How to Meet the Challenges of Recent Changes in Danish Vet?

Professional learning communities as an approach to supporting techers' implementation of changes in Danish VET

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Editorial

Aiming to increase the visibility and impact of VET research within the research community and towards different stakeholders, VETNET has successfully started to publish a series of proceedings at ECER 2018, which is available online and as a printed version. The 2019 edition is the second volume on *Trends in vocational education and training research*. It includes more than 50 papers that illustrate and discuss planned, ongoing and finalised research, undertaken by early career to experienced researchers from Europe and overseas. It links up to other VETNET publications, such as the proceedings of the Crossing Boundaries conference in Valencia (edited by Fernando Marhuenda and María José Chisvert-Tarazon) and its predecessors in Rostock and Bremen, as well as the publications series Emergent Issues in Research on Vocational Education and Training from the Stockholm International conference (edited by Lázaro Moreno Herrera and Marianne Teräs).

VETNET is a network of researchers interested in exploring societal, policy, governance, organisational, institutional and individual factors that shape and explain vocational education, learning and training across the lifespan. It is an open network, which welcomes members and contributions from all over the world. With its publications VETNET aims to foster knowledge sharing and mutual learning among researchers and between research, practice and policy. The publications help to keep up with current projects and emerging topics in VET, encourage discussion and cooperation and support the establishment of a European landscape of VET research.

Papers included in the 2019 VETNET proceedings are based on double-blind peer-reviewed abstracts that were accepted for presentation at the European Conference on Educational Research ECER in Hamburg.

We thank the Bern University of Teacher Education for the financial support. A special thanks goes to Sabine Lehmann for her great support in checking all the references and preparing the online version of the book.

VETNET builds on the expertise and the commitment of its members – we appreciate their valuable contribution to the proceedings and other VETNET activities.

Hamburg, 2 September 2019

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Chair and Link Convenors of VETNET

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Aarkrog, V., & Wahlgren, B. (2019). Teacher training through research circles. In B. E. Stalder & C. Nägele (Eds.), *Trends in vocational education and training research, Vol. II. Proceedings of the European Conference on Educational Research (ECER), Vocational Education and Training Network (VETNET)* (pp. 1–7). https://doi.org/10.5281/zenodo.3366315

Teacher Training Through Research Circles[1]

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Abstract

The paper addresses training and competence development based on participation in action research in a current project about dropout among young adults in VET. The paper deals with a particular kind of action research, called 'research circle'. The paper concerns the way the method of research circles has been used in the project in which researchers and practitioners in VET cooperate, the advantages of employing research circles, and the interrelation of practice-based knowledge and research based knowledge. The results show that the practitioners' outcome of participating in the research circles is mainly experienced-based. They learn from reflecting on their activities in practice and from exchanging experiences with practitioners from other schools. The practitioners mostly use the research-based knowledge for conceptualizing or reflecting on their practice, however also to some extent to change their actions in practice. The study points to a need for further developing practice in research circles and more generally in action research focusing on not only transmitting research-based knowledge, but also transforming the knowledge into directions for action.

Keywords

research circle; practice-based knowledge; research-based knowledge; transfer of knowledge

1 Introduction

Action research has been regarded as a way of bridging the gap between research and practice (Coleman, 2015). The gap between researchers and practitioner, between research-based knowledge and practice-based knowledge, has been discussed in a number of academic articles. Some have argued that the gap is fruitful and must be maintained, the two positions (research and practice) adding different perspectives to action, a pragmatic and a critical perspective (Kvernbekk, 2012). Some regard the gap as a serious problem, which must be bridged, in order that teachers gain access to research-based knowledge (Ulvik, Riese, & Roness, 2018). A precondition for filling the gap is an equality between researchers and teachers in the social interaction (Reason & Bradbury, 2008).

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[1] We have chosen to keep the title as it corresponds to the previously delivered abstract. However, a more suitable term is 'practitioner' that in the study includes teachers, supervisors and managers.

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A criterion for qualified action research is that the research must produce new knowledge or new theory. The research process must produce results with significance (Bradbury, 2015). Through reflection on practical experiences and by integrating research-based knowledge the teachers become more qualified (Luttenberg, Meijer, & Oolbekkink-Marchand, 2017).

In a current project about dropout among young adults in VET and basic general adult education (2017-2019), the method of research circle has been employed. The research circle is a specific way of organizing the meeting between practitioners and researchers, the aim being to develop practice as well as creating new knowledge for both practitioners and researchers. The work in research circles is organized as alternations between scheduled meetings (circle meetings) and the practitioners' developmental work at the schools. The researchers and the practitioners mainly meet at the meetings, where the practitioners will present their experiences and the researchers the results of their research. Between the meetings the researchers have occasionally visited the schools, mainly for discussions of the schools' local developmental plans; however this these visits have been rather infrequent.

The activities in the research circles qualify the practitioners as well as the researchers. Thus, the research circle facilitates a learning process as well as a research process. The research circle can be characterized as 'participatory action learning and action research' (Zuber-Skerritt, 2018). The research circle shares similarities with 'learning circles' in the way that both kinds of research activities aim to close the gap between practice and theory (Johansson, 2017). A learning circle focuses on how an object of learning is constituted and how it can be taught (Thorsten, 2017). However, the aim in a research circle is to improve practice by integrating practical and research-based activities. In relation to this, the paper deals with two research questions:

- How do the practitioners develop practice based on participating in the research circles?
- How does the research-based knowledge qualify the practitioners' performance in practice?

2 Method

2.1 Research circles in the project about drop out

In the study of research circles used in a project about drop out, the practitioners included teachers, supervisors, and managers from six VET colleges and seven adult education centers. The practitioners were organized in three research circles. 2-3 practitioners from each institution have participated in the research circles, i.e. all together 35 practitioners. Four researchers are involved in the project, two researchers participating at each meeting. At the time of the data collection, five research circle meetings had been accomplished out of all together seven meetings.

The research circle meetings have a duration of four hours and are conducted according to the following agenda: 1. The practitioners present their experiences from their activities related to the project since the last meeting. 2. The researchers introduce to theoretical knowledge that can qualify the practitioners' activities. 3. Eventually, the practitioners discuss in groups across the participating institutions how they will use the theoretical knowledge in practice. E.g. at the third meeting, 1. the practitioners presented their experiences and reflections on various types of drop outs (based on research-based knowledge presented at the second research circle meeting); 2. the researchers presented results from a study of how initiatives at the participating institutions influence the students' drop out processes, and 3. The practitioners discussed how the results inform guidance activities at the institutions.

2.2 Two sets of data

The study includes two sets of data. At the end of the third and the fifth meetings in the research circles, the practitioners were asked to reflect on their learning outcome from participating in the research circles, focusing on what they had learnt and how they had learnt. Firstly, the practitioners should each write down the answers to the two questions. Secondly, they should discuss their answers with the colleague from their own school, the aim being to elaborate their perceptions. Thirdly, the various perceptions were presented in a plenary session and summed up by the researchers. The data includes five summaries.

The second set of data consists of interviews with the practitioners; five individual interviews and seven group interviews were conducted, the groups consisting of 2-3 practitioners. The practitioners were asked to describe their outcome from participating in the research circles. Hereafter, the practitioners were systematically asked about specific possible types of outcome. The interviews had a duration of half an hour to one hour, were recorded, and summarised, central passages in quotation.

The two sets of data were analysed and thematised in relation to the two research questions. This included categorizing the statements into statements about practice-based knowledge, respectively research-based knowledge. The theoretical framework includes Gilbert Ryle distinction between knowing that and knowing how (Ryle, 1949) and theory about transfer focusing on ways of applying knowledge in practice (Eraut, 1994; Wahlgren & Aarkrog, 2012).

3 Results

The presentation of the results is structured according to the two research questions.

3.1 How do the practitioners develop practice based on participating in the research circles?

According to the practitioners, participating in the research circles has an impact on practice in several ways.

Participating in the research circles and being part of a research project motivates and legitimates that time is spent on improving practice at the educational institutions. The practitioners perceive it to be important to participate in a research project. The advantage of participating is that they perceive a coherence between the work being done in the research circles and the work at the educational institutions.

Secondly, the research circles strengthen the focus in practice; the practitioners have to choose a specific focus for their activities in practice; they have to report experiences from conducting the specific activities at the research circle meetings and they have to – together with the other participants at the meetings – to reflect on and in that way systematize their experiences. *We mostly learn ... when we prepare the presentation of our actions and experiences* (V3).

Thirdly, the practitioners learn from each other: *We learn a lot on the way back to our school when we talk about what the others have done* (V3). The exchange of experiences among the practitioners inspires developing practice: *You are inspired by the others… We have stolen the concept of 'can – will' (a concept that one of the institutions presented at a research circle meeting), because we think this concept clarifies to others at our school, what we are doing* (E2).

However, does participating in the research circles actually have an impact on practice in the participating institutions? Participating in the research circles has an impact on the way the practitioners perceive their practice: *We have started to think more about what is going on in the students' brains* (V4). Some of the practitioners have also changed their actions: *We have changed practice so the guidance counselor at the school visit the class in the beginning of the*

classes, meaning that guidance counselling is not only initiated in cases of too much absence. Now, we have contact with all the students from day one (V1). Some of the practitioners have also started to reflect more on their own performance.

Summing up, the experience-based part of the research circles is particularly important for the practitioners and for developing practice; the practitioners learn from reflecting and making experiences based on their drop out activities at their own institutions, and they are inspired by exchanging experiences with practitioners from other institutions.

3.2 How does the research-based knowledge qualify the practitioners' performance in practice?

The general impression from the interviews is that the practitioners think that they learn a lot from participating in the research circles and that the research-based knowledge play a significant role in the project.

Through participating in the research circles, the practitioners are introduced to two kinds of research-based knowledge. The one is research-based knowledge that has been developed in previous research, e.g. knowledge about dropout (Rumberger & Lim, 2008) or theory that deal with factors that have an impact on the students' decision to stay in or drop out of an educational program, e.g. the concept of self-efficacy (Bandura, 1997), self-determination theory (Deci & Ryan, 2000), theory about goal setting (Lunenburg, 2011) or the teetering theory, which describes students' vacillating between staying in or dropping out of school (Lessard et al., 2008).

The other kind of knowledge is knowledge produced in the project, i.e. knowledge based on empirical data that the researchers –sometimes together with the practitioners - have collected. This research-based knowledge concerns types of decision-making processes among the students (Aarkrog, Wahlgren, Larsen, Mariager-Anderson, & Gottlieb, 2018; Wahlgren, Aarkrog, Mariager-Anderson, Gottlieb, & Larsen, 2018).

Based on the data, another categorization research-based knowledge can be made, defining four categories:

The first category is 'categorization of knowledge'; in the project we have developed a categorization of decision-making processes, where four types of processes have been categorized. The practitioners can recognize these categories from their practice; they have just never used these categories before. However, the research-based knowledge can be used to label the different students and to differentiate actions in relation to the students: *The four types of students are important; a new tool in relation to supporting the students; the knowledge can be transformed, because we can recognize the knowledge in practice* (E1). The practitioners can use the research-based knowledge in practice because they perceive identical elements between theory and practice (Thorndike & Woodsworth, 1901).

The second category of research-based knowledge can be conceptualized as a 'frame for understanding'. E.g. the practitioners are introduced to the teetering theory including a visualization of the students vacillating like a rope walker: *The article about teetering launched new ideas. You understand better the various ways of behavior among the students* (E3). The frame of understanding is a frame for mutual understanding, because the practitioners can share the concept: *The more we meet the better the shared language… the teetering concept is good: we need a common language to talk about what it is all about* (V1).

The third category of research-based knowledge is 'scientific theory' that can be used as direction for actions or as explanation for actions. The concept of self-efficacy (Bandura, 1997) is used in this way: *We try to base our dialogues with the students on positive matters in order to strengthen their autonomy or self-efficacy* (V1).

The three first categories can be conceptualized as 'knowing that'. The fourth category of research-based knowledge is 'knowing how'. Knowing how has been developed in the data

collection and data analysis. The practitioners learn a research-based method that some of them continue to use in interviews with the students, e.g. when the guidance counselor have interviews with the students about their plans, problems etc.

The data show that the practitioners apply the knowledge differently and to different degrees; some do not apply the knowledge at all, and relatively few apply the knowledge to change actions in practice. Some kinds of knowledge is easier to apply that other kinds. While expressing satisfaction with learning the scientific theories e.g. about self-efficacy, this category of knowledge is used rather seldom. The practitioners use the first two and the fourth category of knowledge more. Thus, the practitioners use the categorization of decision-making processes, the teetering theory and the methods for conducting interviews.

The data shows that the practitioners use the research-based knowledge that they have contributed to develop more than results from other empirical studies of e.g. dropout.

4 Discussion

The analysis shows that the practitioners learn from participating in research circles. They enjoy being introduced to theories; they feel inspired, they are able to talk about their practice in a new way, and some of them even adopt the method for conducting interviews.

Does that mean that the practitioners have been trained? From a transfer point of view, training has not succeeded if the practitioners have not developed their competences, competence meaning the ability to perform adequately in current contexts. If the practitioners have developed their competences, they are supposed to perform in new ways.

Do you perform in a new way when you are able to label your practice, e.g. by using the categories of decision-making processes or by using the concept of teetering in talks with colleagues? It is a recurrent result in studies of transfer - not least transfer in academic education - that the students report that they have learned new concepts or understandings; however often they have not changed their actions in practice (Aarkrog, 2008; Stegeager, 2014).

In relation to research circles and generally in relation to action research, the aim is research-informed development of practice. However, some research-based knowledge is too general to directly transfer into a development of practice. A translation is needed (Hermansen & Mausethagen, 2016). Research into transfer shows that the more specific the research-based knowledge is the easier it is to apply in practice (Dreer, Dietrich, & Kracke, 2017; Lancaster, Milia, & Cameron, 2012). Specific knowledge is e.g. models, principles, rules or procedures.

Difficulties in applying research-based knowledge is apparent in research about action research (Ulvik, Riese, & Roness, 2018). The results of our research point to having a greater focus in the research circles on translating the general theory into specific knowledge that can guide the practitioners in developing practice.

5 Conclusion

The study shows that the practitioners' main outcome from participating in research circles concerns experience-based learning. Being forced constantly and systematically to reflect on their practical experiences and sharing these experiences with practitioners from other colleges the practitioners develop their competences in relation to reducing drop out.

The results also show that the practitioners are keen on obtaining research-based knowledge. However, while the practitioners mostly use this knowledge as a conceptual framework and a way of talking about practice, the research-based knowledge has less impact on the practitioners' actions in practice and consequently on developing practice.

The study confirms results from other studies of transfer showing an interrelation between on the one hand proximity, specificity, and first hand experiences and on the other hand the degree of impact on the practitioners' actions. The research-based knowledge shares more identical elements with the practitioners' own experiences, the more useful they perceive the

knowledge is for their practice. This mean that the practitioners learn most from reflecting on own or other practitioners' experiences. The more specific the knowledge, the more useful: the four types of decision-making processes are relatively specific and therefore useful, and the same goes for the teetering concept not least because this concept has been visualized in drawings of ropewalkers. When the practitioners participate in developing the research-based knowledge, they are more likely to apply the knowledge in practice than when the knowledge has been developed by others: when the participants participated in the interviews, they developed a confidence with the method that enabled them to try out the method themselves.

The study points to a need for developing practice in research circles and more generally in action research, focusing on not only transmitting research-based knowledge, but also transforming the knowledge into directions for action.

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Social Skills Do Not Develop en Passant! The Promotion of Social Competence in Apprenticeship

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Abstract

In the context of digitalization numerous initiatives and projects have been started, most of them focus on technical competences. The question of social skills is only marginally discussed, although interaction, communication, cooperation and team skills in increasingly networked work processes are a central prerequisite. Social competence is more than an add-on and has functional relevance for apprenticeship and the development of vocational competence. Following on from first results of a research project in the funding guideline "Promotion of social competence in dual training, in particular for the integration of refugees of the Federal Ministry for Economic Affairs and Energy", the article discusses the promotion of social competence in apprenticeship. The article deals with the social skills of apprentices in the first year of apprenticeship in industrial technical training occupations, in the context of a learning project.

Keywords

social competence; apprenticeship; future of work; vocational education training

1 Introduction: The importance of social competence

Research on recruiting apprentices shows that companies have increased expectations and expectations of social skills and interpersonal relationships with young people (Protsch, Gerhards, & Mohr, 2017). This requires apprentices to make an effort that is not to be underestimated to build up previously social skills. Part of this effort can already be significantly reduced by apprenticeship if this expectation is included right from the start as an integral part of the content and methodology vocational training process. Until the 1880s, vocational education training relied mainly on craftsmanship (for example, in dealing with complex machine tools) and an understanding of existing processes (Brater, 2010). The question of social skills is, if at all, addressed only marginally so far, although interaction, communication, cooperation and team skills are an essential prerequisite for increasingly networked work-processes. In addition, the provision of social competence in apprenticeship makes a significant contribution to prevent contract solutions and increases the chances of taking over after the end of the apprenticeship. Therefore, social skills are more than only an add-on and have functional relevance for the development of occupational skills. Data from the IAB ZEW company survey on "Workplace 4.0" shows that the promotion of interdisciplinary qualifications in the context of company-based training is increasingly playing a role, especially

for companies with Workplace 4.0 investments (Janssen, Leber, Arntz, Gregory, & Zierahn, 2018; Warning & Weber, 2018). In view of increasing interdisciplinary work, structures of vocationally are losing importance in future VET in favour of an interdisciplinary approach that requires social skills. So far, we assume that, the more knowledge-intensive the work the higher the demands on social skills.

In many cases, there is a shift to social skills only in the event of disruptions and conflicts. Instead of this problem-oriented discourse, we assume that social competence functions equally as a prerequisite and as the goal of vocational learning processes. There is no universally accepted definition of social competences (Reißig, 2006). Difficulties with the construct "social competence" lie in particular in its blurring and the different theoretical and disciplinary references from the psychological, sociological or pedagogical research. While some well-established procedures exist for the collection and promotion of general social competence (Kanning, 2003, p. 31), the promotion of social competences in the vocational context is neglected. Although in the course of the reform of the Vocational Training Act (BBiG) in 2005, the vocational competence was anchored as a model of vocational training and the competence dimensions methodical, personal and social competence in itself, the social competence nests a niche in favour of investigations for modelling and measuring vocational competencies. The concept of competence is used in the project in a pedagogical understanding. According to vocational education research, we define social competences as "dispositions for purposeful interaction with other people about factual, social or personal issues in specific types of situations" (Euler & Bauer-Klebl, 2009). Based on theories of action theory and constructivism, learning social competences shape vocational competencies. According to psychological and vocational educational approaches, the construct of social competence is not understood exclusively as a personality trait, but always includes an environmental or situational reference (Euler & Bauer-Klebl, 2009; Reißig, 2006).

Based on first results of a research project in the funding guideline "Promotion of social competence in dual training, especially for the integration of refugees“ - funded by the Federal Ministry for Economic Affairs and Energy - the paper discusses the promotion of social competence in apprenticeships. The paper deals with the social skills of apprentices in the first year of apprenticeship in industrial technical training occupations, in the context of a learning project. While social skills are indisputable in training occupations with interactive requirements - such as commercial occupations and nursing professions - social skills in the technical field have long been neglected.

The aim of the paper is to clarify that social competence cannot be reduced to a personal trait, which has to be "teased out" by the training staff, but rather the interaction between operational, personal and vocational aspects between the poles of assertiveness and adaptability concretized.

2 The learning project 3D-printer - methodical approach

To enhance the social competences of apprentices, the research project focusses the implementation of the learning project "Development and Construction of a 3D Printer". It is about how the apprentices work together in the learning project, plan the next steps and support each other. For the concretisation of the construct "social competence" workshops and semi-structured interviews with the apprentices were carried out. In addition, semi-structured interviews were conducted with vocational trainers to find out what expectations are made of young people. The implementation of the project was also boosted by the high relevance of vocational education training in the company. At the beginning of the new vocational training year, a multi-day workshop takes place regularly together with trainers and all new apprentices in a seminar hotel outside the company's location. A goal of this workshop is to promote the social coexistence between the apprentices and the staff.

As a heuristic model for the development of social competences, we refer to the topic-centred triangle (Euler & Bauer-Klebl, 2009) in order to make the interactions between subject, individual competencies and teamwork visible (Figure 1).

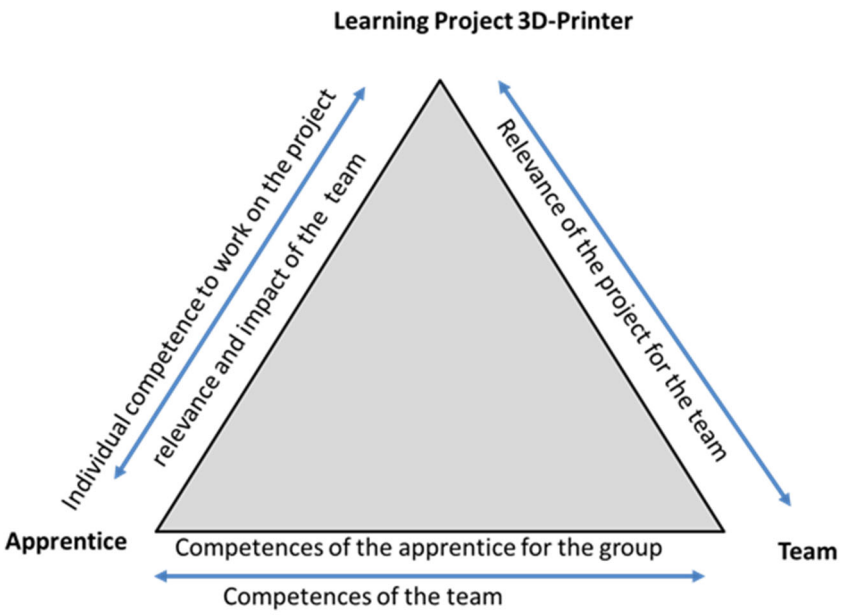

Figure 1 Heuristic Model: The topic-centered triangle

The focus lies on the action regulation (interaction partner as subject with own interests, experiences to perceive and accept values) and perspective coordination (ability to relate the different perspectives to each other). The implementation was carried out by semi-structured interviews and workshops with the apprentices and the vocational trainers. Sixteen apprentices from the first year of apprenticeship participated in the project. The age range was between 18 and 28 years. Three quarters of the apprentices had a migration background (especially Turkish background). The committed and motivated participation of the apprentices in the project also results from the fact that for two-thirds of the apprentices the apprenticeship is the desired occupation.

Building on the activity model of social competences (Runde, 2001), according to which social competence is acquired and applied not in general but in specific situations, the learning project is differentiated into 5 learning situations (Figure 2), which address technical as well as social skills. In this way, it is possible to concretize the four overarching social skills of teamwork, conflict resolution, communication skills and organizational skills and relate them to the working-process.

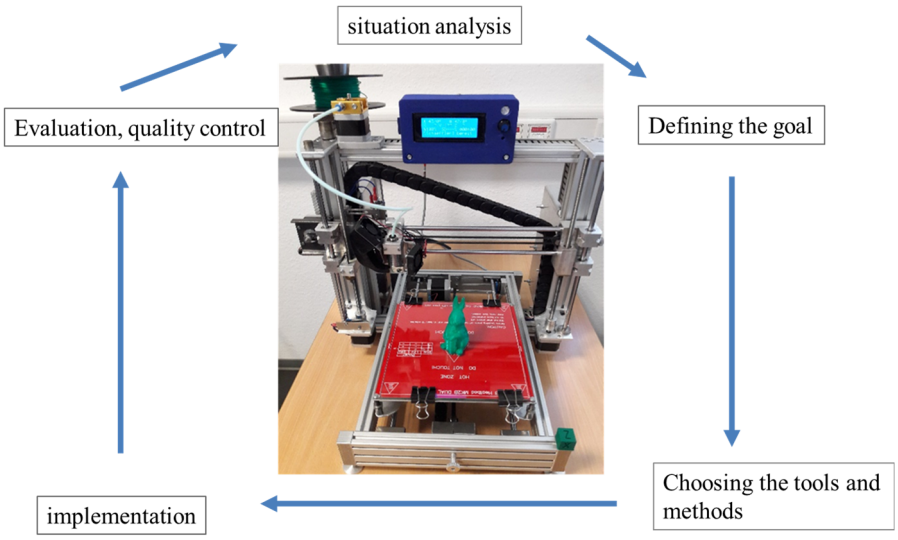

Figure 2 Model of situational social competences in the learning project 3D-Printer

The aim of the project was to promote social competencies in vocational education not only "en passant" or through unique experiential educational events, but to integrate them into the vocational educational training practice. Advantages of the learning project 3D printers are:

- occupation-typical practical and current task by building a 3D printer,
- complex task processing oriented to the complete action,
- processing the learning project is only possible through the coordination of individual competences and social interaction and communication,
- joint planning and coordination.

The apprentices get technical support in the implementation of the learning project primarily by the vocational trainees, but also states a good half of the apprentices to turn to second year or third year apprentices in case of problems and uncertainties. It clearly shows that the learning project can only be successfully mastered together and across all vocational fields, that the apprentices depend on each other to complete the learning-project successfully.

In addition to the vocational trainers, apprentices from the second and third years of apprenticeship can make a significant contribution to promoting a constructive working atmosphere as well as a learning and error culture. In many cases, contact persons for new apprentices are shaped on an informal level. In the project, these informal contacts from the second and third year of apprenticeship were explicitly designated as mentors. It is often already apparent at the informal level which apprentices from the second or third year of apprenticeship are suitable as mentors for the new apprentices. They are apprentices who are open in communication, show an interest in the operational work-processes and contexts and are characterized by helpfulness. This also means not only responding to questions which are directly addressed to them, but also hearing and seeing if a trainee needs support. For apprentices in the first year of apprenticeship, the mentors are important contact persons, because they are like-minded people in "small short questions". Through their explicit choice as mentors, the sense of responsibility for the support of the apprentices in the first year of apprenticeship increased. The mentors "help" the apprentice with "any questions". This is done not only on direct questions, but also adaptively, for example, by the mentors hearing from the sounds of the machine whether the tuning parameters are correct.

3 Challenges for the trainers in vocational education

Trainers in vocational education play a key role in providing the necessary occupational competences as well as in the socialization of apprentices. The competence profile of trainers can be derived from the four fields of action of Ordinance on Trainer Aptitude (AEVO): examining and planning training, preparing, executing and completing training, and assisting with the recruitment of apprentices. In general, these tasks can be divided into organizational and administrative tasks, didactic-methodological tasks (planning and implementation), educational tasks and socio-pedagogical tasks. In view of the changing socio-structural composition of apprentices and changed work processes, trainers are confronted with new demands and tasks. In addition to their traditional training activities, they act as moderators, learning process facilitators or coaches.

The task of the vocational trainers is to shape the occupational socialization process of the apprentices. The trainers move in the field of tension, on the one hand to prepare for the operational structure and the operational control system, on the other hand they have to be open to the interests and values of the young people (Diettrich & Harm, 2018). In view of the changing socio-structural composition of apprentices and changing work-processes, vocational trainers are confronted with new demands and tasks. In addition to their traditional training activities, they have to act as moderators, learning process facilitators or coaches.

4 Form a soloist to a teamplayer

When it comes to the question of social competence, the demand for group work is almost reflexive. The occupational socialization space requires an orientation towards others, such as colleagues and trainers, as well as the group ("not only for me, but learning for the team"), while in school by the subject orientation individual learning is in the foreground (“soloist").

The quote from an interview with an apprentice in the third year of training illustrates the challenges of the transition process and the "arrival" in the workplace:

“At school, I preferred to do things on my own, because I was also a step ahead of many scholars, and group work is always a bit difficult, because some people lag behind, they do not do that much and I was much further away. This has changed the most here in the company, because you had no choice, so you were confronted with it directly. You have to do some project together now. You do not do the projects alone, but different occupations together or you just do not know some things and you have to explain them to yourself or do it together with somebody.”

Requirements for social competence become equally virulent in project work at the content and relationship level. The overwhelming majority of the surveyed apprentices confirms the fact that group work promotes the technical exchange. However, the apprentices attribute a higher meaning to the social exchange than to the technical and professional one (Figures 3 and 4).

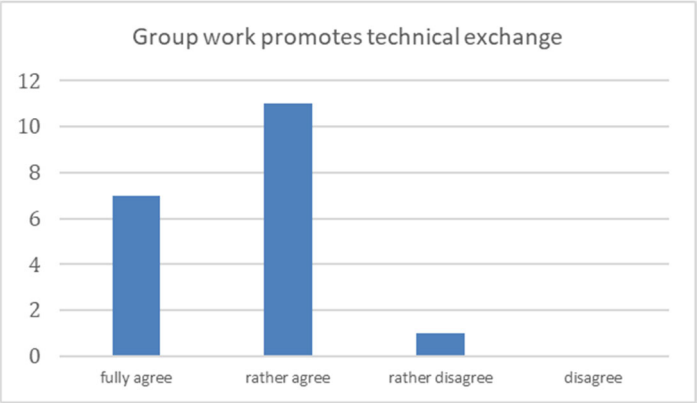

Figure 3 Group work and technical exchange

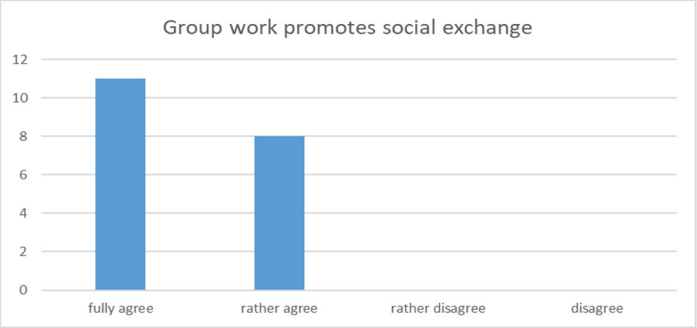

Figure 4 Group work and social exchange

Furthermore, one third of the apprentices agree that group work takes too much time, and they could do it faster on their own (Figure 5).

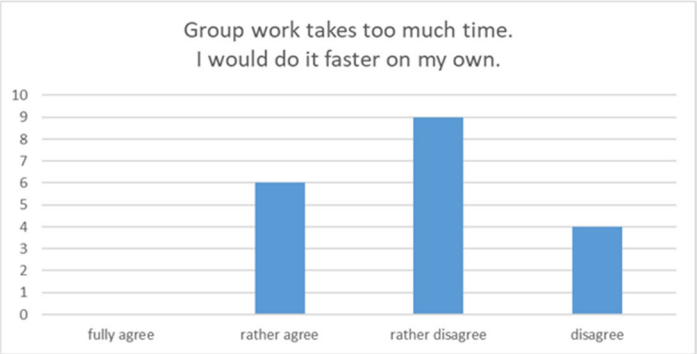

Figure 5 Group work and time

The apprentices pay close attention to whether the work in the group is equally distributed. This shows a dilemma that young people have to overcome: on the one hand, they must and

want to distinguish themselves from the trainers; on the other hand, they must and should behave cooperatively.

5 Promotion of social skills through regular

Almost all apprentices asked for feedback on technical and vocational questions. One third of the apprentices also want feedback from the vocational trainers in case of problems with other employees and apprentices. Only four apprentices also want a feedback from the vocational trainers in case of private problems. In addition, the apprentices want regular feedback (Figure 6).

Figure 6 Regular Feedback

The desire for regular feedback from the trainees is of key importance to the apprentices in their first year of apprenticeship. The transition from school to work-based education is accompanied by uncertainties that have to be taken into account by the trainer. The apprentices want to know what they are looking for and wish to embedding their work tasks in the workplace. The apprentices are not only concerned with subject-specific feedback - for example, if a component has been processed correctly - but also with feedback on the behaviour in the workshop, the communication with the trainers and the other apprentices. Interesting in this context is that in particular the trainees who spend a longer period in the apprenticeship workshop, the care of the vocational trainers rate is higher.

The following questions sensitize for social competences without evaluating them:

- How is information obtained? (for example: independently, via third parties)
- What is the significance of the individual and the group?
- What role do rules and regulations play for the apprentices?
- What role do age and gender play in communication between apprentices and vocational trainees?

6 Conclusion

The study shows that the integration of project work in vocational training increases the sensitivity for social skills. A particular challenge lies in the communication across the different vocational profiles. In future it will be necessary to combine vocational occupational content more closely than before with inter-occupational projects.

Three results should be emphasized: First, the study showed that for the apprentices the social exchange in group work is in the foreground and cross-occupational group work as a didactic

method for dealing with complex problems plays a subordinate role, so far. This, as well as the results of the surveys that the apprentices expressed scepticism regarding a fair assessment of group work, indicate that the primacy of the subject matter as an individual competence has priority. At this point further learning projects are also desirable between the learning venues company and vocational school in order to promote the simultaneity of occupational and social competences through learning projects.

Secondly, the sceptical attitude of the apprentices towards group work. The apprentices pay close attention to whether the work in the group is equally distributed. This points to the social preconditioning of group work. Vocational trainers face the challenge of not only taking into account technical aspects of group affiliation, but also social ones.

Social competencies concretize between the poles adaptation and assertiveness. The apprentices are challenged to position themselves in the social structure in the company with their rules and hierarchies between individual profiling and social integration. Two attitudes can be distinguished: On the one hand, apprentices who try to distinguish themselves at an occupational and technical level by highlighting their vocational skills, on the other hand, apprentices who emphasize their reliability, seriousness and commitment. In this context, sometimes the various demands on the apprentices' conflict: on the one hand, self-employed personalities are sought, but at the same time, the hierarchically structured corporate social structure demands conformity and subordination rather than a self-confident appearance and individual action. The simultaneity between networked inter-occupational work processes and still existing hierarchical company structures represents a special challenge for the apprentices. On the one hand, the operational demands regarding self-responsibility and independent work increase, on the other hand, the micro-enterprise structures require "suitable" employees. Furthermore, the hierarchically structured company demands rather conformity and subordination instead of a self-confident appearance and cooperative action at eye level. Therefore, vocational trainers are challenged to act as moderators and coaches in addition to their traditional educational work, given the changing social structure of apprentices and changing values and attitudes to work.

Thirdly, in many cases, in everyday vocational training, certain apprentices are repeatedly asked as contact persons for problems and questions. Recognizing these informally acquired competences through mentoring activities arouses great interest in the apprentices. Here, the apprentices would be willing to take additional lessons on the subject of feedback methods and communication models in their spare time. The goal would be to list this mentoring activity in the work certificate.

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Work-Based Learning in a Digitalised Retail Checkout Practice Through the Lens of the Theory of Practice Architectures

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Abstract

In this paper, I explore how work-based learning is enabled and constrained in retail stores using cloud-based platforms integrating the point of sale system with retail management systems. The context of the study is an adult retail apprenticeships program focusing work-based learning at the checkout. Among the results is that work-based learning in the digitalised checkout involves two supervisors – a personal and a digital – using different languages. The results of the study give some implications for the design of adult and vocational education increasingly situated in a world of internet networks, websites and mobile devices.

Keywords

work-based learning; mPOS; retail; personal supervisor; digital supervisor

1 Introduction

Learning has been influenced and enabled by technology for millennia. What separates digital information systems from previous technologies, for example pen, paper and video, are that they are interactive, enabling forms of communication and collaboration undreamt of in the past. Education and work increasingly situated in a world of internet networks, websites and mobile devices challenge our conceptions of professions, working and learning (Duval, Sharples, & Sutherland, 2017). Retail checkouts in physical stores are one example where the implementation of digital mobile technology, information systems and e-commerce are intertwined in cloud-based platforms, transforming work and work-based learning. Meeting the new demands, a more holistic view on technological innovations, work and education are emerging, recognising the complex relationships between technology, society and the individual (Lang, Siemens, Wise, & Gašević, 2017; Littlejohn, 2017; Manceau & Morand, 2014). Aiming at a holistic view, I take a practice-theoretical approach to exploring work-based learning in digitalised checkout practices. A digitalised checkout practice refers to a checkout where the work activities are based on and involve interaction with a point of sale (POS) platform integrated with the store´s retail management system (RMS), other stores and platforms.

For a long time, technologically deterministic arguments have prevailed in research, as well as in work and policy documents, that assumes that when people have access to technology in the workplace, in school or at home, then other benefits will automatically follow (Grant & Eynon, 2017). In a previous study of math containing activities in a Swedish adult retail

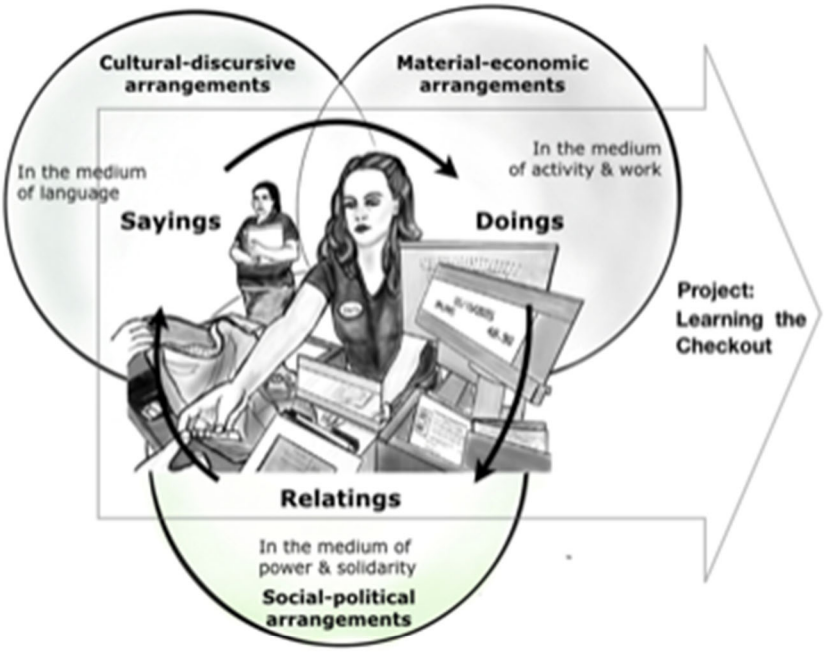
apprenticeships (Arkenback-Sundström, 2017), I found that: a) supervisors, apprentices and store managers mainly associate mathematics with the checkout practice b) Math activities involve interaction with digital technology and c) Learning to use the technology in work may be associated with problems. Drawing on a reanalysis of the data, I further the role of digital devices and information technology in work-based learning at the checkout. Using the theory of practice architectures (Kemmis & Grootenboer, 2008; Mahon, Francisco, & Kemmis, 2017), I aim to answer the following research questions:

1. What role does a mobile point of sale (POS) system have in the learning practice?
2. What enables and constrains the development of vocational competencies for work in (mobile) digitalised checkout practices?

In supermarkets and grocery stores, the education time for cashier work at the checkout has decreased as technology has evolved and automatized work activities at the checkout. After one or two hours of training with the POS system, the new employee is expected to work independently at the checkout (Andrews, 2014). Technology developers and vendors, on the other hand, describe the opposite; more time is needed to learn modern POS software. Vend (Wood, 2018), for example, suggest that an employer investing in a POS platform should set aside around 40 hours for an employee to get up and running on easy-to-use software.

2 Theoretical framework

Practice theoretical approaches are increasingly used in studies of socio-technological changes in organisations and education, for example, activity theory (Engeström, Miettinen, & Punamäki, 1999), actor-network theory (Latour, 2005), CHAT (Engeström, 2001), and in recent years the theory of practice architectures (Kemmis & Grootenboer, 2008; Kemmis et al., 2014). The theory of practice architectures, theoretical standpoint and analysis tool for the study, enables both a theoretical, an analytical and a transformative approach when studying work-based learning. Theory of practice architectures was first articulated by Kemmis and Grootenboer (2008), building on Schatzki's (2001) concepts of practice and the critical insights of Habermas (1974). The theory assumes that social reality consists of a variety of practices that we daily, without further reflection, engage in and take for granted. These practices are constituted in the human practitioners' activities of ‘sayings’, ‘doings’ and ‘relatings’ that ‘hang together’ in characteristic ways in a distinctive project.



Learning Practice	Intersubjective dimension	Practice architectures
'Sayings' *"The cash register is just a computer and everyone knows that"*	Semantic space	*Cultural-discursive arrangements* Retail language; Swedish; English, Interface language of mPOS
'Doings' **S** demonstrate how to do, **A** observe and listen	Physical space-time	*Material-economic arrangements* mPOS system: checkout counter
'Relatings' Master-apprentice roles	Social space	*Social-political arrangements* The store's values, rules and goals

Figure 1 Work-based learning at the checkout through the lens of theory of practice architectures (authors interpretation, Mahon et al., 2017, p.11).

A learning practice at the checkout is, analytically speaking (Figure 1), interactionally secured in apprentices´, supervisors' and customers' characteristic 'sayings' and thinking in semantic space, realised in the medium of language; 'doings' in physical space-time, realised in the medium of activity and work; and 'relatings' in social space, realised in the medium of power and solidarity. The project of the learning practice is *Learning the Checkout*. The practice architectures are the particular resources or arrangements found or brought to the checkout that together make possible and constrain action and interaction in the learning practice. Analytically (but not in empirical reality), the practice architectures can be separated into three dimensions (Mahon et al., 2017). Exploring the *practice architectures* of learning practices at the checkout can thus help to analyze, understand from different perspectives, and thus develop learning situations.

Cultural-discursive arrangements encompass what appears in semantic space registered in our minds, in language. The 'cultural-discursive' prefigure and make possible particular sayings, enabling and/or constraining what it is relevant and appropriate to say (and think) in performing, describing, interpreting, or justifying the practice. *Material-economic arrangements* encompass what appears in the physical space-time of the practice. They are what we encounter as bodies, moving around in the materiality of things in the physical world in which we encounter one another. The 'material-economic´ prefigure and make possible particular doings in the learning practice and the checkout practice enabling and/or constraining

how to move about in the learning practice. *Social-political arrangements* encompass what appears in social space. They are how we will form (or not) bonds of belonging and solidarity with one another or be in relations of power with or over or under one another. The 'social-political' prefigure and make possible particular relatings between the apprentice, the supervisor, the customer and the digital technology in the learning practice.

3 Method

In this paper, I reanalyse data from empirical research of an adult retail apprenticeships education conducted between 2014-2015 (Arkenback-Sundström, 2017). The research was conducted by using a combination of qualitative methods found in ethnographic research: participatory observation, shadowing, interview, photo, audio- and video recording, field notes and apprentice logbook. The focus of the study was a Sales Assistant apprenticeship program offered by North School and South School, two adult education providers in a larger municipality in southern Sweden. The program consisted of eight selected retail courses from the corresponding upper secondary vocational program and the vocational teachers were responsible for assessment and grading. Every fifth week 3-20 students started the program, structured with work-based learning four days/week and school-based learning one day/week. The goal with the education was to become employable sales assistants. Six apprentices from each school, two teachers and supervisors from 15 workplaces within sports, fashion, shoes, home electronics, jewelry & accessories, design, supermarket and home furnishing participated in the study.

This paper, focusing on work-based learning at the checkout, builds on data material from eight of the twelve apprentices and nine supervisors. It consists of field notes, logbook notes, photos, video recordings, interview and Group Supervision transcripts. The central part of the data was produced through action research in collaboration with the six students from South School. In the dual roles as researcher and mentor, I met the students at South school throughout the program for 'Group Supervision' on the theme "Learning to Learn at Work" (90 min/week). Four sessions were audio recorded. According to the methodology of action research, the dialogues were based on the students' and the researcher's logbook notes. The structure of the apprentice logbook was developed continuously in collaboration with the students. Four sessions were audio recorded.

I conducted 1-3 observations/apprentice (30-60 min) of work-based learning in checkout practices, followed by interviews with the apprentice and the supervisor. Three apprentices switched workplace twice, one finished the program within 36 weeks instead of 40, and three were hindered from continuing at the workplace. Between 2016 and 2019, I conducted six complementary observations of checkout practices and follow-up interviews with two of the supervisors and one of the apprentices.

Table 1 Study participants and data collection methods

Study participants			Work-based learning		School-based learning	
Apprentice	Super-visor	Workplace 4 days/week	2014-2015 Observation + interview.	2016-2019 Observation S + field Inter.	2014-2015 Group-supervision	2014-2015 Apprentice Logbook
North School	(S)	(weeks at workplace)	(no.)	(no.)	Learning to Learn at Work 90 min/week	Structured: Describe Reflect Evaluate Plan
Dilba 40 weeks (quit program)	S1	Sports (16)	2 (sales floor) 1 (S1:checkout/ sales floor)			
Dominic (quit program)	S2	Shoes (18)	1 (storage) 1 (checkout) 1 (checkout/ sales floor)	3(checkout/sales floor/storage)		
South School	(S)	(weeks at workplace)	(no.)	(no.)	(no.)	(no.)
Dahlia 40 weeks	S3	Furniture (24)	2 (checkout)		6	6
	S4	Fashion (16)	2 (checkout/ sales floor)	3 (checkout/ sales floor)		
Diana 36 weeks	S5	Jewelry & Accessories (36)	3 (checkout/ sales floor)	1 (Diana: follow-up)	6	6
Disa 40 weeks	-	Fashion (10)	-		6	4
	S6	Jewelry & Accessories (30)	2 (checkout/ sales floor)			
David 40 weeks	-	Grocery (10)	-		6	4
	S7	Home electronics (30)	2 (mPOS/sales floor)			
Daisy 20 weeks	S8	Clothes (16)	1 (checkout)		3	1
Daniella 40 weeks (quit workpl.)	-	Health food (10)	-		6	3
	S9	Fashion (20)	2 (checkout)			

The analysis was made in three steps: 1) Analysis of the sayings, doings and relatings in the activities at the checkout to gain knowledge of what is happening in the learning practice. 2) Analysis of the cultural-discursive, material-economic and social-political arrangements shaping the learning practice 3) Analysis of the role of mPOS in the checkout and learning practices.

4 Results

The supervisor´s and apprentice´s knowledge and understanding of checkout work, what to learn and in what way are, analytically speaking, cultural-discursive arrangements that will shape the learning practice evolving (Table 2). The mPOS system, the checkout counter, and the supervisor´s time for engaging in the learning practice, meanwhile working at the checkout are examples of material-economic arrangements composing the learning practice. The store managers and supervisors described that besides Swedish literacy, personal qualities such as social, initiative taking and having the right attitude and accuracy in work are essential for succeeding at the workplace. They can be understood as social-political arrangements shaping the relationship that the store wants to establish with its customers. When perceived, the apprentice was not showing these qualities in work, as for Daniella, Dilba and Dominic, the apprenticeship at the workplace were ended.

Table 2 Practice architectures composing the ‘sayings’, ‘doings’, and ‘relatings’ in learning practice.

Learning practice apprentice, supervisor	Intersubjective dimension	Practice architectures
Sayings **All S:** *The cash register is quite easy to handle, you can always learn it. It´s just a computer and everyone knows that.* **S3:** *If you don´t know the computer nor the language, then it will be difficult to work here. There is no time for learning it in work.* **S9:** *We do not fold like this, I'll show you how to fold correctly.* **Daniella:** D*oes it matter? The others folds in another way.* **S2, S3, S8:** *Now you forgot to scan the label;* **All S:** *Remember to say hello, smile and make eye contact with the customer.* **Dahlia:** *I just clean up and pick goods, I learn nothing. I want to show I know the checkout"* **S1:** *She did not take any initiatives; it was like working with a child and that doesn´t work here. I´m not a Swedish teacher*	*Semantic space*	*Cultural-discursive arrangements* Retail language; Swedish; English, Interface language of mPOS (buttons, symbols abbreviations pictures, diagrams, tables, numbers, textboxes; spatial words & concepts); Ideas and thoughts of sales assistants work & apprenticeships. **Internal c-d arrangements:** apprentices (and supervisors) literacy, numeracy, spatial thinking & digital knowledge
Doings **S** demonstrate how to do, **A** observe and listen; **Example sales closure:** greet customer, smile, eye contact, compliment purchase, scan barcode , compare information, remove hanger and alarm, ask for membership, enter item, fold garment on the counter, ask about the week's item, ask for payment form, verify information, put garment bag, alert the customer that receipt is put in bag, smile and wish welcome back.	*Physical space-time*	*Material-economic arrangements* mPOS system (computer, iPad, touch screen, keyboard, cash drawer, mouse, iPad, scanner, alarm device, card reader, receipt printer, software); counter; bags; calculator; working methods; routines; time; schedule; education of supervisors
Relatings Master-apprentice roles -> **Power relationship**. E.g. **Daniella:** *It would be 100 times easier if no one constantly talked about how I shall go on. It makes me feel pressed, stressed and confused. Apparently, it is essential to fold "right" even though the clothes still roll around in the bag!?* **Behaviour**, e.g. customer are to be treated as guests (and presumptive thieves). **S4:** *Don't forget that you have to keep track of the exits as well. You must always keep an eye on the store, preventing customers from stealing*; **S2, S3, S5, S9:** *If you find the checkout and the cash register difficult, I think it is really about the person.*	*Social space*	*Social-political arrangements* The store's values, rules and goals (satisfied customers, profitable and effective sales closures); workplace curriculum (Billett, 2006); curriculum of the vocational program; Integrated digital cloud-based systems (mPOS, Members club, Inventory, Stock, Marketing Management) for organising store, control and register production and employees Apprentices not allowed to use iPad cashiers for financial transactions

Apprentices with a lack of Swedish literacy and digital knowledge were, to a greater extent, prevented access to the checkout. They described difficulties with understanding the language spoken in the workplace and said that it was different from the Swedish they had learnt at SFI (Swedish for Immigrants). As a consequence, they had difficulties in interpreting and understanding social-political arrangements composing the learning practices at the workplace. For example, the workplace´s organisation of work and apprenticeship training, expectations on apprentices and requirements for working at the checkout.

The supervisors, on the other hand, experienced it as challenging to supervise apprentices not being able to communicate in Swedish. One supervisor explained why her apprentice after three months in the sports store had to quit: “She did not take any initiatives; it was like working with a child, and that doesn´t work here. I´m not a Swedish teacher”. All but one supervisor described that the supervisor role was on top of their everyday work. They were not aware of if there were any material-economic arrangements (e.g. time, financial compensation) associated with becoming a supervisor for apprentices.

The supervisors emphasised the work on the sales floor and customer service as the most important of the sales assistant’s tasks. The majority of the apprentices, however, considered cashier service as a confirmation of being a skilled sales assistant, while at the same time unsure

whether they would be able to do the job because of math difficulties. When starting the apprenticeship, they associated checkout work with calculating change, percent and discount, and all but one were afraid of making errors in front of customers.

4.1 The personal supervisor in the learning practice

At first, the learning practice focus on the working methods and routines characterising the checkout. The supervisors demonstrate and instruct how to perform a sales closure, while the apprentice is to listen and observe (Billett, 2001; Gherardi & Nicolini, 2002; Nicolini, 2012). Then the work is divided, and they work alongside. The supervisor focuses on the activities demanding interaction with the customers and the mPOS. The apprentice scans barcodes, control items (e.g. size, colour), remove alarms, sort and fold items while observing the supervisors' doings', listening to the 'sayings'. Work-based learning at the checkout is unique in the way that it always happens in the presence of an outsider. The supervisors give instructions, correct and confirm the apprentice´s work continuously in front of the customers. For example, "We do not fold like this".

When satisfyingly performing the methods, the supervisor introduces the mPOS. After a brief demonstration of the cashier window, how to make a sales closure in mPOS, the apprentice is to perform the whole process. Store managers and supervisors describe that since the cashier is a computer and everyone knows that, no problems are learning it: "You learn mPOS by exploring yourself, and if it doesn't work you can always ask a colleague." Initially, the supervisor monitors the interaction with mPOS:

> You should press that button, then the card payment/.../no, no, further up to the right, on the right. Then you enter the price/.../ in the box, there. Good.

Gestures accompany the verbal instructions and sometimes if it takes too long to accomplish a moment, the supervisor takes over the work. The reasons for why doing an activity in a specific way, however, is not part of the learning practice. It emerges that it is up to the apprentice to learn how to interact with mPOS efficiently, and without errors in work.

The learning practice is now focusing on customer service and add-on sales, apprentices developing the right behaviour, methods and correct and efficient sales closures. Some apprentices found it challenging to accept the reprimands in front of customers. They gave rise to insecurity and a feeling of not being accepted as a coworker. Daniella, whose supervisor has decided that she needs to spend more time on the sales floor before working at the checkout, says:

> It would be 100 times easier if no one constantly talked about how I shall go on. It makes me feel pressed, stressed and confused. Apparently, it is essential to fold "Right" even though the clothes still roll around in the bag!?

If apprentices and newbies have difficulties *learning the checkout* the majority of the supervisors address this to the individual: "If you find the checkout and the cash register difficult, I think it is really about the person." It emerges that there is no time for learning Swedish, the computer, or how to interacting with different systems at the checkout.

4.2 The digital supervisor in the learning practice

Analytically, mPOS can be understood as digital practice architectures enabling and constraining the activities at the checkout and in the learning practice. The mPOS register is no longer merely a machine adding up sums and calculating discounts and change, nor a machine automating financial transactions at the checkout. mPOS is interactive, run on computers and mobile devices and intertwined with the store´s management systems. The new functions added are transforming the checkout work (Table 3). In the analysis, it emerged that mPOS has several

roles. It is a) An instructor in the learning practice b) A math assistant performing the financial transactions c) A search assistant retrieving information in the customer meeting and d) A controller monitoring and documenting sales assistants' (and customers') activities involving mPOS. As a consequence, learning the mPOS is not limited to memorizing the cashier interface, PLU codes and automating scanning and ring-up sale.

Table 3 The role of mPOS in learning practice at the checkout

The role of mPOS at the checkout & in the learning practice	
Apprentices´ and Supervisors´ 'Sayings'	**Digital ´sayings´**
S2, S5, S6: I learned POS through video training and then I shadowed a colleague at the checkout. **S1-S4, S6, S8:** You learn mPOS by exploring yourself, and if it doesn't work you can always ask a colleague. **David:** *Something I have noticed is that I have a lot easier now than when I started to search for products. I quickly learned how to enter an item number on the screen to find a product in the storage room. But now, I can find almost anything by just knowing some numbers.*	**Retail language:** Swedish, English **Math language:** e.g. price, discount, budget, VAT **Data language** – Determined by the store's language settings on a) Products b) Attributes & Values c) Printed or emailed transaction receipts d) Category names e) Payment method names f) Line display messages **User interface language:** labels, menus, lists, textboxes, colours, buttons (Esc, Pay cash, Pay others, Ctrl, Sub, Tot, Login, Cl, C, Barcode) **Instructor language:** shift, scroll, tap, swipe "choose press here or on the letter C or scan", "you use POS to clock in and out"
Apprentices´ and Supervisors´ 'Doings'	**Digital 'Doings'**
• sales closures, returns, reclaims, insurance sales, stock ordering, information search (inventory, members club, reports, price lists, product catalogues, e-store, social media) • Charge 2 items at the checkout – Interaction with 12-15 windows in mPOS. • Charge 2 items on iPad – Interaction with 20-30 windows in mPOS • Search for an item – Interaction with 5-10 windows.	**Administrator:** convert reports to orders; manage employees´ working time; **Search Assistant** – search for information in stock, other stores, e-store, Social Media **Math Assistant** – calculate amount, change, price & discount. Sales reporting on different levels (budget, result, statistics, compare) **Instructor -** written instructions popping up on the screen: "scan or enter Item"; "search"; "clear"; "attach to Transaction"; "Save order"; "Turn Printer Off". **Educational videos produce by vendors -**verbal instructions in combination with cursor on the screen: "Your name will show up here (point with finger on screen)", "choose which section you are in"; "the invoice tap is always ready to process sales"; "For cash payments simply touch take cash and enter the payment amount"
Apprentices´ and Supervisors´ 'Relatings'	**Digital 'relatings'**
S2: *If you are afraid of working at the checkout, then it can become an obstacle, and you cannot think properly* **Dahlia:** *My supervisor said that my cash register was short four days ago, but how does she know it was me? The new apprentice and the hour employees share the same login. I am always thorough, so why does she accuse me? She doesn't like me* **Diana:** *I feel safer now making ordinary sales; it's only the percentage calculations I struggle with. I still feel insecure, though I shouldn't. For example, if it's a 25% discount on these earrings, what will the customer then pay? Now I can usually figure it out, but it's hard to think when the checkout line is long.*	**Controller** – monitor and document all financial transactions with mPOS (time, sales assistants ID, amount, item etc.). Verify customers ID & credit card. Register and document employees´ working time, statistics of performance. Intertwine members club, social media with cashier function.

The Instructor - There are several ways of performing an activity and mPOS gives instructions on the screen on how to go on. For example, "scan or enter Item" or "save order", some of the apprentices and supervisors also described that they had watched an educational POS video before starting at the checkout. Learning mPOS requires partly that the apprentice has experience of using computers, mobile devices and learning through a computerized educational program. Partly to be familiar with the structure of software programs and the interface language of computers and mobile devises to learn the interface of mPOS. Analytically these competencies are internal cultural-discursive and material-economic arrangements enabling or preventing work-based learning at the checkout.

The Assistant - Cash registers and POS systems have since the beginning in the1880s (Crandall, 1997), been designed to assist sales assistants doing the financial calculations at the checkout. Modern POS systems do all financial transactions and also function as a library and search assistant during the customer meeting (Basker, 2016). Since computers make correct and efficient calculations, the intention is that sales assistants will be able to focus on customer service and sales work. Though, the results showed that during a sales closure of two items with mPOS, the supervisor interacted with 12-15 windows on the touch screen while interacting with the customer. The same process on the iPad register, having a smaller screen, demanded interaction with 20-30 windows depending on the sales assistant's knowledge of products and item numbers.

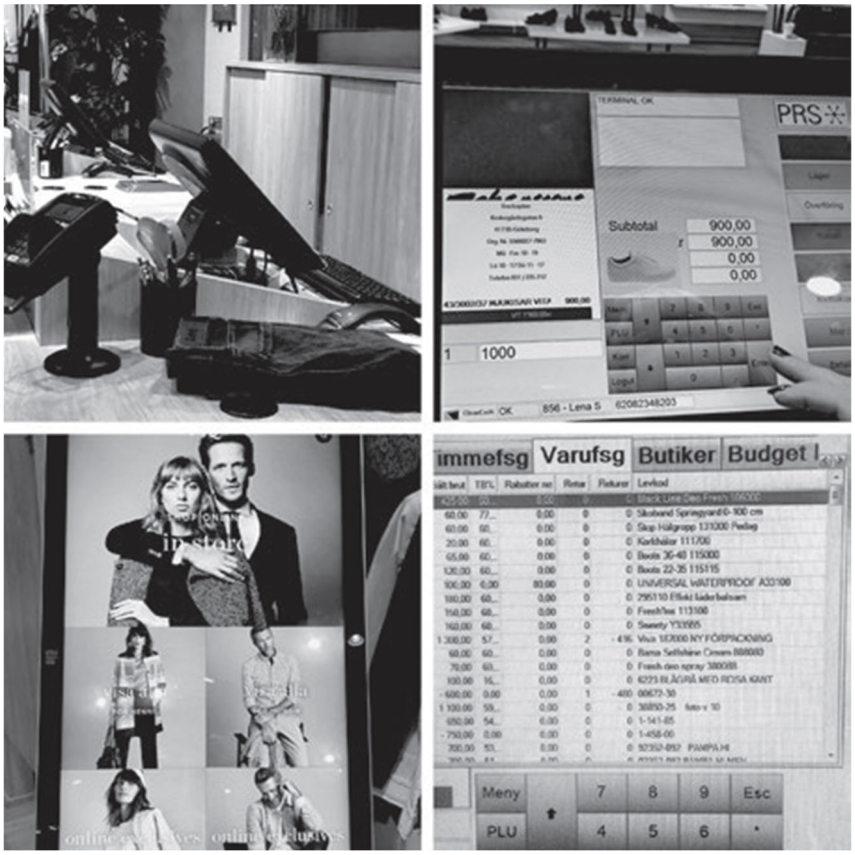


Figure 2 mPOS at the checkout

mPOS role as math assistant in the learning practice is a social-political arrangement enabling apprentices a feeling of security when not forced to make calculations in front of customers. Both supervisors and apprentices appreciated the "fast buttons" on the cashier window, relying on mPOS doing right. Though, when prices and discounts were not in the system, the math insecurity rapidly arouse. Diana, with apprentice practice in a Jewelry & Accessories store, has low mathematical self-esteem. She describes:

> I feel safer now making ordinary sales; it´s only the percentage calculations I struggle with. I still feel insecure, though I shouldn't. For example, if it's a 25% discount on these earrings, what will the customer then pay? Now I can usually figure it out, but it's hard to think when the checkout line is long

Learning the checkout involves developing the ability to switch between analogue and digital conversations and function as a translator during the customer meeting. Learning to interpret, act and communicate the information in mPOS is a process that takes time. David, being at the end of his apprenticeship in a home electronics store, describe:

> Something I have noticed is that I have a lot easier now than when I started to search for products. I quickly learned how to enter an item number on the screen to find a product in the storage room. Now, I can find almost anything by just knowing some numbers."

The Controller - mPOS is also a digital social-material arrangement shaping the relationships between the apprentice, supervisor, customers, coworkers and store manager in the learning practice. mPOS monitor and document apprentices and sales assistants (and customers) interaction with the system. The store management then uses the data to plan, organise and develop the production and the store's organisation. The data include information on the performance of each employee and apprentice working with mPOS. For some apprentices, it was difficult to understand on what grounds the supervisor or the store manager could claim that they had made errors in work. First, it could be difficult to understand how someone not participated in the work could say that you had made an error. Secondly, one did not trust mPOS being correct, or the supervisor's and stores manager's interpretation of the data. During a group-supervision session at South School, Dahlia brought a situation from her workplace to discussion:

> My supervisor said that my cash register was short four days ago, but how does she know it was me? The new apprentice and the hour employees share the same login. I am always thorough, so why does she accuse me? She doesn't like me, that's why I'm not allowed to work by myself at the checkout.

Problem-solving is part of the work and the learning practice and the participants' knowledge, and understanding of mathematics and the mPOS system are cultural-discursive arrangements enabling or constraining how to go in the practice when a problem arises. Whose fault is it and what to do if a discount turns out to be wrong after the closure of the sale?

5 Conclusion

The theory of practice architectures has contributed to making visible how knowledge, ideas and thinking of sales assistants work shape work-based learning in digitalised checkout practices. It has made visible the role of mPOS as an instructor, controller, search assistant and math assistant. It has emerged that digital and analogue conversations in parallel characterise sales assistants' work. When transactions are automated instead, other math skills are required of the sales assistant.

The results conclude that there are two supervisors in the learning practice; a personal - focusing on working methods, customer service and behaviour; a digital, mPOS – focusing on financial transactions and information searching. Learning the checkout requires being able to communicate and interact with both, which has implications for the design of vocational and adult education. However, it is essential to point out that the image of mPOS systems role in checkout practices and work-based learning emerging in the results is not static. The technology development and interest of the industry indicate both a future with cashier-less stores and a future where technology enhances sales assistants performance.

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Pride and Prospects: The Impact of the Implementation of a More Socially Just Vocational Curriculum at Lower Levels

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Abstract

Evidence shows that the level 1 (L1)[1] curriculum is impoverished, with minimal exchange value in the labour market (Keep & James, 2012; Wolf, 2011), & that lower-attaining youth experience significant social & educational exclusion, lacking access to valorised capitals (Atkins, 2017), issues which are contrary to notions of social justice. Curriculum changes in response to policy initiatives addressing these issues have not been research-based or rigorously evaluated. This paper reports the impact of a new L1 curriculum model designed to confer greater social & cultural capital & awareness of the world of work. Key results include improved retention, especially amongst the most socially excluded students, with a much smaller proportion becoming NEET (7/39 (18%) of the cohort, compared to >30% in previous years) & positive employment outcomes, including progression to apprenticeships. We conclude that in addition to positive educational outcomes, the young people have accrued significant personal & social benefits from engaging with the programme in its revised form, and that the curriculum offers a model with potential to be adapted to local need and implemented nationally. Final outcomes of this study will be reported in 2020.

Keywords

curriculum; social capital; cultural capital; NEET

1 Introduction

Whilst the number of young people engaging with higher level vocational education is rising across Europe (CEDEFOP, 2018), there remains an imperative across all nations to cater for lower-attaining young people, who might previously have accessed low-pay, low-skill, routinised occupations which are now in decline across Europe as a whole, limiting the

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1 Level 1 programmes are positioned at the lowest mainstream point in post-16 education in the UK, and represent the expected attainment level of the average 14 year old. Ambivalently positioned, some education providers include them as part of a Special Needs offer.

opportunities available to this group of young people (CEDEFOP, 2018; Keep & James, 2012, see also Billett et al., 2010). Typically, these young people exhibit characteristics of significant social & educational exclusion, and lack access to valorised capitals: most also have negative previous educational experience (Atkins, 2009). Despite this, there is evidence to suggest that these young people have occupational aspirations broadly similar to those of higher-achieving peers, but lack the support, knowledge and cultural capital to pursue those aspirations, so they are, effectively, unrealistic (see Bathmaker, 2001; Atkins, 2009, 2010, 2017).

This has not been acknowledged by policy makers however, and lower-attaining youth are commonly conceptualised in policy as having low aspirations, are problematized as being 'disaffected' and 'disengaged' (e.g. Atkins, 2017; Billett et al., 2010) and have few options but to engage with a limited range of low-level vocational programmes. In the UK, research has found that the vocational curriculum at its lowest levels is impoverished, with minimal exchange value in the labour market (Keep & James, 2012; Wolf, 2011). Recent curriculum changes in response to policy initiatives which attempt to address these issues in the UK have not been research-based or rigorously evaluated.

This paper reports on an ongoing project evaluating the medium term impact of a new curriculum model designed to address some of these issues, which offers important insights for researchers internationally who are concerned with these issues. The project is being conducted in a further education college in Guernsey, an independent Crown Dependency, which does not form part of the United Kingdom. However, its post-16 education is modelled on the English system, although it is subject to different and more flexible funding arrangements and there is no inspection body. This gives the college autonomy to develop the curriculum according to local need.

2 Method, methodology and theoretical framework

This project utilised a participatory, action-research model of curriculum development. All students enrolled on Level 1 at Guernsey College in the academic year 2017/18 (n=39) participated in this aspect of the programme which drew on a broad range of student activities, staff evaluation and internal college data. A smaller sub-sample (n=12) consented to longitudinal follow-up (two interviews in each academic year) over the academic years 2018/2019 and 2019/2020 to establish the extent to which their transitions into the work-place were sustainable and supported their career aims. This sample reflected an equal gender balance and represented each of the four vocational areas offered at level 1 (vocational studies, incorporating health and social care and childcare; IT; construction; and art and design). Individual case studies of each young person were developed using a multiple case-study design (Yin, 2003) which allowed comparisons to be made between, and identify commonalities amongst the individual cases, whilst also generating over-arching themes which may be relatable to other contexts.

We position this study as research for social justice, rather than socially just research (Atkins & Duckworth, 2019), but have drawn on theoretical concepts of social justice to inform the conduct of the study (e.g. Lincoln & Denzin, 2013). Ethical approval was obtained from the University of Derby, and the research design was consistent both with BERA Ethical Guidelines (2018) and the notions of respect inherent in concepts of social justice. The most significant ethical issue has been effective anonymization of young people who are easily identifiable in a small community. For this reason, identifying characteristics are not mentioned, and all student participants are referred to in gender neutral terms.

Theoretically, we have drawn upon work by, amongst others, Bourdieu and Passeron (1990) in order to conceptualise the young people's agency and social positioning, and on work by Hodkinson and Sparkes (1997) and Hodkinson (e.g. 1996, 1998, 2008) as a means of understanding the young peoples' transitions and social an educational positioning. We draw

on work by Bloomer (1996, 1997), Carr (1991), Stenhouse (1975), and Kelly (2009) as a theoretical framework for the curriculum development. The project is driven by a shared commitment to social justice. This is a 'slippery' term, which can be open to interpretation. For the purpose of this project we understand social justice as being concerned with oppression, inequalities, and hegemony and implying action. This means that it is "a form of politics, as well as a form of critical inquiry, and also a guiding philosophy" (Atkins & Duckworth, 2019, p. 40), an understanding of social justice which draws on ancient and contemporary philosophy, including Aristotle's Nichomachean Ethics (1997) and Plato's Republic (as cited in Lee, 1955/1987), enlightenment work such as that by Hume (e.g. 1740/2015), and more recently, work by philosophers such as Rawls (1971) and Griffiths (1998, 2003).

3 Method: curriculum developments

> "The existing state of educational provision will not do. It does not serve even one of the varied interests which bear upon post-16 education effectively or efficiently. Most importantly, it disenfranchises young people as citizens and as workers through the 'dependency culture' which it engenders by its institutional discourse, contributing to the perpetuation of hegemonic relations and the maintenance of a low-skill, low-trust society in the process" (Bloomer, 1996, pp. 161-162).

In developing this curriculum, we adopted Bloomer's (1996, 1997) critiques of the post-16 curriculum as a starting point. Whilst made a generation ago, they remain relevant to the largely unchanged curriculum model used in the UK and Guernsey post-16. Further, the extensive study which provided the empirical basis for these critiques remains the only work to have explored these issues in significant depth. We have also sought to develop a curriculum which has the facility to empower the young people to make active and critical decisions about their future lives. In doing so, we acknowledge Bloomer's (1996) argument that empowerment is a term (like democracy and citizenship) that has never been "satisfactorily articulated in curriculum planning" (p. 155) and means different things to ideologues from both the Left and the Right. As educators concerned with social justice, and again drawing on Bloomer we see empowerment as "encouraging young people to exercise their studentship [agency within and over the curriculum] within the context of a 'moral democracy'" (Bloomer, 1996, p. 156; Carr, 1991, p. 374). Notions of education for studentship are closely related to early philosophical debates around education for citizenship. Whilst as Bloomer argued, Citizenship is another term which "has never been successfully articulated in curriculum planning", it does have philosophical definitions, including that by Marshall (as cited in Carr, 1991) who refers to citizenship relating to full membership of a community, where all are "equal with respect to the rights and duties with which the status is endowed". Achieving these philosophical goals required whole-scale changes in the mind-set of teachers whose only experience of vocational education has been associated with the competency based approach which is now ubiquitous internationally. Rather than a product or qualification outcome, we were seeking to adopt curricula and pedagogical approaches which were "participatory rather than instructional teaching methods in order to cultivate the skills and attitudes which democratic deliberation and participation [as citizens] require" (Carr, 1991, p. 374).

Taking cognisance of these ideas, we adopted a form of "integrated curriculum research" (Stenhouse, 1975, p. 121) which involved the participation of teaching staff, local employers, and students as we sought to apply theory to practice. In terms of the literature we have drawn on here, and the concepts of social justice which have also driven this development, we acknowledge that we have developed a curriculum model which is "overtly value-laden and ideological" (Kelly, 2009, p. 90). However, we would argue that the practice of education is inherently value-laden, and that by adopting this stance we are better positioned to develop approaches which have the potential to enhance the opportunities available to low-attaining youth and promote more positive transitions and improved life chances.

The over-arching aim of the project was to:

Develop, implement and evaluate an evidence based, research informed curriculum for level 1 students which confers cultural capital and meaningful knowledge

To achieve this, the project sought to offer effective Careers Education and Guidance (CEG), clearly articulate with the needs of the local labour market and/or further education, and promote more secure, less precarious transitions from school to work. The revised curriculum (Figure 1) has adopted five key pillars: a project-based approach to core, competency-based, applied vocational qualifications, continuous and embedded CEG, English and maths at levels consistent with each individual's level of attainment, work experience, and a broad range of enrichment activities, which are designed to provide the young people with opportunities, knowledge, and experiences to which they had not previously been exposed.

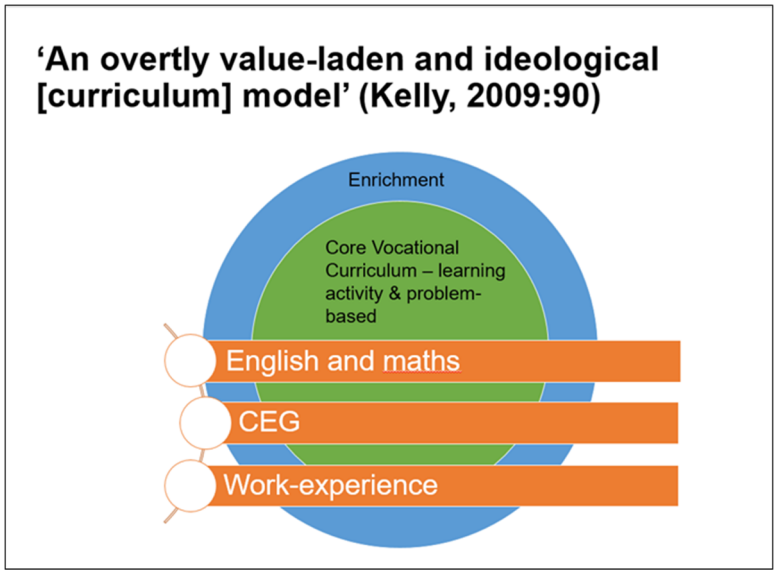

Figure 1 Revised curriculum

Project-based learning has been adopted in response to teachers' perceptions that students became disengaged and bored with a competency based approach, and is a pedagogical approach which is consistent with the effective development of work-related skills (Gessler & Howe, 2015). English and maths have been included as these are widely regarded by employers as essential skills in the workplace: however, few students at this level manage to achieve the GCSE pass grades currently mandated by the UK government. Work experience has been identified as critical in supporting effective school to work transitions for lower attaining youth (Wolf, 2011) and has been found to be effective in a study recently conducted in England (Defeyter, Graham, Atkins, Harvey-Golding, & Crilley, 2017) which helped to inform the approach taken to work experience in this project. Young people undertook short placements in a voluntary capacity contributing to initiatives in their local community. A wide range of Enrichment activities were offered, in some cases tailored to the vocational area the young people were enrolled in. For example, students undertaking a level 1 in engineering were given an old go-kart. They stripped this down, rebuilt it, and then took it to a local go-kart track for testing. In another example, vocational studies students (working towards careers in care and childcare) planned and implemented an awareness raising day for Liberate, the Guernsey equivalent of Pride. This won the national award for best educational initiative, and was featured on the BBC news. In the case of Liberate, the suggestion for the activity came from the students, reflecting the forms of studentship advocated by Bloomer (1996; 1997).

CEG also forms a central plank of the new curriculum, responding to the critiques alluded to above (Atkins, 2009; Atkins & Flint, 2015; Bathmaker, 2001) suggesting that lower-attaining young people have aspirations similar to their higher-achieving peers, but lack the support, cultural and social capital to realise those aspirations.

4 Results

We consider the results in relation to the different aspects of the curriculum, before reporting on the wider outcomes of the project. In relation to English and maths, the students were all assessed as having very low attainment in these subjects, with many participants functioning at Entry levels (equivalent to Year 6/8). Whilst only a very small number achieved GCSE passes (the UK expected level of attainment at 16+), all demonstrated an improved level of attainment, gaining entry level or level 1 credentials. Perhaps more importantly, by the end of the programme, they were more highly motivated to achieve in these subjects, recognising their significance for career progression, and making comments at interview such as:

> [I need] maths, English and Digital Design to work at Digital Greenhouse [a States of Guernsey initiative to promote digital and creative growth] (Phoenix)
>
> 'Actually, you need English. I hope so anyway! To spell!' (Sage, aspiring Tattoo Artist)
>
> 'I'm currently at L2 English but only L1 maths cos I'm just … but since I came to college I'm doing really well' and [to be an IT technician] 'I need my level 3 diploma…as well as maths and English' (Dallas)

These quotes also illustrate that at the time of interview (shortly before the programme concluded) the young people had much clearer ideas about their career paths than they had had a few months earlier. At the beginning of the programme each young person completed a short assessment about their aspirations. Many were unclear about their intended career, indicating 'not sure' or 'not very confident' in relation to statements such as

> I know what job I want to do in the future
>
> I know what qualifications I need to do the job I want

None indicated that they were 'extremely confident' in these areas. Tailored CEG was delivered using the project based model adopted across the curriculum, facilitating students to investigate their chosen careers, exploring potential employment opportunities and training requirements. This was in addition to existing guidance sessions, and supported by work experience. Follow-up interviews with students at the end of their programme were indicative of a much higher level of awareness regarding their idealised careers, implying that the approach had enjoyed some success. Students demonstrated awareness of the credentials required to enter their chosen occupation, and of the length of time their transition might take. Examples include those quotes from Rowan and Dallas (above) as well as Hero, who aspired to work in Early Years and who noted that 'I will need level 3 early years [to work in childcare] and it will take me four years, because I'm doing level 2 over 2 years' (Hero).

Similarly positive outcomes were evident from the enrichment activities, which were designed to introduce the young people to activities and experiences they had not previously encountered. For example, the most vulnerable students had the opportunity to participate in Forest school as a means of personal development and acquiring team building skills. Rowan reported that 'the woods was good. I didn't like it at the start because obviously I wasn't used to it but then – now I can light a fire and *I'm quite proud of myself*' (Rowan, our emphasis).

A significant aspect of the enrichment programme is a residential trip off the island. In year 1 of the project, this was to Herm, a 20 minute ferry ride from Guernsey, but in year 2 of the project the residential took the form of a PGL trip to the mainland. Leaving the island – even

to Herm, generated considerable anxiety amongst some students. Despite this, most made the trip to Herm, and 'it was a lot of fun!' (Sage). Sage's comment is supported by a range of visual data, including photographs and video footage showing the young people participating in a wide range of physical and team building activities. Similar feedback was received from the PGL cohort. In both cases, the students gained opportunities to work together in team building exercises, to develop their communication skills, and to broaden their experiences. Staff concerns about close proximity exacerbating interpersonal difficulties between students were not realised on either trip, perhaps reflecting a 'softer' benefit to the activities.

In terms of quantitative outcomes, of the 39 young people who commenced the programme, 30 students successfully completed their level 1, whilst 9 students had withdrawn. No students failed the programme. Table 1 shows outcomes for those students who withdrew, and Table 2 for those who completed.

Table 1 Outcomes for those students who withdrew

Outcome	No/9
Further Education	0
Employment	2
Apprenticeship	1
Unemployed	5
Not known	1

Table 2 Outcomes for those students who completed

Outcome	No/30
Further Education	22
Employment	1
Apprenticeship	5
Unemployed	2
Not known	0

If these figures are combined, in percentage terms, 21% (8/39) have a negative outcome (unemployed or unknown) whilst 79% (31/39) have positive outcomes in terms of employment and/or further education. These data demonstrate much improved outcomes for this cohort. It is also worth noting that more recent data, which is still subject to analysis, shows that an additional 2 students are now in secure employment. These quantitative data are supportive of the qualitative outcomes, suggesting that the programme has been successful in supporting the most marginalised and vulnerable students who might previously have been expected to withdraw.

5 Conclusions

Tentatively, the outcomes thus far show improvements – teaching staff believe some students with high degree of challenges who have remained on programme would have withdrawn in previous years. It is apparent from these outcomes that as well as positive educational outcomes, the young people have accrued significant personal and social benefits from engaging with the programme in its revised form. In addition, there have been some very positive employment outcomes, including progression to apprenticeships. Follow up with employers indicates that these students – some of whom have significant social and personal difficulties – continue to progress well, indicating that their transitions are, so far, stable and secure. We continue to

follow up the core sample of twelve of the original cohort in order to monitor their medium term outcomes. This involves twice-yearly interviews with the young people, as well as liaison with others who are involved with them, such as employers, youth workers, education providers and social services. In addition, we are now also monitoring 8 young people from the second cohort. The curriculum itself is constantly monitored and evaluated, with developments taking place in response to the data that emerges from these processes. For example, in 2018/19 this included introducing a recognised volunteering course to promote employability skills, and weekly work experience in preference to 'block' work experience. We are currently undertaking a detailed costing comparison between UK funding levels and the actual costs of implementing a programme of this nature. Our initial findings in relation to this imply that the difference in costing is minimal, largely because the college team has drawn on local resources and social enterprises (such as the walled garden) to support the programme. The success of the curricular approach has been such that the College will begin implementing a similar approach for all students from 2019/2020.

In summary, we would suggest that our data strongly supports the adoption of this form of curriculum model for low-attaining students as a means of re-engaging them with education, and generating learning, experiences and capitals that will support more secure and sustainable transitions into the world of work. Achieving this, we would argue, is not merely in the economic interests of governments, but is a move towards a more socially just education system in which young people are enabled to fulfil their capacity for the forms of citizenship described by Marshall (1950) and Carr (1991).

6 Acknowledgements

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Attwell, G., & Gerrard, A. (2019). The training and professional development of teachers in use of digital technologies in vocational education and training. In B. E. Stalder & C. Nägele (Eds.), *Trends in vocational education and training research, Vol. II. Proceedings of the European Conference on Educational Research (ECER), Vocational Education and Training Network (VETNET)* (pp. 38–44). https://doi.org/10.5281/zenodo.3371247

The Training and Professional Development of Teachers in Use of Digital Technologies in Vocational Education and Training

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Abstract

This paper is based on the work and emerging results of the Erasmus Plus funded Taccle 5 project: Extend European Framework for the Digital Competence of Educators for VET teachers and trainers. The paper provides a general overview of the aims of the Taccle 5 project and expected outcomes. It discusses the need to extend the EU DigiCompEdu Framework to consider the particular context and needs of Vocational Education and Training teachers and trainers. The development of digital learning materials and Open Educational Resources is seen as key in VET, given the large number of different occupational areas and, unlike in Higher education, the need for these to be available in national languages. The European perspective is seen as important in allowing the development of models and solutions which will have applicability in multiple VET contexts including in apprenticeship programmes, VET schools and in the workplace as well as in programmes for initial and continuing training of VET teachers and trainers.

Keywords

VET teachers; VET trainers; digicompedu; technology enhanced learning

1 Introduction

This paper is based on the work and emerging results of the Erasmus Plus funded Taccle 5 project: Extend European Framework for the Digital Competence of Educators for VET teachers and trainers. It is to be presented at a workshop at the VETNET network of the European Conference on Educational Research, held in Hamburg in September 2019 as one of a series of three interlinked papers This paper provides a general overview of the aims of the Taccle 5 project and expected outcomes. It also looks at the need to extend the EU DigiCompEdu Framework to consider the particular context and needs of Vocational Education and Training teachers and trainers. The second paper by Fernando Marquenda reports on the interim findings of a qualitative survey and study carried out through the project and examining the present training and professional development of VET teachers and trainers in five

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countries: Spain, the UK, Greece, Germany and Portugal. The third paper by Ludger Deitmer looks in more depth at continuing professional development in the use of technology for teaching and learning for trainers in the construction industry in Germany.

2 The changing work of VET teachers and trainers

The work of teachers in adult and vocational education has undergone considerable change in recent years. Teachers' roles have been expanding and the link between the quality of education in those sectors and the quality of teachers and trainers firmly established (Cedefop, 2004). The European Commission (2010) says VET should be delivered by highly qualified teachers and experienced trainers who are supported through initial and continuing professional development (including digital skills and innovative teaching methods) in view of delivering high quality learning outcomes. Efforts should be targeted at increasing the attractiveness of teachers and trainers' professions to ensure a sufficient number of qualified teachers and trainers.

The provision should be based on an appropriate/different mix of modern learning environments, including work-based learning and technology supported learning, pedagogies and tools as well as access to state of the art infrastructure.

The increasing focus on the use of technology for teaching and learning in VET is being driven by changing economies and production in different sectors and consequent skill needs, particularly in the context of digitalization and the introduction of new technologies. The European Commission's Advisory Committee on Vocational Training 'opinion on the future of vocational education and training post 2020' (2018) says

> "VET systems need to be better adaptable to the rapidly evolving socio-economic environment, more demand-driven and open in terms of forms of provision, notably through internationalisation strategies, more transnational mobility experience, new forms of digital learning, blended learning, modules for re- an up-skilling that are offered and diversity of providers."

A CEDEFOP (2018) study on the Changing role and nature of VET highlights some trends paving the way towards VET in the future:

- VET provisions are becoming increasingly diverse. Countries with school-based VET are strengthening apprenticeships and vice versa. Work-based elements are given high priority and visibility in all VET forms. At the same time boundaries between school-workplace and vocational-general are becoming less clear cut, pointing to hybrid models. Vocationally-oriented higher education is becoming more visible and gaining in importance
- Countries are reducing the number of qualifications they award while broadening their scope, as they put more emphasis on social and transversal skills and competences.
- VET's re-orientation towards learning outcomes and competences potentially allows for a more learner centred approach.
- More flexibility in the time and place of learning and increased acceptance of prior learning opens up VET to broader groups of young and adult learners.
- As skills-intelligence systems are becoming stronger, they highlight the need for reviewing and renewing skills and matching them more effectively to jobs.
- Herd and Mead Richardson (2015) highlight five drivers for the development of ICT in Vocational Education and Training – "the requirements of a knowledge economy, the increase of ICT in the workplace, the demand to increase access to initial vocational education and training, the lack of qualified teachers and the requirement to provide opportunities for continuing professional development, re-skilling and skills upgrading."

- The growing use of robot technologies and of AI is likely to lead to large scale change in employment and occupations. While many reports have focused on job displacement, the major impact may be the changing competences required in different occupational profiles. This in turn will require continuing vocational education and training, as well as updated curricula in initial VET. In the coming years, VET teachers and trainers will be required to help shape quick and flexible responses to emerging needs, related both to the integration of thousands of refugees and migrants into the labour market and to the need to develop basic, digital and entrepreneurial skills. At the same time the world stands on the brink of a rapid transition beyond carbon (Mason, 2019), once more requiring new and changing skills and competences.

CEDEFOP has said that providing teachers and trainers with access to quality professional development and support is essential to ensuring that both their technical competences and pedagogical skills are up the highest standards (2018). The EU report ion Developing skills for the labour Market: the Riga Conclusions (2015) has put renewed emphasis on the issue, calling for systematic approaches to and opportunities for initial and continuing professional development (CPD) of VET teachers, trainers and mentors. Cooperation and partnerships among stakeholders are seen as a way to support this.

Despite the role that technology in playing in reshaping the workplace and leading to new and changed occupational profiles, and there is at least a perception that VET teachers and trainers have fallen behind in using technology for teaching and learning. However, this may be fast changing. A nationally-agreed vision for post-16 digital skills in Wales, up to the year 2030, has been adopted by the Welsh government (2019). This includes clear aims and objectives relating to key areas such as leadership and management, curriculum delivery, assessment, and staff development. The initiative, Digital 2030, is an extension of the Digital Competence Framework already available to schools throughout Wales.

The UK Jisc (Smith, McKean, & Knight, 2017) report that learners now enter vocational education and training with "increased experience of technology, and have the expectation that technology will feature in their learning journey in some way."

Jisc acknowledges, however, that staff and students have different levels of digital literacy skills and many do not have a clear understanding of how courses could or should use technology to support learning. They say that

> "Embedding digital activities and assessment opportunities as part of the curriculum sets the expectation that students will use technology throughout their studies. And with responsive support from the college or provider, such expectations establish a base line of digital literacy and confidence that can become the norm in learning and teaching practice over time."

A series of different studies and reports in different European projects have shown that VET teachers and trainers in general recognise the importance of digitalisation to occupational learning and competence and the potential of ICT for teaching and learning (see, for example Attwell, Garcia, & Molina, 2017). Yet they also often feel that they lack modern technology, especially within vocational schools, and lack opportunities of continuing professional development. This may be exacerbated by the structure of VET, with many teachers and trainers working part time, or combining the role of trainer with that of a skilled worker. While there is a lack of statistical research in the numbers of VET teachers who have received training in the use of ICT for VET, there have been a number of surveys and reports into those in general education (and it is probable that in VET there has been less professional development). A survey, funded by the European Commission Directorate General Information Society and Media and undertaken by European Schoolnet and the University of Liège, found that only 40% of pupils in EU member states are taught by teachers who have engaged in any pedagogical training on the use of ICT (European Commission/EACEA/Eurydice, 2015). The backlog is

huge - for example, in Italy the MOE Digital School Plan foresaw training for 157,000 teachers in 2018, France estimated 300,000. The OECD's Teaching and Learning International Survey (TALIS) Teachers' Professional Development in Europe (2013) estimated that 2 million teachers will have received little or no training in using and teaching digital technologies.

This provides the background to the Taccle 5 project which is both looking at Frameworks for Teacher development in the use of technology for teaching and learning in VET and examining different models for the delivery of such profession development. In the next section fo this paper we will outline the European JSC DigiCompEdu Framework.

3 The DigiCompEdu framework for teachers and trainers in using technology for learning

Both the European Commission and UNESCO have developed frameworks for teacher development in the use of technology for teaching and learning. The frameworks are designed to be flexible, to be capable of adoption in different national policies and for different contexts. There are considerable similarities between the frameworks, both of which are intended to be applicable for vocational education and training as well as for general school teachers.

The DigCompEdu Framework aims to capture and describe educator-specific digital competences by proposing 22 elementary competences organised in 6 areas. Area 1 is directed at the broader professional environment, i.e. educators' use of digital technologies in professional interactions with colleagues, learners, parents and other interested parties, for their own individual professional development and for the collective good of the organisation. Area 2 looks at the competences needed to effectively and responsibly use, create and share digital resources for learning. Area 3 is dedicated to managing and orchestrating the use of digital technologies in teaching and learning. Area 4 addresses the use of digital strategies to enhance assessment. Area 5 focuses on the potential of digital technologies for learner-centred teaching and learning strategies. Areas 6 details the specific pedagogic competences required to facilitate students' digital competence. For each competence, a title and a short description are provided, which serve as the main point of reference.

The Framework also proposes a progression model to help educators assess and develop their digital competence. It outlines six different stages through which an educator's digital competence typically develops, so as to help educators identify and decide on the specific steps to take to boost their competence at the stage they are currently at. At the first two stages, Newcomer (A1) and Explorer (A2), educators assimilate new information and develop basic digital practices; at the following two stages, Integrator (B1) and Expert (B2), they apply, further expand and structure on their digital practices; at the highest stages, Leader (C1) and Pioneer (C2), they pass on their knowledge, critique existing practice and develop new practices. As stated earlier the DigiCompEdu Framework is designed to be used in all sector of education.

A major aim of the project is to extend the framework for the specific context of Vocational Education and Training. VET takes place in different contexts, in the workplace as well as in the schools. VET also integrates practice based and often informal learning. Importantly technology plays a dual role for VET teachers. On the one hand technology forms the subject of much vocational education and training in its use in different occupational areas. On the other hand, technology is a means of delivering VET.

The Taccle 5 project is working across different sectors of VET. This reflects the focus on pedagogy and the development of digital learning materials as key aims for the project. In terms of the pedagogical focus, the project is looking at occupational and workplace learning as well as the classroom based learning which predominates in general school education. The development of digital learning materials and Open Educational Resources is seen as key in VET, given the large number of different occupational areas and, unlike in Higher education,

the need for these to be available in national languages. In the next section we will look at the methodology, ongoing activities and outcomes being developed through the Taccle 5 project.

4 Methodology and outcomes

The research and development work is being carried out over a two year time period, commencing in autumn 2018, with a major objective of extending the European Reference Framework in the areas of digital pedagogy and the development of digital Open Educational Resources for VET teachers and trainers in school and workplace settings.

The first period of activity has focused on undertaking a survey of Vocational Education and Training practitioners in the five European countries, to explore their present access to training, support and professional development opportunities and their current use of ICT in teaching and learning practice. The sectors include Building and Construction, Teaching Assistants, Tourism, Agriculture and Wellness and Sports. The findings from the survey will be used to develop learning scenarios for different sectors in VET and create a model using learning scenarios for training VET teachers in how to develop and use their own digital resources.

The survey will be used to produce a report on the Extension of the European Reference Framework in the two key areas of Digital pedagogy and Digital resources. The report will combine a literature review, desk research and a survey (based on a semi structured questionnaire and interviews) to identify all the competences and skills needed by a VET teacher or trainer for sourcing, creating and sharing digital resources and for applying digital pedagogies in school and workplace settings.

The taxonomy used in DigiCompEdu will be extended in school and workplace settings and the descriptors of the progression model and the CEFR levels will be harmonized with the VET context.

The project will produce six learning scenarios for different sectors, and will create a model for using learning scenarios for training VET teachers and trainers on how to develop and use their own digital resources. These scenarios will provide trainers with practical guidelines for learning approaches, activities and content when designing their own lesson plans. The scenarios will be also used as a model to inspire trainers to develop their own resources for different contexts, situations and learner groups. The learning scenarios will refer to a given learning situation, will describe the learning and the support activities, the roles, the target users, the prerequisites, the objectives, as well as the tools and the resources necessary for the accomplishment of activities.

Learning Scenarios will be delivered as a publication that will serve as additional dissemination tool for VET providers and any other related stakeholders. The outputs will also include a model for the development of new learning scenarios.

A further outcome will be a repository of learning materials and best practice exemplars The repository of learning materials and best practice exemplars will includes the development of 12 Open Educational Resources (OERs) with teaching, learning and research materials in digital format based on the learning scenarios. The main aim is to provide access to quality learning and teaching material to VET trainers to positively impact in use of technology for teaching and training in VET in school and workplace settings. The OER development will be subject to an ongoing Quality Assurance process to be developed for the project and will include self-assessment procedures and rating systems.

A fourth area of work will be research leading to a report on innovative online and face to face learning opportunities for professional development for teachers and trainers in the use of technology in VET. The report will focus on innovative strategies for professional development for VET teachers and trainers on applying digital pedagogy and develop digital Open Educational Resources in school and workplace settings. It will develop a methodology for

empowerment and self-discovery through the expansion of personal learning networks, and the ability to blend in voices, concepts and tools from different sources. The methodology will describe and analyse the non-formal activities, working methods and tools that VET teachers and trainers will be able to use for professional development (including MOOCs, blended learning and peer based learning) as well as face to face workshops and courses. The project will research and develop different models for providing access to professional development in the use of technology for VET teaching and learning for all VET teachers and trainers including part time teachers and work based trainers. Each project partner will work with a VET organisation in piloting one of the models and methodologies and report on its use.

The fifth area of work is the development of an online Community of Practice for VET teachers and trainers in the use of technology for teaching and training in VET. The Community of Practice will support the needs for communication, resource exchange, collaboration, and relationship building. The Community of Practice is designed to facilitate the exchange of open educational resources. Project partners and trainers will be encouraged to share other resources such as instructional materials, policy documents, videos illustrating techniques, or examples of their work.

5 The European perspective

We recognise that the project cannot, by itself, resolve the challenges VET faces in this area. Through the activities of the project we can develop models and exemplars which can be transferred to a wide range of different actors, including policy makers, planners, school and workplace providers and establish a community of practitioners as the basis for taking forward the project post the period of European funding. The European perspective is important in allowing us to develop models and solutions which will have applicability in multiple VET contexts including in apprenticeship programmes, VET schools and in the workplace as well as in programmes for initial and continuing training of VET teachers and trainers.

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Biographical notes

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Avis, J. (2019). Industrie 4.0: Implications for VET across the lifespan. In B. E. Stalder & C. Nägele (Eds.), *Trends in vocational education and training research, Vol. II. Proceedings of the European Conference on Educational Research (ECER), Vocational Education and Training Network (VETNET)* (pp. 45–49). https://doi.org/10.5281/zenodo.3371358

Industrie 4.0: Implications for VET Across the Lifespan

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Abstract

Industrie 4.0, or the fourth Industrial Revolution (4th IR) are rhetorical constructs rooted in neo-liberal or minimally capitalist understandings of the economy. The 4th IR as an ideological and rhetorical construct has particular implications for vocational education and training across the life span. This in turn is shaped by conceptualisations of the future of waged labour and by default the relationship of VET to these processes. The 4th IR's association with digitalisation and artificial intelligence (AI) is ambivalent. For some writers this leads to technological unemployment and the elimination of labour from paid work. Whilst for others there is no employment crisis that cannot be resolved. The paper examines these arguments drawing out their implications for VET across the lifespan.

Keywords

Industrie 4.0; the fourth industrial revolution; vocational education and training; lifespan; waged labour

1 Introduction

The paper engages with a diverse and contradictory literature, employing an analytic stance rooted in policy scholarship. It discusses rhetorical constructions of Industrie 4.0 and its equivalent the 4th industrial Revolution (4th IR) and their implications for VET across the lifespan.

2 Research questions

The paper addresses the implications of the 4th IR for VET across the lifespan and as such it addresses the following questions:

- What implications does the 4th IR have for VET over the lifespan?
- Do we need to re-think VET in the context of the 4th IR?
- How should worklessness be addressed in VET?

3 A note on method

The paper is rooted in policy scholarship with its methodology set within a critical engagement with a relevant literature. In this respect the paper adopts an approach derived from critical theory. The analysis that the paper develops is thus part of its methodology. Consequently, the validity of the argument can be judged on the basis of its credibility and plausibility, which in

turn will be partly shaped by the manner in which readers position themselves in relation to the paper. Rather than engage in a systematic or definitive review of the literature based upon the protocols of the former, I seek instead to engage with the relevant debates. Systematic reviews rest upon a quasi-technicist and positivist approach to empirical research (Avis, 2003, 2018; Maclure, 2005). In this paper I seek to address the particular and often contradictory stances that have been taken towards the 4th IR and the resulting debates. Inevitably I am positioned as a participant in these discussions having selected the particular themes and debates to be examined. I have not limited my discussion to advanced manufacturing as to have done so would have restricted the argument and ignored the ideological ramifications of the 4th IR and its social imaginary. I have aimed to mobilise a range of arguments that can rest alongside and have an affinity with the 4th IR. The 4th IR encompasses far more than a narrow technical focus upon advanced manufacturing. Consequently, I engage albeit briefly, with arguments that address post-work, Marxism as well as Italian Workerism as these provide something of a counter to more mainstream arguments that address the 4th IR. These analyses provide a rather different understanding of the ideological and socio-economic context in which the 4th IR is placed than do more conventional and empiricist engagements.

4 Industrie 4.0 and the fourth industrial revolution

The paper locates Industrie 4.0 and the 4th IR in understandings of the economy rooted in neo-liberalism which rest upon a capitalist terrain (Avis, 2018; Fuchs, 2018; Harvey, 2014). Whilst this discussion is focused on the global north it should not be forgotten that these debates have a significant impact upon the global south. This arises in a number of respects and can be seen in the rhetorical claims that address the presumed educational and upskilling needs of these developing and emerging economies but also in the prevalence of the informal economy and exclusion of workers from the formal economy (Sassen, 2014). The 4th IR is an ideological and imaginary construct which reflects specific material interests, having particular implications for education and training throughout the lifespan (Jasanoff & Kim, 2015; Pfeiffer, 2017). The association of the 4 th IR with digitalisation and artificial intelligence (AI) is ambivalent. For some writers this leads to technological unemployment whilst for others, even though there is labour market disruption, there is no employment crisis that cannot be resolved (Anslow, 2016; Atkinson & Wu, 2017; Autor, 2015; Ford, 2016; Haldane, 2015). The strong connection between the 4th IR and labour market requirements are softened by those adopting a qualitative analysis of advanced manufacturing work. These writers suggest the relationship between technology and skill is rather more complex than the protagonists of technological unemployment suggest (Baxter, Rooksby, Wand, & Khajeh-Hosseini, 2012; Pfeiffer, 2016).

Neo-Marxist discussions of the elimination of labour from paid employment, together with the falling rate of profit, in some senses bypasses the former arguments (Berardi, 2017; Blacker, 2013). Harvey (2014) argues these processes are embedded in capital's developmental logic. Such arguments raise questions that address important socio-economic issues concerned with the expulsion of labour from waged employment – the salience of surplus labour and the wider political as well as educational responses. In the case of the former a universal basic income is posed as a way of responding to a restricted labour market. In the case of the latter we encounter well-rehearsed arguments that stress the salience of lifelong learning in relation to up- and re-skilling alongside those that emphasise the importance of soft skills (West, 2018).

5 The 4th IR - implications for VET over the lifespan

What would constitute a progressive educational response to socio-economic conditions that cohere around the 4th IR in the global north and south (Dittrich, 2016; Hajkowicz et al., 2016; Peters, 2017)? Such a response would need to go beyond those rooted in social democratic

sensibilities and should acknowledge the interpenetration and dialogic relationship between the socio-economic and political contexts and VET.

The key question is whether we need to rethink VET in putative new conditions. West's (2018) and many other writers concerns with lifelong learning point to the requirement for continuous up- and re-skilling alongside the development of soft skills. These arguments reflect discussions that have been frequently rehearsed over the last 30 years. However, there is nothing really new here other than the urgency within which this argument is set, alongside a recognition of the salience of digital skills. Nonetheless, is there something qualitatively different in the current conjuncture that necessitates a fundamental review of what constitutes VET and its relationship with wider society?

In the current conjuncture, one in which the imaginary of the 4th IR is all pervasive, we encounter a number of problems when we explore what a socially just and progressive vocational curriculum would look like:

- To what extent would it be socially and institutionally situated?
- How would it engage with the concerns of distributive justice?
- How would it provide access to powerful knowledge?
- How would it articulate the relationship between powerful knowledge and the vernacular to develop 'really useful knowledge'?
- How would it relate to wider society in developing an appreciation of the civic implications of occupational practice?
- How would it contribute to the development of an engaged and critical citizenship in the pursuit of a socially just society?
- What would VET look like in conditions of worklessness?

How do these concerns map onto VET across the lifespan? At this point, and to reiterate, we encounter a range of familiar arguments that have been expressed over the last thirty, if not forty years, that call for lifelong learning, the development of soft skills allied with continual upskilling. In this context creativity, entrepreneurialism and flexibility are deemed to be essential for the new conditions we encounter. The VET system is to prepare both young and old for such a scenario. Both demographics are deemed to carry particular dividends. Older workers are thought to possess the skills, experience and knowledge of production processes that are invaluable with the shift away from physically demanding production processes allowing older works can extend their working life. Younger workers and women in societies where there has been a limited participation in the labour force, offer demographic dividends that address labour shortages and provide an important reservoir of labour. Young people as a result of migration can address labour shortages found in the developed economies.

It will not have been missed by the reader that there is a paradox in the above which arises in relation to the question of worklessness. There are several issues. Whilst the logic of capitalism leads towards the expulsion of workers from waged labour, this is mediated by cost - if waged labour is cheaper it may be used. The distinction between labour and work is often confused, though the point is that 'really useful' labour can be distinguished from waged labour. There is any amount of 'productive' labour available in society that could contribute to the well-being of all and that exists outside of capitalist waged relations. This point also alludes to the importance of care work which discussions of the 4th IR tend to marginalise as a result of its concern with industrial processes, the IoT and AI etc.

However, when considering the implication for VET across the lifespan does this merely lead to more of the same? That is to say, the development of skilled, flexible workers and so on. If surplus labour is a feature of contemporary capital this then poses questions about social justice that can only be marginally addressed by a concern with interventions such as universal

basic income (UBI). Paradoxically whilst this may serve to mitigate and be a palliative for inequality, it may do little to distribute meaningful or 'decent' waged labour. It may be the case that capitalist social relations are being stripped out by the forces of production presaging the development of a post-work, post-capitalist society. It is important to view this process as being one of struggle rather than the result of an inevitable determinist process. Here again we return to the question of what an appropriate model of VET would look like in the current conditions.

6 Conclusions

It is as well to remember that technology and AI are entwined with social relations, being sites of class struggle. How this is played out is dependent on the balance of power, not only within particular social formations but globally. How far the development of the forces of production are compatible with capitalist relations is a moot point, as it is also a site of struggle. The point is that the progressive affordances offered by the 4th IR are constrained by the manner in which these are enmeshed within capitalist relations. I guess the struggle is to push these progressive affordances as far as we can.

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Critical Analysis of Vocational Education Policy in Israel

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Abstract

This paper offers a critical discursive examination of the renewed interest shown by the Israeli Ministry of Education in recent years in vocational education, after decades of neglect. Through critical discursive analysis of governmental and organizational texts, and of press articles, this article proposes to characterize the educational-governmental policy on vocational education against the backdrop of neo-liberal descriptions that view this education as a great equalizer (Downey, Von Hippel, & Broh, 2004). A review of governmental documents reveals three main justifications for expanding and strengthening vocational education in Israel: "Go learn welding": The need for working hands; "Smart Hands"; In praise of blue-collar jobs. It also identifies three major forms of rhetoric: Rebranding: From "vocational" to "technological" - verbal coverage and disclosure; Statistics as government manipulation; Rhetoric of strategic blindness. Finally, we argue that the VET Israeli policy uses strategic blindness and ambiguity as a government resource.

Keywords

vocational education; educational policy; critical discourse analysis; ethnicity; social class

1 Introduction

One of the first things to say about vocational education in Israel is its close connection to (stigmatic) ethnicity and working class in Israel. These vocational schools began to flourish as a governmental means of absorbing the Jews of the Arab countries (Mizrahim in Hebrew or "Orientals") in the second decade of the establishment of the State of Israel (which was established in 1948; Saporta & Yona, 2004). The significance of this process is that from the establishment of the State of Israel to the present day, most of the students in vocational schools are Mizrahim of low economic class.

[This connection between class, ethnicity and vocational education also exists in various places around the world.]

The main ethnic distinction among the population in Israel is between Jews of European and North American origin (called Ashkenazim in Hebrew) and Jews of Arab origin (known as

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Mizrahim in Hebrew or Orientals). Like other cultures in the world, the former, the Euro-American Jews, are considered to have high cultural capital, while the latter, the Orientals, the Jews of Arab origin, are considered to be culturally inferior (Shohat, 1999). In other words, as elsewhere in the world, while European ethnicity is transparent, and hence privileged, Oriental ethnicity is stigmatized, and marked as a problem to be intervened in by way of re-education or close social control (Shoshana, 2016).

It is also important to note that the vast majority of vocational schools in Israel are located in what are called "development towns" (in Israel's geographic-social periphery) or neighborhoods populated by people of low socio-economic class in central cities (such as South Tel Aviv). Vocational schools, also called second class schools, last-stop schools or "residual" spaces (populated by children who were expelled from all other educational frameworks) are therefore closely connected with class and ethnicity in the common public and academic discourse in Israel.

Against this background, this article offers three main questions:

1. What is the governmental rationale behind the Ministry of Education's renewed interest in vocational education?
2. What are the justifications and accounts for vocational education in light of the neo-liberal discourse that encourages equality, meritocracy, and mobility?
3. How does the public education policy relate to issues of ethnicity, class, educational tracking, and inequality affiliated with vocational education in Israel?

2 Methodology

A critical discursive analysis (Van Dijk, 2001) of various texts since 2012, the year in which we recognized that a renewed interest in vocational education was initiated by senior government representatives: protocols of government meetings in various committees; reports prepared by the **Israeli parliament (Knesset)** Research Center for various committees; posts from the Minister of Education via his Facebook page; analysis of interviews with the Minister of Education; analysis of the Ministry of Education website; letters written to the Minister of Education by senior officials of the Manufacturers Association of Israel; statements by various Knesset members about vocational education; and press articles about vocational education.

3 Findings

A review of governmental documents reveals **three main justifications** for expanding and strengthening vocational education in Israel:

1. "Go learn welding": The need for working hands
2. "Smart Hands" or "Not everyone is a genius who can study only academic content in universities"
3. In praise of blue-collar jobs

3.1 " Go learn welding ": The need for working hands

In a letter sent to the Minister of Education by the President of the Manufacturers Association, it states:

> "As someone who has been watching for years as the small industry in Israel shrinks and suffers from a severe shortage of professional and skilled manpower, we urge you to examine the possibilities inherent in technological education and vocational training and to permeate it more into the various schools throughout the country" (Koren, 2017).

This petition to strengthen vocational education in light of the industry's distress also arises from the statements made by the head of Technological Education and Vocational Training in the Manufacturers Association:

> "We lack locksmiths, welders, CNC [computer numerical control] operators, production workers, electricians, and now at a given moment we have a need for about 9,500 vocational workers in all industrial professions" (Cohen, 2016).

This distress is presented by representatives of the industry as an acute problem that requires immediate handling and as a real danger to the Israeli economy. As the president of the Association of Engineers, Architects and Graduates in Technological Sciences in Israel says:

> "I expect the State to tell a young man who finished elementary school or grade 10, '**Go learn welding**.' Without any immediate change, factories will close" (Bior, 2012).

3.2 "Smart Hands" or "Not everyone is a genius who can study only academic content in universities"

Another justification for the existence of vocational schools lies in the claim that "not everyone is suited for academic education." This position emerges from the words of the founder of the Center for Vocational Education from November 2014:

> "After all, not everyone is a genius who can study only academic content in the universities. That's the situation. That is how God created people - one smarter, another less smart. There are many tens of thousands of students who are not capable of studying academic education."

In addition, vocational education is presented as providing a solution to those whose qualifications fit the vocational track, and not the theoretical one, or in other words, those who were blessed with "smart hands," as the head of the Manufacturers Association put it (21.1.2014, minutes of Committee No. 145):

> "We create people who because of our desires we make them be lawyers and all kinds of professions that they are not good at, and do not let them express themselves in what they are good at. God created people with all kinds of traits, and some of them with **smart hands**."

Such statements reflect a situation in which students ostensibly *choose* the vocational track following their inclination or strength, and therefore vocational education provides them with a space in which they can realize their skills and vocational aspirations.

This discourse of choice, which is also evident in various studies around the world, is questionable in the context of vocational education because, contrary to the governmental and industrial description that certain young people "choose" vocational education, research shows that they do so not because they know what they want to do but because they know what they cannot do while doors are closed to them (Ball, Macrae, & Maguire, 1999).

Finally, the analysis reveals that alongside the claim that not all students are suited to academic education and that there are those with "good hands," there is a parallel discourse that describes these students as "dropout youth" or "**youth at risk**," and vocational education as a refuge that "rescues" them from unemployment or from lapsing into crime. This approach emerges in the words of the representative of the Forum for the Advancement of Technological Education from July 2016:

> "What's better for a young man like this when he leaves school? He gets examples in the factory that he can emulate, and not mimic the street bully, but rather the foreman."

These statements are consistent with the claim that students do not choose the vocational tracks out of interest or future ambition, but from the understanding that this is the only option

available to them. This steadfast connection between vocational education students and youth at risk should trouble us.

3.3 In praise of blue-collar jobs

In 2013, the then Minister of Economics and current Minister of Education, Naftali Bennett, posted the following status on his Facebook page:

> "Do not study law, work in construction, they have good salaries."

When he entered the Ministry of Education as a minister in 2015, he posted another status following his visit to a vocational school in Ashdod, a city in southern Israel:

> "What jobs are in demand in Israel? Answer: Vocational manual workers – for example, welders, electricians, chefs, carpenters, car mechanics. And after that: engineers... Young people, parents: take this into account."

The statements made by the former Minister of Economics and the current Minister of Education express the claim that in the current reality in the Israeli economy, vocational industrial workers enjoy jobs that are in high demand in the market and that their wages sometimes even surpass those with higher education.

The Head of the Vocational Training Division of the Ministry of Economy said:

> "In the past, a lawyer or a beginning academic would earn 3 or 4 times more. Today, your salary as a CNC operator exceeds the salary of the beginning accountant and the starting lawyer... Today you have plumbers and electricians who are tycoons, and even for beginners, the salaries are very respectable" (Taversky, 2016).

This argument regarding the advantage of graduates of vocational education in the job market in terms of wages recurs as part of the justifications given for vocational education. However, studies conducted in Israel (see for example: Zusman & Tsur 2010) and around the world (Brunello & Rocco, 2017; Golsteyn & Stenberg, 2017; Stenberg & Westerlund, 2015) cast this claim in doubt and describe that from a long-term perspective, the wages of academic education graduates are higher than those who studied in vocational schools in tracks such as welding, framing, automotive mechanics, and metalworking.

4 Rhetoric and strategies to promote vocational education

The discursive analysis identifies three major forms of rhetoric:

1. Rebranding: From "vocational" to "technological" - verbal coverage and disclosure
2. Statistics as government manipulation
3. Rhetoric of strategic blindness

4.1 Rebranding: From "vocational" to "technological" – verbal coverage and disclosure

"There is a confusion of concepts - what is technological education?" thus member of Israeli parliament Yaakov Margi, chairman of the Knesset Education Committee, opened the meeting marking vocational training day in November 2016:

> "When I talk to people in the Knesset, everyone sees something else in his mind. There are those who see the technological trends, and there are those who see the vocational schools."

This statement by the Knesset Member largely reflects the ambiguity that characterizes the current policy of the Ministry of Education with regard to vocational education.

As part of the Ministry of Education's policy to expand vocational education and its re-branding, more “exclusive” tracks have been added to traditional tracks and a tactical choice to

relate to all tracks and to present them as a single field under the overall name "Technological Education."

In a document written by the Knesset Information and Research Center in 2008, vocational education is presented as divided into three main branches: the prestigious practical engineering courses (such as practical engineering, electronics and biotechnology); the technological track (architecture and industrial design); and the vocational track (mechanics, beauty professions).

These differences between the various tracks within technological education are also evident in the percentage of entitlement to matriculation, ethno-class profile of students in the various tracks, and future wages.

Despite the Ministry of Education's attitude towards all tracks as a single field and referring to them all by the prestigious name "technological education," some of these tracks are perceived as suitable for outstanding students and direct their graduates towards higher education and full matriculation, and some direct towards the world of work and do not set expectations for top quality matriculation, which is an entrance ticket to university. This is expressed in the Ministry of Education's official publications. For example, the department's website under the biotechnology track states that the program is intended for "students with motivation and scientific curiosity who have proven ability in scientific subjects and mathematics" and that "graduates of the program who are entitled to a matriculation certificate will be able to continue their studies in institutions of higher education." On the other hand, under the track of hair styling and grooming, it is written that "after acquiring the necessary skills, students can formulate a unique professional language that will ensure their vocational and economic future." No reference is made to a matriculation certificate.

The words of Member of Israeli Parliament, Amram Mitzna, in the Knesset Committee (7.7.2014, Minutes 223) also indicate the differences between "technological" and "vocational":

> "Technological education is ostensibly a more beautiful name, for education in physics, mathematics, and high-level computers. Vocational education - as its name suggests – is as it was since the establishment of the State and before the establishment of the State, actually is an education in which a vocation is obtained, but it is also education for professional values and integration into society."

The choice to refer to all tracks, from automotive mechanics to robotics and cyber under the term "technological education" therefore creates ambiguity and often confusion. This ambiguity creates a misrepresentation, which presents "technological education" as a springboard for academia and "future-oriented" professions, when in practice these "promises" refer mainly to the higher "technological" tracks. These promises do not reliably represent employment tracks that still serve students from low socio-economic class, guide them to working-class jobs, and do not direct them to a high-quality matriculation certificate that enables continued academic studies.

5 Statistics as government manipulation

The headline of a recently published article (Detel, 2019) declared that "Tracking, but for the First Time - Vocational Education Passed academic Education." Two years earlier, a similar article was published under the title: "Graduates of Practical Engineering Education Earn More than Graduates of Academic Education" (Margalit, 2017). These newspaper headlines present a situation in which vocational education, with all its various tracks, provides an advantage to its graduates over graduates of academic education. A thorough study of the data reveals a completely different picture. Claims against the "misrepresentation" presented by the Ministry of Education were raised, inter alia, at a meeting held in the Knesset called, "When you grow up you will be blacksmiths and secretaries: half of the youth in the periphery are in vocational education" (25.10.2017, minutes of Committee 95), within the framework of the special

committee for distributive justice and for social equality. It was argued that there is a great difference between the different tracks, especially between technological-practical engineering education and vocational education, and therefore an attempt to relate to them as one "field" creates a "delusion" that does not reflect the educational reality.

Evidence of this can be found in a report written by the Knesset's Information and Research Center in December 2018, which reveals a great deal of variance among the students studying the various tracks in vocational-technological education: The rate of entitlement to a matriculation certificate among graduates of practical engineering tracks in technological education is 89.2%, significantly higher than the rate of entitlement among students in technological trends (52%) and vocations (45.4%). In addition, there is a disparity among the different tracks according to the socio-economic class of the students - most of the students in technological education with a high socio-economic background study in the prestigious practical engineering tracks. Most students from a low socio-economic background study in vocational tracks.

It was also found that the practical engineering track contributes significantly to the wages of its graduates, while the vocational track even damages the salaries of its graduates. Moreover, in contrast to studies from other countries in the world (see for example Brunello & Rocco, 2017; Golsteyn & Stenberg, 2017; Stenberg & Westerlund, 2015), the disadvantage in the wages of the graduates of the vocational track is already noted in the first years after graduation.

Finally, an in-depth examination of the educational institution reveals significant differences in this aspect: Among students who applied for higher education, more than half from the biotechnology, software engineering and technological science tracks continued their studies at various universities. In contrast, most of the graduates of the education, tourism and leisure, and business management programs who applied for higher education did so in the various colleges, and only less than 20% of them studied at university. These findings, which testify to inequality, are "hidden" under statistical data that present a false representation of the success of vocational education and the reduction of gaps with respect to vocational education.

5.1 "Soon you will go far" - Rhetoric of strategic blindness

The Minister of Education, Naftali Bennett, during his tenure as Minister of Education, actively encouraged vocational education (or, more accurately, "technological" education as noted above), by publishing his slogan "**Soon you will go far**." He stated the following at a summit meeting of dozens of CEOs and senior executives from prominent Israeli companies (People and Computers, 2018):

> "Until a few years ago, Israeli schools were the same as those of 120-130 years ago - a teacher who stands and lectures to bored children. At that time, obedient, disciplined adults had to be raised to do what they were told. This was what was needed in the era of large factories and production lines. Today we need the exact opposite… The graduate of the future will be a creative person, a smart man with good tools in mathematics and English."
>
> The Education Minister added.
>
> "If there is no increase in the number of examinees in five matriculation units in mathematics, there will be no one to develop high-tech, there will be no one to build iron domes, and we will not obtain any more Nobel Prizes."

These words resonate with the findings in the literature about the disparities in the socialization of students from different socio-economic classes (also known as the "hidden curriculum") (see Anyon, 1980; Bowles & Gintis, 1976). These studies report how low socio-economic schools emphasize values of obedience and discipline that prepare them for working-class jobs. Upper socio-economic schools, on the other hand, emphasize values of creativity, independence, and leadership that prepare their students for elitist professions.

The Minister of Education completely ignores the case (as well as in other interviews with him or his descriptions on his Facebook page) of the public and research criticism of vocational education in Israel. This emphasizes that the Minister of Education's remarks are not relevant for vocational education students, the vast majority of whom come from families of low socio-economic class and stigmatic ethnicity (Mizrahim), who are directed to educational tracks that guide them to the professions of the working class (or the low-tech industry).

It is interesting to note that the Chairman of the Education Committee of the Manufacturers Association, at a meeting in November 2016, noted this disregard on the part of the Minister of Education by "cooling down" this class-oriented future orientation and indicating "modest" aspirations for members of the lower socio-economic classes that emphasize the "occupational security" that characterizes the traditional work world:

> "A production worker is not a high-tech worker. That's just the way things are. Conditions are different on the one hand, but on the other hand he has long-term employment security, he can work in the same workplace 10, 20 and 30 years."

This disregard and strategic blindness was also proposed by the Director General of the Science and Technology Administration in the Knesset Committee in July 2014:

> "We are talking about a system that enables each student to continue advancing, a system *that does not track,* does not create a 'glass ceiling' and 'a dead end.'"

In his attempt to deal with the tracking claim of discrimination against vocational education, the Ministry of Education presents an educational system that is not dependent on class or ethnicity, one that does not have a hierarchy between the tracks, and one that allows each student in each track to reach what he chooses. As expressed by the Director of the Education Division in February 2012:

> "Technological education is integrated vertically and not horizontally, and some of the students in it get an excellent scientific matriculation certificate, with 5 units of mathematics and 5 units of physics, just like in the theoretical education system."

Another example of distortion, deception, and even a governmental lie can be found in the words of the Director of the Science and Technology Administration of the Ministry of Education of November 2016:

> "We want to emphasize that the system does not track. Anyone studying automotive mechanics is in the matriculation track. Anyone who studies hotels and tourism is in the matriculation track. It's part of our worldview."

6 Discussion: Strategic blindness, ambiguity as a resource, and educational policy

An in-depth examination of the vocational education system in Israel reveals that for the students who study in the vocational tracks there is no "opportunity" for a promising employment horizon, and this is not a "choice." The claim that vocational track students *can,* if they desire, complete their studies with a matriculation certificate and that the matriculation track is open to them, is refuted by the data, which reveals that most of the students in the vocation tracks finish their studies with a poor matriculation certificate or no matriculation certificate at all.

The use of the term 'opportunity' in an unequal society is often a manipulative educational rhetoric because it legitimizes the existing policy that does not undermine existing relations of control. In addition, the Ministry of Education utilizes class and ethnic blindness in relation to vocational education by refusing to address the hierarchy between the different tracks and declining to relate to ethnicity or class or to present data on the matter. This class and ethnic blindness is consistent with the neo-liberal discourse, which gives an interpretation to the social and educational reality in terms of "ability," "interest," "self-efficacy," or "talent," and thus

ignores class issues and legitimizes inequality (Nylund, 2012). The neo-liberal and the psychological discourse, and the alliance between them (Shoshana, 2014), in turn promote practices that encourage silencing and ignoring issues of race and ethnicity.

Moreover, the analysis of the discourse conducted by the Ministry of Education with regard to vocational education reveals a great deal of ambiguity, which is expressed in various contexts: the use of the term "technological education" to describe study tracks that differ significantly from each other; presenting data in a way that hides the actual situation more than it reveals it; using false slogans and promises that do not meet the test of reality, at least not equally to all students in all tracks; inconsistency, and even concealment, of wage gaps between graduates of vocational and theoretical education; and promises for admission to higher education and lucrative positions.

This ambiguity is in fact a strategic resource for policymakers, enabling them to "allow" specific policies and governmental rationales that suit the current neoliberal agenda (Jarzabkowski, Sillince, & Shaw, 2010). This ambiguity, which is exacerbated by social inequality, creates deception aimed at meeting the demands of the labor market for available and cheap labor (Atkins, 2010), and is actually a tool for population regulation, or governmentality according to Foucault (1991).

We suggest that we try to understand the Ministry of Education's refusal to deal with issues of class and ethnicity, to relate to the hierarchy between tracks and the tracking that this education generates, as related to the "discursive volatility" of vocational education and its historical and social contexts in Israeli society. Vocational education in Israel is closely linked to inequality and ethnicity, ethnic discrimination, and long-standing tracking. This link was even dubbed "Productivication of Mizrahi Jews" (Zameret, 2005). The public criticism of vocational education in Israel, which links class and ethnicity, is even known as an "ethnic demon," which in turn can teach us about the fear of discursive volatility.

The term "ethnic demon" also appears in relation to other case studies on the class of Mizrahim in Israel (with regard to wage gaps between Mizrahim and Ashkenazim, discrimination in employment, and lack of representation of Mizrahim in prestigious positions) and assumes "hacking" or "eruption." Moreover, this is a metaphor that includes associations to dark worlds, panic about the [negative] demonic eruption, lack of control, lack of rationality, and instability. These characteristics, which threaten the social order, encourage delegitimization of critical claims, or at least attempts to imprison the critical demon in the imaginary space from which it erupted and caused a commotion.

The use of these strategies of strategic blindness and vagueness may prevent the public discursive commotion or immolation of criticisms about the connection between ethnicity, low socio-economic class, and vocational education, or the [hidden] privilege of distancing upper-class children from vocational schools.

We would like to argue that these strategies reinforce inequality and obtrusively deepen it. Moreover, I suggest that explicit reference to ethnization of vocational education may challenge the durability inequality and encourage creative thinking about educational alternatives. Conscious rhetoric of structural tracking, a connection between prestigious study tracks and specific ethnicities, and the populating of other study tracks by members of stigmatic ethnic groups, may, as poetically worded by Foucault (1988, p. 265), "question over and over again what is postulated as self-evident, disturb people's mental habits and the way they do and think things, dissipate what is familiar and accepted, and reexamine rules and institutions."

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The Resilience of Occupations in Occupational Fields. Disruption and Reinstitutionalisation of the Piano Makers' Occupation

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Abstract

Recurrently, dual vocational education and training systems are said to be unable to adapt to rapid changes of labour market requirements because of their large number of specialised occupations. To reduce the number of occupations and create broader profiles is one proposal for increasing flexibility, for example, by combining similar occupations in so-called occupational fields. However, little is known about the actual practices of establishing occupational fields. Based on the case study of piano makers in Switzerland, we shed light on an occupational associations' institutional work. Regulatory changes disrupted the piano makers' occupation. Yet, the occupational association reinstitutionalised it as part of the musical instrument makers' occupational field together with other occupations. More than a decade later, the piano makers are reintroducing their former occupational title, which is deeply connected to their occupational identity. Therefore, this case study illustrates the resilience of occupations within occupational fields.

Keywords

occupational field; institutional work; deinstitutionalisation; reinstitutionalisation; occupational identity

1 Introduction

Dual vocational education and training (VET) systems are characterised by the occupational principle *(Berufsprinzip)*, which is a social identification and allocation instrument that implies a close relationship between certified occupational qualification and employment activity (Hellwig, 2008; Severing, 2014). Recurrently, dual VET systems have been attributed to a lack of flexibility when requirements in the labour market change rapidly—for example, in times of fast socio-technological change like the current digital transformation. A repeatedly proposed

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measure is to increase the systems' flexibility by reducing the number of occupations, for example, by concentrating on core occupations or combining related occupations into so-called occupational families or *occupational fields*. This should broaden occupational profiles to improve individual mobility in the labour market and increase the efficiency of training (Häfeli & Gasche, 2002; Maurer & Pieneck, 2013; Seufert, 2018).

Already at the beginning of 2000, the reduction of the number of occupations was discussed. In Switzerland, a VET policy reform provided the opportunity to reorganise occupations in 2004. All occupations were to be adapted to the reformed national VET act, which prescribed new training standards. Then, around 300 different occupations on the VET track at the post-secondary level existed (Berner, 2013)—among them were 130 occupations with less than 100 apprenticeships per year (Häfeli & Gasche, 2002).

In Switzerland, occupational associations are the main actors when it comes to defining occupational training content and creating apprenticeship positions. This task is delegated to them based on the assumption that they know best what the labour market needs and can ensure a continuous adaption of VET. Occupational associations are, therefore, important educational actors (Baumeler, Engelage, & Strebel, 2018; Strebel, Engelage, & Baumeler, 2019). In addition, the federal state and the cantons are involved in VET governance and training takes place in firms and VET schools.

During the implementation of the 2004 reform, public authorities urged some of the smaller occupations to merge. This pressure provoked substantial institutional work from occupational associations. Institutional work is the purposive action of individual and collective actors aimed at creating, maintaining, or disrupting institutions (Lawrence & Suddaby, 2006). The institutional work perspective states that institutions—or, in our case, occupations—do not only need to be purposefully and actively created and maintained, but their *disruption* also implies effort (Lawrence & Suddaby, 2006).

Against this backdrop, we investigate the case of the piano makers' occupation as an example of one of the smaller occupations that had to merge into an occupational field and as an example of institutional disruption. The long-established traditional handicraft could not uphold the legitimacy of retaining its individual apprenticeship and lost its occupational title. We address the following research question: Which institutional work practices did the piano makers' association develop to deal with the deinstitutionalisation of their occupation?

Based on this in-depth case study, we contribute to the understanding of occupational fields and institutional work in two ways. First, we detail processes of occupational field construction and identify challenges. Here, we pay special attention to the importance of the occupational identity of the affected occupational association. Second, we shed light on institutional work in deinstitutionalization processes, because there is little research that investigates the practices through which actors aim to disrupt institutions (Clemente & Roulet, 2015; Lawrence & Suddaby, 2006; Maguire & Hardy, 2009).

2 Theoretical framework

2.1 Occupations and occupational fields

Institutions are enduring elements of social life that provide templates for action, cognition, and emotion (Lawrence, Suddaby, & Leca, 2011). An occupation (*Beruf*) can be conceived of an institution (Bechky, 2011; Lawrence, 2004). It is defined as "a formally recognized social category, with regulative structure concerning VET, qualifications, promotion and the range of knowledge, both practical and theoretical, that is required to undertake the activities that fall within it" (Clarke, 2011, p. 103). It represents a division of labour, also referring to particular wage relations, social position, and social status.

Occupations are based on collective governance where consensus-oriented and time-consuming decision-making involves key sectoral stakeholders (Clarke, Winch, & Brockmann, 2013). Because they are the result of negotiation processes, occupations are social constructs rather than mere reproductions of activities found in the labour market (Dehnborstel, 2005; Schwarz & Bretschneider, 2014). Further, occupations are not only legally, but also normatively and cultural-cognitively defined (Nicklich & Fortwengel, 2017).

In the last century, economic and technological development has led to an increasing number of specialised occupations as a result of the differentiation and specialisation of work (Pahl, 2001). The increasing differentiation of occupational profiles has repeatedly been a topic of VET policy (Maurer & Pieneck, 2013). While employers are usually interested in VET that is closely tailored to their needs and allows apprentices to work productively as quickly as possible, narrow occupational profiles can restrict individual mobility on the labour market. Further, it is argued that constant technological change requires broader competencies. In addition, a larger number of occupations raises costs for the public sector, as occupation-specific offers at VET schools are mostly publicly financed. The discussions, therefore, revolve around the fundamental question of how narrow or broad occupational profiles should be designed.

The construction of an occupational field is one attempt to reduce complexity. It comprises of a group of occupations that have certain similarities in terms of activity, training path, and requirements (Häfeli & Gasche, 2002). The construction of occupational fields should provide apprentices with broader skills, improve the mobility of workers within the field, and increase efficiency in training and regulation. It should also improve transparency by reducing the amount of information for young people who are about to choose an occupation. In occupational fields, training of different occupations can be combined, but there also remains specialised content to account for the peculiarities of individual occupations (Schwarz & Bretschneider, 2014).

2.2 Institutional work and disruption

The institutional work perspective (Lawrence & Suddaby, 2006; Lawrence, Leca, & Zilber, 2013; Lawrence, Suddaby, & Leca, 2009; 2011) deals with various forms of institutional change and focuses on the role of actors in these processes. It states that institutions need to be purposefully and actively created, maintained, and disrupted, and highlights the knowledgeable, creative, and practical work of individuals and collective actors attempting to shape institutions. Institutional work involves reflexive awareness and effort and addresses cultural-cognitive, normative, and regulative pillars of institutions (Scott, 2008). This theoretical stream is especially interested in studying institutional work that is "nearly invisible and often mundane, as in the day-to-day adjustments, adaptations and compromises of actors" (Lawrence et al., 2009, p. 1).

The institutional work of *disruption* refers to deinstitutionalisation, which is a "process by which the legitimacy of an established or institutionalized organizational practice erodes or discontinues" (Oliver, 1992, p. 564). Here, organisations fail to continually reproduce previously taken-for-granted actions. This might be the case when changes in the political field, in laws and societal values, or functional economic considerations call the legitimacy of a traditional practice into question. Then, organisations might respond to changing circumstances either by proactively and consciously deinstitutionalising a practice or they might exert little control over environmental change and react passively or subconsciously. Consequently, the delegitimation of an institution might also foster institutional replacement (Oliver, 1992) or "repair work", which is institutional work carried out to undo disruption (Micelotta & Washington, 2013).

For example, outsider-driven deinstitutionalisation, such as regulatory change, might destabilise established practices (Greenwood, Suddaby, & Hinings, 2002; Maguire & Hardy, 2009). Organisations may react by innovating and seeking solutions. These innovations need to be justified to gain broader acceptance and legitimacy. The innovation is only fully reinstitutionalised when the new ideas and practices become taken-for-granted as a natural and appropriate arrangement. If the reinstitutionalisation process is successful, new ideas and practices become embedded and routinised, which allows their reproduction over time.

3 Method: Qualitative case study

We explore our research question by using a qualitative case study (Merriam, 2009; Patton, 2015). The aim of case study research is to conduct in-depth analysis, focussing on the participants' perspective (Mills, Harrison, Franklink, & Birks, 2017). It intends to provide a comprehensive holistic account that helps in understanding the phenomenon.

The case selected here is the piano makers' occupation. After the Swiss VET reform of 2004, public authorities aimed at reducing the number of occupations by merging small occupations. This led to the disruption of the piano maker occupation. The piano makers' apprenticeship merged with organ builders and wind instrument makers to become the musical instrument makers' apprenticeship.

Typically, case studies use various data sources (Mills et al., 2017). First, we analysed official documents concerning the VET reform to set the ground for our empirical study. Second, our case study was based on theory-generating, semi-structured expert interviews with a key representative of the occupational association and two pedagogical consultants in the reform process for the smallest occupations (Bogner, Littig, & Menz, 2009). Third, we used document analysis. Data sources were official communications, such as the magazines of the occupational association, websites, newspaper articles, and government documents, as well as statistical information. The analysis of the different sources served to reconstruct the occupational reform process (Langley, 1999) and to identify the occupational associations' institutional work.

4 Results: Disruption and Reinstitutionalisation of the Occupation "Piano Makers"

Piano making and tuning have always been a niche occupation with low numbers of apprentices. Yet, while in the 20th century a piano still belonged in every good room, in the 1960s the Swiss had to compete with imports from the Far East. At the same time, modern residential construction meant that larger pianos hardly found any room. Today, ten times more digital than acoustic pianos are imported into Switzerland and musical instrument makers specializing in the piano are mainly concerned with maintaining, repairing, and tuning these instruments (Grossrieder, 2018).

The association of the piano makers, founded in 1947, brings together around 240 piano makers and tuners from all Swiss language regions. It defines the content of vocational training, arranges expertise, and organises events and further training. The management of the association works on a voluntary basis without payment. Piano makers were among the first to implement the 2004 reform in their occupation and the apprenticeships in the newly created occupational field started in 2007 with an average of 12 apprentices per year.

During the VET reform in the early 2000s, public authorities identified piano makers as one of the small occupations that should be merged into an occupational field. They received a letter from the public authorities saying this occupation could no longer exist if it was not integrated into an occupational field and they were urged to join forces with other small craft occupations in the woodworking sector. This started the outsider-driven deinstitutionalisation process and provoked substantial institutional work of the piano makers and tuners association.

Fearing their occupation would lose its recognition as an apprenticeship, they first examined alternatives. One possibility was to stop training in Switzerland and send apprentices to a German training centre. However, this idea was rejected with the argument that training in Germany lasted only three years instead of four and thus would not offer the same quality. Another argument was that training was not offered in French and, therefore, French-speaking Swiss were left behind. Finally, the association took part in the meetings of the smallest occupations organised by the public administration to find out if the suggested merger with other wood occupations was possible. These first meetings, however, did not bring any agreement because of large differences in the individual occupational activities. However, the occupations that built and maintained musical instruments showed more commonalities than other woodworking occupations. Consequently, as one of the first small occupations, the piano makers joined forces with the wind instrument makers and the organ builders to found the umbrella occupational association of musical instrument makers. Thus, they became pioneers in establishing a so-called occupational field, which also meant they started reinstitutionalising their apprenticeship.

The public administration supported the occupational reforms financially, which allowed for developing educational plans and teaching materials. The first challenge was identifying common educational content for the three occupations and determining the areas in which occupation-specific education was required. Moreover, all educational plans were to be formulated and elaborated in accordance with the new competence orientation at the time. An educational consultant was commissioned to provide support and the process was initiated in accordance with the legal requirements. A reform commission, including representatives of the Confederation and the cantons, the presidents and examination experts of the associations, as well as some teachers and the Swiss trade association, was formed. They discussed the issues associated with merging occupations in detail because the novelty of the procedure for musical instrument makers served as an exemplary case for subsequent mergers. Musical instrument makers managed to assert their interests because their president was a member of the Swiss National Council and was thus able to negotiate with federal and cantonal representatives and make use of a well-developed network.

At the same time, it became clear that professional management of the umbrella organisation of the musical instrument makers was indispensable because the members of the organisation, who had previously worked voluntarily, were no longer able to cope with the additional workload and the loss of income while doing institutional work. This meant that paid staff was hired for the administrative work. However, the membership fees of the associations were not sufficient to finance the staff of the umbrella association. To raise additional funds, an obligatory training fund was set up, into which all firms had to pay. This led to some contestations and, finally, a firm who did not want to pay was sued. In addition, the association argued that importers of musical instruments also benefitted from the good education in Switzerland. Because they had an interest in skilled workers able to maintain the instruments, it was fair to demand a levy from these firms.

Besides new training content and the umbrella association, the musical instrument makers had to find a location for their new vocational school and training centre. Several cantons rejected an application, only one canton saw the musical instrument makers' request as an opportunity to revive an agricultural vocational school. Private patrons of the arts donated a considerable amount of money to equip this school with training material.

Today, the training consists of a basic study course, organised together with other instrument makers, and specific learning content within the field of piano making and tuning. The apprentices are trained in companies, as well as at a training centre, which offers inter-company courses. During their training, the students build an acoustic piano and thus gain in-depth knowledge of the structure and interaction of the individual parts of the instrument. The

lessons in the training centre are held bilingually and the learning material is available in German and French.

Notwithstanding this successful reinstitutionalisation of the piano making apprenticeship within an occupational field, merging came at a high price for piano makers. They were not allowed to keep their occupational title and from then on were called "musical instrument makers with a specialisation in piano making and tuning". It was difficult and painful to communicate this loss of identity to the members of the association. Or, as the president of the piano makers' association expressed it more than ten years after the founding of the occupational field: "We are no musical instrument makers; we make pianos!"

5 Conclusion

Dual VET is often praised for its proximity to the labour market because of the involvement of economic stakeholders. Nevertheless, it is criticised for being too complex and slow in times of a rapidly changing world of work. The differentiation into many specialised occupations is regarded as being inert, regulation-intensive, and inflexible. One solution repeatedly proposed is to increase the efficiency and transparency of training and the mobility of workers is reducing the number of occupations, for example by concentrating on core occupations or competencies, constructing occupational families, or merging related occupations into occupational fields.

The case of the piano makers shows how a regulatory reform delegitimised the existence of a long-standing occupation. This occupation, therefore, needed to merge with other occupations into an occupational field. Yet, the occupation did not just disappear. By identifying the piano makers' associations' institutional work, we document how they reconstructed and reinstitutionalised their occupation. Crucially, cultural-cognitive and normative factors influenced the organisational effort, as well as the high commitment of a large number of association members to the value of apprenticeships. Over the years, the identification of piano makers with their own occupation has been a guiding principle. Today, the piano makers are at the verge of regaining their formerly abandoned occupational title and, thereby, successfully completing their reinstitutionalisation work. This finding illustrates the resilience of occupations and occupational associations.

In conclusion, the creation of an occupational field at least partially calls into question the occupational principle. Thus, such a policy measure cannot be thought about without considering the governance structure of the respective VET system. If, as in Switzerland, occupational associations are equipped with far-reaching responsibilities, it is necessary to consider these collective actors. If their occupational identity is not preserved, occupational associations may engage in work to reinstitutionalise their occupation or, if they fail to do so, they might no longer be committed to continually offer apprenticeships and their member companies might lose their willingness to train. Thus, this case study indicates that policy-makers might need to strike a balance between searching for training synergies and respecting occupational identities. Finally, whether reducing the number of occupations actually has the effect of increasing efficiency and improving labour market mobility remains an open question for further research.

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New Methodical Approach to the VET Teachers' Training

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Abstract

Although the national VET systems differ in many aspects, the development of the new technologies and the spread of interactive and collaborative learning environment have brought about a general intention to launch action researches with innovation objectives. Our four-year project is aimed at the renewal of educational content and methods, and because it is strongly connected to schools, it is of empiric nature. The lecture describes the innovation processes relating to the content-methodological renewal of vocational teacher training. Since 2016, a network of 12 schools has been established in which teachers and students implement content development activities. This work aims to reduce the deficits in vocational learning materials as well as to modernize the slowly changing content. This model, which is aimed at serving this objective, necessarily requires a modern ICT-based infrastructure that helps online and collaborative learning.

Keywords

ICT; micro contents; open content development; teacher training; VET

1 Introduction

One field in the development of VET systems that bears serious development risks and possibilities all over the world is teacher training. In the last decade, the McKinsey report was an essential factor in recognizing the fact (Barber & Mourshed, 2007) that the future success and efficiency of educational systems was highly dependent on the teachers' quality and the effectiveness of their preparation. In VET, where educational content is permanently changing, and the learning environment has profoundly transformed during the latest years, the level of technical education very much depends on the teachers' methodological skills. Also, the renewal of the didactics applied in VET has become of exceptional importance during the latest years (Gessler & Herrera, 2015) mainly because owing to the online and interactive

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technologies (Beetham & Sharpe, 2013) the educational and learning environment has opened up many new opportunities (Mészáros, 2014).

In 2016, the Hungarian Academy of Sciences launched a four-year program that placed methodological modernization into the focus of subject pedagogical developments. One of the core features of our project is that in line with the nature of VET, stepping beyond the disciplinary frameworks and adjusting to the sectoral characteristics of VET and the structure of vocational teacher training, it aims to develop the methodological skills of the engineer-economist teachers in the online environment, with interactive techniques and collaborative processes (Benedek & Molnar, 2015). It is a specific, future-oriented challenge that the innovation model we wish to present in our lecture is being formed at a technical university environment that has a history of almost one and a half century in the field of vocational teachers' training.

2 History of OCD model

Our starting point is that the traditional curricular structures and the school books objectifying these for the pupils are somewhat limited in warranting the dynamics and the quality of the education of vocational subjects. Regarding the school books and handbooks, our surveys made it clear that the total deficit in learning materials is about 30 per cent while regarding quality, app. Forty-five per cent of the existing materials does not meet the requirement of being up-to-date. In the case of VET, this tendency could very clearly, and the challenge is growing tougher in the future. The essence of our model, which has been proved by our first development results, is that in the development of vocational educational content, the partnership that is much more open than traditional content development processes could establish between the teachers and the students. For all this, the online learning environment and interactive communication offer a favourable development environment where the partners' activeness and so their development attitudes can mutually be improved. Our procedure the target was at establishing a system in the process of the so-called open content development, from teacher training to the integration of VET teacher trainees at the schools, that comprehensively develops the teachers' (students-pupils') attitudes and their skills in adopting interactive, collaborative methodological techniques and also apply them in the school practice.

In a didactical sense, this model theoretically based on the classic student-teacher-content triangle. However, the development scope is much more complicated (Haege, 2015). Relying on the attitude surveys, we strived to develop the teachers' and the students' activity, as well, and to compose construction tasks similar to those in community-based content development. Micro contents that are connected to the creation of the learning results at the elementary level fulfilled essential functions as construction tasks. On the one hand, relating to the system of curricula, learning objectives and results in content development indicate a trend of collaborative creation in which activities may lead to concrete aims, results and successes (Ure, 2015). On the other hand, the role of images, that are permanently required in vocational didactics, as well, can be much more strongly asserted than in traditional processes. By applying the BYOND attitude, considerable student activity can be achieved, and at the same time, learning content can be developed in a differentiated way, deficiencies can be completed and the existing learning units updated.

The wider didactical environment of our model also offered the opportunity to integrate essential elements appearing as results in terms of the sustainability and the dissemination of the model. Thus, for example, new methodological modules were introduced and tested in the teachers' training and further training, the adoption of learning framework systems with VET objectives has become general, which has established up-to-date possibilities in the field of online collaborative learning, and the creation of cloud technologies intended to provide infrastructural support for content development and to help the wide range application of micro-

content (Benedek & Horváth, 2016) with an open-access attitude has also brought about promising results.

The lecture frames the general description of the model developed in the first half of the project. The theoretical background of our research is connected to the analyzations the frameworks of which were set by our research community at several fora (ECER VETNET, EDULEARN, INTED) along with our international activities aimed at renewing vocational didactics. Although the national VET systems differ in many aspects, the development of the new technologies and the spread of interactive and collaborative learning environment have brought about a general intention to launch action researches with innovation objectives. One of these initiations was the subject pedagogical research program prepared by the Hungarian Academy of Sciences between 2015 and 2017 that incorporated our project dealing with the development of VET methodology in 2016. The four-year project is aimed at the renewal of educational content and methods, and because it is strongly connected to schools, it is of empiric nature. Our research offers the possibility to launch concrete innovation processes connecting to the content-methodological renewal of vocational teacher training. Since 2016, a network of 12 schools has been established in which teachers and students implement content development activities. This work aims to reduce the deficits in vocational learning materials as well as to modernize the slowly changing content.

About the possibilities of local innovation, the methodological speciality of our project is the development of vocational micro-content and the creation of the connecting new pedagogical practice. The development is open for teachers and pupils, as well, therefore during the research, surveys examining the teachers' and students' attitudes have been made. We also analyse the new knowledge elements created during the modernization of the contents and also elaborate a series of methodological proposals that warrant the sustainability of the model.

This lecture primarily aims to describe the whole system relying on the first experiences in the operation of the OCD model, and so make the adoption available for a broader range of practice. One of the essential elements of our model is to implement strategic developments in the higher education phase of vocational teacher training. By doing so, we provide the possibility of learning the new methodology and the connecting techniques for the career starter vocational teachers. In the current phase of our project, we are establishing the infrastructural conditions (Sik, 2018) of the system connecting to content development, which will provide help for the teachers in the course of content development (creation of micro contents). Within the frames of the action research, we support collaboration between teachers in the pedagogical practice as well as the sharing and archiving of the new content in a network system by providing up-to-date cloud services.

3 Our Research Methods

The conceptional background of our research is connected to the analyzations the frameworks of which were set by our research community at several fora (ECER VETNET, EDULEARN, and INTED) along with our international activities aimed at renewing vocational didactics. The theoretical foundation is also supported by some international research projects (Opening Up Education), which is also crucial for Hungarian applied research (Pongrácz, 2017). Based on these, the authors can build action research on BYOD / BYOC approach.

Although the national vocational training systems differ in many aspects, the development of the new technologies and the spread of interactive and collaborative learning environment have brought about a general intention to launch action researches with innovation objectives. One of these initiations was the subject pedagogical research program prepared by the Hungarian Academy of Sciences between 2015 and 2017 that incorporated our project dealing with the development of VET methodology in 2016. The four-year project pursues at the renewal of educational content and methods, and because it strongly connected to schools, it is

of empiric nature. Our research offers the possibility to launch concrete innovation processes to the content-methodological renewal of vocational teacher training. Since 2016, a network of 12 schools established in which teachers and students implement content development activities. This work aims to reduce the deficits in vocational learning materials as well as to modernize the slowly changing content. About the possibilities of local innovation, the methodological speciality of our project is the development of vocational micro-content and the creation of the connecting new pedagogical practice. The development is open for teachers and pupils, as well, therefore during the research, surveys examining the teachers' and students' attitudes have been made.

We also analyse the new knowledge elements created during the modernization of the contents and also elaborate a series of methodological proposals that warrant the sustainability of the model.

Based on the main trends and tendencies in the universe of industrial revolutions, the new developmental direction for technological innovations is called Industry 4.0.

The everyday use of new technologies (specifically ICT tools) is marked as digital literacy, which is already pervasive in our daily lives and our lifestyle. This influence is of great importance in the specialization phase of teacher education and training.

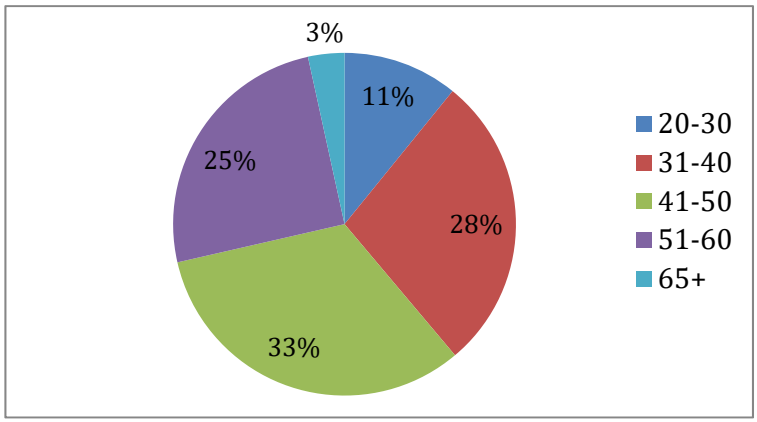
4 Empirical Survey

In this lecture, the author will address the role of ICT in vocational education, teacher training, and cloud-based and mobile learning methods. In addition to the theoretical considerations, the authors support the hypotheses through practice-oriented applications drawn from professional teacher training and empirical surveys and seek answers to open questions. The basis of the investigation is based on a simple stratified sampling method regarding a quantitative survey concluded in 2017, which reflects the results of a target group of N = 157 people. This lecture primarily aims to describe the whole system relying on the first experiences in the operation of the OCD model (Benedek & Molnár, 2017), and so make the adoption available for a broader range of practice. One of the essential elements of our model is to implement strategic developments in the higher education phase of vocational teacher training. By doing so, we provide the possibility of learning the new methodology and the connecting techniques for the career starter VET teachers. In the current phase of our project, we are establishing the infrastructural conditions of the system connecting to content development, which will provide help for the teachers in the course of content development (creation of micro contents). Within the frames of the action research, we support collaboration between teachers in the pedagogical practice as well as the sharing and archiving of the new content in a network system by providing modern cloud services.

The empirical test was in autumn 2017, a quantitative questionnaire based survey assessed the opinion of a sample of (N=177) instructors in vocational training institutions and students enrolled in vocational teacher training programs. In the case of the empirical test, we used on-line questionnaire forms, the tested multitude was chosen via simple layered sample taking the procedure, and the respective answers were processed and analysed with descriptive statistical methods. The size and wording of the questionnaires reflected the needs and demands of the given target group. Thus survey forms completed by instructors provided a more detailed and higher amount of information. Since the respective target groups are independent of each other and apart from a few exceptions they do not know each other, we can gain a comprehensive view of the current status of vocational training, and general conclusions can be drawn by the expansion of the sample. The aim of the testing process is to demonstrate the differences and similarities of the opinions of pedagogues and students, along with exploring the potential causes while integrating the respective information in the academic profile of our Department.

5 The results of the instructor survey

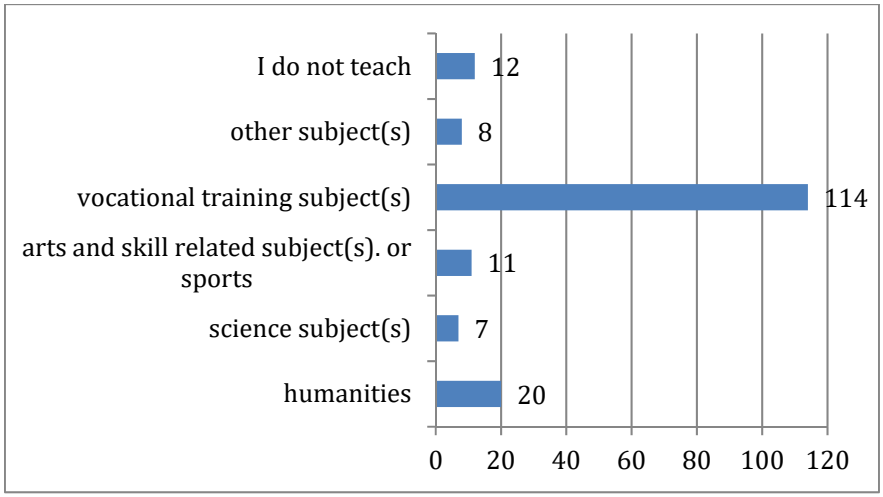
At first we provide a few pieces of characteristic and essential data gained from surveying the opinions of teachers. We present the given information in a graphic form, in diagrams. Figure 1 shows the age distribution of the respondents representing the X, Y, and Baby Boom generations.



Source: author's own compilation

Figure 1 The age distribution of the respondents

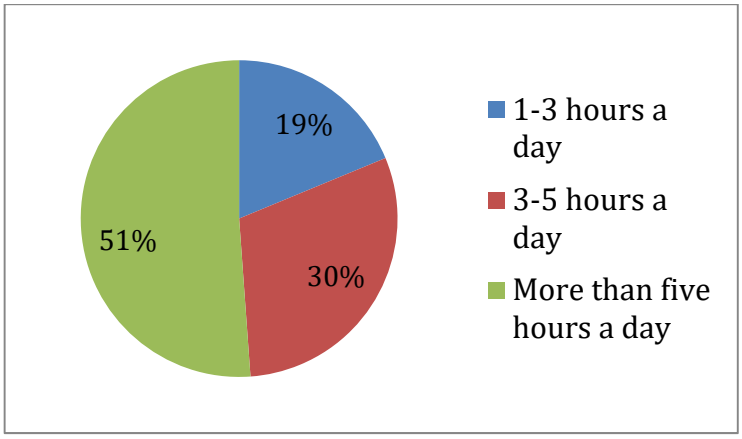
The next graph shows the distribution and variety of the subjects instructed. Accordingly, the figure proves that 64,4% of the respondents teach professional or vocational training related subjects, as most of them work as vocational instructors.



Source: author's own compilation.

Figure 2 The distribution and variety of subjects taught by the respondents

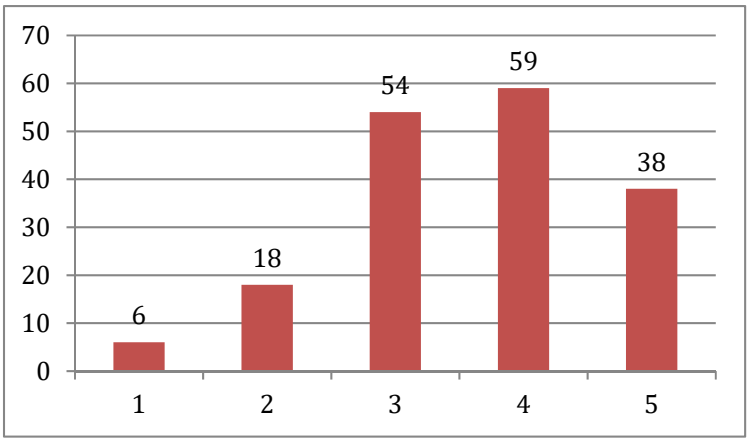
The figure below illustrates the amount of time people use computers during an average work day. Accordingly, 51% of the respondents use computers more than 5 hours a day while approximately 1/3 of the sample work with computers between 3 and 5 hours a day. Such findings prove that the respondents' digital culture is dominated by computers.



Source: author's own compilation

Figure 3 The distribution and variety of computer use among the respondents

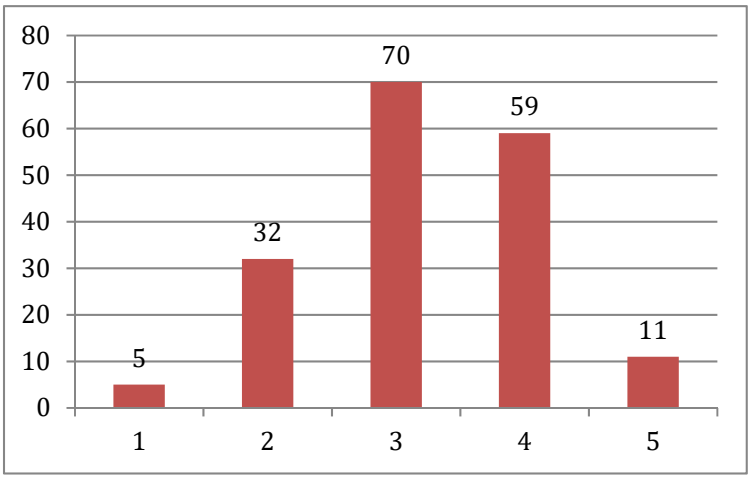
Figure 4 illustrates the extent of ICT device use in the education process with the value of 5 representing the use of such technology in every class. It can be concluded that ¾ of the respondents use ICT devices virtually on a daily basis.



Source: author's own compilation

Figure 4 The distribution and variety of the extent of the respondents' computer use

The last figure represents the availability of ICT devices in the respective institutions with a value of 5 representing full availability. Accordingly, the ICT accessibility at the institutions surveyed is at average or medium level.



Source: author's own compilation

Figure 5 The distribution and variety of the accessibility of ICT devices at the schools of the sample

6 Conclusions

According to the activities done during the preparation year (2015) and the currently running project (2016-2020), the first results of our researches can be summarized as follows:

- we have established the theoretical background that gives the basis for our three-level model the internal structure of which is as follows:
- the VET didactical analyzation of the micro-content connected to the learning results at the elementary level
- initiation of methodological innovation in vocational teacher training and the further education of teachers working in VET
- establishment of a pilot school-network (12 schools) I which we examine the impacts and the results of the innovation
-

The starting point of our VET didactical principles is that less and less fixed and stable learning materials are available in VET. Therefore a new type of partnership must be created in content development that allows the teachers' and students' active participation. The OCD model, which is aimed at serving this objective, necessarily requires a modern ICT-based infrastructure that helps online and collaborative learning. The process, that has already been introduced and tested in school practice, shapes the teachers' content development culture at the micro level. The development of micro-content allows cooperation while the size of the task and the time demanded by the applied process can be adjusted to the teachers' everyday activities. An essential condition of this method, which focuses on a training field wider than the traditional disciplinary - subject based view, is that the teachers get targeted preparation to use it. The essential phase of this is teacher training. However, the teachers' further training is also of great importance as well as the local support of developments.

A new element of the OCD model is that it is open to the students' activities, which allows a unique type of cooperation between teachers and students. The most significant added pedagogical value of this, which is also perceivable in practice, is the increase in the students' activity.

The development program initiated at pilot schools is currently stepping towards general practice. So far, our measurements have strived to determine the attitude levels of the teachers and the students. Since the micro contents elaborated by the teachers and the students can be considered essential results of the development, their evaluation and the analysation of their content and genre may reveal new possibilities of VET educational content development. In the next phase of our research, we will primarily focus on the analyzation of these impacts and the operational results of the OCD model.

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Vocational Education and Training, the Contested Partner in Innovation Projects. Questions and Remarks

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Abstract

The Learning Region concepts primarily consider universities as innovation partners and ignore vocational education and training (VET) and secondary education in general._My research attempts to point to the role of VET institutions as potential innovation partners in local development processes. I explain the reasons which lead to the fact that secondary VET is mostly ignored in the learning regions concepts. I search the differences in the interpretation of innovation concepts how they handle VET. The main research question is, what circumstances support and what block and reduce the chance to build strong partnership with the involvement of VET institutions. There is still a strong tendency in many cases to interpret secondary VET as a means of responding quickly to the needs of the economy (particularly short-term). It is a crucial question if the higher pro-activity level of VET can give a positive shift to become an innovation partner.

Keywords

learning region; learning community; innovation; partnership; secondary vocational institute

1 The learning region

1.1 Theoretical background

From the 1980s onwards, based on a set of inter-directly or indirectly related disciplines, numerous conceptual elements had emerged and strengthened which were favourable for the birth of the multiple disciplines common set of "learning regions" concept. Among others, regional sciences (Rechnitzer, 1993), innovation theory (Lundvall, 1992), organization theory (Castells, 1996), management sciences (Bakacsi et al., 2004), direct democracy and bottom-up theory (Ray, 1999) paved the way for the creation of a *new concept*, which by adjusting the emphases of new scholarly approaches led to the birth of a new structure, using the same building blocks. The appreciation of local knowledge, the function of the local economy, grassroots initiatives, creativity and a broader interpretation of innovation, the importance of implicit knowledge in terms of competitiveness, the role of partnership in the development of a particular area, were already known before the learning region concept has emerged. By linking these elements and rearranging their emphases, the emerging learning region concept created a new quality (Benke, 2013, 2015).

Learning appears as a key building block in the connection system of those organizations which are capable of learning. In the course of evolving cooperation, learning processes take place in *network relations*. Knowledge transfer, knowledge sharing, creation of new knowledge happen along the strands of networks in the non-formal and informal learning processes. Connection points in the networks can be considered as birth places of the new knowledge (Erdei & Teperics, 2014).

Although, the learning region concept has generated several debates among the researchers for years (Hassink, 2007), however, all the challenges it has faced, both regarding theoretical debates and empirical experiences (Boekema, Morgan, Bakkers, & Rutten, 2000) it offered very rich sources of information and knowledge, providing great support and solid basis for further research. To achieve and maintain the learning region, it is still a most focused target of policies influencing regional economic adaptability (Benke et al., 2018).

1.2 Common elements and different contexts; the interpretation of innovation

All learning region concepts emphasize the importance of learning within and between organizations. This process is a learning partnership that will create added value for the participants. The learning region concepts have some common building blocks, as of dialogue, partnership, recognizing the importance of local knowledge, innovation processes launch, bottom-up initiatives, development and co-operation of networks (Asheim, 1996; Florida, 1995; Lundvall, 1996; Morgan, 1997; Putnam, 1993).

The learning region concept represents a serious promise for development policy in support of lifelong learning. The European Commission supported a number of projects and programs aimed at the creation of that learning regions (R3L + program, Telson, PENR3L, the Learning Regions Network in Germany).

Asheim draws attention to the different contexts of the "learning regions" concept (Asheim, 2007). It was introduced by economic geographers in the 1990s in order to illustrate and examine the importance of cooperation and collective learning in networks for fostering innovative and competitive regional development strategies in the global learning economy (Asheim, 1996; Florida, 1995; Morgan, 1997). According to an other approach, "the idea of learning regions originates from the new evolutionary and institutional economic writings on the knowledge and learning based economy, where knowledge is considered the most fundamental resource and learning the most important process"(Asheim, 2007, p. 219). This ensures the learning capacity of an economy strategic importance for its innovativeness and competitiveness. In this context "innovation is understood as interactive learning in contrast to the previous hegemonic linear model of innovation" (Asheim, 2007, p. 219). The third approach conceptualizes "learning regions as regionally based development coalitions" (Asheim, 2007, p. 219) of intra- and inter-firm learning organizations based on broad participation out of the firm context.

As Hassink points out, „most scholars consider learning regions as a regional innovation strategy in which a wide range of innovation-related regional actors (politicians, policy-makers, chambers of commerce, trade unions, higher education institutes, public research establishments and companies) are strongly but flexibly connected with each other" (Hassink, 2010, p. 51). Emphasizing the importance of partnership and cooperation between stakeholders, the key role of universities as innovation partners, the utilization of local knowledge and the support of bottom-up activities, the concept of learning region easily became a flagship of the university-based regional/urban development activities, the lifelong learning movement and offered an appropriate environment for research projects targeting local development with a wide range of regional instruments (Benke, 2014).

There is a discrepancy between the concepts of the learning region on the interpretation of innovation and the role of universities and research institutes (Lorenz & Lundvall, 2006). In the

North American approach, in a knowledge-based, high-tech economy, learning regions are linked to the importance of the quality of the knowledge infrastructure of leading universities and research institutes, producing, attracting and retaining highly skilled workers (such as the Silicon Valley) (Florida, 1995). According to the European interpretation, contrary to the above, the analysis of learning regions focuses on the contribution of social capital and trust in supporting dense networking between companies and the process of interactive learning (Wolfe, 2002).

1.3 Appearance of non-market and non-economic factors

Emphasizing interactive learning in the concept of learning region points to the importance of collaboration, and leads to the importance of non-market and non-economic factors (Putnam, 1993), to the role of social capital (eg. trust) in the economic performance of institutions, regions and nations. In the "New Economy" learning represents the key, and so it embodies a qualitatively different requirement compared to simple market transactions and exchanges.

The fundamental difference is that knowledge creation and learning are essentially social rather than market processes. It includes the development and exchange of tacit, hidden and underdeveloped knowledge, for which there are no markets (Storper, 1993). Instead of non-existent markets, networks are places where such learning takes place.

According to the latest approaches, learning regions can only develop in a way that is compatible with sustainable development. According to this, people and communities in the learning region learn together how to create economic recovery, social capital and ecological sustainability.

1.4 Education and training institutions as innovation partners

Concerning education and training institutions, the learning region concepts primarily consider universities as innovation partners (Goddard & Chatterton, 1999; Lorenz & Lundvall, 2006), and vocational education and training and secondary education in general are ignored in the concepts. In this way, there is a contradiction in the concept between 'ignoring' vocational education and training and so the 'non-inclusion' of a large group of people, and the ’advocacy’ of bottom-up initiatives. Secondary VET institutions, as potential collaborating partners, are present in a much larger proportion of the regions and are available to larger groups of learners than higher education institutions. With ignoring them, especially in underdeveloped micro-regions, the power to utilize local knowledge in the development of the area is being reduced (Benke, 2013).

In the underdeveloped regions, the proportion of people with tertiary education is insignificant, so the importance of secondary education is relatively highly appreciated there. If it is important to involve local forces in local innovation processes, the involvement of those with the highest level of educational attainment at local level and considering them as potential partners in local innovation processes, can represent a mobilizing force towards the wider local community (Benke, 2019).

The broader range of training institutions - as potential innovation partners - can be found in those approaches of the learning region where the term ’learning region’ is interpreted as a regional-based development coalition (Asheim & Gertler, 2005; Lundvall, 2008). This coalition includes a wider range of organizations and institutions that influence and support learning and innovation in a given region (Asheim, 1996; Morgan, 1997). While at the level of theoretical concepts of the learning regions, secondary education and training do not play a prominent role, there are examples of development projects where the importance of secondary education appears. In the OECD Learning Region project, five participating European regions considered “there and then” the development of secondary education as the key to development (Németh, 2014; OECD, 2001). One of CEDEFOP's publications examined the impact of the learning

region concept on local development through case studies, highlighting the role of VET and secondary education and training (Gustavsen, Nyhan, & Ennals, 2007).

2 The learning city

In spite of the fact, that the concept "learning region" was rather flexible since it's first appearance, the failure of some large development projects and the changing policy environment could not ensure a supporting atmosphere for learning region projects any longer, and required a new, more easily "digestible" and more concentrated spatial approach for the development works which led to the emergence of the „learning city" concepts. A very important policy issue contributed to this shift from the regional level to the city level. As the concept of regional equalization has lost it's dominance in the regional development policy, large cities with strong university links – as regional poles – came into the focus of policy interests as the new targets of regional development, and as an evidence of this process, learning cities came in place of learning regions both in terms of policy and project level.

A number of international development projects address cities (Pallace, TELC, PASCAL Learning City in 2020) (Longworth & Osborne, 2010), which are intended – among other things – to develop the "learning performance" of cities. (Hungarian participation has been displayed in the learning city projects, as Pécs has been involved in the development activity of PASCAL (Németh, 2014).) The prominent role of universities in the learning city projects can be considered as one of the most important features of these projects (Gál, 2010).

3 The learning community

Along with the continuation of the discourse on learning regions and learning cities, growing attention is being paid to learning communities, as well (Benke, 2014). According to the 'classic' vision of the learning community, it implies close co-operation of the local economy, local schools, colleges, universities, professional associations and local government to ensure that the community is a pleasant, livable place for members of the community in all aspects (Longworth, 2012).

Faris offers the interpretation of the generic term "learning communities" as a nested concept of social/cultural learning with an expanding scale of learning environments. He identifies the following learning communities: virtual global learning communities, learning communities of place, learning organisations, academic learning communities, communities of practice and learning circles, virtually placed them in a nested 'Russian Egg' (Faris & Wheeler, 2006). Another concept, based on a system approach, starting from the controlled systems is reaching the alive learning systems, deals with the learning communities by considering the principle of sustainable development essential for the future (Clarke, 2009).

In accordance with one of the latest approaches of the European Union, the learning communities are evaluated on the basis of how the members of the communities work together and as they utilize the resources of the communities. Non-traditional, new, innovative partnerships have an important role in the formation of these learning communities. Regarding this new approach of the EU, all kinds of learning - from the first steps to the highest standard, from the formal to non-formal and informal learning - is viewed as valuable and which enriches the community. Interest and capacity of citizens related to learning are considered the most valuable resources of the learning community (Gejel, 2012).

4 The target and the method of the research

My research attempts to point to the role of VET institutions as potential innovation partners in local development processes. I am planning to explain the reasons which lead to the fact that secondary VET is mostly ignored in the learning regions concepts. I search the differences in

the interpretation of innovation concepts how they handle VET (Asheim, 1996). The main research question is, what circumstances support and what block and reduce the chance to build strong partnership with the involvement of secondary VET institutions. Since despite the fact that the definition of secondary vocational education and training is in the process of being transformed (see Cedefop, 2015 and the three new VET scenarios), in practice, there is still a strong tendency in many cases to interpret and use secondary VET as a means of responding quickly to the needs of the economy (particularly short-term). Becasue of this I try to find answer to the question if the higher pro-activity level and capability of VET gives a positive shift to become an innovation partner. In the first phase of the work the employed research methods are literature review and secondary processing of research outputs. It will be complemented by expert interviews in the second phase of the research. The research is planning to focus mostly on international research sources and on the available national outputs.

5 Preliminary findings

Australian researchers' outcomes highlight some factors that reduce building partnership with VET institutions. There are contradictions between centralised VET policy and the regional view of local learning communities, and between the short term needs of VET market and the long term needs of trust which serves as a vital force for communities. There is significant tension between the centralised policy frameworks within which VET has come to operate and the focus on regional economic development and community building that is more often the focal point of learning communities. Any meaningful involvement in a community requires mutual trust. While the building of trust develops in the long-term, it has been damaged by the high level of uncertainty, change and instability experienced by many VET organisations in recent years... And, also Kimberley emphasizes the new challange VET meets in relation to the learning communities. "VET can meet the postmodern challenge to satisfy the paradox of simultaneously working from the bottom up (learning community enterprise) and the top down (policy imperatives)" (Kimberley, 2003).

At the same time, prestige problems may arise with the management of secondary VET institutions as partners. On the basis of national experience, the question arises as to how the process of centralization of VET, the behavior of companies and the "survival strategies" of VET schools can contribute to the emergence of real, meaningful partner roles. Moreover, implementation of tasks arising from ad hoc market requirements leaves very little room for schools to develop meaningful, genuine partner roles (Benke, 2016). In recent developments in Hungary, the development of practical training has played a key role, ie the most important objective was to meet the needs of the ad-hoc labor market, quickly. At the same time, support for theoretical learning and the needs of LLL has been pushed into the background. The need for a closer partnership arises only in terms of understanding labor market demand and integrating it into vocational training. However, I assume that under more favorable conditions the knowledge comes from schools and workshop practices can make a meaningful contribution to VET schools' incremental innovation capacity.

I assume that a 'reactive', follow-up institution cannot be a meaningful innovation partner, only pro-active institutions are suitable for real partnership. The more pro-active the institution is, the more likely and successfully it is to be a meaningful innovation partner. This means that it can show alternative training paths, rather than short-term, interested in long-term development and is able to build a strong trust relationship with local society and the local economy. The question is whether secondary vocational education and training institutions can be involved in local participatory planning process. My assumption is that learning regions and learning communities can work successfully there and then if and when the local innovation process is actively supported by local education and training institutions. In underdeveloped

areas, this is a task for secondary schools, especially for secondary vocational schools. Research is in progress.

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Biographical notes

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Learning Lives in Retrospect: What the Narratives of Middle-aged women in Italy and UK reveal about Work, Family and Learning

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Abstract

The paper discusses the ways in which women aged 50, in two different cultural contexts (Italy and UK) narrate and portray life relationships and events that have influenced their learning and self-development. The reference paradigm is adopted from Narrative Learning Theory and the approach is qualitative and comparative in analysing the participants' voice. This inquiry has shown how women's representations of their life course reveal different propensities to reflect on and learn from their own lives. The research supports the case for approaches that are facilitative of biographical learning to become integral to adult education practices and to the development of adult education practitioners working in areas such as mid-life career change and work-re-entry.

Keywords

lifelong learning; narratives; women; comparative; Italy; UK

1 Introduction

This paper discusses the ways in which women aged 50, from contrasting cultural contexts, narrate their life course, with reference to relationships and events that have enabled and constrained their learning and self-development. Their representations reflect complex sets of motivations, beliefs and dispositions towards learning and their own capabilities for taking action to change their situations (Evans & Waite, 2013). Born in the 1950s, their life experiences and trajectories are rooted in, and intertwined with, 20th century post-war changes in both UK and Italy in the social organization of initial schooling, access to vocational and higher education and the availability of learning opportunities later in life (Rönka, Orvala, & Pulkkinen, 2003). Furthermore, their biographies are reflective of the frameworks of power and control that produce gender relations they and have shaped their adult life development over the same period (Perrig-Chiello & Perren, 2005).

In exploring the narrated experiences of women living in Italy and the United Kingdom, our research questions are: How do middle-aged women represent their learning lives? What

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are their learning trajectories? What is the role (or the impact) of learning in the transformation of their life patterns?

The results of this inquiry have supported the case for approaches that facilitate biographical learning to become integral to adult education practices and to the development of adult education practitioners working in areas such as mid-life career change and work-re-entry.

2 Research Method

The methodological approach is qualitative; in-depth interviews with a sample of UK and Italian women are the method for generating descriptions and interpretations on how women in their 50s learn from their own lives (Tedder & Biesta, 2007), revealing different propensities to reflect on their life experiences.

The first data source is a selected sample of 220 semi-standardized interviews of the longitudinal research National Child Development Study that investigate biographies of people born in UK in one specific week in 1958. For the purposes of this paper, we consider 31 interviews with UK-based women that have drawn a personal diagram representing their life course. The second data source is a set of 28 interviews with Italian women in their 50s living in the North East of Italy, in the Veneto area, based on the same items of the UK interview and requiring an outline of the life course.

The nature of the comparison between UK and Italian narratives and sketches is not focused on measuring differences between two groups (Ritchie, Lewis, & McNaughton Nichols, & Ormston, 2014); it aims to explore emergent themes in the accounts of different groups and contexts. The focus is the way UK and Italian women at the age of fifty represent their learning trajectories. Diagrams are powerful tools in the research process because they provide an alternative way to explore the subject of the study, generating potential impulses in sense-making.

The diversity of the groups is recognized, considering the multiple influences of macroeconomic conditions, social and institutional structures characterizing the two countries. The goal is to explore, in the narrative or in the graphical representation of the life course, different ways in which learning is taken into account as a key event of the life pattern.

In this paper, we have selected some interviews – 2 UK and 2 Italian – that are not representative but demonstrative as a summary exemplification of the different perception of the role of learning in respondent's life trajectories.

Thematic, linguistic and narrative analysis of the transcription with Nvivo enables an exploration of how and why learning can play a crucial role in transforming women lives. The validity of the results is verified by a continuous process of discussion and by a comparative analysis conducted by the two authors both separately and together. The close cross-cultural collaboration of the researchers facilitates mutual learning and understandings of the socio-cultural context of the two countries and the elicitation of the meaning of the tellers 'stories in the interviews. A shared commitment in the reflection on women's narratives is sensitivity to their situatedness in place and time.

3 Findings: Learning Lives

Different expressions of the role of learning in the women's life course emerged from the accounts. There were three main configurations:

Low	simply chronological examination of the learning episodes as a part of the life course
Medium	analysis, from a retrospective point of view, of the role of learning experiences in the life course
High	active identification, according to a reflective and critical enquiry, of the impact of learning as a key event of the life course.

Eight recurrent milestones arose from narratives of UK and Italian women, composing differently the "life palettes" that shaped their life course. These markers were usually used as reference points to define the shape of life, even if with some differences in the two countries (Evans & Biasin, 2017, p. 21): These revolved around relationships (with partner, parents, family, social life), health, children and family, having or losing faith, work, education - starting leaving//moving on.

In the accounts, learning is considered as a key event in two different ways: in a narrow perspective, it is an educational outcomes, a school performance or a qualification achieved or failed (marker 2); in a broader perspective, it is an outcome of a professional course, a cultural/personal interest or a form of learning recognized by others or derived from life experiences (marker 8).

These women have often used the answers to the questions posed as a form of memory of their past, to focus the attention on themselves, to put in order events of their story, to identify the meaning of (part of) their lives. Key events have also permitted, in this specific time of the life course (Stewart, Ostrove, & Helson, 2001), to achieve a form of retrospective self-evaluation in considering failures, successful experiences, moments of pain, discouragement and happiness, or in bearing in mind the loss of loved ones and the moments of new beginning. The explicit questions "What have I learned from my life?" or "How and when have I learned this?" do not emerge from the accounts as a definitive form of Narrative Learning (Goodson, Biesta, Tedder, & Adair, 2010). However, in some participants, a form of reflection on learning seems to be the natural conclusion of the interview, having its focus on personal/social identity.

Diagrams enable visualisations of life trajectories. Events such as marriage, birth of children, divorce, death of parents usually find space both in the Italian and UK diagrams, while learning episodes or school/training experiences are indicated as less important visual markers in the general life shape.

In this paper we consider some UK and Italian interviews where respondents look at the role of learning in their lives in two polarized ways. At one pole, learning is a part of the puzzle of life but it has not generated an active and reflective attitude towards themselves or others, neither seems to generate specific attitudes towards the living context. At the other pole, learning introduces a form of consciousness that women develop as a critical reflection on the specific shape of their lives. There is a specific linkage with self-awareness in interviews where women are able to manage the connection between learning and self-development. This correlation is not associated to the level of education attained but it is connected to the ability to reflect critically and retrospectively on one's own life, finding meaning or analysing meaning perspectives through narration.

Therefore, women with a high level of initial education have sometimes not considered learning as an important marker in their lives; while women with a low or medium level of instruction have perceived learning as a means to improve their lives or as an emancipative and

transformative boost. Personality traits, family background, social conditions and gender regimes in the two countries also play an important role in this awareness.

In the high-level configuration, women talk explicitly of learning experiences and recognize competences obtained in formal or non-formal contexts; narratives reveal a clear awareness of the role of learning in life choices and of the impact of it in professional paths.

In one telling UK case (n.27UK), the woman rebuilds her story starting from the relationships with parents (the divorce, the grandparents' figure) and from the husband (the first meeting, the support in family life). She refers to her love of learning and her decisions to take up continuing adult and professional education courses in early adult life. She also changed jobs (working in a microbiology lab, as counter clerk in a bank, receptionist in an optician shop), balancing with great difficulty study, family life and work. She perceived that learning could improve her life and offer her a search for meaning, not necessarily a potential gain in earning money. An important turning point is narrated:

The need to enroll at university occurred to her when she was driving back home after visiting her son, enrolled at university. Learning is associated to a positive enhancement and it contributes to empower her in taking decisions in crucial transformation of meaning perspectives through how she looks at her life. The later decision to do a PhD is also based on the motivation, with support from her partner, to increase her low self-esteem and self-confidence for a better life.

This case can be compared with a Italian case (n.6IT) that exemplifies the high level configuration in a different way. The woman starts telling how difficult her infancy was (raised by an anxious grandmother because parents worked far from home, with a mother very oppressive and rigid in imposing rules and values, solitude and isolation from classmates). School experiences were the best and very educational events she remembers, given that they compensate negative family experiences. Also, her husband is defined as a person that influenced (harmfully) her life because he was able to impose on her his passions, hobbies, sports, friends, behaviors. Two learning experiences emerge from the accounts as very important for her: learning to be a mother, facing her new role with freedom to be, remembering the passion and the positivity that she knew during her period of schooling; learning at work and improving her professional career Learning is considered as a form of rescue, a safety that permits her to find spaces to transform, giving purpose to her life; it appears the way that provides open possibilities to be detached from her family story and to the educational model of her "dark childhood" because it permits her to elaborate past experiences with a new meaning perspective.

Two interviews are selected from the sample as expression of a low-level configuration where learning is not associated to a form of awareness or self-discovery, but it is considered as a burden or an obligation to carry out without connections with training, work or personal identity.

In the UK interview selected (n.54UK), the woman considers learning as a phenomenon restricted to childhood and to formal instruction. Learning was not appreciated as a way to achieve her goal and then to empower her but evaluated as an instrumentally. Telling the story about various jobs, she explains that she sees herself as *naturally talented in selling and in communicating with people.* Learning is perceived as an intellectual and nonconcrete way do to things: "*I am a can-do person*". She's totally focused on her job: "*I spent all my times in my work, all with people in work*" even though her daughter was extremely ill for a long time. She is more reactive than reflexive about her life.

The parallel Italian case selected (n.15IT) presents some similarities with the UK one. The interview is a chronological succession of events (the meeting with her husband, the wedding, the birth of the daughter and then the son, the sacrifices to build the house, daughter's illness, husband retirement, grown-up children, "little" freedom from everyday life); she draws her life

trajectory as a four-step staircase that synthesizes lifespan: from downs (school, family) to ups (tranquility, have a kitchen garden, take a walk around). Learning is not a part of her life and is not a good investment for enhancing her agency; it is associated to the "worst years" of her life with no sense in her adult life.

4 Discussion

Women's interviews analyzed show that learning is not strictly embedded to agency in adult life. Narratives explain that learning experiences can be generative and perceived as a booster of agency, as a platform where adult development can be shaped. Education can be a structural advantage because of knowledge, competences, attitudes that develop a transformative power in life. But Education can be also a disadvantage for future learning where is associated a negative experience and its impact affect the way adults understand themselves and their acting possibilities.

Retrospective accounts of lives reveal inner capabilities that are developed reflexively through experiences, relationships during the life course. The longitudinal perspective of retrospection can show the potential of learning in shaping the life course and in implementing a form of power to better achieve self-development. This self-development is not that of self-propelled autonomous individuals but essentially relational, with action and further learning potential stimulated through engagement with others. The narratives reveal aspects of the conditions and relationships through which women come to express their self-development. Such insights are often missing in assumptions about the self - determination and readiness for learning projects in adult life. Comparative reflections on these temporally embedded, retrospective accounts of lives shaped over half a century show how biographical negotiation confronts pre-given life worlds that are themselves reflective of gender regimes (Connell, 2009).

Exploring women's lives through the lens of the micro has a macro-causal dimension (Ragin, 2008) as the macro can be seen in different ways through the lens of the micro. The micro cases of biographical learning can be analysed and interpreted not only in terms of possible macro forces in action, but also as reflections of gendered relations that transcend national boundaries, embedded in the prevalent societal conditions and gender regimes. Some narratives reflect the gendered relations that transcend national boundaries; the IT-UK comparison however reveals how particular historically and culturally embedded gender regimes (O'Connell, 2009) are embedded in expressions of agency, learning and identity development. Women's access to resources —personal, relational or material— can further influence patterns which are part of an existing 'gender regime' that can be characterised by embedding of norms, regulations and principles in social practices Women in this present study have given their retrospective accounts over periods in which gender regimes have shifted. The gender gap in both countries has narrowed over the 50 years of their lives. At the same time, dominant gender regimes and characterisations of 'gender gaps' are themselves complicated in both countries by migration patterns and multi-cultural influences. .

5 Conclusion

A reflexive approach that sees gender regimes as dynamic rather than static emphasises the compound mix of inner abilities of the person which are not clearly visible. These inner capabilities are developed reflexively through experiences in a range of life and work environments. Variations in women's narrations of how they move their lives forward reveal the potential for adult education to incorporate practices that can better support people towards the achievement of critical insight into their experiences, as the construction and narration of their stories becomes part of the learning process. Adult educators often hold preconceptions about the starting points for the activation of self-managed learning in adult life. Understanding,

from the perspective of the women themselves, the role of activating events and relationships in the life-course indicates the importance, for adult education practitioners, of sensitivity to these variations and to the cultural embeddedness of the women's experiences. The research thus supports the case for approaches that facilitate biographical learning to become integral to adult education practices and to the development of adult education practitioners in mid-life career change and work-re-entry. The use of drawings also yields some methodological insights into tools that can be used, in both research and practice, in facilitating, elucidating and comparing life course narratives.

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Thinking, Acting, Learning: Promoting Quality Education with the "Hamburg Model of Teaching Practice and Learning Practice" Evaluation Survey

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Abstract

Based on the "Hamburg Model of Teaching Practice and Learning Practice (HMLP)", a genuine short survey for course evaluation was developed. It covers the five core concepts of the HMLP, "Teaching Practice", "Learning Practice", "(Internal) Learning Effect", "External Effects", and "Feedback". For each concept, four 5-point-Likert-items and an open text question were derived. Based on these items' analysis, a report card for educators highlights professionalization potentialities and suggestions for critical reflection of the individual's teaching practice. The instrument is available in both English and German and was successfully piloted in several higher education settings at University of Hamburg and Chulalongkorn University, Bangkok (135 completed datasets for seven different courses). That way, international applicability and generalization for non-VET/non-teacher-training settings were confirmed, even though test development is at an early stage and needs further data for elaboration.

Keywords

quality education; teacher training; evaluation

1 Introduction

Research findings provide knowledge on effective teaching, so teachers should be advised to apply up-to-date knowledge and proven teaching concepts. However, an overwhelming number of studies have shown that a huge gap persists between theory and practice (e.g. Bakkenes, Vermunt, & Wubbels, 2010; Cochran-Smith, 2005; Korthagen, 2010; 2017, p. 388; Meijer, de Graaf, & Meirink, 2011; Roness, 2011). At last year's ECER, we approached vocational teacher

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training at university and its perceived theory-practice-gap in a design-based research project (DBR Collective, 2003; Reinmann, 2005). As our theoretical framework, we introduced the first English version of the "Hamburg Model of Teaching Practice and Learning Practice (HMLP)" (Augsdörfer & Casper, 2018).

We were able to develop a working prototype of a video-based didactics seminar by referring to the HMLP. Here, learning practice is the focal point of any teaching/learning situation. In accordance with Biggs and Tang, we believe the desired level of teacher professionalization is an informed "focus on what the student does and how that relates to teaching. [This] is a student-centred model of teaching: the purpose of teaching is to support learning" (Biggs & Tang, 2011, p. 20).

However, scholars working in the fields of self-study and core practices have questioned the capacity of teacher educators to engage novice teachers in meaningful practice-based work. (Peercy & Troyan, 2017, p. 26). Furthermore, feedback and evaluation items often fail to provide detailed information on how and to what degree interventional elements succeed. Accordingly, the standardized faculty survey we used to evaluate our prototype proved to be insufficient. In particular, it did not comprehensively assess our main question: How can learning settings be developed in order to tie practice and theory in meaningful, socially embedded learning practice? As shown in our last year's contribution, our theoretical framework strongly refers to VET, work studies and higher education literature such as Wenger (2008), Schön (1983), Biggs & Tang (2011), Tramm & Casper (2018). Our research following ECER 2018 indicated that no existing evaluation instrument was fully in line with our ambitions and the pedagogical framework of the HMLP. Some established measures show a certain degree of compatibility (e. g. Kirkpatrick's "Four Levels", 2010) but these neither meet the VET-based theoretical roots nor the emancipatory ambitions of the HMLP.

Thus, a genuine short survey with 25 items was developed. It covers the five core concepts of the HMLP, "Teaching Practice", "Learning Practice", "(Internal) Learning Effect", "External Effects", and "Feedback". Based on these items' analysis, we developed a report card for teachers and lecturers, highlighting professionalization potentialities and formulating suggestions for reflection of the individual's teaching practice. The instrument is available in both English and German and was successfully tested in several higher education settings at University of Hamburg and Chulalongkorn University, Bangkok. That way, international applicability and generalization for non-VET/non-teacher-training settings were confirmed.

At ECER 2019, we present and discuss this new HMLP Survey, its theoretical framework and its test development up to date. We understand this paper as a direct follow-up to our last year's contribution (Augsdörfer & Casper, 2018). In line with the design-based research paradigm, we assess how our prototype's second iteration benefitted from evaluation and how this is reflected by our new survey instrument.

2 Methods and theoretical framework

In general, our projects follow a design-based research paradigm (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; DBR Collective, 2003; Reinmann, 2005; 2017). Iterations of didactical design and research on innovative teaching practice are understood as a continuous improvement process (CIP), alternating between phases of conceptual abduction, deductive design, and inductive evaluation and generalization.

Based on the design and development of last year's prototype for a video-based VET teacher training seminar (Augsdörfer & Casper, 2018), new insights on criteria for quality education were identified and generalized. The prototype employed authentic video-taped lessons as an approach to seeing beyond the surfaces of teaching/learning situations. By reconstructing intentions, anticipations, psychological processes and planning-as-thinking/plan-as-theory, students of education could gain a deep pragmatic understanding.

In order to assess the success of the prototype in specific and quality education in general, a new evaluation instrument was developed during the second iteration. It operationalizes the core concepts of the Hamburg Model of Teaching Practice and Learning Practice (HMLP), as shown in Figure 1.

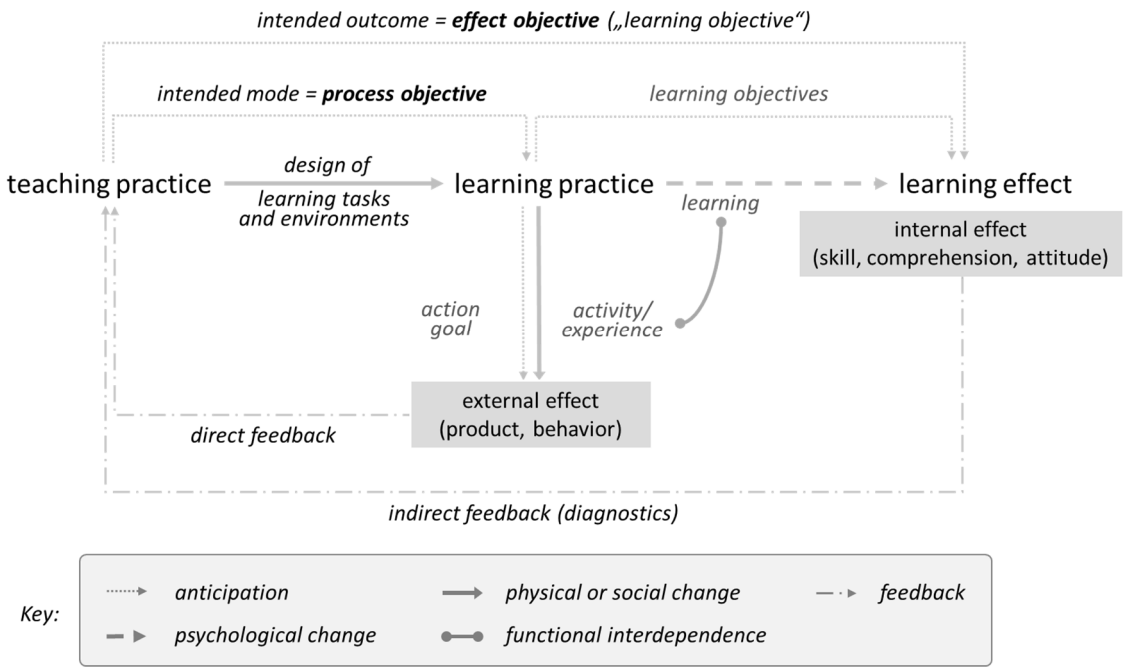

Figure 1 Hamburg Model of Teaching Practice and Learning Practice (HMLP) (Augsdörfer & Casper, 2018, p. 35)

The HMLP was initially developed by Tramm and Naeve (2007) and continuously elaborated at University of Hamburg. Interdependencies between thinking, acting, and learning were visualized as a conceptual model for learning practice. The 2007 publication translates to "Moving towards self-organised learning". It refers to regulation theory (Hacker, 2005) and interactionism, stressing holistic work activity and respective learning practice for post-Taylorist labour. Thus, the HMLP serves as a prime reference frame for lifelong learning, VET and higher education.

With its central proposition, the HMLP considers *learning to be a practice*, which defines it as an interaction with a certain quality of social relevance. People who learn set *action goals* which manifest in *external effects*: social interactions, successful performances or material products. While engaging in such productive, meaningful activities, *learning* is the psychological equivalent to physical *experience* – actions in the physical world are regulated and changes are continuously evaluated by cognitive modelling and testing. Thus, in analogy to the external effects of actions, there are *internal effects* of learning: new dispositions of knowledge, skills, and attitudes. When learners consciously seek such learning effects, they become explicit *learning objectives* rather than implicit by-products of activity. This interactionist understanding of learning practice has some crucial implications for didactic analysis and design, as we pointed out in our last year's contribution:

Teaching cannot *directly* lead to learning. Rather than that, teachers anticipate the intended outcomes or *learning effects*, which are *internal* effects and neither designable nor visible by themselves. Teachers can, however, have a direct influence on tasks and learning environments which initiate various *learning practices*. A perspective on learning practice is the indispensable

key: By setting action goals and engaging in meaningful activities, learners gain experience and 'learn' in a cognitive sense of developing and establishing relevant dispositions. Thus, learning practice leads to both internal (psychological) effects and external effects, such as visible products (e.g. a worksheet or student presentation) and observable behaviour (e.g. actions and communication performed by students). Since only learning practice can be influenced directly by teachers (not 'learning' itself) teachers have to perform a double anticipation:

- What do I have to do as a teacher in order to enable students to do something
- which I believe/anticipate to lead to the internal effects I intend as learning outcomes? (Augsdörfer & Casper, 2018, p. 36)

Also, two kinds of feedback should be differentiated: Whereas external effects are visible and allow for *direct feedback*, internal effects can only be assessed *indirectly*, via suitable diagnostics. It is a common mistake we see with less experienced teacher students to equate learning effects with external products: However, even though the processes leading to both types of effects were functionally linked, most products are actually weak indicators of internal effects. Usually, a group poster or a worksheet tells very little about the cognitive progress a student really made. Thus, both direct and indirect types of feedback are needed to adjust teaching practice in the short run and to improve it in the long run.

Based on this framework and current empirical research, we set the five core concepts of the HMLP as evaluation criteria. We understand quality education to be achievable via

Teaching Practice which
- supports learning through personal commitment;
- provides relevant topics and perspectives;
- effectively utilizes the given room;
- and uses media well; (cf. Avidov-Ungar, 2016; McInerney, Ganotice, King, Marsh, & Morin, 2015)

Learning Practice which
- challenges to think and act autonomously;
- is goal-oriented;
- puts activity at the service of conscious learning;
- and has a social/peer context; (cf. Gorozidis & Papaioannou, 2016; Horvath, Lodge, & Hattie, 2016)

(Internal) Learning Effects which
- tie in with individual interests;
- develop skills;
- challenge to rethink attitudes;
- and establish new knowledge; (cf. Reeve, Ryan, & Deci, 2018)

External Effects which
- show a quality recognizable to peers;
- are valuable to learners;
- make learners proud;
- and inspire peers; (cf. Hargreaves & O'Connor, 2018)

and Feedback which includes
- valuable teacher feedback;
- valid tests and exams;
- ongoing process feedback which reliably indicates later success;
- and valuable peer feedback. (cf. Winstone & Carless, 2019)

Following this structure, four Likert-scale items were derived for each concept, with the common Likert options “strongly disagree”, “disagree”, “neutral”, “agree”, “strongly agree”. A fifth open-text question was added for qualitative feedback for each concept. Table 1 shows all items in English and German.

Table 1 HMLP survey items

Concept [German] (Cronbach’s α)	Item [German]	question type
Teaching Practice [Lehr-handeln] (.735)	1. The teacher’s personal commitment supported my learning process. [Der Dozent/die Dozentin hat durch persönliches Engagement mein Lernen unterstützt.]	5 Likert
	2. The teacher provided topics and perspectives, which were relevant to me. [Der Dozent/die Dozentin hat Themen und Perspektiven angeboten, die für mich relevant waren.]	
	3. The teacher used/designed the given physical room for the best learning experience possible. [Der vorhandene Seminarraum wurde so lernförderlich wie möglich eingerichtet/ genutzt.]	
	4. Media (including online platforms and other digital tools) was set up in a way that supported my learning process. [Medien (auch digitale, wie Online-Plattformen etc.) wurden lernförderlich eingesetzt.]	
	5. Please sum up how well the teacher designed and conducted this project. [Wie gut hat der Dozent/die Dozentin die Veranstaltung gestaltet und durchgeführt?]	open text
Learning Practice [Lern-handeln] (.681)	6. The tasks challenged me to think and act autonomously. [Die Aufgaben in dieser Veranstaltung haben mich zum eigenständigen Handeln und Denken herausgefordert.]	5 Likert
	7. I always had a set goal, even if, at times, I might have been wondering how to get there. [Ich hatte stets ein Ziel vor Augen, auch wenn ich zwischendurch nicht wusste, wie ich es erreichen soll.]	
	8. Whenever I was active for this class, I felt like learning/developing. [Immer, wenn ich für dieses Seminar aktiv war, hatte ich das Gefühl, auch etwas zu lernen/mich zu entwickeln.]	
	9. The social connection (i. e. working with other participants and exchanging ideas) increased the quality of my learning process. [Das soziale Umfeld (Austausch und Zusammenarbeit mit anderen Teilnehmenden) hat die Qualität meines Lernens erhöht.]	
	10. Please, review how well thinking and acting was connected in this project. [Wie gut wurde in dieser Veranstaltung Handeln und Denken miteinander verknüpft?]	open text
(Internal) Learning Effect [Lern-effekte] (.783)	11. I was able to follow individual interests and learning goals. [Ich konnte in diesem Seminar eigene Interessen und Lernziele verfolgen.]	5 Likert
	12. I am now more skilled than I was before. [Ich kann nun mehr als vor dem Seminar.]	
	13. The class challenged me to rethink some of my attitudes. [Ich wurde herausgefordert, einige meiner Einstellungen zu überdenken.]	
	14. I gathered new knowledge, i.e. new concepts and contexts. [Ich habe neues Wissen aufgebaut, d. h. Begriffe und Zusammenhänge kennengelernt/verstanden.]	
	15. Please, conclude on your personal learning effect. [Was nehmen Sie persönlich aus diesem Seminar mit?]	open text

External Effects [Handlungs-ergebnisse] (.720)	16. Usually, the participants' contributions were of high quality. [Die Beiträge der Teilnehmenden waren in der Regel von hoher Qualität.]	5 Likert
	17. Everything I produced for this project is or was valuable to me in some way. [Alles, was ich in diesem Seminar erstellt habe, hatte oder hat einen Nutzen für mich.]	
	18. I am proud of something I produced during this project. [Ich bin stolz auf etwas, was ich in diesem Seminar erstellt habe.]	
	19. The products and contributions of other participants inspired me. [Die Ergebnisse der anderen Teilnehmenden haben mir neue Einsichten gebracht.]	
	20. Please describe the most significant product or contribution for you and why you consider it meaningful. [Welche Produkte/Ergebnisse aus diesem Seminar waren für Sie am bedeutungsvollsten und warum?]	open text
Feedback (.703)	21. The teacher's feedback was valuable. [Die Rückmeldung des Dozenten/der Dozentin hat mich weitergebracht.]	5 Likert
	22. In exams/tests, I was able to show what I learned. [In Prüfungen/Tests hatte ich die Möglichkeit, zu zeigen, was ich gelernt habe.]	
	23. In advance, the quality of my own contributions was a good indicator for my success in learning. [Meinen Lernfortschritt konnte ich bereits gut durch die Qualität meiner Beiträge einschätzen.]	
	24. Other participants' feedback was valuable. [Die Rückmeldung von anderen Seminarteilnehmern hat mich weitergebracht.]	
	25. Which kind of feedback was the most valuable for you? Please describe and explain. [Welche Art von Feedback hat Ihnen in dieser Veranstaltung am meisten gebracht und warum?]	open text

3 Results

The HMLP survey was piloted at Chulalongkorn University, Bangkok (20 completed responses, English, online version) and later in six different courses at University of Hamburg (115 completed responses, German, paper version). With a total of 135 evaluable datasets so far, the survey instrument is still in development and analysis is limited. More elaborated procedures, such as factor analysis, will be carried out as soon as a sufficient amount of data is available. With the given data, Cronbach's α for the five concepts was calculated and indicates sufficient internal consistency (Table 2). Furthermore, item correlations were analyzed. For example, table 3 shows strong relationships between items 2, 11, and 13. This emphasizes the importance of subjective relevance for changes in attitudes, while pointing out a certain redundancy between items 2 and 11 to be reviewed for the next iteration of the instrument. This is similar for items 19 and 24, which are closely related by both assessing what peers did. To conclude, item correlations both hint at conceptual relationships (which are intended) and redundancies (which should be avoided). At the current state of test development, they primarily serve as indicators for item review. In this respect, we are looking forward to a fruitful peer discussion at ECER 2019 and following.

Table 3 Item correlations

Concept		Teaching Practice				Learning Practice				Internal Learning Effects				External Effects				Feedback			
	Item	1	2	3	4	6	7	8	9	11	12	13	14	16	17	18	19	21	22	23	24
Teaching Practice	1																				
	2	0,543																			
	3	0,368	0,274																		
	4	0,450	0,350	0,473																	
Learning Practice	6	0,386	0,605	0,233	0,304																
	7	0,274	0,363	0,223	0,142	0,374															
	8	0,424	0,607	0,375	0,229	0,510	0,415														
	9	0,277	0,280	0,223	0,080	0,284	0,091	0,415													
Internal Learning Effects	11	0,435	0,534	0,243	0,214	0,557	0,375	0,595	0,317												
	12	0,373	0,452	0,420	0,308	0,376	0,357	0,471	0,185	0,423											
	13	0,430	0,521	0,236	0,285	0,396	0,283	0,522	0,049	0,524	0,338										
	14	0,492	0,522	0,170	0,324	0,354	0,255	0,455	0,060	0,481	0,479	0,595									
External Effects	16	0,169	0,179	0,274	0,141	0,266	0,149	0,219	0,403	0,304	0,217	0,180	0,149								
	17	0,355	0,375	0,337	0,270	0,373	0,344	0,484	0,226	0,432	0,347	0,358	0,389	0,266							
	18	0,253	0,291	0,196	0,255	0,392	0,197	0,427	0,324	0,374	0,338	0,266	0,224	0,292	0,484						
	19	0,177	0,266	0,172	0,151	0,388	0,230	0,339	0,384	0,354	0,278	0,250	0,245	0,422	0,399	0,481					
Feedback	21	0,493	0,269	0,301	0,234	0,185	0,243	0,258	0,105	0,298	0,435	0,208	0,329	0,189	0,384	0,306	0,273				
	22	0,241	0,268	0,245	0,174	0,323	0,242	0,425	0,133	0,479	0,274	0,344	0,275	0,120	0,394	0,348	0,287	0,279			
	23	0,095	0,310	0,214	0,035	0,275	0,276	0,416	0,137	0,337	0,321	0,252	0,178	0,256	0,393	0,446	0,254	0,407	0,431		
	24	0,167	0,187	0,187	0,104	0,234	0,309	0,312	0,221	0,327	0,237	0,283	0,200	0,357	0,390	0,357	0,512	0,364	0,289	0,458	

Effect evaluation according to Cohen (1988):

no relationship (r <= 0,1)
weak relationship (r > 0,1)
moderate relationship (r > 0,3)
strong relationship (r > 0,5)

For class evaluation analysis, means are calculated for each item. Averages are calculated for each concept group and for the course total. In a *teacher/lecturer report card*, results which are lower than the total average minus one standard deviation (SD) are highlighted as "Improve?"s, while results higher than average plus one SD are highlighted as "Great!"s. That way, teachers get focused feedback relative to their individual norm, with selected areas of both best practice and improvement opportunities.

Table 4 Results for the video-based didactics seminar in 2018/19, 14 completed datasets

concept	Teaching Practice					Learning Practice					Internal Effect					External Effects					Feedback					TAS
item	1	2	3	4	Tot	6	7	8	9	Tot	11	12	13	14	Tot	16	17	18	19	Tot	21	22	23	24	Tot	
value	4,4	4,4	4,0	4,2	4,3	4,4	3,9	4,1	4,2	4,2	3,9	4,6	3,9	4,3	4,2	3,9	3,9	3,9	4,3	4,0	4,6	3,6	3,8	4,1	4,0	82,5
hint	Great!					Great!						Great!									Great!	Improve?				

hint	MN	SD	low	high
measures	4,1	0,3	3,9	4,4

As shown in Table 4, the latest iteration of our video-based didactics seminar was evaluated with positive results (notice that all Likert values above 3,0 signal agreement). As a total agreement score (TAS), the course was appointed an averaged 82,5 out of 100 (maximum of 5*20 items). TAS can be used to compare different courses or progressions over time. However, individual professionalization should not be guided by absolute comparison alone. We consider the individually normed "Great!"s and "Improve?"s to be the most productive element of this report. As the example in table 4 shows for the didactics seminar, even "Improve?"s can be positive in absolute terms (here: 3,6 and 3,8). Nonetheless, they deviate significantly from the individual norm and thus hint at improvement opportunities.

In order to provide impulses for personal development and to systematically tackle the theory-practice-gap in teacher training mentioned above, we currently formulate suggestions for reflection for every item, posing guiding questions and/or pointing to literature recommendations. For example, for the two "Improve?"s shown above, following impulses were drafted:

- Improve in 22. “In exams/tests, I was able to show what I learned”: You could review how well intended learning effects, learning practice and tasks in exams were aligned. For further ideas, check the concept of constructive alignment (J. B. Biggs).
- Improve in 23. “In advance, the quality of my own contributions was a good indicator for my success in learning”: You could check whether learning objectives and expectations were transparent for all tasks. Were all tasks designed in a way that mastering them could be experienced as successful learning? Also, reassess your feedback: Was it aimed at intended final outcomes? Useful instruments for visualizing complex learning arrangements are learning maps/advance organizers (D. P. Ausubel).

4 Conclusion

Considering the effects on learners of our prototype for video-based teacher training, the survey indicates a success. Eventually, the “Great!”s and “Improve?”s delivered by the HMLP Survey highlight both its success and potential very well. For example, an outstanding agreement was achieved for “I am now more skilled than I was before”, whereas a weaker (but still positive) point was “In exams/tests, I was able to show what I learned”. This marks a To Do for further development of the final exam. At the same time, it stresses that students outstandingly experience the course as promoting pragmatic competencies, which was our main goal to start with. Open text responses underline this, especially regarding theory and practice “as necessarily linked concepts along a continuum of specifications and generalities, or cases and systems” (Augsdörfer & Casper 2018, 34).

Since test development is at an early stage, analysis is still limited. However, sample teachers’ responses so far indicate a high usability (due to the concise format) and “catalytic validity” (Cohen, Manion, & Morrison, 2007, p. 139; Winter, 2010, § 16): The report card, with its pointed highlights and fully worded suggestions, induces *change*. It proves to be an eligible instrument for reflecting and promoting quality education. Furthermore, the HMLP Survey seems adaptable to any teaching and learning context with action-oriented ambitions. Especially for VET, higher education, and teacher training courses, future applications and iterations should be carried out to gather data and elaborate the instrument. On this path to quality education, international and institution-crossing cooperation is welcome.

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Professional Development in the Use of Technology for Teaching and Learning in the Construction Sector

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Abstract

This paper studies developments in the German building and construction sector under the perspective of current changes in industrial and craft trade occupations: What kind of skill changes are needed to improve teaching, learning and working through the use of digital media technology? By using data from a survey of apprentices and nine interviews With Vocational Education and Training teachers and trainers it provides a first picture of the state of art in this occupational domain. It attempts to systemize and cluster the challenges for high quality apprenticeships and for their teachers to support work related learning processes different learning and working venues, including VET schools, industrial training centres and the building and construction companies themselves.

Keywords

building and construction industry and craft trade; digital tools and media; initial and further vocational training and education; mixed method approach

1 Introduction

This paper is based on the work and emerging results of the Erasmus Plus funded Taccle 5 project: Extend European Framework for the Digital Competence of Educators for VET teachers and trainers. It is to be presented at a workshop at the VETNET network of the European Conference on Educational Research, held in Hamburg in September 2019 as one of a series of three interlinked papers. This paper looks at continuing professional development in the use of technology for teaching and learning for trainers in the construction industry in Germany. The paper by Graham and Attwell and Gerrard (2019, this volume) provides a general overview of the aims of the Taccle 5 project and expected outcomes. It also looks at the need to extend the EU DigiCompEdu Framework to consider the particular context and needs of Vocational Education and Training teachers and trainers. The third paper by Lizandra, Ros, Suárez, and Marhuenda (2019, this volume) reports on the interim findings of a qualitative survey and study carried out through the project and examining the present training and professional development of VET teachers and trainers in five countries: Spain, the UK, Greece, Germany and Portugal.

2 The importance of the building and construction sector for the labour market and the number of apprentices in different occupations

The construction sector is one of the largest in Europe with an average of over 9 % of the GDP in the European states and provides 18 million direct jobs. It is not surprising that this sector is of structural importance for the labour market and the economy.

In Germany there are about 1.8 million people employed in the sector as architects, civil engineers, technicians, foremen, general foremen and a high number of skilled workers in more than 60 occupations. The occupations include road construction; pipe fitting and welding; well builders; specialised ground workers, and industrial and private house building with skilled occupation including masons, concreters, scaffolders; carpenters and finishing and completion trades with occupations within sanitation, heating and regenerative energy.

The sector recruits most of its workers through a three and a half year apprenticeship either in craft trade companies or in the construction industry and supplier and vendor companies including the production and maintenance of vehicles, machinery, and also building materials including stone and cement and prefabricated building sections - stairs, walls, roofs etc.

The apprentice rate is high comprising about 8,4 % employees in the industry and differing slightly throughout the different building occupations. The constant need for investment in the road infrastructure and house building as well as industrial building results in a constant demand for skilled employees especially at skilled worker and foremen level! It is a struggle to recruit sufficient young school leavers to undertake apprenticeships. The VET system covers three learning arenas: large and small companies, regional training centres and local VET schools.

3 Changes in work and technology in building and construction

Compared to other factory industries, for example car and vehicle production, machinery or electrical devices, the use of digital media for learning and work has developed quite smoothly over the last 5 years starting from a low level but now more and more increasing. Quality standards and installation techniques in the construction industry are becoming ever more sophisticated. This is demonstrated above all by recent developments in construction equipment, including devices as well as a rich variety of new construction materials. For instance, in underground engineering, new processes for horizontal drilling technology (HDD) are applied today. They demand higher standards of technical and social qualification for the underground workers; as well as new geological skills in advance planning and machine safety control. Altogether, this leads to entirely new requirements for work processes performed by the workers and foremen involved, with increased demands for specialist skills and process expertise. Both in initial training and in further education, new training contents must be taught as well as translated didactically into practically-oriented vocational training in construction covering different knowledge domains.

The advantage of using digital media is it could help to enhance the image of this sector as well as to help make work less stressful and safer. But the media competence of the professionals is not yet developed at the same level as it should be. Continuing vocational training and apprenticeship still lacks well proven media concepts at an organisational as well at a personal level. This leaves big gaps in introducing sufficient and innovative digital media.

4 Use of digital media

A survey of more than 700 apprentices in the construction industry revealed a generally high use of smartphones and tablets, including to obtain work-related information and to solve concrete problems. However, the respondents were only partly aware of specific apps for construction professions. Even those that were known were rarely used. Simultaneously, the

survey showed a high level of interest in the general use of mobile technologies in the work process (Deitmer & Heinemann, 2017).

5 Feedback from nine interviews with VET teachers and trainers

Interviews with vocational teachers and trainers undertaken through the Taccle 5 project included those with professional backgrounds as carpenters, car mechatronics, pipe fitters, road builders, media occupations and vocational inclusion. The teachers and trainers discussed different issues of their work including teaching and learning, digital resources and empowering and facilitating learners as well as assessment.

The interviewees stated that many of the existing apps were simply not suitable for solving problems that arise in the work process and professions. The many apps analysed often more or less successfully provide information and data but are produced by vendors and not accessible by the training institution. They do not promote mobile learning by apprentices, and especially fail to support informal learning in practice work place (Deitmer, Heinemann, & Müller, 2018).

COMMON GROUND: All trainers have a high level of professional competence and commitment. Critically, the high work load restricts time for professional development in digital media: finding out about digital tools is time consuming and may require training in their use in the teaching and learning process. At present the assessment of media applications and their use by students for learning is not very systematic.

COOPERATION: Some trainers work in close cooperation with training companies but other do not find time for intense cooperation on integrated projects. Digitisation helps better cooperation between teachers and trainers in different learning venues and at least allows them to know what the is being done at different learning places.

CONTINUING TEACHER TRAINING**:** those interviewed stressed the importance of collaborative learning with VET colleagues; they favoured internal school based continuing training measures (SCHILF: school internal teacher further education). Most of the teachers and trainers interviewed assessed themselves as having intermediate media expertise; very few felt that were at an advanced level (see Table 1, below).

CONCEPTS ON DIGITAL MEDIA DEVELOPMENT**:** some schools have a clear-cut media agenda including addressing the issue of digital resources. In some schools there was overall coordination of the use of digital media coordination' in others this was non-existent.

CRITICAL: the creation and discovery of sufficient high-quality digital resources for supporting learning is a major challenge for all teachers and trainers. Didactical expertise is diverse and uneven among those interviewed. It is still very unclear in which direction the digital media infrastructure in the VET schools will develop: for example, the BYOD (Bring Your Own Device) approach or the provision of tablets or computers by the schools. Further research, development and discussion is needed. Bandwidth and connectivity are often still a problem.

Table 1 Self-assessment of competence in digital media by VET trainer and teachers

How would you classify yourself? nine selected trainers and teachers in construction occupations			
Six areas of educators professional expertise (Redeker et al. 2017)	beginner	intermediate	advanced
Professional competence: using Digital media for communication and collaboration		1	8
Digital resources: sourcing and creating digital resources	2	3	4
Digital pedagogy: orchestrating use of digital media in teaching and learning		6	1
Assessment: using digital media to enhance formative assessments		8	1
Empowering learners: to enhance inclusion and learners active engagement			9
Facilitating learners digital competence: enable them to creatively use digital media for information, communication, content creation, well being and problem saving.		7	1

Most teachers and trainers assessed their occupational identity as well as their professional competence as very strong and robust. However, this was less so for producing digital resources. Equally 'Facilitating learner digital competence' was seen this as a big challenge within VET school teams and organisations. Assessment is presently informal and not undertaken systematically.

6 Conclusion

VET in Germany is diverse and includes a broad range of work tasks and sectors. Until now digitisation had a limited impact on the way apprentices develop their skills. There is still a controversial debate over the best future path regarding the development of learning opportunities in the work place, training companies, VET schools and t cross company training centres.

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On the Inclusive Performance of Apprenticeship Within the French VET System and the Current Reform of Its Governance and Related Institutional Setting

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Abstract

Apprenticeship constitutes institutionally the second main component of the French initial vocational education and training (IVET). It is a dual system based on an alternation between on-the-job training within a company and off-the-job training within an apprenticeship training centre. Although apprenticeship is observed to be the most performing IVET instruments in terms of its contribution to vocational inclusion and effective access to the labour market, its future further development remains hindered by some structural and functioning weaknesses (Brunet, 2018; Marchal, 2019a, 2019b; Pesonel, 2018). In this connection, the implementation of a major related reform integrating within the VET reform Act of the 5th September 2018, was launched at the beginning of 2019. This paper is an analytical investigation into the functioning and performance of apprenticeship including the recently undertaken institutional and governance reform within the perspectives of its future development. The adopted investigation method is primarily based on scientific desk research and available data, documentation and performance evaluation studies and reports published by the ministries of education and labour, completed by a set of semi-structured interviews conducted with the representatives of involved stakeholders. One of the main outcomes of this research investigation confirms that apprenticeship is the most inclusive IVET component within the labour market as, on average, 72% of apprentices find jobs (56% on permanent employment contracts) within a seven-month-period following the completion of their apprenticeship in 2017, compared to only 51% of the school-based IVET graduates. This performance is expected to improve in the future following the implementation of the recently undertaken apprenticeship reform.

Keywords

apprenticeship reform, governance, inclusion, transition to work, vocational qualifications, work-based training

1 Introduction

The French educational system includes several VET schemes designed for effective vocational inclusion and transition to the labour market, especially young people with low or without initial vocational qualifications. Among these schemes, apprenticeship constitutes one of the most observed inclusive instrument. Although apprenticeship finds its early roots in the medieval

guilds practice, it was formally established as a dual work-based system, by the Astier Act of the 25th July 1919 and developed since then to become an important component of the French initial vocational education (IVET) system through Guichard's Act in 1971 (Gues, 2009; Sanchez & Zamora, 2007). It is a written work contract between the apprentice and an employer allowing the apprentice to undertake in-company training under the responsibility of an apprenticeship tutor /master in an apprenticeship training centre (CFA- *Centre de Formation d'Apprentis*) for up to three years. Its basic aim is to allow young people to have access to all levels of vocational qualifications referenced within the NQF Directory of vocational qualifications (*RNCP- Répertoire National des Certifications Professionnelles*) (Abriac, Rathelot, & Sanchez, 2009; Brunet, 2018; Marchal, 2019a, 2019b; Pesonel, 2018). In spite of its high inclusive performance compared to the school-based IVET, and due to some structural and functioning weakness and rigidities which are still hindering its future further developments, the implementation of a major related reform integrating within the VET reform Act n° 2018-771 of the 5th September 2018 on the freedom to choose one's professional future, was launched at the beginning of 2019.

This paper is an analytical research investigation into the functioning and inclusive performance of apprenticeship within the French IVET system including the presentation of the recently undertaken institutional and governance reform within the perspectives of its future further development. The conducted investigation is primarily based on desk research and available statistical data, documentation and related performance evaluation studies and reports published by the ministries of education and employment, which are then completed by conducting a set of semi-directive interviews with the representatives of involved stakeholders. The analysis of the outcomes of the research investigation is presented through the following two basic section: a)- functioning and inclusive performance of apprenticeship, b)- recent institutional and governance reform of apprenticeship.

2 Functioning and inclusive performance of apprenticeship

2.1 Objectives, functioning organisation and methods

The major aim of apprenticeship is to facilitate transition from school to work of young people aged from 16 to 30 years old by allowing them to have access to formal professional qualifications through an alternation between on-the-job workplace raining and in-house training centre. The duration of the related employment contract signed between the apprentice and the employer is usually equivalent to the duration of the targeted qualification (Dif, 2013; MT, 2019).

Until the launch of the implementation of the overall restructuring reform of apprenticeship at beginning of this year 2019, a large number of stakeholders were involved in its provision, governance and funding. They are usually grouped in two main categories: alternating training providers and other involved stakeholders. The first category includes two types of directly involved stakeholders: enterprises and all other public, semi-public and private in-house training providers. The enterprises which take in charge on-the-job training (including off-the-job courses in cases where they possess their own in-house training centres) pay the trainee's salary as a percentage of the minimum guaranteed wage (SMIC) whose level is variable according to the trainee's age and level of undertaken training. The usual in-house training providers include apprentices' training centres (CFA- Centres de Formation d'Apprentis) and all other public, semi-public and private in-house training providers. As for the the second category, it concerns all other stakeholders involved in the qualification design processes and in the implementation and follow up of apprenticeship contracts and their funding arrangements, including quality assurance, inclusive coaching and guidance provision services. It is a networking of partnerships and cooperation between the following main involved

stakeholders: the State, social partners, chambers, regional networks. The Sate is involved via its ministries and inter-ministerial institutions such as "the national commission for vocational qualifications (CNCP)" and "the national council for lifelong vocational leaning (CNFPTLV)". Social partners play an important consultative and decision making role in the qualification formation processes, such as the design/updating of qualifications and their referential standards, including continuing vocational training mandatory funding collection and management via parity based collecting organisations (OPCA- Organismes Paritaires collecteurs agrées). The chambers take in charge the validation of the apprenticeship contracts (connected with their sectors of activity) and other issues concerning the follow-up of apprenticeship in cooperation with the employers, the CFA and the regions. The regional networks include different institutions and their networks with shared responsibilities for apprenticeship. Regional authorities are responsible primarily for vocational inclusion (of young people and job-seekers) including apprenticeship management and funding in co-operation with local job-centres and missions. The other networks are more connected with the apprenticeship funding before its recent reform and they include namely *the organisations collecting apprenticeship tax (*OCTA- Organismes colleteurs de la Taxe d'Apprentissage*) from the enterprise (representing 0.68% of the enterprises' gross wage bill) and the regional funds for apprenticeship and CVT (*FRAFP- Fonds Régional de l'Apprentissage et de la Formation Professionnelle; Cedefop, 2016; Dif, 2013).

As a dual system, apprenticeship is organised through an alternation between on-the-job-workplace training and off-the-job in-house training. On-the-job training within a company represents from 60% to 75% of the overall training time and off-the-job training within an apprenticeship training centre represents 25% to 40% of the whole training programme. About two thirds of the undertaken in-house training time is devoted to general, technical and vocational subjects, whereas the remaining third is dedicated to professional and practical training as a usual complement to workplace training.

In contrast with the practice in the school-based training system, the apprentice training centres (CFA) are committed to respect the following basic principles connected with the concept of "alternating pedagogy" specific to apprenticeship training provision: (a)- focussing on work-based training where teachers and trainers use workplace experience in the development of their teaching and training programmes and methods; (b)- distributing learning and training activities between on and off the job training according to specifically adapted schedules; (c)- guaranteeing a complementary role of the in-house training provision to on-the-job training by completing observed insufficiencies in workplace training programme within the enterprise; (d)- securing the management and continuing communication between the training centre, the company and the trainee via well-established coordination, control and follow-up intermediary tutors and instruments. In this connection, in-house training centres and their teaching and training staff have a large pedagogical autonomy and flexibility in defining and using adapted teaching approaches and supporting instruments, tools and equipment. The training provision is founded on the use of the inductive and active learner-centred teaching method. It goes from concrete and specific to general as its practice is based on the use of specific experiments, case studies or experimental exercises in training provision by building up progressively on the learner's individual experiences, knowledge, capacities, expectations and constraints. Within this process, the alternating training providers use two assessment methods: continuous assessment during the study/training courses called CCF (contrôle en cours de formations) introduced at the beginning of the 1990s, and the traditional punctual assessment (CP-Contrôle ponctuel; Billet, Cahuzac & Perrin, 2002; Dif, 2013).

As it is the case within the whole educational system, apprenticeship is basically subject to the same overarching quality assurance evaluation mechanisms, namely the following: a)- the evaluation and the accreditation/certification of providers and trainers; b)- the evaluation of the

educational and training system and its teaching methods by various inspection and evaluation organisations; c)- quality assurance through the process of learning outcomes certification (assessment, validation, recognition and certification awarding) implemented within the framework of a mixed approach of regulation and autonomy combining both prescriptive and cooperative characters; d)- the existence of referential framework of standards combining occupational and qualification standards for all awarded vocational qualifications which are also validated and referenced within the NQF directory of vocational qualifications (RNCP; CEDEFOP, 2009; Dif, 2013; Lombardi, 2010).

2.2 Inclusive performance

The inclusive performance of apprenticeship is analysed in terms of effectively achieved accessibility to both: apprenticeship programmes and to employment after graduation.

Accessibility to apprenticeship

412,266 apprentices were following their apprenticeship at all levels of the French five-level-NQF during the school year 2016/2017 (429,900 apprentices by the end of 2017 representing 1.6% of the occupied work force), dominantly (at 63%) within the upper secondary apprenticeship training centres (CFA), where 38.8 % at the NQF Level 5 (EQF level 3) and 24.2% at NQF level 4 (EQF level 4). Within higher education, 18.5 % of the apprentices targeted NQF-level-3 (EQF level 5) qualifications which included the "high technician certificate (BTS)"and the "university diploma in technology (DUT)", followed by the professional Masters and Bachelors" with 12% and 6.5% respectively. 294,800 new apprenticeship contracts were signed between the apprentices and both private and public employers. Out of the 280,388 newly signed contract in 2017 within the private sector, 81.8% were taken in charge by small and medium enterprises with less than 250 employees, leaving only 18.2% to larger ones. 58.6% of these new apprenticeship contracts were signed within the service sector companies. The remaining 41.4% of the apprenticeship contracts were taken in charge by the enterprises of the production sectors, namely the the industry (21.8%), the construction (16%) and the agriculture (3.6%) (Demongeot & Lombard, 2018; INSEE, 2019; DEPP, 2018a, 2018b; Pesonel, 2018). About two thirds (68.9%) of the new apprentices in 2017 were initially holders of vocational qualifications (where 27.1% at EQF level 4, 21.3% at EQF level 3 and 20.5% at EQF level 5 and over; Pesonel, 2018). The weight of newly participating apprentices with the lowest initial NQF level (EQF level 3) or without any qualification went down from 94.8% in 1992 to 52.4% in 2017. This decrease touched more specifically those without any initial formal qualifications as the share of their participation in the new apprenticeship contracts decreased from 60.5% in 1992 to 31.1% in 2017 (DARES, 2018). Moreover, most of the new beneficiaries of apprenticeship contracts in 2017 (85.9%) came from the initial educational tracks, where 58.6% from initial school-based system and 27.3% from apprenticeship. As for those who were unemployed job-seekers represented only 5.2% of the beneficiaries in 2017 (Pesonel, 2018).

Accessibility to employment

As a dual system functioning through an alternation between on-the-job and in-house work-based training, apprenticeship offers a better access to employment than the school-based component of the VET system. 72% of all the apprentices who completed their apprenticeship up to EQF level 5 in 2017 had an effective access to employment (56% on permanent employment contracts) within the following seven months as compared to only 51% (35% on open-ended work contracts) for those completing their school-based VET programmes at the same EQF levels. About half of the apprenticeship graduates at all NQF levels in 2017 are kept by the enterprises within which they completed their on-the-job training. The access rate is even

higher for the holders than for the non-holders of vocational qualifications. In apprenticeship, 76% of graduates holding vocational qualifications up to EQF level 5 have access to a job within the first seven month following their graduation (57% of them on permanent employment contracts), compared to only 59% of graduates non-holders of vocational qualifications (52% on open-ended work contracts). By contrast, this access rate is far lower for the holders of the same vocational qualifications up the EQF level 5 within the school-based system as only 53% of them (35% on open-ended contract) have access to a job seven after the graduation. Moreover, the access rate to employment is generally observed to be increasing with the increased level of obtained vocational qualifications through apprenticeship as it goes up from 67% for EQF level 3 up to 82% for EQF level 6 and 7. However, some of the well established intermediary vocational qualifications obtained via apprenticeship remain characterised by allowing their holders to have even a higher access rate, such as the EQF level 5 BTS (High Technician Certificate) and the EQF level 4 PB (professional certificate) at access rate of 83% and 84% respectively within seven months after the graduation in 2017 (Marchal, 2019a, 2019b).

3 Recent institutional and governance reform of apprenticeship

3.1 Need for apprenticeship reform

In spite of its observed overall positive performance mainly as an effective facilitator of professional inclusion and transition to the labour market of both young and adults, apprenticeship still suffers from some weaknesses basically connected with the following:

- First, the risk of breaching the apprenticeship contracts before their due time remains non-negligible issue as the overall observed rate of defection before the end of the contractual period was 29% for the apprentices enrolled during the school year 2015/2016.The defection usually takes place during the first year where about a third of apprentices abandon apprenticeship within the trial period for three main reasons: a)-dominantly for personal reasons (such as dissatisfaction with the training programme contents, work/working environment, changes in the learning/career project, health or other personal reasons); b)-changes in the employer's economic situations where some contracts are ended prematurely; c)-unsatisfactory trial period from the employer's point of view. This observed defection rate is decreasing with the apprentices' increased age and level of targeted vocational qualifications (Arrighi & Mora, 2010; Cart & Toutin-Trelcat, 2010; Pesonel, 2018;).
- Second, the persistence of a traditionally held poor perception of work-based vocational training in comparison with the school-based general education (Pigeaud, 2014).
- Third, there are some observed functioning inefficiencies due basically to the existence of a large and complex networking of (directly and directly) involved institutions and stakeholders in their governance and funding arrangements (Cahuc & Ferracci, 2014; Dif, 2013).
- In connection with the perspectives for reforms and future developments, it is important to underline some basic related actions to be undertaken for further improvement (Dif, 2013; Pigeaud, 2014; Proglio, 2009) namely:
- Reinforcing the observed positive inclusive performance of apprenticeship through the development of a more adapted information and guidance provision, aiming primarily at the following: (a)-changing the traditionally held poor perception of apprenticeship in comparison with general education, (b)-promoting the image and standing of apprenticeship as a learning pathway of excellence.

- Simplifying apprenticeship related governance and funding systems and reinforcing cooperation and partnerships between directly involved stakeholders, especially on regional levels.

3.2 Apprenticeship recent reform

In order to deal with some of the above underlined structural and functioning weaknesses hindering further future development of apprenticeship, the implementation of a set of related major reform measures undertaken within the framework of the "VET Reform Act n° 2018-771 of the 5th September 2018 concerning the freedom to choose one's professional future", was effectively launched at the beginning of 2019. As an overall restructuring reform of apprenticeship institutional setting and mode of governance and funding, its contents can be presented through the following overarching points, namely: liberalising apprenticeship market and transferring its regional governance to the professional activity branches, creating "France competences" agency as a unique national governance institution and promoting the attractiveness and accessibility to apprenticeship.

Liberalisation of apprenticeship market:

Previously in the hands of regions, apprenticeship governance is transferred to the professional activity branches which will be involved in the design of qualifications, including their related activity and certification referential standards. They will also be involved in setting the costs of apprenticeship contracts. This new mode of governance and funding, will be accompanied by the liberalisation of apprenticeship provision market, via allowing all training organisations (including companies) to create their own apprenticeship centres (CFA) after obtaining prior formal quality assurance certification.

Creation of "France competences" national agency:

The number of involved governance institutions is reduced through the creation of a unique quadripartite national body representing the State, the Regions and the social partners called "France competences" under the responsibility of the Ministry of VET. It replaces and absorbs the activities and roles of the previous national governance institutions such as "the National Commission for Vocational Qualification (*CNCP- Commission Nationale de la Certification Professionnelle*), "the National Council for Employment, Training and Vocational Guidance (*CNEFOP- Conseil National de l'Emploi, de la formation et de l'Orientation Professionnelles*) and the Parity Fund for Securing Career Pathways (*FPSP- Fonds Paritaire de Sécurisation des Parcours) Professionnels*). Among its missions will be the regulation and control of prices and the quality of training, as well as the management of the NQF Directory for vocational qualifications (*RNCP- Répertoire National des Certifications Professionnelles*). It also plays an important financial role by ensuring via its newly created operators the reallocation of the funds collected from employers by "the Union for Recovering Social Security Contributions and family Allowances (URSSAF-*Unions de Recouvrement des cotisations de Sécurité Sociale et d'Allocations Familiales*)" or the Agricultural Social Mutuality *(MSA- Mutualité Sociale Agricole*). In this connection, apprenticeship centres (CFA) are financed on the basis of the real number of individual apprenticeship contracts. The regions can, in addition to the possibility of subsidising the investments of apprenticeship centres, complete this funding via their financial contribution to current costs of apprenticeship contracts in accordance with their regional criteria for spatial and regional development. This regional complementary funding can be obtained via agreements by objectives and means concluded with the competences' operators. Finally, the "France competences" agency allows for the development of an expertise networking and contributing to the public debate on the efficiency of policies connected with

training and access to employment. Moreover, the accredited vocational training funds collectors and mangers run by social partners called OPCA (*Organismes Paritaires Collecteurs Agréés*) have also to be restructured to become the competences' operators for "France competences" agency (*OPCO -Opérateurs de compétences*) by taking in charge the management of skill formation and support to small and medium companies.

3.3 Promoting the attractiveness of apprenticship

Promoting the attractiveness of apprenticeship for both apprentices and employers is considered at the heart of the undertaken reform. The measures enhancing the apprenticeship attractiveness for apprentices, include namely: 1)- promoting the image of apprenticeship as a pathway to excellence through guidance and information provision about the effective access rate to employment following each apprenticeship programme completion; 2)- extending the maximum access age limit to apprenticeship from 26 to 30 years old to allow more young people to take advantage of this opportunity, and creating a pre-apprenticeship preparatory programme for candidates without/with low initial qualification in order to reduce the observed risk of apprentices' defection; 3)- encouraging apprentices' mobility by allowing each one of them to benefit from a financial support of €500 for obtaining a driving licence; 4)- improving the apprentices' purchasing power through the usual annual increases of the referential minimum guaranteed wage (SMIC) in addition to increasing the net salaries of all apprentices aged from 16 to 20 years old by € 30 per month and those aged 26 years old and over to the minimum guaranteed wage level at least; 5)- loosening the rules of mobility abroad and strengthening European openness of apprenticeship by doubling the number of apprentices benefiting from the Erasmus + programme by raising it to 15,000 a year compared to less than 7,000 today. As for the measures enhancing the attractiveness of apprenticeship for employers, they include basically:

1. involving the enterprises in pedagogy and qualification design so that they can match better the companies needed skills and competences;
2. loosening the hiring schedule of apprentices by allowing accessibility to apprenticeship contracts through the whole year without the usual constraint of hiring season imposed by the apprenticeship centres (CFA);
3. simplifying hiring support instruments for employers by unifying them into a unique instrument focussed on small / medium companies and baccalaureate / pre-baccalaureate levels;
4. more flexibility in apprenticeship contract signed with a company, as it will no longer be mandatory to go through labour courts to break a contract after 45 days (as, for instance, the employer may terminate the contract for a serious professional malpractice);
5. encouraging the creation of a quality certification of "apprenticeship masters" where the necessary competence / qualification requirements are established via an agreement between the professional branches;
6. simplifying apprenticeship funding mechanism to a unique alternating contribution (instead of two before the reform) whose amount will be set by the social partners.

4 Conclusion

Within the whole French initial vocational education and training (IVET) system, apprenticeship is observed to have the highest performance in terms of effective access of its beneficiaries to work-based learning and employment as in 2017: a)- about one third of the new beneficiaries of apprenticeship contracts were without any initial formal vocational qualifications; b)- over two thirds on average of the apprentices completing their apprenticeship, have a direct access to the labour market, dominantly via open-ended

employment contracts; c)- About four out of five on average of holders of vocational qualifications through apprenticeship find jobs within a period of seven month after the completion of their apprenticeship.

This observed inclusive performance of apprenticeship is expected to improve further in the future following the effective implementation starting from January 2019 of the recently undertaken reform introduced via the Act of the 5th September 2018 on the freedom to choose one's professional future. As an overall restructuring reform of apprenticeship institutional setting and mode of governance and funding, it is focussed basically on: a)-liberalising the apprenticeship market by allowing the training organisations including companies to create their own quality certified apprenticeship centres and the transfer of governance from regions to the professional branches which will be involved in the design of vocational qualifications and in setting apprenticeship contracts costs; b)-reducing the number of national governance institutions to the unique "France competences" body to take in charge the management the NQF directory of vocational qualifications and the reallocation of the alternating training funding collected by the URSSAF (the union for recovering social security contributions and family allowances); c)-promoting the image and the attractiveness of apprenticeship for both apprentices and employers.

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How to Meet the Challenges of Recent Changes in Danish VET? Professional Learning Communities as an Approach to Supporting Teachers' Implementation of Changes in Danish VET

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Abstract

The Danish vocational colleges are challenged with implementing new laws, meet the political ambition due prevent a future lack of skilled workers and reduce costs. In addition, younger pupils attend the colleges because of new approaches to recruiting and the building of bridges from lower secondary education to colleges. Furthermore, colleges merge to balance the budget due to economic conditions. Such challenges are part of the context for a team at a social and healthcare college that is introduced to the idea of professional learning communities. The methodological approach is action research using observations and interviews. The results show how a team use reflective dialogue to meet some of the challenges, use differentiated teaching, and how a sub-team cooperate regarding rules in the classroom. It is discussed how the idea of professional learning communities supports the implementation of changes.

Keywords

Professional learning communities; action research; VET; team; social and healthcare college

1 Introduction

In Denmark, there is a strong political focus on VET due to an expected lack of skilled workers, both currently and in the future. Analyses illustrate the fact that too few young people attend VET (Government et al., 2018). To meet this challenge, new political initiatives have been implemented. In 2014, a reform of VET was carried out, and, in 2018, new initiatives were taken to introduce and underline the importance of vocational skills in primary schools (Government et al., 2018). Other political initiatives include new combinations of existing educational programmes. One example is a relatively new youth education at upper secondary level called EUX (Ministry of Education, 2018). EUX combines general subjects and provides access to higher education and a vocational-oriented education. EUX is promoted to attract strong and gifted pupils to VET. Another example of this is a course designed as a combination

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of lower secondary school and VET taking place at vocational colleges. This course, called eud10 [VET10], combines an introduction to vocational education and general subjects in the 10th grade at Danish primary school (Ministry of Education, 2014). The objective of VET10 is to introduce VET and also build the capacity of pupils' basic skills, thus granting access to VET. Pupils taking EUX and eud10 [VET10] are examples of new activities designed for specific target groups in VET that are calling for new ways of teaching and for a high degree of collaboration between teachers. Furthermore, the intention of reforms of Danish VET since 2014 and other political initiatives in general is to attract and increase the enrolment of younger pupils directly from primary schools.

The new target groups of VET programmes may challenge the teachers, who will have to renew their didactic and pedagogic approaches. The objective of this paper is to present the results of an action research project based on contributing to this renewal. Based on the idea of strengthening teachers' professional learning communities, it points to ways of helping teachers understand the pupils and the changes needed in the pedagogy and didactics to support pupils' inclusion on VET programmes.

1.1 Professional learning communities at VET

In Denmark, the implementation of so-called 'professional learning communities' (PLCs) are an emerging approach in state schools meant to support the implementation of changes (Albrechtsen, 2010). In some Danish municipalities, PLCs are used in selected schools or in many schools in the district on a large-scale, including school management, managers at the municipalities, team leaders, and teachers (VIA, 2017). University colleges are also offering different kinds of courses and workshops on PLCs.

However, there is little research about the effects of PLCs. Recently, a few evaluations have been made as well as some research regarding PLCs in general and how PLCs are implemented in practice in the Danish education system (e.g. VIVE, 2018), but the knowledge about this new practice is sparse. The aim of this paper is to contribute to knowledge of the potentials and problems related to the idea and implementation of PLCs in the context of Danish VET colleges.

The idea of PLCs is inspired by the theory of learning in organisations (Senge, 1990), although the understanding of collaboration and learning communities differs in research in the area (Vangrieken, Dochy, Raes, & Kyndt, 2015). The idea of PLCs is introduced and practiced in Denmark in different ways. In one of these, PLCs are conceptualised as being based on five basic characteristics in the community: (i) common values, (ii) de-privatisation (iii) cooperation, (iv) reflective dialogues, and (v) focus on pupils' and teachers' learning. (Albrechtsen, 2010, 2016; Marzano, Heflebower, Hoegh, Warrick, & Grift, 2016). This specific framework for conceptualisation of the idea has gained some currency in Denmark and is also the one focused on in the research project.

The research question is how PLCs, as an idea, can support teachers in developing an approach that meets the challenges in VET. After presenting the design and methods, this question will be answered by presenting and analysing how a team works with reflective dialogues and how a sub-team develop teaching in VET10 together.

1.2 Methods

The methodological design is based on action research, and the research project is conducted from October 2018 to April 2019 at a VET college. The project thus employs a study design where participation, action, and critical reflection are at the core of the approach (Dick, 2015).

As an action research project, the researcher undertakes the role of teacher, coach, and data collector (Brydon-Miller & Aragón, 2018). The teachers are thus part of the research process in terms of playing a role in the definition of problems, creating and defining knowledge,

learning processes, and implementing PLCs (Kildedal & Laursen, 2012). Theory and action are entangled, and the objective is problem-solving in practice (Dick, 2015; Nielsen, 2012; Stegeager & Willert, 2012). The teachers define the core of their learning goals in the project (Kildedal & Laursen, 2012; Madsen, 2010).

An important tool in the project is communication, where teachers jointly describe and reflect on their own actions (Madsen, 2010; Revans, 2011).

Data was collected from a team including 15 teachers within the subject area of Care, Health and Pedagogy (Duch, 2019). The specific team consisted of more or less organised sub-teams, and the teachers were teaching in different subjects and at different levels of VET. At the college, differentiation is part of the pedagogical and didactic values that are decided in an organisational process. From November 2018 to April 2019, the team in focus was introduced to and worked with PLCs at a monthly 4-hour meeting, facilitated by one of the researchers. In the weeks between the meetings, some teachers were observed in their teaching. The observed lessons involved teaching on the 'Basic programme' (which is the first year in the Danish VET system), the subsequent main programme, EUX, and the described VET10. The focus of the observations was discussed with the teacher, though in general it involved the question of how to differentiate matching pupils' challenges on VET programmes. VET10 is a sub-team, and some team meetings were included in the dataset. At the end of the project, the team members and the team leader were interviewed by the researchers. These interviews included: one focus group interview with three leaders at the college, including the team leader, and two focus group interviews with the teachers in the team separated into two groups. Data were analysed using theories addressing reflection (Schön, 1991).

2 Results

The analysis focuses on two themes: the team and reflective dialogues, and the role of observations. The main results are presented below.

2.1 Team and reflective dialogues

At the team meetings, reflective dialogues were introduced and practiced, and the approach was adapted to the team. The model of these reflective dialogues (Madsen, 2010) were: each teacher had to choose a specific focus on how she/he was developing differentiated teaching to meet the challenges of the pupils and to support their learning. After selecting this focus, the teacher then briefly described this and sent it to the researcher (by e-mail), and she afterwards made sure that this was maintained during all the reflective dialogues. Then the team was divided into smaller groups. This division had to be dynamic because not all teachers showed up to all the meetings due to other tasks, illness, or days off. The group then distributed roles among participants. One teacher was the 'actor' who was reflecting on her/his focus, and another teacher supported this reflection by asking questions. The rest of the group was a 'reflective team' that, in a meta perspective, mirrored the conversation.

Some of these focuses were about how differentiated teaching could support different categories of pupils such as those understood as 'quiet', 'academic weak', 'gifted', or more or less ready to attend a course at VET. Other focuses were about the teachers' collaboration based on pedagogical theory or plans for courses. The chosen focuses also showed different approaches to differentiated teaching such as variation in tasks, feedback, evaluation, motivation, etc.

The observations of the reflective dialogues showed that the teachers were concerned about different aspects of teaching such as challenging pupils, values as a teacher, workload, and teaching methods. Some teachers maintained the chosen focus during the research project while others forgot it or made other choices. Some teachers were concerned with the question of

whether it was necessary to end reflective dialogues with a conclusion about how to take action in the classroom, as stressed in the design for the project.

In the focus group interview, the teachers expressed that the reflective dialogues were seen as challenging and demanding but also supporting their learning processes. The focus group interviews revealed that dialogues only took place at the team meeting and were not integrated into other contexts.

If the topic in the reflective dialogues mirrors the challenges at VET in a teacher perspective, the reflective dialogues are an occasion to reflect on such matters. This may be important to manage as a teacher, but also points to a challenge: How do reflective dialogues support the development of differentiated teaching and thereby pupils' learning?

2.2 Cooperation supported by observations

Some of the teachers in the team teach on the above-mentioned VET10 course. This specific course represented several challenges for this sub-team. One of these challenges was related to student behaviour in the classroom. This was a problem addressed by the teachers at the PLC meetings and also appeared in the observations. For instance, observations showed how the use of mobile phones during the lessons drew pupils' attention away from the activities, some pupils did not concentrate on the activities but wandered in and out of the room, and some pupils used part of the classroom as a kind of 'stage for performance', as described in the following observation:

> Some students are talking about their hair, others are working. The teacher talks with a student who is happy to have received the grade 4 for the first time. They have a dialogue about how to proceed. He explains the tasks for another student who got 10, but who does not understand some of the questions. A student walks across the floor, two others follow a little after. The teacher is sitting and talking focused with a student. A group speaks and laughs aloud. Something about a ball, a student enters. The teacher goes to the noisy group. (Field notes)

On one occasion, observation also showed how the teachers' agenda for the lesson was challenged so that the pupils' work with the subject matter was disturbed and more social and practical matters were overruling this agenda.

The field notes from these observations were made accessible for the teacher being observed and helped the teacher to find patterns in their teaching and to select the theme for the dialogues. It also initiated a process in this sub-team with a stronger focus on tightening the rules for behaviour in the classroom. For instance, observations in the classroom one month later showed:

> The table arrangement has been changed, common rules have been made for what pupils must bring, what must take place during the hours, when lessons stop, etc. The new line-up of the tables, where the students sit in horseshoes, eliminates the "scene" (in the middle of the room, where students go unmotivated and do activities that attract attention). Pupils can still attract attention as they move around the wall/horseshoe, but it is less visible to all. (Field note)

In the interviews, one teacher expresses:

> The observations have given an awareness of what I do and what is going on in class. It was most rewarding. (Quote from interview with the teachers)

Another challenge for this sub-team was a result of the implementation of the new legislations, rules, and regulations. VET10 is part of the laws applicable in the Danish state school. Observations from team meetings show how time is spent identifying and collecting such information, and the teachers negotiated how to implement this. Specifically, the challenges were related to such things as the annual exams, the evaluation of pupils' abilities to apply for attending VET after VET10, and planning internships at relevant workplaces.

Observations from meetings also showed that a great deal of the time was spent on sharing information about pupils' social background and social problems to understand how to handle the conduct inside and outside the classroom. The consequence was that little time was left for more pedagogical agendas.

Where the observations from the classroom showed that PLC seemed to support teachers developing an approach that meets the challenges of new target groups in VET, it is not quite clear whether the observations from the meetings also showed this. At the meetings, the teachers discussed if and how it might be possible to rethink the agenda of the meetings and how to make priorities between practical matters and pupils' learning.

3 Conclusion

Our main focus was to carry out research on the role and potentials of PLCs with regard to supporting the teachers in meeting the challenges of the new reforms in VET and, specifically, successfully developing a pedagogic practice to meet the diversity represented amongst VET pupils.

The action research project described above gave access to empirical data about the discussions and reflections at the meetings of the team and sub-team as well as the teaching that was practiced in the classrooms. This provides a context for describing and analysing the implementation of PLC in the context of the recent changes in Danish VET; changes with consequences that are visible at policy level, organisational level, and for the teacher in the classroom.

The specific VET college that this paper is about is a merger of two different colleges in order to meet some of the organisational and economic challenges, and, during the time of the project, differentiated teaching and the idea of PLC were written into the official document stating values and visions at the college. Participation in the research project was cost-free and offered by VIA University College, the process of defining values and visions was supported by a consultant from a private firm. Common values are one of the characteristics of PLC, and, in this way, there is a coherence between different processes at the VET college.

In the design, differentiated learning is put forward in the reflective dialogues, and that is also a characteristic of PLC, but the dialogues also have a broader perspective on teaching at VET. Depending on the perspective, this can be seen as a lack of focus or as supportive to the teachers' coping with challenges. Teachers' dialogues about challenges in their job can be seen as part of the *de-privatisation* mentioned in PLC.

In VET10, the observations and field notes are used to address and reflect on some general challenges in student behaviour in the classroom, and a common action was taken to counter this. However, meeting time is spent solving practical problems, and little time was left for pedagogical concerns.

With regard to the research question in this paper – how PLCs as an idea and practice can support teachers developing an approach that meets the mentioned challenges in VET – the project contributes in shedding some light on this. As concluded above, the result indicates that PLCs in some aspects support the teachers. However, it is difficult to state whether pupils' *learning* is improved or not. One assumption could be that if teachers are supported in meeting challenges and learning by reflective dialogues, it might possibly improve or at least continue the pedagogical development to improve pupils' learning.

Changing the practice of schools and the pedagogy of teachers is demanding and time consuming. The teachers at VET not only had to adapt their teaching to new legislation and find ways to practice for instance new methods of assessing pupils, they also had to find out how to adapt their pedagogy to the new groups of pupils attending VET, for instance in the VET10 context. Adapting teaching to new legislation is in itself a new challenge for the schools and teachers, but in addition some of the pupils attending these courses also represent complex

problems. Some have personal problems, different kinds of social problems and challenges, some have low academic skills and resources, and some are gifted. Finding out how to meet these pupils in the best way to support their academic learning as well as their more social learning appeared as a demanding task.

Turning to theories of learning, this whole situation may require both enough time for teachers to reflect on their practice as well as time to experiment with new practices. As theorist Schön (1991) describes it, teachers' need to carry out reflections 'in practice' as well as reflections 'on practice'. Due to high workload, the teachers did not have time for reflections 'on practice' on a daily basis, but the dialogues at the meetings supported such activities. The designed action research project included and facilitated such room – it was a part of the conceptualisation of the PLC and one of its five main parts, and thus also played an important role in the design of the action research project. The observations as well as the interviews showed that the teachers used this 'room' very actively.

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Qualifying Vocational Trainers in the Metal and Electrical Industry for Digital Transformation

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Abstract

Digital transformation influences work in many ways at all levels. In this context, the design of effective and efficient production processes is a decisive factor for the economic success of small and medium-sized enterprises in the industrial production sector. In addition to technological and organizational excellence, this requires highly qualified employees. As the vocational training personnel is central for developing the apprentices into future skilled workers, this paper focuses on the changes that occur for the vocational trainers. It describes the development and implementation of a needs-based further training concept, which was supposed to prepare them to promote their competences for understanding and co-designing industrial processes and products in a digitized working environment. Overall, the concrete goals - sensitization for the digital transformation and the selection of digital media in an interactive design - based on the requirement analysis were successfully implemented in the workshops, as shown by the first evaluation results.

Keywords

training concept, digital transformation, industry 4.0, vocational trainers, evaluation

1 Introduction

The paper gives an overview of the background, development and implementation of further training for vocational training personnel in the metal and electrical industry in the course of the digital transformation.[1]

"The transformation of the economy being brought about by Industry 4.0 means that, in the future, business processes such as supply, manufacturing, maintenance, delivery and

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1 The development and implementation of the training takes place within the framework of the project "AditPro²" which is promoted by the Ministry of Labour, Integration and Social Affairs of the State of North Rhine-Westphalia.

customer service will all be connected via the Internet. The resulting highly flexible value networks will require new forms of cooperation between companies, both nationally and globally" (Kagermann, Wahlster, & Helbig, 2013, p. 6). In this context, the design of effective and efficient production processes is a decisive factor for the economic success of small and medium-sized enterprises (SMEs) in the industrial production sector. In addition to technological and organizational excellence, this also requires highly qualified employees. As a result, tasks of production organization such as the design and optimization of manufacturing processes become more important, also for skilled workers at different qualification levels (Borch & Zinke, 2008). Future skilled workers are to be prepared to cope with these requirements in the course of initial vocational training, which aims to develop a comprehensive competence that enables the individual to act professionally and responsibly in occupational, private and social situations (Bader & Müller, 2002, pp. 176–178). While this overarching educational goal remains untouched by the digital transformation, the necessary abilities, skills and knowledge that future skilled workers must develop in order to cope with current and future vocational situations are changing.

Frenz, Heinen, and Schlick (2015) state that detailed predictions on the future of occupations in industrial production within the framework of existing qualification research on industry 4.0 are not yet possible. What becomes clear, however, is that the advancing digitalization requires both new possibilities for shaping the world of vocational education and training and a corresponding qualification of the heterogeneous vocational training personnel

A number of more recent studies examined the changed demands placed on skilled workers in production and derived consequences for occupational profiles and regulatory tools (e.g. Spöttl, Gorldt, Windelband, Grantz, & Richter, 2016). However, to the best of our knowledge, there are currently no studies available that examine the consequences of digital transformation for the vocational training world with a focus on the requirements profile of vocational trainers in industrial-technical field. In addition, there is a lack of didactic concepts for qualifying the heterogeneous target group of vocational training personnel. As the stated quote in the beginning by Kagermann and colleagues (2013, p. 6) describe, the topic area "digital transformation" is highly relevant for the global perspective (Liao, Deschamps, Loures, & Ramos, 2017). The importance, among others, becomes visible within the government plans of several countries (e.g. United States, France, United Kingdom, Japan, European Commission), which are investing great resources in the expansion and development of digital technologies (Cabinet Office of Japan, 2015; Conseil national de l'industrie, 2013; European Commission, 2016; Foresight, 2013; Rafael, Shirley, & Liveris, 2014).

This contribution gives an overview of how a continuing education concept[2] was developed. The aim of the concept was to prepare vocational trainers in a digitized working environment to promote their competences for understanding and co-designing industrial processes and products. To this end, the vocational trainers who know, understand, document and help shape the production and product development processes of their own companies must be able to do so. In addition, they must be enabled to develop new training concepts based on production processes, by means of which they can develop the competence for understanding and co-designing industrial processes and products.

[2] In cooperation with the following companies: QualiTec GmbH, Gemeinschaftslehrwerkstatt der Industrie von Velbert und Umgebung e.V., WILO SE, Dörries Scharmann Technologie GmbH/ Starrag Group, MEK GmbH

2 Methodology and results

In order to achieve the described goals, first a requirement analysis was carried out. Based on these findings and a guiding didactic idea, in a second step, a concept for further training was developed and evaluated. As the qualification of vocational trainers in the metal and electrical industry for digital transformation is only one aspect of the subject area of digitalization and the vocational training systems in the different countries are very heterogeneous, this contribution first describes the development of a further training concept for the mentioned target group in Germany. In a future perspective, however, the training concept could also be tested in other countries after the transfer evaluation has been carried out and possibly adapted to the current vocational training system.

2.1 Requirement analysis

The requirement analysis was divided into two areas. First, the objective requirements for specialists in product and process design in the context of digital transformation were determined. This was based on the 2018 amending regulations for industrial metal and electrical occupations in Germany, which essentially contain two innovations: On the one hand, a new

Metal occupations	Electrical occupations and mechatronics technicians
System integration • Analysis of technical orders and development of solutions • Installation and commissioning of cyberphysical systems	**Digital connectivity** • Analysis of technical orders and development of solutions • Installation, modification and testing of networked systems • Operation of networked systems
Process integration • Analysis and planning of digitally networked production processes • Adaptation and modification of digital networked production systems • Testing of production processes	**Programming** • Analysis of technical orders and development of solutions • Adaptation of software modules • Testing of software modules in the system
Additive manufacturing processes[3] • Modeling of components • Preparation of additive manufacturing • Additive manufacturing of products	**IT Security** • Development of security measures • Implementation of security measures • Monitoring the security measures
IT-supported plant modification • Planning changes to assets • Manufacture and digital post-processing of pipelines, profiles, plant components or sheet metal structures	

Figure 1 Overview of additional qualifications for industrial metal and electrical occupations (Schmitz, Warner, & Frenz, in print)
(based on: Announcement of the new version of the Ordinance on Vocational Training in Industrial Electrical Occupations of 28 June 2018, 2018; Announcement of the new version of the Ordinance on Vocational Training in the Industrial Metal Professions of 28 June 2018, 2018)

[3] Also for mechatronics technicians.

occupational profile position will make the topics of "digitalization of work, data protection and information security" an integral part of training. This must be taught integratively in the company throughout the entire training period. On the other hand, the annexes to the amending regulations contain optional additional qualifications that can be offered to trainees as qualifications that are currently in high demand and certified separately.

Besides that, the prevailing vocational training concepts and the qualification profiles of vocational training personnel, which represent the target group of the project, were collected and systematized. The requirement analysis consisted of a mix of applied methods. For developing learning processes in process management with concrete production processes, methods of qualification research and work psychological tasks analyses (Hacker, 2005, 2009; Ulich, 2011) have been successfully used. First, different learning and production places within the companies have been visited to gain insights into the current design of production and processes. To deepen that knowledge and find out more about the educational processes, the management was interviewed in a next step. Further, the instructors were surveyed with different methods: Questionnaires helped to assess their knowledge concerning the methods of process management and their qualification and task profiles. In direct interviews, they gave further insights about the most important training concepts. Finally, using document analysis, many documents such as existing regulations, task, performance and process descriptions and course records, which were provided by the companies, were analysed.

2.2 Training development

Building on the results of the requirement analysis a four-part workshop series[4] was developed according to the needs and main interests reflected in the requirement analysis.
The aim of the first workshop was to create a common understanding of the phenomenon of digital transformation and to identify possible effects on skilled work and thus on in-company vocational training. In order to be able to discuss concrete examples here, a guided tour through a demonstration factory of the machine tool laboratory of RWTH Aachen University was offered during the workshop. The participants got to know the technological possibilities of an industry 4.0 with the focus on digital assistance systems in manual assembly. This first step was of great importance in the sense that many of the participants were not involved in technical work, but were full-time vocational trainers. In the further course of this training, the focus was on the selection and use of digital media in vocational training based on concrete application examples.

The next module of the continuing education concept was about preparing the vocational trainers for the implementation of the additional qualification of process integration (Figure 1). One component here was advising company actors on the benefits of this additional qualification. Further, learning content was developed in the form of procedures and methods (e.g. SIPOC analysis, benefit analysis, Ishikawa diagram) to promote understanding and participation in shaping industrial processes.

Subsequently, within the third module a concrete application example was made by the vocational trainers by using so-called learner tutorials. By creating learning tutorials, the trainers took on the role of a trainee and dealt with a work process that they prepared with the help of tablet computers and a video app. They also discussed contexts in which creating tutorials can be a useful way to learn.

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[4] Workshop 1: The Digital Transformation and its Effects on Technical Work; Workshop 2: Process management for technicians; Workshop 3: Process-oriented Training with Tutorials; Workshop 4: Digital Media in Vocational Training.

In the last workshop, the aim was to enable vocational trainers to make a didactical choice of media to support teaching-learning processes. The first step was to introduce Härtel and colleague's (2018) model of media pedagogical competence and to discuss possible applications for in-company learning. The theoretical input was supplemented by a market of possibilities in which different digital media were presented and tested by the participants. By working with case studies, the vocational trainers then brought together the contents of both components.

With regard to the seminar methodology, the workshops were developed according to the following four guiding principles, summarized by Sloane (2006): simulation and real coping, experience orientation, metaview and casuistry.

1.1 Evaluation concept

In order to prove the quality and effectiveness of the workshops and the underlying didactic concept, for each one, a formative evaluation has been conducted. The initial goal was to gain insights about individual needs as well as positive and negative aspects to improve further trainings.

After each workshop, the participants received a questionnaire with the request to answer it. Some aspects were evaluated after every single course: the general concept, general conditions, moderation quality, content design, participant centricity, practical relevance and subjective satisfaction. These topics were covered by a combination of closed items that were rated on Likert scales and a few open-ended questions with the chance to give improvement suggestions. Next to these workshop-related questions, in each questionnaire, demographical and job-related questions regarding the time since starting as a vocational trainer, the size of the company and the kind of vocational training were asked.

To gain further insights about the training and learning processes, more questions were added to the third and fourth workshop: In the third training, the scales *Ease of Use*, *Perceived Behavioral Control*, *Intrinsic Motivation* and *Compatibility* from the UTAUT (Unified Theory of Acceptance and Use of Technology), which was constructed by Venkatesh, Morris, and Davis (2003), were added. This was done in order to evaluate the acceptance of tablets which were extensively used in this training.

For the last workshop, it was decided to include three measurement points with different goals. Next to track developments within participants and to increase the statistical power, this is a helpful approach to measure the amount of the content's transfer to the job (Hagemann & Kluge, 2014). Before the training, the vocational trainers rated their knowledge and skill level in the most important topics of the course. Additionally, some stable individual differences were measured in order to find out whether certain validated factors such as motivation to learn (Ng & Ahmad, 2018) contribute to a better transfer. Within the week after the workshop, participants were asked to rate different aspects: First, they indicated their skill level in the covered topics, in order to compare it with the level before. Second, the course's transfer suitability to the job - which is a necessary condition for transfer and a success criterion it itself - was measured with scales such as content validity and attitude towards training. Finally, they stated whether they had formed a transfer intention, which is a good predictor for actual behaviour (Webb & Sheeran, 2006). About two months after the training, the vocational trainers will be asked to rate their level of skill and knowledge regarding the central topics another time for measuring stability. In order to find out whether the learning process included more than broadening knowledge, they will indicate whether they transferred the course topics and learning goals to the job with different criteria, for example by generalizing the contents or mastering new requirements on the job. In addition, the job environment will be regarded to explain transfer by examining whether it provides the right conditions (Aluko & Shonubi, 2014).

3 Conclusion

So far, the following main basic results can be named.

3.1 Requirement analysis

In the requirement analysis, it became apparent that the topic Industry 4.0 is virulent in all companies and that there is great interest in it. However, it was unclear which phenomena are exactly meant by this trend term and which concrete consequences can be expected for in-company vocational training. Here some vocational trainers are also in a double role. On the one hand, the digital transformation will result in changes in the future gainful employment of their trainees. On the other hand, the use of new media leads to changes in their own work as vocational trainers.

3.2 Training development

The format of a modular workshop series allows a demand-oriented selection from the individual modules for the heterogeneous group of participants, e.g. with regard to previous experience, resources, main interests and frameworks in which they train vocational trainees. From the point of view of the trainers, the distribution of further training over several relatively short periods of time should make it possible to send trainers more flexibly. In addition, the workshop format implicates an interactive design, which combines discussion sessions and phases with short input lectures. This has been successfully put into practice, as shown by the evaluation.

3.3 Evaluation concept

So far, three of the four modules have been evaluated within the framework of implementation. The first interim result of the evaluation shows that most of the relevant criteria were rated as positive. Some aspects (such as the balance between activity and theory) were seen as especially fitting. Further, the utility of the evaluation could be shown because feedback from the first two workshops was implemented in the third workshop and accordingly, this one received even better ratings than the two preceding. The transfer evaluation for the fourth workshop – which has not been finally conducted yet – will show for the first time whether the learned methods can be transferred into the job and used in other contexts.

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Open Access in Vocational Education and Training Research – A Research Project at BIBB

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Abstract

This short paper elaborates on a research project at the Federal Institute for Vocational Education and Training (BIBB) in Germany, which examines perspectives of researchers on open access (OA) in the field of Vocational Education and Training (VET). The project explores the technical and structural, policy-related and normative, and inherent academic research conditions influencing the acceptance, dissemination, and use of OA in German-speaking countries. VET research comprises of various related academic research areas, rather than one stand-alone discipline. Therefore, results of the project will be transferable to other fields of the social sciences and humanities. The project is rooted in science communication and media theory. A sequential mixed methods design with both qualitative and quantitative strands forms its empirical basis. Accordingly, an online survey aimed at academic researchers from various disciplines in VET research will follow a qualitative exploration via focus groups. The project is running from 2018–2021.

Keywords

open access; vocational education and training research; social sciences; humanities; sociology of science

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1 Introduction

1.1 A research project at the Federal Institute for Vocational Education and Training (BIBB) in Germany

As is the case across various academic research disciplines, publishing in open access (OA) is becoming increasingly significant in Vocational Education and Training (VET) research. The BIBB research project "Open Access in Vocational Education and Training Research" is set to explore and analyse the technical and structural, policy-related and normative, and inherent academic research conditions influencing the acceptance, dissemination, and use of OA among VET researchers in German-speaking countries. The research project refers to academic research performed on the German VET system, which is a system characterised by companies and vocational schools both acting as learning venues. Research in the field of VET is performed in few specialised extra-university research institutes, as well as at universities. Among other areas, VET research is concerned with training occupations, the vocational school system, didactics, methodology, career guidance, career orientation, and various target groups, such as company training staff, trainees, examiners, and vocational school teachers.

Since 2010, researchers at BIBB have been conducting extensive work on the subject of OA. For this reason, BIBB formally adopted an Open Access Policy in March 2011 and signed the "Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities" in 2014. In 2016 BIBB signed an "Expression of Interest in the Large-scale Implementation of Open Access to Scholarly Journals" in order to support the "Open Access 2020" initiative. As part of the implementation of its OA Policy, all BIBB publications are made accessible following the principle of "gold open access", and the BIBB library supports this OA strategy by establishing the VET Repository, a database for VET research literature. BIBB is playing a pioneering role in the field of OA in VET research at its institutional level. Against this background, questions regarding the various conditions for the acceptance, dissemination, and use of OA in VET research are of special interest for the research team of the project "Open Access in Vocational Education and Training Research".

1.2 Open access as an area of debate within Vocational Education and Training research in germany

Free access to academic research literature is central to the concept of OA. In this regard, "free" encompasses the three following aspects:

1. Access to academic research literature is free of charge. Readers do not need to pay for electronic access to academic research literature. No usage or licensing fees are charged. However, editorial processing is an indispensable process and causes costs to cover the production and graphic preparation of manuscripts in the run-up to publication. These costs are usually covered by article processing charges (APCs). This means that the author or institution pays for the article as an OA publication. The financing of OA is a problem area and subject to much extensive debate. Since this aspect may also be of high significance in the field of VET, it forms a substantial part of the research project.
2. Licensing ought to be as open as possible. Frequently legal protection of OA publications takes place through licensing models fostering the dissemination of academic research literature much more than copyright regulations, of which the latter, at least in Germany are highly author-centric. Creative Commons Licences (CC Licences) are one example of a common licensing model. Generally, it is highly likely that the aspect of licensing plays a crucial role in German VET research. Therefore, this aspect will also be taken into account in the research project.

3. OA publications should be easily accessible and searchable, in order to provide free access and availability unhindered by technical restrictions. For this reason, a standardised and meaningful meta data structure needs to be in place. Repositories or similar instruments and infrastructures are also needed in order to provide permanent storage. At the same time, access to academic publications should be free from technical obstacles. Documents should be downloadable and come in suitable file formats. This third aspect regarding free access to OA publications will also be taken into account for our research project.

In the OA debate, a distinction is made between the two publication pathways of "gold open access" and "green open access". Gold open access describes the process of the initial publication of an article in OA journals or in the form of an OA monograph. Green open access means the publication of academic research works in repositories, in addition to their publication in printed format by a publishing house at the same time as a print publication, or later following the expiry of an embargo.

In Germany, various stakeholders at both policy-making and academic research level are undertaking tremendous efforts to promote OA. These include the OA Strategy adopted by the Federal Ministry of Education and Research in 2016 "Open Access in Deutschland" [Open Access in Germany], and the "OA 2020—initiative for the large-scale transition to Open Access", as initiated by the Max Planck Digital Library. However, within the field of VET research, scepticism and uncertainty are likely more prevalent because detailed knowledge regarding the topic of OA is not widespread. This particularly applies to questions on quality standards, common financing models, and licensing. In this regard, two academic studies on OA as a publication model in the humanities and social sciences in Germany are currently available:

According to Herb (2015), the term Open Science describes a cultural shift in practice and communication within academic research. Computer-aided work and digital communication are facilitating a more effective, open exchange of information within the academic research community, and are fostering a transfer of knowledge between researchers and society. Bambey (2016) outlines the status of OA in the educational sciences and performs a literature analysis to explore the effect of specialist and socio-cultural constellations on publication behaviour. She also looks into the publishing houses on the market and information structure conditions, and concludes that status-related differences become visible in publication behaviour (Bambey, 2016, p. 277). For our BIBB research project, we aim to investigate whether the relationship between publication behaviour and status of a person in addition to an influence of specialist cultures from related disciplines can also be found in VET research.

VET research includes aspects of various academic disciplines (Sloane, 2006, p. 610; Weiß, cited in Euler, Howaldt, Reimann, & Weiss, 2008). These are influenced by a range of academic research approaches and work methods, as well as by different publication traditions and behaviours (Taubert, 2009, p. 658). We assume that results from our research regarding publishers' attitudes and perceptions towards OA in VET research will be at least partially transferable to other social sciences and humanities disciplines.

1.3 Theoretical background with regard to media theory and research on science communication

In order to identify, describe, and reflect on developments in the field of OA, our research project is rooted in media theory and science communication research. The overall aim of the project is to facilitate a deeper understanding for the economic relevance of knowledge transfer and science, and to explore processes of science communication and publication systems along academic disciplines.

In recent years, societal transformations and respective practices of knowledge transfer have affected and shaped science communication and caused a shift in publication structures. A shift from a work and industrial society to a knowledge society resulted in a new economic era, establishing specific infrastructures for the distribution of knowledge as an economic production factor in the 1990's (Wilke, 1998). Today academia and the communication structures within facilitate this economisation of knowledge in the publishing system. Consequently, an increase in research publications is not only making it more difficult for researchers to oversee an abundance of research results, but is hampering the work of academic research libraries financially.

In addition to the economisation of knowledge, opportunities brought about by digitalisation are adding to a shift in formal communication in science. The consequence of this shift in information and communication technologies has been that: "The Internet has fundamentally changed the practical and economic realities of distributing scientific knowledge and cultural heritage. For the first time ever, the Internet now offers the chance to constitute a global and interactive representation of human knowledge, including cultural heritage and the guarantee of worldwide access" ("Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities," 2003).

Although the benefits of OA for authors in terms of a higher degree of the dissemination and better availability of research results are obvious (Schäffler, 2012, p. 35), OA tends to be much more recognised as a publication medium in the natural sciences, compared to the social sciences and humanities. Generally, the reputation of a journal is largely based on the reputation of the scientists publishing in it. Hence, readers trust a journal's reputation without reservations, and emerging scientists perceive scientific experts along with impact factor journals, as main gatekeepers in academia. It is debatable whether these quality assurance systems are effective regarding research innovation and quality (for the debate see Callaway, 2016; Fanelli, 2012; Ioannidis, 2005; Roberts, 2017; Schekman, 2013). Concerning OA, quality assurance procedures in OA journals do not differ from those in subscribed journals. Here too, peer review is in place in numerous cases; a list of peer-reviewed OA journals is available on the Directory of Open Access Journals (DOAJ) platform.

2 Methods

2.1 Research approach

A thorough literature analysis indicates that technical and structural, policy-related, and normative and inherent academic research conditions may exert an influence on the acceptance, dissemination, and use of OA. In the framework of our research project, we define and understand the terms *acceptance*, *dissemination* and *use of OA* as follows: *Acceptance* signifies that the authors understand, endorse, and support the OA model by publishing in OA. *Use* signifies that authors use OA publications for their own scientific work (even if their opinion on OA is in fact a critical one). The term *dissemination* here describes the different models for making OA publications accessible (green open access road, gold open access road).

First, *technical and structural conditions*, as part of the above-mentioned academic research conditions influencing the acceptance, dissemination and use of OA, include storage, archiving, distribution, and findability of OA publications. Establishing online repositories as a virtual location for the systematic storage of documents is one example in this context. The financing of OA publications, e.g., by means of a publication fund, represents another condition in this regard.

Secondly, *policy-related and normative conditions* mainly relate to the statutory foundations of OA. These range from Article 5 (1) of the Basic Law of the Federal Republic of Germany, and its implications for transparency and the democratic decision-making process, to

regulations contained within the German Freedom of Information Act (IFG). Policy-related and normative conditions also encompass provisions from the German Copyright Act (UrhG) (Rödel, 2017, p. 5), and its amendments formulated in the "Gesetz zur Angleichung des Urheberrechts an die aktuellen Erfordernisse der Wissensgesellschaft (UrhWissG)" [Copyright Law Knowledge Society Act] which took effect in 2018 (Linten, Rödel, Taufenbach, & Woll, 2017, p. 12) . Legal certainty regarding the use of OA publications created through alternative licensing models, such as Creative Commons Licences, is an additional aspect of policy-related and normative conditions for the acceptance, dissemination, and use of OA.

Finally, conditions *inherent within the academic research system* include quality assurance procedures, such as "peer review" and an established reputation system. Against the background of prevailing pressure in research to publish, we have to examine the relationship between research quality assurance and publication pressure with regard to OA, and take into account how they constitute the acceptance and use of OA. This is of special interest in terms of OA in VET research from the point of view of academic researchers themselves, particularly with respect to status and career issues.

2.2 Methodological approach and hypotheses

The RLTW matrix (table 1), introduced by members of the research team, visualizes the aforementioned possible conditions (technical and structural, policy-related and normative, conditions inherent in the academic research system) and their relation to the acceptance, dissemination, and use of OA. The columns of the matrix display possible conditions for the acceptance, dissemination, and/or use of OA. In the rows, the conditions - technical and structural, policy-related, and normative or conditions that are inherent within the academic research system - are indicated. The matrix displays the possible characteristics of these conditions, framed as questions (see table 1). The RLTW matrix shows the complexity of our research endeavour, and will guide us as we structure our findings in the research process. In order to examine these conditions, we carry out an empirical analysis, following a sequential mixed design (Teddlie & Tashakkori, 2006, p. 21). This approach combines a qualitative methodological strand with a quantitative part.

For the qualitative part of our research project we have chosen focus group discussions (Krueger & Casey, 2015) as a research method. This allows for the topic of OA to be broadly explored and for hypotheses to be generated from within the research field with several participants at once. Each focus group discussion was audio-recorded and transcribed. Using MAXQDA, a specific software for qualitative and mixed methods research, we will analyse the transcripts, and conduct a thematic analysis, a method of qualitative content analysis in accordance with Mayring (2014) and Schreier (2014). This method allows for deductive and inductive coding processes combined in one coding system. Concept-driven, deductive categories will be taken from the RLTW matrix, whereas, data-driven, inductive (sub-)categories are filtered out from the material following the principles of inductive category formation (Mayring, 2014, p. 79).

Table 1 RLTW[1] matrix of possible conditions for the acceptance, dissemination and use of OA in VET research.

Matrix of the Possible Feature Space	Perspective of the Authors		
	Acceptance of OA	Dissemination of OA	Use of OA
Technical and structural conditions	Which technical and structural conditions influence the acceptance of OA? These include proofreading for quality assurance/impact measurement procedures/IT-structures of long-term archiving	Which technical and structural conditions influence the dissemination of OA? e.g., publication and financing models	Which technical and structural conditions influence the possible uses of OA? e.g., access/research opportunities, usefulness, reliability, quality
Policy-related and normative conditions	Which policy-related and normative conditions influence the acceptance of OA? e.g., support for (IT) infrastructure and academic research career opportunities	Which policy-related and normative conditions influence the dissemination of OA? e.g., copyright, limitations on copyright, funding conditions	Which policy-related and normative conditions influence the use of OA? e.g., legal certainty via alternative licensing models, financial support
Conditions inherent within the academic research system	Which conditions inherent within the academic research system influence the acceptance of OA? e.g., structuring of science communication/peer review procedures for quality assurance	Which conditions inherent within the academic research system influence the dissemination of OA? e.g., change in communication opportunities	Which conditions inherent within the academic research system influence the use of OA? e.g., acceptance of academic research, reputation

Based on the RLTW matrix, we developed a set of hypotheses. These were structured along two thematic areas: First, three overarching *influencing factors* (knowledge (of OA), academic cultures, status), and second, six *aspects* influencing the acceptance, dissemination, and use of OA among VET researchers as users, authors and researchers. In line with our hypotheses, these aspects are: quality assurance, reputation, access (to OA), financing and political action, licensing and legal regulations, and communication and usability.

In a next step, we created a set of six versions of the RLTW matrix, one matrix for each of the six aforementioned aspects from our hypotheses. Within each of these RLTW matrices, we operationalized each aspect into possible attributes and assigned them to the three conditions, technical and structural, policy-related and normative, and conditions inherent within the academic research system. This process was crucial for the development of a structure for our focus group discussions.

[1] The RLTW matrix has been named after the researchers who developed the research project. The abbreviation RLTW comprises of the initial letters of their surnames.

Following this, we re-assembled the matrices for the six aspects - quality assurance, reputation, access (to OA), financing and political action, licensing and legal regulations, and communication and usability - and their attributes into three matrices. One for each of the three thematic areas acceptance, dissemination, and use of OA in VET research. Subsequently, members of the research team rated each of the attributes on a scale from one to three points, based on their relevance for the focus group discussions. As a result of this, the three aspects with the highest overall ratings were included in the structure of the focus group discussions. Additionally, individual attributes with an average rating of three points were also included in the structure.

2.3 Structuring the focus group discussions and selecting participants

In order to include the most relevant aspects from the above-mentioned RLTW matrix in our focus group discussions, and guide facilitator engagement, we prepared our detailed structure for the focus group discussions prior to data gathering.

Following this, we conducted four focus group discussions in Germany in April, May and June 2019, with academic professionals from the field of VET research. In this context, we regarded all academic persons who are scientifically engaged in VET topics as 'researchers in the field of VET'. Focus group discussions took place with researchers from BIBB in Bonn, and with researchers at three universities and research institutes in Cologne, Hamburg and Paderborn. Professional attributes, such as professional status and academic position, academic degree, age, and gender were evenly distributed among participants of each group. Altogether, we conducted focus group discussions with five participants in Bonn, six participants in Cologne, seven participants in Hamburg, and eight participants in Paderborn.

All discussions lasted approximately 90 minutes and followed a set structure. To initiate each discussion, we provided a stimulus to introduce the topic of OA. Hereafter, the discussion followed three thematic areas along the topics of *use*, *acceptance*, and *dissemination* of OA. Each of these topics highlighted aspects such as reputation through OA publications, financing, or quality assurance in OA publishing. While in the first part, participants were asked to answer questions from their perspectives as readers of OA publications, in the second and third part, they were encouraged to consider their roles as authors and researchers in more detail, taking into account that these roles are hardly distinguishable, since researchers can be authors and users of OA simultaneously.

3 Next steps in the research process

The aim of the thematic analysis of the focus group discussions is to align the topics discussed with participants to a coding-system based on the RLTW matrix (see table 1). Based on this analysis, we will form questions for an online survey with a questionnaire. A large-scale internet search will lead to email addresses of VET researchers in Germany, as well as additional information including, name, academic status, institution. The actual amount of researchers in the field of VET in Germany is still unknown, and we aim to reveal it as a by-product of our research project. Ideally, all researchers in the field of VET in Germany will be invited to participate in the online survey. The information gained from the internet search will assist us in assessing the representability of the sample. A statistical analysis of the closed-ended questions using a Likert-type scale will be carried out using SPSS software.

As an overall approach, our research will be conducted as an "Open Science" project. We will publish all texts, methods, (raw) data, evaluations, questionnaires, etc. on the BIBB project homepage (www.bibb.de/oabbf) provided this is compatible with stipulations of the Data Protection Act. We also aim to include interactive tools (such as a commentary function) on the project homepage, in order to engage the public in our research.

4 Conclusions

The purpose of the BIBB research project "Open Access in Vocational Education and Training Research" is to gain insights into VET researchers' attitudes towards OA. After the initial phase of the project, we have completed data gathering for the qualitative part of the project. The focus group discussions are still subject to analysis. However, first impressions from the research field allude to the fact that researchers are not always well-informed about all aspects of OA and frequently raise concerns regarding this publication model. Publishing in highly-ranked, peer-reviewed journals remains a priority for researchers, while apprehensions in terms of licensing and author rights persist.

In the further course of our research, we will analyse the discussions in more detail, uncovering conditions for the acceptance, dissemination, and use of OA among academics in VET research. The results will feed into an online questionnaire, which we aim to send out to VET researchers following the qualitative analysis of the focus group discussions at a later stage in the project.

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Acceptance of a Tutorial-Creating Authoring System for Work-Based Learning in Industrial Manual Assembly

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Abstract

The article introduces a workshop for formally non-qualified persons aiming competence development and certification of skills and knowledge in manual assembly. Within the workshop, participants set up a workplace, define a work process and use authoring systems to create tutorials of an industrial assembly process. While filming, the tutorial creation process facilitates the target group to reflect the working process and to confront them with decision-making problems when optimizing details. In fact, the authoring system serves as an overlaying work-based reflection process. However, current research does not cover acceptance studies of authoring systems for this target group in this domain. Therefore, the study evaluates technology acceptance of an iPad-based authoring system with the help of a translated UTAUT questionnaire in context of industrial manufacturing. In the end, the article discusses the outcomes in view of the fact that several limitations may skew them.

Keywords

vocational education; German further education system; manual assembly; authoring system

1 Introduction

All manufacturing branches face trends of digitalization that can shift nowadays business models of small and medium-sized enterprises (SME) in Germany (Müller, 2019). One can observe efforts in digital enhancements and assistance, not only for tasks, operations and processes in manual assembly (e.g. Petruck et al., 2019), but also in learning (e.g. European Commission, 2018).

Work-based learning is a useful method to foster learning in the work process (Ellström, 2001, 2006; European Training Foundation, 2013). A contemporary approach (Goppold, Braun, Gerschner, & Frenz, in press) uses tutorial creation as an assisting method for reflecting

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and learning work processes in manual assembly (cf. Nyhuis & Wiendahl, 2012). When thinking about information and communication technologies (ICT) as an additional device for learning in a main work process, one has to ensure that ICT do not distract the main work process and the overlaying learning process. Therefore, the study collects user acceptance data within a selected target group in order to investigate whether ICT deliver help for learning or are one further obstacle.

1.1 Target group

Many employees working in manual assembly classify as formally non-qualified and process an increasing number of tasks in manual assembly (e.g. Gerschner, Molitor, & Frenz, 2017). These employees have rarely received vocational education and training (e.g. Kondrup, 2015). According to that, personnel in manual assembly are a heterogeneous target group.

Today, employees need to be qualified in dealing with challenges of digital transformation. Therefore, formally non-qualified employees in manual assembly need support and training in the field of digitalized work processes as well as changes in manual assembly technology. Trainings have to face with the fact that frequently customers are not participants in the training. Employers send their personnel and choose trainings.

1.2 Workshop concept

The study develops a SME based continuing vocational training to promote this diversified target group by tutorial creation in manual assembly. The main concept refers on constructivist didactics (e.g. Chisholm, 2012), which focuses especially on individual, interactive self-oriented learning processes that build upon existing competences and creativity. Thus, learning tasks consist of problems that enrich and upgrade participant's existing competences including new and unknown questions. Work-based learning settings enable to encourage learning of problem solving in professional environment. The didactic framework incorporates the learning field concept as standard approach in vocational education and training in Germany (cf. Kulturministerkonferenz, 2017) including reflexive handling competence (cf. Dehnbostel, 2005) as didactic goal. Furthermore, fostering of basic digital skills for manufacturing professions is an additional goal.

Developing a curriculum for highly diversified target groups uses a competence categorization of manual assembly occupations based on work-studies of Gerschner et al. (2017). Analysing manual assembly work processes enables to formulate competence level-dependent curriculum descriptions for manual assembly tasks. All curriculum descriptions fit into European Qualification Framework (European Parliament & European Council, 2017) and exist for EQF levels 1, 2 and 3. For a compatibility of competence models, integrated basic digital skills in the training rest mainly upon DigComp 2.1 (Carretero, Cuorikan, & Punie, 2017).

Detailing the training concept, the authors rely on modern interpretations of authoring systems such as Wiemer (2015) or Schröder (2014) suggest. These differ from known definitions of authoring systems or authoring tools such as those found in Locatis and Al-Nuaim (1999), Hand (2012), Ritter and Blessing (1998) or Ayub, Venugopal, and Nor (2005). When using authoring systems, learners become authors of learning material, for instance tutorials. Authoring systems complement operational tasks in manual assembly training situations well, because they consist of similar structures. To be an author, one needs process structuring skills that enable to derive singular, (non-)linear tasks from complex work processes comparable to industry-leading standards (cf. Schulmeister, 2007; DIN e. V., 2015; Deming, 2018). Therefore, the training concept adapts basic methods of authoring systems to utilize synergies with manual assembly processes. Within the training, participants describe and analyze their own work processes by producing learning tutorial videos. The tutorial creation hints at optimization

potentials and structural problems in assembly processes. Participants identify them in the work process while filming or in the postproduction. Authoring systems help triggering different optimizations on work and assembly processes during the training, which root for example in economics (e.g. Atkinson, 1999) or ergonomics (Luczak, Volpert, Raeithel, & Schwier, 1987). Fundamentally, the authoring system serves as a work-parallel overlay to foster a reflection process.

1.3 Workshop implementation and authoring system description

The training implementation has taken place in a research and manufacturing plant environment of Demonstrationsfabrik Aachen (DFA). Participants assemble parts of an electric go-cart's front axle. DFA's plant provides multiple assembly process assistant systems for this process and produces karts as a supplier for e-go Mobile AG. This work process suits well for work-based learning in manual assembly, because it contains the most common joining technologies and is directly situated on the shop floor in the production line.

Within the training, participants describe and analyze their own work processes, by producing learning tutorials videos with the aid of iPads. Video production will use the recording app Filmic Pro (FiLMiC Inc., 2018), because it was the most functional app in a pre-test on a shop floor. For post-production, the iMovie app (Apple Inc., 2018a) completes the video production setup due to its resilience and reliability. When simulating an online situation, all data such as technical drawings are stored in a cloud solution as a pdf file. For training without internet connection, these files are stored in the internal storage of each iPad tablet. Apple's standard viewer and the app Pages (Apple Inc., 2018b) are in use for accessing and editing pdf files. Using a general setup, participants learn extracting the learning tutorials from one closed software system, iOS, in order to load and save it in a knowledge management system. For simulating a knowledge management system with administration and storage systematics, the authors use cloud storage within the sciebo tool (Sync & Share NRW, 2018).

1.4 Research questions

In literature, you cannot find studies that cope with the acceptance of a similar technical system in a comparable use case. In order to evaluate the acceptance of a tablet computer-based multi-application system in a work-based vocational training concept, there exist the following research questions:
How much technology acceptance of digital learning media exists within the target group of formally non-qualified employees in manual assembly?
Are there differences within sub-groups of the target group?

2 Methodology

Referring on the research questions, the study needs to conduct technology acceptance research on the application of the tablet computer setup processes on the shop floor of manual assembly work places. The study complements the holistic workshop evaluation concept on Kirkpatricks' and Kirkpatrick's (2005) bottom level.

The study refers to the commonly known technology acceptance model UTAUT by Venkatesh, Moris, and Davis (2003). The UTAUT model has its roots as its previous version TAM (Davis, Bagozzi, & Warshaw, 1989) in the theory of reasoned action (cf. Fishbein & Ajzen, 1975) and theory of planned behavior (cf. Ajzen, 1985). The UTAUT model generalizes empirically validated research findings of TAM and multiple other models (Venkatesh et al., 2003). Venkatesh et al. (2003) validate their model with two pilot studies and afterwards meta-studies confirm the model (e.g. Dwivedi, Rana, Chen, & Williams, 2011; Khechine, Lakhal, & Ndjambou, 2016;).

To measure technology acceptance, the authors choose the UTAUT questionnaire (Venkatesh et al., 2003) and translate its items into German language. Afterwards, there is a double check within multiple translations variations and a reference translation. A cross-validation with another translation by Vollmer (2015) confirms the effort. On top of that, a heterogeneous target group requires pre-testing, that establishes with three students and six members of the target group that do not speak German as mother tongue.

3 Results

First of all, pre-testing suggests to exclude two scales due to unsolvable understanding problems of multiple items. Especially in the "attitude toward using technology" and "anxiety" scales, the target group is not able to differ the meanings of the items (cf. Venkatesh et al., 2003). Even further declarations and explanation has not enhanced and improved their understanding issues within these scales. Therefore, the scales exclude completely from the main study.

3.1 Demography

41 out of 48 workshop participants who filled out the UTAUT questionnaire stated demographical details. In the whole sample, the mean age was 30.8, with a wide range between 17 and 56. Most were male (95%) and about half of the group had a mother tongue different from German (48%). Based on their current biographical activity, the target group subdivides into the groups of labour market, vocational school and manufacturing enterprise. The three groups differed especially regarding their age, and to a lesser extent to their mother tongue (see table 1 for detailed results).

Table 1 Demographic characteristics of the participants

	Total	Labour market	Manufacturing	School
n	41	19	10	12
Age				
Mean	30.8	39.7	27.3	18.5
SD	13.3	11.8	10.6	1.2
Minimum	17	19	17	17
Maximum	56	56	44	20
Gender				
Male	39	17	10	12
Female	2	2	0	0
Mother tongue				
German	16	9	8	2
Another language	19	7	1	8
German + another language	5	2	1	2

3.2 Prior experience

In order to better interpret the technology acceptance results, the study investigates items concerning participant's prior experience beforehand. The majority reported to be privately interested in technology (85%), having used an iPhone or iPad within the last 5 years (63%) and to be skilled or an expert with smartphones/tablets (69%). However, just about half of the group stated to be skilled or an expert with understanding technical drawings (51%). Only a small part (27%) had already written a screenplay/storyboard. Table 2 reports more details about group differences that appear to be rather small descriptively.

Table 2 Prior experience with technology

	Total		Labour market		Manufacturing		School	
	n	%	n	%	n	%	n	%
Privat interest for technology								
yes	35	85%	18	95%	6	60%	11	92%
no	6	15%	1	5%	4	40%	1	8%
Use of iPhone or iPad within in the last 5 years								
yes	26	63%	10	53%	7	70%	9	75%
no	15	37%	9	47%	3	30%	3	25%
Experience with smartphone/ tablet								
expert	8	20%	2	11%	3	30%	3	25%
skilled	16	39%	7	37%	3	30%	6	50%
rather inexperienced	14	34%	9	47%	3	30%	2	17%
absolutely inexperienced	3	7%	1	5%	1	10%	1	8%
Understanding of technical drawings								
expert	7	17%	3	16%	3	30%	1	8%
skilled	14	34%	7	37%	3	30%	4	33%
rather inexperienced	13	32%	5	26%	2	20%	6	50%
absolutely inexperienced	7	17%	4	21%	2	20%	1	8%
Writing a screenplay/ storyboard								
yes	11	27%	4	21%	3	30%	4	33%
no	30	73%	15	79%	7	70%	8	67%

3.3 Reliabilities

Regarding the scales, all showed good reliabilities of .75 and above, except facilitating conditions (α=.66). Table 3 illustrates the results.

Table 3 Scales for General Technology Acceptance: Reliability and Means

		Total		Labour Market		Manufacturing		School	
	Reliability	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)
Self-efficacy	0.75	47	3.9 (0.9)	19	3.8 (0.9)	10	3.7 (1.3)	13	4.2 (0.4)
Behavioral Intention to use the System	0.88	46	3.2 (1.3)	18	3.3 (1.5)	10	3.0 (1.4)	13	3.3 (1.4)
Facilitating Conditions	0.66	47	4.0 (0.9)	19	3.8 (0.8)	10	3.7 (1.1)	13	4.4 (0.7)
Effort Expectancy	0.87	48	4.3 (0.8)	19	4.4 (0.7)	10	4.1 (1.0)	13	4.2 (0.9)
Social Influence	0.86	42	3.5 (1.1)	16	3.4 (1.4)	8	3.3 (1.0)	13	3.5 (1.0)
Performance Expectancy	0.75	47	3.9 (0.9)	19	4.1 (0.7)	9	3.5 (1.1)	13	3.7 (1.0)

3.4 General technology acceptance

In total, 48 participants answer questions about their technology acceptance. All item means are in a range between Mean=3.1 (BI2) to Mean=4.4 (EOU4), and standard deviations move between SD=0.8 (PEU6) and SD=1.5 (BI1, BI2 and BI3).

The scale means are in a comparable range, with the "Behavioural Intention to use the System" as the minimum (Mean=3.2) and "Effort Expectancy" as the maximum (Mean=4.3). Table 4 reports the detailed results.

Table 4 Items for General Technology Acceptance: Means

	Total		Labour Market		Manufacturing		School	
	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)
Perceived Usefulness	48	4.3 (1.1)	19	4.6 (0.5)	10	4.0 (1.4)	13	4.1 (1.4)
Relative Advantage 1	47	4.1 (1.0)	19	4.3 (0.7)	9	3.6 (1.2)	13	4.2 (1.3)
Relative Advantage 5	47	3.9 (1.1)	19	4.5 (0.6)	9	3.3 (1.7)	13	3.5 (1.0)
Outcome Expectations 7	45	3.2 (1.3)	17	3.1 (1.5)	9	3.3 (1.3)	13	3.1 (1.1)
Perceived Ease of Use 3	48	4.2 (1.0)	19	4.4 (0.8)	10	3.8 (1.1)	13	3.9 (1.3)
Perceived Ease of Use 5	48	4.2 (1.0)	19	4.4 (0.8)	10	4.1 (1.3)	13	4.1 (1.1)
Perceived Ease of Use 6	48	4.4 (0.8)	19	4.4 (0.8)	10	4.4 (1.1)	13	4.5 (0.7)
Perceived Ease of Use 4	48	4.3 (0.9)	19	4.4 (0.7)	10	3.9 (1.4)	13	4.3 (0.9)
Subjective Norm 1	46	3.4 (1.3)	17	3.4 (1.5)	10	3.4 (1.4)	13	3.1 (1.1)
Subjective Norm 2	45	3.5 (1.4)	17	3.6 (1.5)	9	3.7 (1.2)	13	3.2 (1.5)
Social Factors 2	42	3.5 (1.4)	16	3.2 (1.5)	8	3.3 (1.6)	13	3.8 (1.4)
Social Factors 4	43	3.7 (1.2)	17	3.5 (1.5)	9	3.2 (1.3)	12	4.2 (0.9)
Perceived Behavioral Control 2	44	3.9 (1.2)	18	3.8 (1.4)	9	3.7 (1.4)	12	4.0 (1.0)
Perceived Behavioral Control 3	47	4.2 (1.0)	19	4.3 (0.9)	10	4.0 (1.4)	13	4.4 (1.1)
Perceived Behavioral Control 5	46	3.5 (1.4)	18	3.3 (1.3)	10	3.6 (1.6)	13	4.2 (0.8)
Facilitating Conditions 3	46	4.1 (1.1)	18	4.0 (1.1)	10	3.4 (1.4)	13	4.8 (0.6)
Self-efficacy 1	47	4.0 (1.2)	19	4.0 (1.3)	10	3.7 (1.4)	13	3.9 (1.1)
Self-efficacy 4	47	4.1 (1.2)	19	3.9 (1.6)	10	3.9 (1.3)	13	4.4 (0.7)
Self-efficacy 6	45	3.9 (1.2)	17	3.7 (1.4)	10	3.8 (1.4)	13	4.1 (0.8)
Self-efficacy 7	47	3.9 (1.1)	19	3.8 (1.2)	10	3.4 (1.4)	13	4.3 (0.6)
Behavioral Intention to use the System 1	47	3.4 (1.5)	19	3.3 (1.6)	10	3.7 (1.4)	13	3.2 (1.4)
Behavioral Intention to use the System 2	46	3.1 (1.5)	18	3.3 (1.6)	10	2.6 (1.7)	13	3.3 (1.4)
Behavioral Intention to use the System 3	46	3.1 (1.5)	18	3.3 (1.4)	10	2.7 (1.6)	13	3.4 (1.5)

3.5 Group differences

Because the one-way ANOVA is less robust against violations against variance homogeneity in case of unequal sample sizes across the groups, we used the Welch-Test to find out whether the groups differed in their technology acceptance.

Only two items revealed significant patterns: RA5 (F_W (2, 15.73) = 5.89, p<.05) and FC3 (F_W (2, 19.47) = 6.95, p<.01), indicating that at least two out of three groups differed significantly.

Table 5 Welch-test for group differences

	Welch-Test	Significance
Self-efficacy	F_W(2, 19.27) = 1.37	p= .28
Behavioral Intention to use the System	F_W(2, 22.69) = 0.21	p= .81
Facilitating Conditions	F_W(2, 20.87) = 2.52	p= .10
Effort Expectancy	F_W(2, 19.29) = 0.59	p= .56
Social Influence	F_W(2, 19.73) = 0.10	p= .90
Performance Expectancy	F_W(2, 17.06) = 1.73	p= .21
Perceived Usefulness	F_W(2, 15.60) = 1.35	p= .29
Relative Advantage 1	F_W(2, 15.93) = 1.25	p= .31
Relative Advantage 5	F_W(2, 15.73) = 5.89	p= .01
Outcome Expectations 7	F_W(2, 20.62) = 0.14	p= .87
Perceived Ease of Use 3	F_W(2, 18.76) = 1.35	p= .28
Perceived Ease of Use 5	F_W(2, 18.65) = 0.59	p= .56
Perceived Ease of Use 6	F_W(2, 20.53) = 0.13	p= .88
Perceived Ease of Use 4	F_W(2, 18.45) = 0.58	p= .57
Subjective Norm 1	F_W(2, 21.97) = 0.30	p= .74
Subjective Norm 2	F_W(2, 21.72) = 0.46	p= .64
Social Factors 2	F_W(2, 18.10) = 0.64	p= .54
Social Factors 4	F_W(2, 19.96) = 2.03	p= .16
Perceived Behavioral Control 2	F_W(2, 19.72) = 0.23	p= .79
Perceived Behavioral Control 3	F_W(2, 19.13) = 0.24	p= .79
Perceived Behavioral Control 5	F_W(2, 20.63) = 3.08	p= .07
Facilitating Conditions 3	F_W(2, 19.47) = 6.95	p= .01
Self-efficacy 1	F_W(2, 21.83) = 0.15	p= .86
Self-efficacy 4	F_W(2, 20.69) = 1.10	p= .35
Self-efficacy 6	F_W(2, 20.47) = 0.48	p= .63
Self-efficacy 7	F_W(2, 20.24) = 2.47	p= .11
Behavioral Intention to use the System 1	F_W(2, 22.83) = 0.36	p= .70
Behavioral Intention to use the System 2	F_W(2, 21.77) = 0.69	p= .51
Behavioral Intention to use the System 3	F_W(2, 21.35) = 0.57	p= .57

4 Discussion

4.1 Results

In order to answer the first research question – the degree of technology acceptance within the given sample – it is most helpful to look at the scale means: First, it becomes evident that all means are above "neutral", indicating that the average attitude is closer to positive than negative. Further, except the behavioural intention, the means are all closer to "rather agree" than "neutral", showing that the technology acceptance is generally high.

Moreover, it seems that no major problems exist concerning the system itself, as effort expectancy – which contains system attributes such as clear, easy, understandable – are not far away from the highest rating. This can be explained by the finding that most participants stated to be familiar with technology beforehand.

However, participants appear to be rather neutral towards actually using the system (behavioural intention towards the system), with a relatively big gap to effort expectancy. A possible explanation for this finding is the result for social support, indicating that they feel low support from the colleagues/management/organization to use the system.

To summarize, the results for the degree of technology acceptance are satisfying, as attitudes generally seem to be positive. However, despite the apparently given abilities (effort expectancy) and resources (facilitating conditions), the intention to use the system is comparably small. This suggests that the social component should not be underestimated, e.g. negative colleagues could potentially stop the actual use of a system.

Regarding the second research question – the degree of technology acceptance differences between groups – only few conclusions can be made. They only displayed differences in two items, namely relative advantage 5 ("Using the system increases my productivity.") and FC3 ("A specific person (or group) is available for assistance with system difficulties."). The descriptive results indicate that the labour market group believed more than the other groups that the system would increase their productivity and that the school group rather assumed assistance in case of system difficulties.

This suggests that the labour market offers the best opportunities for higher productivity levels through the system. An explanation for the other significant result might be that the pupils have a particular person – e.g. a teacher – in mind who seems to be especially supportive.

4.2 Method

Despite these promising results, the study faces some limitations: On the one hand, the setting might have caused problems. As the participation in the labour market group was rather voluntary than in the other groups, there could have been a sampling effect, leading to more motivated participants in this group. On top of that, there could have been a bias effect within the labour market group, because only motivated participants have shown up on site.

Whereas the study has taken place in a real laboratory for the labour market and school group, it was a field study for the manufacturing group in their well-known workplace. This lead to a different focus of the workshop that tilts towards the tutorial creation part. Consequently, the internal and external validity of the results between the groups differs.

In total, the heterogeneous target group held individuals with a variety of attitudes towards questionnaires due to cultural biases and comprehension of all items. Therefore, the study carries a risk that the results do not cover their intentions.

Next to these points concerning the setting and the sample, some statistical issues might have caused problems: In general, the sample size has been small. Consequently, the mean values have to be regarded cautiously. Because of even smaller sample sizes within the groups, the statistical detection of potential differences has been low in order to answer the second

research question. However, descriptive group differences were small anyway. Thus, the missing significances must not have been necessary due to the sample sizes.

The two significant Welch-tests also have to be viewed carefully: Because 29 tests were conducted, the probability of a few significant results just by chance are quite high. On the other hand, these were highly significant, which is much more convincing in this case than significance at the 5%-level.

5 Conclusion

Overall, the investigation of technology acceptance of authoring systems in workshops in industrial manual assembly has been successfully. In general, the use of UTAUT technology acceptance methodology and obtained data face different obstacles and biases in the field of application and within the target group. Nevertheless, the results suggest a good technology acceptance of the incorporated authoring system for tutorial creation.

The study identifies the overlay use of authoring systems for vocational work processes as promising and accepted approach to conduct further research. One alternative is a broader use case scenario within manufacturing industry incorporation physical operations and mental work occupations. Additionally, a transfer to vocational teacher education could help when reflecting explorations of work processes in didactic courses and offer at the same time one teaching method.

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Adapting Apprenticeships to the Digital Transformation of Education and Work from the Perspective of In-company Trainers

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Abstract
In a current research project, the aim was to identify how VET programmes are adapted to what is required of human labour in the fourth industrial revolution (4IR). Since the digitalisation trend and its implications are contested, this paper focuses on already observable digitalisation effects from the perspective of in-company trainers. It combines a document analysis of apprenticeship curricula, semi-structured interviews and two focus group interviews. The document analysis shows that vocational curricula are mainly competence-based, giving trainers freedom to adapt their apprenticeship programmes within the given framework. Data based on interview with 16 trainers gives detailed insight into their perceptions and adaptation procedures at micro- and macro-didactical levels. Strategies used by trainers to adapt their apprenticeships were identified as stabilisation, integration and academisation. These findings reveal that adaptation activities are either reactive to the demands of the digitalised world of work or proactive, enabling learners to shape the implementation of digital technology. This confirms that the adaption processes linked to the 4IR should involve setting educational goals and designing curricula and didactics in a holistic sense.

Keywords

apprenticeships; didactics; in-company trainers; digital transformation; qualitative research

1 Introduction

The availability and application of digital technology, including embedded systems, artificial intelligence and smart factories, is thought to have a sweeping effect on societies and economies in Europe (Bloem et al., 2014) and elsewhere (Hajkowicz et al., 2016). This megatrend is usually discussed using the umbrella term of the fourth industrial revolution (4IR) (e. g. Schwab, 2017)

Since vocational education and training (VET) is linked to the specific competence and qualification requirements of digitally transformed work environments, the 4IR impact is expected to be particularly relevant for apprenticeships and other forms of VET (e. g. Pfeiffer, 2015). However, the direction of recognized or expected 4IR effects is disputed and

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contradictory. Some suggest that digitalization will substitute for human labour and polarise the labour market (Frey & Osborne, 2013, Alhammadi, Brynjolfsson, MacCrory, & Westermann, 2014). Others predict labour shortages (Pew Research Centre, 2017) or doubt a reduced demand for intermediate qualifications (Esser, 2017). On one hand, the 4IR is seen as a disruptive quantum leap (Schultz-Wild & Lutz, 1997), on the other as a long lasting, incremental process of change (Kodama, 2018) that might help liberate humans from work that is dirty, dangerous and difficult (3Ds; Esmaeilian, Behdad, & Wang, 2016).

In the wake of these contradictory trends, our research interest is focused on the effects of the fourth industrial revolution as already perceived by in-company trainers in different enterprises and sectors in Germany. The research questions can be summarized as:

1. How are implications of the fourth industrial revolution (4IR) perceived by in-company trainers responsible for corporate apprenticeships?
2. What type of strategies do in-company trainers use to adapt apprenticeships to the effects of the fourth industrial revolution?

This paper seeks to answer these questions from a didactical perspective (Heimann, Otto, & Schulz, 1965; Klafki, 1994, Sloane, 2010), i. e. by exploring the ways in which trainers (re-)define the educational goals they set for the apprentices, which (new) content is addressed in their training and which teaching and learning methods are used. A holistic model of didactics is applied, to include not only the design of teaching and learning environments within a given institutional context (micro-didactics), but also the design of these institutional contexts (macro-didactics). Within this expanded model, we also take into account, for example, curriculum development, further training of trainers, alignment of training and workplaces, cooperation with the managers of the apprentices (if this role is separated from the trainer role), and partnerships with schools and training providers.

2 Research Methods

The research presented in this paper is a sub-project under a wider project, which focuses on the changing qualification needs of professionals involved in VET at schools, enterprises, chambers of commerce and elsewhere, preparing learners for the digitalised world of work (Project Q4.0[1]).

The present paper combines the results of three related strands of work. Firstly, it draws on a document analysis of apprenticeship curricula as they are today. Here, the current range of curricular activities susceptible to adaptation was reviewed and used as input for the research process that followed. Secondly, it uses semi-structured problem-centred interviews (Witzel & Reiter 2012) with four individual in-company trainers. Thirdly, two focus group interviews were conducted (Vaughn, Schumm, & Sinagub, 1996) with 12 in-company trainers, categorised by trade. Details can be found in Table 1.

[1] Details at: https://wiwi.uni-paderborn.de/dep5/sloane/forschung/q-40/

Table 1 Description of trainers

	occupations in which apprentices are educated (examples)	job description	gender	interview type	type of company (sector)
Trainer 1	commercial clerks, mechanics, IT specialists	full-time trainer, head of training division	male	individual interview	large enterprise (industrial sector)
Trainer 2	commercial clerks, IT specialists, business computing (dual study programme)	full-time trainer, head of training division	male	individual interview	large enterprise (media)
Trainer 3	management assistant for retail services, textile management expert (dual study programme)	full-time trainer, head of training division	female	individual interview	mid-sized enterprise (retail)
Trainer 4	commercial clerks, mechanics, IT specialists, business engineers (dual study programme)	full-time trainer, head of training division	male	individual interview	large enterprise (industrial sector)
Trainer 5	industrial mechanic	full-time trainer, head of apprentice workshop	male	focus group interview	mid-sized public service (state sector)
Trainer 6	commercial clerks, mechanics	full-time trainer, head of apprentice workshop	male	focus group interview	large enterprise (industrial sector)
Trainer 7	motor vehicle mechatronics technician	mechatronic master and part-time trainer	male	focus group interview	small enterprise (crafts sector)
Trainer 8	management assistant for retail services, office manager	full-time trainer, head of training division	male	focus group interview	large enterprise (retail)
Trainer 9	office manager, IT specialists	CEO and part-time trainer	male	focus group interview	small enterprise (consulting)
Trainer 10	office manager	project manager and part-time trainer	female	focus group interview	small enterprise (private training provider)
Trainer 11	office manager, IT specialists	CEO and part-time trainer	male	focus group interview	small enterprise (industrial sector)
Trainer 12	office manager	head of financial division, part-time trainer	male	focus group interview	small public service institution (state sector)
Trainer 13	commercial clerks, mechanics	full-time trainer, head of training division	male	focus group interview	mid-sized power supplier (industrial sector)
Trainer 14	commercial clerks, mechanics	full-time trainer, head of apprentice workshop	male	focus group interview	mid-sized power supplier (industrial sector)
Trainer 15	industrial mechanic	full-time trainer, head of apprentice workshop	male	focus group interview	mid-sized enterprise (industrial sector)
Trainer 16	industrial mechanic	full-time trainer	male	focus group interview	mid-sized enterprise (industrial sector)

Both types of interview aimed at understanding the trainers' perspectives in four areas:

1. Their understanding of digitalisation and what it looks like in their companies
2. Perceived changes at the apprentices' workplaces and resulting new demands for competences and qualifications
3. Their views on the potential requirement for skill sets to be redesigned for specific trades or professions ('vision of the skilled worker in the future')
4. Implications of the fourth industrial revolution on their teaching and training and on how they organise their apprenticeships programs.

First, all interviews were transcribed. Consistent with qualitative methodology, the interview data was analysed using deductive coding based on the two guiding research questions. In addition, a holistic model of didactics was used in combination with inductive coding so as to draw on the richness of data rooted in the everyday practices of the trainers (Mayring, 2014).

3 Findings

On this basis, three main findings were generated: Classification of the curricular framework (3.1) categorisations of perceptions and adoption activities (3.2) and differentiations of three types of adapting strategies (3.3).

3.1 Classification of the curricular framework

When analysing how trainers dealing with the 4IR take steps to adapt their apprenticeships, a special feature of the German VET systems must be taken into consideration. Apprenticeships usually take place under the umbrella of a vocational occupation. This provision is regulated at a national level, where employer associations and trade unions are involved in the political decision-making process. That is, in-company trainers must comply with a skeleton curricula (German: *Ausbildungsordnung*) for each occupation. For this study, popular skilled occupations with particular relevance to the 4IR were selected for a comprehensive document analysis: plant mechanic for sanitary, heating and air conditioning systems, warehouse logistics operator, office manager, clerk in public administration, industrial mechanic, motor vehicle mechatronics technician, production technologist and nurses. The analysis shows that these curricula are mainly competence-based and situation-oriented. This is, they refer to actual workflows and business processes as the basic unit of the curriculum, not to compulsory subject content or topics. In general, these type of curricula give trainers a great deal of freedom to translate economic, social and technological changes into redefined curricula at company level, including meeting the changes demanded by the 4IR. For this, trainers need to undertake curriculum development and adaption activities at company level. These activities and their links to perception patterns are analysed in detail in the following sections.

3.2 Perceptions and adoption activities categorised

Based on our analysis of the interview material, approaches to the digitalised world of work can be categorised as:

1. Perceptions of digitalisation and its general implications
2. Adaptations on micro-didactical level
3. Adaptations on macro-didactical level
4. The role of in-company trainers in the context of the 4IR

Concerning the trainers' perceptions of digitalisation, the interview analysis confirmed the ambiguity of the digitalisation trend. On one hand, digitalisation is seen as a long-lasting development including the introduction of digital technology and automation efforts over decades, on the other, digitalisation is seen as a disruptive force. This category was further divided into four subcategories: 'definition of digitalisation', 'evaluation of digitalisation', 'anticipated effects' and 'effects realised at the trainers' workplaces'.

In defining digitalisation, the trainers highlight that the introduction of digital technology 'permeates all areas of life' (trainer 11). It is seen as an unstoppable force that will also affect those areas still to be digitised.

The evaluation of the digitalisation trend is ambivalent, too. Opportunities are emphasised alongside threats. Opportunities for digitalisation identified by the trainers include substitution of 'dull work', increased 'productivity' (trainer 1) and 'new training opportunities for people with disabilities' (trainer 13) with digital technology providing support in the work place. Digitalisation is evaluated as a threat, when it is 'not transparent from the point of view of individuals what happens with their data' (trainer 10), when automatisation makes humans 'dependent on the technology' (trainer 15) and leads to the 'external determination' (trainer 8) of human workflows by machines. Placing the trainers' statements within this subcategory revealed stark differences between trainers with a positive evaluation (e. g. trainer 2, 3, 9, 11) and a predominantly negative evaluation (e. g. trainer 5, 10, 12, 15).

Concerning the effects of digitalisation, it is anticipated that those effects already realised will consolidate and strengthen. Even though a number of trainers interviewed confess that they themselves are not sure 'what will change' (trainer 1), and that the process of digital transformation 'will not be finished even 20 years from now' (trainer 2), a number of effects have already been identified, many of them pulling in opposing directions. While it is understood that the 'qualifications required' (trainer 2) for work have risen and will continue to rise, digitalisation will also make some occupational tasks 'less challenging' (trainer 2). This means qualification requirements will be reduced and working autonomy decline. Furthermore, the effects of digitalisation are not emerging equally. Some trainers report that their companies use 'fully digitalised billing' (trainer 11) and 'digital project management' (trainer 2), while others still document working hours with 'paper and pencil' (trainer 4) and 'excel files are filled manually' (trainer 12). While the digitalisation of tasks like these and extensive substitution of human labour are anticipated, the lag in the process of digitalisation is highlighted. According to the trainers' experiences, the effects of digitalised workplaces may lead to 'substitution', to a 'higher standardised and simplified' and 'flexibilised' type of work, while some type of already existing work will be 'maintained'. In their efforts to prepare apprentices for the flexibilised type of work in particular, a set of perceived skill requirements is discussed. These include 'basic IT competencies' (trainer 11), 'identifying potential for automatisation' (trainer 8), 'social skills' (trainer 10) for collaborating in cross-professional teams, more 'creativity' (trainer 11), and ownership and self-management capabilities regarding their assigned tasks, perhaps including the ability to explain to suppliers how they need to comply with their 'digital interfaces' e. g. for automated billing and digital supply chain management. Some trainers also expect their apprentices to engage in social media for the benefit of the visibility of the company (trainer 3). It was also highlighted that some plant equipment has become too complex for humans to operate without digital display units as support measures, and these need to be mastered by skilled labour (trainer 6). Since the interview sample includes trainers from big enterprises as well as from small and medium-sized companies, the effects realised depend on the company. Big companies tend to show a higher level of digitalisation and automatisation. However, in the sample, some small companies with just over 10 employees showed a remarkable level of digitalisation, involving fully state of the art IT security (trainer 11), and

sophisticated digital knowledge management, which the apprentices not only use, but also contribute to in accordance with the corporate culture of their company (trainer 9).

Based on these perceived developments in digitalisation and their implications, the trainers initiate adoption processes. The category of 'adaptations on micro-didactical level' is further divided into four didactical parameters as subcategories: 'learning objectives', 'learning content', 'teaching methods', 'media'. Concerning the adoption of learning objectives, the trainers relate to 'basic vocational competences' that remain the same and comprise traditional virtues such as 'punctuality' and 'personal development', combined with the 'flexibility' to acquire those skills needed in the digitalised future (trainer 1). Almost all trainers also mention 'basic IT skills' that 'everybody needs', even if not involved with software development and coding. When asked to elaborate on the type of IT skills developed during the apprenticeships, the following were mentioned: using ICT to connect with customers and co-workers, responsible and informed handling of own and corporate data, compliance with the data protection act and, referring to the threat of becoming dependent on digital technology, understanding that a machine may 'malfunction'. Beyond that, 'problem solving skills' (trainer 1), were mentioned and 'lifelong learning skills' (trainer 10), 'health competence' (trainer 12), the ability to innovate in implementing new technology (trainer 9), as well as the ability to practice 'self-management' (trainer 2, 4, 9, 11) in an environment where digital technology takes over standard tasks and leaves complex, social, creative and poorly-defined tasks for skilled labour, sometimes carried out by apprentices working from home.

In line with the learning objectives, basic apprenticeship content remains the same. However, issues and tasks that lose their relevance in actual work processes, are more likely to be abandoned as content in an apprenticeship. This applies to 'chiselling' (trainer 1) or 'daily cash accounting' (trainer 13). Instead additional content is introduced, which is often interdisciplinary, that is electronics technician also learn 'software development' for 'microcontroller' and 'surface-mount devices' (trainer 4). Industrial occupations also learn about new technologies such as 'additive manufacturing' (trainer 6). For many occupations, including commercial clerks and office manager, content such as 'tech for managers', 'data encryption', 'man-in-the-middle attacks', 'password management', 'copyright and legislation for data protection', 'Business Intelligence (BI) and big data' and 'social media' is introduced as part of the apprenticeship (e. g. trainer 11).

Concerning the methods, the trainers state that their training will help apprentices to understand the 'relevance and context of the tasks', they are to perform (trainer 8). 'Direct instruction' is supposed to be of limited effect (trainer 12), instead the trainer should act as an 'equal colleague'. With reference to the learning objectives, digital media is not seen as an end in itself. Rather, it is seen as a technical option that might be put to use in the apprenticeships alongside non-digital media. Therefore, educational 'videos' are regularly used (trainer 3), but 'smartphones' are usually banned as they are seen as a 'hazard to the attention needed' by the apprentices (trainer 2).

In the interviews all trainers were consistent in that adaptions on the macro-didactical level are necessary, that is curriculum, examinations, organisation/resources and qualifications of trainers. But the locus of control differs. Some trainers expect the 'skeleton curricula on the national level to be changed first' and the enterprise to 'invest in digital devices' for the training division (e. g. trainer 5, 7, 15, 16) as a prerequisite for them adapting their apprenticeship programmes. Others recognise the flexibility of competence-based curricula and use this as an opportunity to comply with the existing norms for apprenticeships, while at the same time introducing 'supplementary modules and qualifications' within the apprenticeship and additional measures to link up initial apprentice education with further education responding to demands for higher qualification (e. g. trainer 1, 2, 3, 4, 9, 11). Among the innovations on macro-level are 'training projects', in which apprentices of different trades work together (e. g.

trainer 4) and increased cooperation between the training companies and schools (e. g. trainer 6). The trainers insist that these changes are also to be reflected in the 'trade examinations', which are organised not by single enterprises, but on the level of chambers of commerce resp. chambers of trade as self-administration entities of companies in a certain sector (e. g. trainer 7, 11). The organisational capacity to provide suitable apprenticeships is also linked to the development of the company as a learning organisation, and having a 'feedback culture' (e. g. trainer 9).

Regarding the role of in-company trainers in the context of the 4IR, it is highlighted that trainers themselves need to be learning employees, particularly those full-time trainers in training divisions separate from the work processes (e. g. trainer 4, 5, 10). Due to apprentices, who use digital media and may be better informed in some vocational areas as their trainers, trainers are not seen as 'dispensers of knowledge' (trainer 11) any longer, but rather as models and moderators of the complex learning processes, the apprentices need to acquire competences relevant in a digitalised world of work.

3.3 Types of adapting strategies

By focussing on the differences in dealing with the digitalisation trend, three types of strategies for adapting apprentices could be distinguished: stabilisation, integration and academisation strategies.

Trainers applying a stabilisation strategy maintain established apprenticeship practices by at least partially shielding them from the impact of digitalisation on their work (e. g. trainers 5, 7, 10, 14 ,16). It is noteworthy that those who apply this strategy usually share a predominantly negative evaluation of digitalisation and see it as a threat. From this perspective, shielding can be legitimated. From an educational perspective, the benefit of this strategy is that traditional training measures such as manual demonstration can be more instructive than abstract digitalized operations. Due to this way of dealing with digitalisation, adapting processes are mainly limited to micro-level, macro-didactical changes are rare.

The integration strategy is in stark contrast to this and is applied by a different group of trainers (e. g. trainers 1, 2, 3, 4, 6, 8, 9, 11). This group shares a predominantly positive evaluation of digitalisation and sees it more as an opportunity. Threats such as 'external determination' or 'substitution' of human labour by machines are also identified by these trainers, but they believe they will be overcome by developing those skills and competences that future workforces will need in the digitalised world. Hence, the curricular freedom allows new competences and content to be integrated into the apprenticeship and to be organised in a way that gives young learners the chance to acquire them. These include the learning competence to continue development after the apprenticeship (and also to integrate initial training and professional development).

The academisation strategy is applied by a sub-group of the second group of trainers and limited to trainers from large or mid-sized enterprises (trainers 1, 2, 3, 4). The argument is that in some areas the monitoring and controlling of complex operations is so demanding for employees, that the training requires additional studies. Here the training divisions have introduced dual study programs that integrate the apprentices in the working and learning processes within the company, but also send them to a higher education institution instead of school. The admission requirements for dual study programmes are usually higher than for regular apprenticeship programmes. Some companies have cut some apprenticeship positions in favour of new dual study positions (trainers 2 and 4).

4 Conclusions

The study has shown that in-company trainers develop different strategies to deal with the 4IR and its impact on VET. The cross-case analysis of 16 trainers also indicates that those maintaining a negative and concerned view on digitalisation tend to react more passively, applying a stabilising strategy which has educational value but may fail not only to enable vocational learners to work in a digitalised environment, but to take responsibility for the use and effects of the technology implemented that will shape their own work environment. Trainers who take a more balanced perspective on digitalisation, recognising both opportunities and threats, adopt apprenticeships more actively, applying integration and academisation strategies. They don't limit their efforts to the micro-didactical level, such as introducing new digital devices to the practical guidance at the training workshop or workplace, but take management decisions on the macro-level, too, adapting learning objectives, curricula and didactics in a holistic sense. Therefore, this study points to the importance of a comprehensive understanding of the 4IR for trainers to be able to adapt apprenticeship programmes.

Beyond the apparent link between adapting strategies and perceptions of digitalisation, the study has also shed some light on how training conditions depend on the size of the enterprise. Usually, the apprenticeship programmes of large enterprises are considered to be more sophisticated and innovative, since there are sufficient resources to allocate to training, while apprenticeships at small and medium-sized enterprises are more closely linked to actual work processes. This is not necessarily a disadvantage. The sample of trainers interviewed showed that, by virtue of their size, small enterprises may be more flexible and take advantage of new technologies faster than some established large companies. Two trainers (trainer 9 and 11) were also CEOs of their own companies and while acting only part-time as trainers, in board decisions they recognised the training needs of their workforce, and this also benefited the apprenticeships by establishing a corporate culture supporting learning and feedback. In bigger companies however, full-time trainers leading training divisions may be external to day to day business decisions. This independence of work processes may be useful for educational purposes, such as setting up innovative training projects, but also implies the need for further training of the full-time trainers to keep them updated about changes to work processes and business flows. When adapting apprenticeships to the digital transformation, these specific corporate needs must be considered. In this regard, one of the things that may do most to strengthen the attractiveness of apprenticeships would be to link them up with work processes at the company which are innovative, in the sense that they take advantage of new technological opportunities while deploying innovation in a way that ensures meaningful and enriching tasks for human labour that provide learning opportunities in themselves. Those graduating from well adapted apprenticeships may be the very ones to help bring forth this human version of a new digital world of work.

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New Forms of Learning and Teaching and Organisational Change – a Case Study at the Building Industry

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Abstract

This paper discusses comprehensive experiences of an ongoing and complex innovation process, driven by new requirements as a result of digitisation at the construction industry and by new examination regulations. Complex work and learning tasks (orientation on large building projects) were taken from the foremen's occupational reality as a source to (re-)organise the various fields of instruction, enhancing the foreman with the necessary technical and social work-process knowledge. The project DigiProb introduced digital tools and media and project-based forms of learning and teaching in the area of further vocational education and training at a training provider in the construction sector belonging to the German building industry. Starting with the change of work and technology in several building occupations we discuss the challenges this development poses for the foremen. The second part of the results section focuses on the training of the foremen at the side of the building education provider including measures to improve curricula and the digital learning environment.

Keywords

building and construction industry; digital tools and media; general foreman; further vocational training and education; mixed method approach

1 Method

In this project, we carried out a mixed-method design using an array of quantitative and qualitative methods. First, we conducted 20 interviews with those lecturers most involved in the courses as well as the training provider's management staff. These interviews were analysed using MaxQDA in order to group the interviews' contents around the most pressing issues.

As part of the new examination system (see below) foremen are required to do a work project on site and reflect on it. These materials were analysed in terms of how interdisciplinary content is actually intertwined in carrying out real complex work tasks in the world of work.

Furthermore, in the tradition of accompanying research, we organised monthly meetings of a group of lecturers developing the tasks that should structure the new course system stronger

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relating the different lecture's contents to each other. Here, regular group discussions were carried out and evaluated (Deitmer, Heinemann, & Müller 2018).

When the tasks were piloted in courses at the training provider, we carried out various online surveys for learners and teachers/trainers as well as interviews with course participants and participatory observation at the classrooms.

Finally, the usability of the digital tools was not only evaluated from a technical point of view but also (again, using short questionnaires as well as in-depth interviews) in terms of their potential to organise the content in a way that bridges domain-specific knowledge and stronger relates it to actual complex tasks.

2 The project

In the following sections we will present results from the final evaluation of the Project (DigiProb, 2019) in relation to the changing role of the general foremen, the challenges of further education and training providers, the challenges of the lecturers as well as course participants. Experiences with implementing lecturer working groups in order to supper greater building projects as well as evaluation results from testing the lecturer platform and the app Learning Toolbox (LTB) developed in this project will be discussed.

The project used the idea of complex learning tasks (work and learning projects) that were taken from the foremen's occupational reality as a source to (re-)organise the various fields of instruction, enhancing them with the necessary work-process knowledge. The second set of measures was the development of a digital learning and organisation environment, including Learning Toolbox-App for the students and a collaboration lecturer digital platform in order to help the lecturers to reorganise the materials according to these tasks and to enable them to collaboratively develop complex learning tasks (projects). The process of developing such complex learning tasks not only fosters the bridging of course material that used to be provided by different lecturers as isolated modules, but it also supported better identification with the courses as a whole and the role as a lecturer (Deitmer, Heinemann, & Müller, 2018).

2.1 Change of work and technology in Building and Construction

In the building and construction sector many technical innovations take place and are currently changing work and technology within this sector.

- new digital planning technology in the building and construction work like Building Information Modelling (BIM). BIM can be understood as a co-operative computer aided working design method which combines different technical domains and building disciplines such as main raw construction, technical equipment etc. It is represented by strong and extended virtual software artefacts which go beyond computer aided design tools (CAD) an is usually a 3D model of a building plus information on time and costs (Deitmer, Heinemann, & Müller, 2016)
- prefabrication of building segments. This calls for the foremen to command the newest communication technology in order to co-ordinate logistic processes of just in time delivery.
- more complex building standards to meet higher demands on energy consumption and other environmental requirements. The number of building regulations have been more than doubled in the last 15 years and make knowledge about new building technology and building work processes a challenge. Here continuous support by media information tablets is a big need.
- new materials are applied in a massive way which changes the work processes in several building occupations as e.g. brick laying when bricks are not anymore brought together by

using cement but are glued with plaster changing many details of the construction work process (Deitmer & Heinemann, 2015).

Altogether, this leads to entirely new requirements of work processes performed by the skilled construction workers and foremen involved, above all with increased demands for specialist skills and process expertise. Both in initial training and in further education, new training contents must be taught as well as translated methodologically and didactically into practice-oriented vocational training in construction.

2.2 The foreman

Foremen are the 'quality improvement managers' for work and business processes on the building site and manage the co-ordination of different trades from armoured concrete builder and bricklayer up to special supply domains such as completion trades like e.g. carpenters, stone and tile layers, and dry-wall builders. The foreman's tasks consist of assuring quality of work and organisation on the building project and under construction workers on a day to day base. The knowledge and skill domains he has to deal with can be grouped into three areas:

- building technology: e.g. building machinery, materials, logistics, pre-fabrication, new and innovative approaches such as BIM and building apps
- building site project coordination and management: e.g. to ensure quality of work- and business processes (preparation, realisation and assessments), documentation, measurements etc.
- employee management: adequate personal planning and team management processes (including responsibility for apprenticeship); regarding the building workers including apprentices: personal safety on building site, conflict management, team development, and coordination.

Therefore, he acts as a 'living communication interface' between employees, apprentices, suppliers, planners (architects, civil engineers, safety experts and building technicians), corporate building and construction headquarters, competent building authorities.

2.3 The examination system

The writing and compilation of a building project thesis is a key element in the renewed construction examination system aiming at action and project oriented learning. Preparing, analysing, writing and assessing a building project builds "connecting bridges" between the daily work practice of a foreman and the technical knowledge acquired during courses. Here is the chance to follow a project in a more general perspective and undergo quality development processes like plan, do, control, act. By preparing and writing and defending the thesis the foreman gets a chance to undergo a holistic learning process connecting course knowledge and real practice. We analysed several of such cases in order to get a starting point for restructuring the courses at the training provider.

2.4 Courses at providers of further vocational training for foremen

Further vocational education and training in Germany's construction sector leading to general foreman is structured on three levels. In courses carried out at training providers normally belonging to the building industry, one first can attain the level of foreman ('Vorarbeiter'), afterwards the 'Werkpolier' and 'geprüfter Polier' (two different levels of general foreman). The last one is adequate of a master craftsman in industry ('Meister'). In order to cope with technological change and first of all to relate courses and exams closer to the world of work

and the actual general foreman's occupational profile (i.e. day-to-day management of construction sites) in Germany in 2012 the examination of further vocational education and training courses leading to the different grades of general foreman in construction was reformed towards action-oriented examinations (Meyser, 2013; Niethammer, Schmidt, & Schweder, 2013). Examination now focuses on a practical project (usually three weeks) that is carried out at the foreman's company in order to reflect on actual work. The examination mainly consists in an expert talk on this project as well as on typical foremen's work tasks and problems.

During the courses, the learners usually are released from work and the companies pay for the courses as well as the skilled workers' wages during course time. The actual way of carrying out the courses leading to the different grades of foreman is dominated by a number of various external lecturers as sideline activities (often engineers, technicians, architects, experts of suppliers, experts of building authorities and private personnel developer and consultants) that are providing specialised knowledge about their respective fields. A seven weeks course easily may be carried out by more than a dozen or more different lecturers. Furthermore, at the first two levels there are a number of specialisations (e.g. earthwork, sewage conduit construction, construction site safety), that only refer to sub-groups of learners according to their individual fields of work.

The lecturers come from the whole of Germany and are specialists in their respective fields. But this setting makes it difficult, though, to relate the lessons' contents to one another and to enable the learners to grasp the whole picture of a foreman's work - the necessary work-process knowledge (Boreham & Fischer, 2009; Fischer, Boreham, & Nyan, 2004).

The challenge in the project we undertook was to introduce action-oriented forms of learning and teaching into this setting. Fortunately, lecturers' as well as learners' motivation for such an endeavour was quite high. Still, the way courses and examinations are organised overall meant lengthy labour in order to at least partly achieve the aim of stronger relating course contents to the foreman's occupational reality.

Altogether the most important conditions we found were:

The education provider mainly acts as an organising entity, providing infrastructure, copied learning materials of the lecturer, schedules and a basic pedagogical concept:

- Lecturers are spread all over northern Germany and only temporarily contracted; they are very often not pedagogically skilled and don't have an overview over the structure and contents of the courses as a whole.
- Mostly they don't know other lecturers (besides some private contacts) and do not have any chance to collaborate with others. Since participants have to be released from work, the courses are held under high time pressure.
- Since many lecturers feel forced to overload their lessons with factual general and basic information on special technology or building management, students are missing time to reflect and train the study matter. Moreover, they have to transfer the study matters into their field of work practice as a new foreman and evaluate the significance of the special teaching subject by themselves.

2.5 Reorganising course structures

The project's basis was that stronger cooperation in between the lecturers should help to better integrate different kinds of courses. Small groups of lecturers can share their individual course content for greater interoperability between the different learning units. This should lead to stronger interrelations between the learning units and can be formed into mutual building process projects where a bigger building project can be the target for the whole course. Technology, organisation process and the tasks of the foreman can be put into the centre of the course. In the long run, bigger units of groups of lecturers can be build.

Using a digital lecturer platform to organise the manifold building technology sub-topics (tunnel and channel construction, underground construction, and building above ground level) is making it easier to pool the different steps in the building process. This can help course participants in their learning processes to build up a stronger orientation towards integrative building construction processes. They can follow their role as coming building quality managers and be able to time the work and oversee the interoperability of different kinds of building task.

Finally, a mobile app that was developed in the European Framework project 'Learning Layers' was reconfigured in order to deliver the content to the learners in a way that fits these organisational principles – the Learning Toolbox (LTB). Here, the foremen get the content according to the structure of the course and are able to develop and share materials.

Building working groups under course lecturers

Three measures were undertaken and evaluated in the DigiProb project to prepare lecturers for this new kind of course programmes: In the development phase of the project a group of lecturers at the training provider began to develop a work oriented learning task which is able to integrate different building tasks into a larger setting – building a motorway service centre. Such a project relates building occupations such as underground (street building, parking space, piping and sewage) and upper ground work such as mason, concrete worker and stack-builder in order to create functional buildings: gasoline station, restaurant, hotel and recreation grounds and allowing the foremen to be confronted with managing a building site in its complexity.

This kind of creation of occupation-related tasks out of different levels of technical, work process or personnel management domains was carried through in monthly face-to-face meetings as well as by use of a digital platform which was especially constructed for the lecturers.

Though the process did not work as envisaged because of programming problems, the potential of such a platform in a setting where face-to-face meetings are not possible (i.e. outside a project environment) was clearly visible.

The meetings of up to 18 lecturers served to empower the lecturers to create complex and integrated work and learning tasks by making use of the online digital. In this series of meetings the following topics were tackled:

- What are the characteristics of such a "complex and challenging and problem oriented task" in terms of content as well as vocational pedagogy?
- What themes should be covered in the particular courses?
- What features do we need of the digital platform to allow the development of different kind of complex tasks online?

After dealing which such questions other questions occurred: How many co-ordinators for are needed for smaller and larger projects? What is their role? What does the platform? When and where physical meetings of which kind are needed? How is the lecturers work honoured and controlled?

For selection and design of the work tasks the following criteria have been guiding for lecturers:

- **Occupational reality**: selecting such work tasks that reflect typical and complex work processes in construction above and below ground including earthwork, street and sewage etc.
- **Work process knowledge**: the work task refers to work processes in a tripartite structure in combining different knowledge domains such as knowing that, knowing how and knowing why.

- **Shaping potential**: Tasks allowing foremen to be able to reflect on a holistic competence level which goes above functional competences. Each of the tasks is open enough so different pathways can be followed to reach a satisfactory solution.
- **Providing holistic solutions that cover work, technology and process**: The work tasks go beyond technical solutions encompassing the way the work process is organised as well as co-ordinating the different people working on it.

The work teams chose such work task that demonstrated a high level of inter-dependency to make obvious that co-ordination between the different work domains – e.g. earth work and construction and building of fundaments – is very relevant for the smooth processing and fine fitting of the different steps. In our example construction above and below ground meet and mesh.

The whole process of systemisation was carried out as follows:

- first brainstorming for the closer definition of the work task based on an analysis of previous experiences of work tasks commonly known by the lecturers to be suitable for foreman and general foreman.
- sequencing of sub tasks according to work order
- closer definition of sub tasks based on the sub task sequence structure; pedagogically designing the tasks for the work groups for the course participants
- internal validation in the group
- preparing for testing in different courses at the training provider
- evaluating the process and the results by interviews with lecturers and course participants as well as observation and class room shadowing

2.6 Fostering vocational learning by digital media

If one takes the approach to organise vocational learning in further education courses around complex work tasks, digital media gets a specific role. We tried to use digital media in order to foster vocational learning processes combining the acquisition of different forms of knowledge as 'knowing that', 'knowing how' and 'knowing why' (see Hacker, 1992). In order to better specify the role of digital media in this process, we developed a learning matrix showing the different steps of learning involved in the complex work tasks in order to decide if and in which way the use of software may foster the learning processes involved. This was then grouped for measures before, during and after the courses, and related to single lecturers, lecturers' interaction, single participants, participants' interaction and interaction between lecturers and participants.

It is important that everyone involved has a clear picture on when and for what purposes digital media plays a role here. In general, one may order the content of vocational learning processes into three areas: knowledge guiding action, knowledge explaining action and knowledge reflecting action (Hacker, 1992, p. 94). The first group, rule-guided knowledge, may be the easiest to foster by digital media. For occupational factual knowledge like knowing the regulation on slope and calculating it, one may use web contents in form of quizzes, puzzles, and so on. Knowing how is more related to the work process task. Here, the main point is to relate an isolated task to the work process as a whole - something especially important for foremen who have to organise the construction work under different domains. The third area deals with those questions that are posed by special cases that cannot be solved by the routine application of knowledge. For the latter two areas, we do not deal with factual knowledge but can enrich problem-based learning by digital materials.

In terms of soft- and hardware architecture, as well as organisational learning for the further education provider as a whole, these changes mean quite a challenge. For our project, we thus

developed a platform mainly for the lecturers to enable them to collectively work and exchange on the complex work tasks.

2.7 Implementing adequate digital tools and apps for the learners - the Learning Toolbox" (LTB)

The Learning Toolbox was developed in the European Framework project 'Learning Layers'. The guiding idea is to be able to organise content in a way that is suitable for project-based learning. In short, using 'stacks' for course units and 'tiles' for different forms of content, all kinds of contents can be provided in different formats on a smart phone and there is ample possibility to interaction and sharing of contents between lecturers, learners and between lecturers and learners. It also allows the creation and sharing of content by the learners themselves. The LTB was adapted to the DigiProb project to enable the teachers to create learning materials that allow the course participants to follow the complex work tasks according to the work process. At the different steps, small projects by the learners are possible.

The lecturers prepared their teaching scripts via the digital platform for the Learning Tool box. This changed the usual course preparation and planning because the lecturers were forced from the start to consider an application und user centred perspective. The lecturers regarded this change in the process of preparation as rather work intensive, but evaluated the overall process as rather. In every course stack also work experience tiles are now integrated where course participants are asked to load up own work experiences from real building projects, e.g. by annotated photos or videos. This new practice is enforcing the app users to reflect current own work practice.

The experiences during testing the LTB through selected lecturers showed that structuring content via knowledge tiles makes it easier for the participants to learn the contents. As all course participants already have a fair command of technical knowledge as well as occupational practice regarding the management of building projects at their building sites, assimilation of the additional knowledge delivered at the further education courses gets easier.

3 Conclusions

At the beginning of the project the main conditions providing challenges as well as resources to introduce change were:

- **Frame conditions**: Courses having to be carried out in winter and spring time, in as short a time as possible (between 4 to 7 weeks full time).
- **Participants' motivation**: This is quite high for all the learners out of the building and construction industry because they are eager to gain new levels in their professional career.
- **Lecturers**: Having very good factual knowledge of their field e.g. in building technology, devices and materials; building project management and personal management of different building domains on a building site; but mostly are not foremen themselves. Instead, civil engineers. architects or technicians predominate.
- **Exams**: Have been modified in order to be more in line with the actual foreman's job profile and expectation of modern building projects and processes. But often they are centralised and not carried out by the lecturers.
- **Teaching and learning processes**: Lack of well organised teaching materials including e-resources; restrictions on action learning because of time constraints; internal evaluation is carried out in a summative way.

The general foreman's role in the building industry has considerably changed in the last years. In Germany, examination procedures have been changed in order to cope with the foremen's new role. Still, there are severe restrictions put on the way learning is organised at VET and further education providers. Most severe here are the restrictions put on learning via

the organisation of courses - the companies' interest of having only a short, intensive course phase in the winter break is pressurising the instruction towards offering 'hard facts' in order to pass exams.

The innovation processes described have been set up via accompanying research aiming for better work process knowledge instead of restricting courses to technical knowledge that often is fragmented and difficult to assimilate to work practice. In order to achieve this we developed not only a digital collaboration platform for the lecturers, but also an integrative system to develop and set up complex work and learning tasks (work and learning projects) that were taken from the foremen's occupational reality as a source to (re-)organise the various fields of instruction, enhancing them with the necessary work-process knowledge. The support instrument for this step was the implementation of a Learning App: the Learning Tool Box.

As the learners as well as the lecturers show considerable motivation, some of the internal restrictions (e.g. lots of different lecturers in one course) can be overcome. Still, the aim to develop and establish sound forms of lecturer collaboration as well as a stronger orientation towards action-oriented learning only partly succeeded. One problem here simply are the resources to develop digital systems that can make the whole process easier and less time-consuming for the lecturers. As such systems have to reflect the needs of the lecturers' pedagogical co-operation, they are far more ambitious then moodle-like organisations of content – something software developers need some time to understand.

Co-operation and co-ordination amongst the different lecturers is a crucial thing. Qualifying and developing the lecturers' pedagogic and didactic approaches and abilities are a key essential. This included the competence of the lecturers to approach their teaching with a digital learning environment based on virtual spaces to share ideas and experiences up to specific learning apps such as the learning tool box.

The consequence of these changes is an increasing quality level of training in the construction industry. Institutions and trainers involved in vocational training, in particular outside the workplace, must make great efforts to not only maintain but above all to raise their level of training.

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Overcoming Vulnerability and Enhancing Social Cohesion Through Inclusion, Communication and Active Citizenship in the Context of Adult Education and VET: A Symposium[1]

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Abstract

The symposium focuses on the role played by active citizenship and communication practices in contributing to social inclusion of young adults in vulnerable life situations. Engaging vulnerable young people through adult education has been strongly related to addressing the specific needs and requirements that would facilitate their participation in the social, economic and civic/political life in their country contexts. The paper draws on the key findings and conclusions of the Horizon 2020 project 'Adult Education as a Means to Active Participatory Citizenship' (EduMAP, 2017; 2019) conducted in 2016-2019. The project, which involved the partnership and cooperation of eight academic institutions in six European countries and one non-EU partner, aimed to advance understanding and further develop both the current and future impact of adult education on learning for active participatory citizenship in Europe and beyond. The methodological approach was based on both desk and empirical research, carried out through dedicated work packages. The project also involved undertaking a review of the relevant literature, including research publications, policy papers and statistics, relevant to the inclusion and participation of young adults. The EduMAP study involved researching 40 adult education programmes across 19 EU countries and Turkey. Fieldwork was carried out through individual and focus group interviews with 814 participants, including educational practitioners, policy-makers and young adults.

Keywords

adult education, vulnerable young adults, active citizenship, social exclusion

1 Introduction: Setting the context: social inclusion, communication and young adults

It has been increasingly recognised by a range of stakeholders that there is a growing number of young people suffering from the various effects of the unstable social, economic and political situations affecting Europe and its neighbouring countries. Some young adults are particularly at risk of being excluded and marginalised, for example those with health or learning difficulties, early school leavers, members of ethnic minority groups, homeless young people, or young refugees and migrants. In recent years, European policies for adult education (AE) and active citizenship (AC) have been strongly influenced by the global economic crisis and the humanitarian migration. AE systems in Europe and beyond have responded by setting up programmes and strategies with the aim of integrating refugees and migrants into domestic labour markets. The recent debate on AE, social inclusion and citizenship has been strongly underpinned by the discussion on how active citizenship could be exercised in a way that would promote social justice, inclusion and participation and what the contribution of different forms of AE and lifelong learning (LLL) might be (Jarvis, 2012). Different forms of AE (e.g. vocational education and training, second-chance and basic skills programmes) have been increasingly recognised as a means to engage and re-engage young adults, improve their life chances and facilitate their social inclusion, thus contributing to their capacity to take an active role as citizens within their societal contexts. However, the European AE systems often fail to meet the specific educational needs of many vulnerable groups, such as people with low levels of basic or functional literacy (e.g. ethnic minority members, foreign newcomers), as well as those who have dropped out of school or are not in education or training (NEETs). The Horizon 2020 project 'Adult Education as a Means to Active Participatory Citizenship' (EduMAP), conducted in 2016–2019, aimed to address these complex issues and advance understanding and further develop both the current and future impact of AE on learning for active participatory citizenship (APC) in Europe and beyond.

1.1 EduMAP: Researching adult education policies and practices

The project 'Adult Education as a means to Active Participatory Citizenship' (EduMAP, 2017; 2019) is a Horizon 2020 research initiative (2016–2019) focusing on AE and young adults at risk of social exclusion.[i] Particular attention is paid to the educational policies and practices needed to foster APC among young people facing different types of vulnerabilities. The research question that the project seeks to answer is: *What policies and practices are needed in the field of adult education to include young adults at risk of social exclusion in active participatory citizenship in Europe?* Therefore, in the development and conceptualisation of the notion of APC, the project specifically takes into account the requirements of this target group.

1.2 Active participatory citizenship, vulnerability and inclusion

Within the project the concept of 'active participatory citizenship' (APC) was defined to embrace social (socio-cultural) , economic (socio-economic) and political (political-legal) dimensions of participation. The findings of the EduMAP support the view that the potential of adult education for promoting active citizenship lies in providing learners with civic, economic and social skills in a LLL perspective, and facilitating their career aspirations and life chances (Kersh & Toiviainen, 2017). The consideration of socio-cultural, socio-economic and political dimensions of active participatory citizenship (APC) provides the conceptual lens to explore young adults' participation in different social contexts (Kersh & Toiviainen, 2017). The project considers social, economic and political dimensions of active participatory citizenship, encompassing the development of social competences and social capital, civic and political participation and the skills related to the economy and labour market, including employment and work-related skills, access to social benefits, awareness of rights. In the project, the concept of APC is employed to provide a better understanding of social inclusion and participation of young people, where the

- social (socio-cultural) dimension focuses on the development of social competences and social capital;
- economic (socio-economic) dimension relates to employment (e.g. developing employability skills) and access to social benefits; and
- political (politico-legal) dimension encourages civic and political participation, running for boards, neighbourhood activities.

Such interpretation of active citizenship does not exclude discussions of rights and responsibilities, but is additionally concerned with the ways in which individuals improve their life chances and make decisions about their lives. This notion of engagement brings attention to an important configuration of active citizenship, which presupposes both active and participatory engagement of individuals, involving learning, in, through, and for citizenship (Toiviainen, Kersh, & Hyytiä, 2019). Considering relevant communicative practices helped the project to further understand the living circumstances of the members of excluded or minority groups, what communication technologies they have access to, where they obtain information, with whom they communicate, and how all of this varies across different minority groups (EduMAP, 2017; Toiviainen et al., 2019;).

The EduMAP fieldwork involved undertaking individual and focus group interviews in 20 countries. The interviews were carried out with learners, educators and policy-makers representing selected "good practices" of adult education. In this symposium, the data from several countries offer some reflections on the national perspectives, approaches and challenges in relation to the social inclusion strategies and active participatory active participatory

citizenship. The consideration of the context of communication flows and practices in adult education settings for young adults in vulnerable situations provides further reflections on the topic. The next sections will provide country specific perspectives and findings from different country contexts.

2 What Contributes To 'Good Practice' In Adult Education Programmes Aimed At Social Inclusion? Some Critical Reflections: UK, Netherlands and Ireland

Nathalie Huegler, Natasha Kersh and Andrea Laczik

Trends in these countries show an ongoing and increasing emphasis in adult and further education on promoting socio-economic participation (Souto-Otero, 2013), particularly through employability-related and broader personal and social skills (e.g. around communication or developing life plans). A particular policy focus in all countries has been on young people who are 'not in education, employment or training' (NEET). The programmes we researched demonstrated this focus in varying ways – from explicitly targeting young people considered to be in (or be at risk of moving into) this cohort, using personalised plans and support (incorporating, for example, confidence development, time-management and more sector-specific employment skills), through to preventative approaches, for example by providing language skills, entry or first level VET programmes, personalised mentoring, IT skills for migrants, or through sports-based approaches. Some programmes provided a different perspective on the 'NEET' problem discourse, by highlighting the disadvantages faced by young adults (such as experiences in the care system or discrimination based on racism and xenophobia), rather than starting from a skills-deficit approach. Within these varying approaches, the concept of 'active citizenship' is often used implicitly and embedded.

As part of the Good Practice – focused research in these countries, seven programmes were considered: a mentoring programme aimed at enhancing aspirations and life chances of young adults, many of whom come from care experienced backgrounds (Scotland); a VET programme in a small community-based college (England); an English for Speakers of Other Languages (ESOL) programme (England);a 'gateway' programme for unemployed young people aged 16 to 29, providing personalised support alongside a tailored learning experience (England); a youth participation project focusing on barriers in education and employment for young adults from ethnic minority backgrounds (Ireland); a sports-based programme addressing racism and sectarianism (Ireland); and a coding skills development programme targeting refugees, migrants and young adults at risk of social exclusion (the Netherlands). The research has indicated that the elements of 'good practice' are strongly context-dependent and linked to taking into account and addressing the diverse needs and circumstances of young adult learners vulnerable to social exclusion. Programmes which recognise that barriers for young adults exist not just at the level of skills or abilities, but rather are embedded in complex and multi-dimensional contexts and experiences of social exclusion are more likely to provide successful support. The barriers and challenges highlighted in the research included: a lack of confidence, often exacerbated by previous negative experiences in education or by communicative barriers (including, but extending beyond language difficulties); experiences associated with living in deprived neighbourhoods, where resources may be formally available, but inaccessible in reality; experiences of family difficulties and being in care; mental health problems; as well as a variety of difficulties experienced by migrant, refugee and ethnic minority young people (including those linked to discrimination and racism). Communication has a central role within the research: on the one hand, the communicative practices used by education providers can play a crucial role in reaching young adults facing particular barriers in accessing programmes; on the other hand, developing communicative skills, in a multitude of settings and contexts, was also one of the key aspects which all participants considered to make a difference for young adults' capacity to actively participate.

The research suggests that active participatory citizenship is often associated with specific characteristics, such as becoming independent and contributing economically through employment or self-employment; helping and supporting others; being helpful involved in local community activities; raising families; and (to some extent) being involved in decision-making processes. The role of adult educators (tutors, mentors or trainers) is described in various ways by research participants, but a strong emphasis is placed on their communicative skills, their capacity to develop and maintain relationships, be resilient (in the face of slow progress or set-backs), and their resourcefulness (in terms of accessing networks or services). Overall, the role of adult education in contributing to young adults' inclusion and participation is multi-dimensional and involves an understanding of the complexities of experiences of vulnerability and social exclusion, as well as a strong capacity for facilitating processes of mediation.

3 Nordic Adult Education Caught In The Middle Of The State, Market And Humanistic Tradition: Integration Programmes For Active Participatory Citizenship?

Hanna Toiviainen, Paula Kuusipalo and Pirkko Pitkänen

It is often pointed out that the deep-rooted popular tradition and equity demands of adult and vocational education drive the teachers' work in the Nordic countries (here: Denmark, Finland, and Sweden). Nevertheless, the experiences of practitioners and young adult students reveal the dynamics of various and often competing expectations and interests that shape educational practices. In this paper we particularly highlight the role of practitioners working under conflicting pressures of the State policies, the market economy, and the students' needs. Working with students who find themselves in vulnerable life situations AE professionals develop mediation practices to support young adults' integration and active participatory citizenship (Toiviainen et al., 2019). The demands of the State, market and humanistic tradition of AE can be analysed through the central themes of employment, language, cultural norms, and activism. This leads us to scrutinise the mediation and communicative practices that adult educators adopt in the intersection of the values and aspirations of official policies, funding agencies, social partners, teaching staff and students themselves. We have analysed, for example, two work-related refugee integration programmes in Denmark and Sweden (Kuusipalo & Niiranen, 2019) during the aftermath of the year 2015 peak of asylum seekers in Europe. (Fejes & Dahlstedt, 2017; Morrice, Shan, & Sprung, 2017; Webb, 2014.)

In Denmark the young refugees (18-25) -programme was launched for gaining necessary skills for entering Danish education system and labour market. The programme combined studies of Danish language and theoretical subjects, internships at work places, and the opportunity to engage socially with local volunteers. The AE providers were faced with competition with market-oriented actors that entered the education and training field. The austerity policy accelerated by marketisation of the integration programme implementation affected some providers' willingness to cater for "needy" students who demand extra resources. The AE providers were struggling between the Danish educational tradition driven by humanistic values and the demands of a market driven policy that is steering their practice.The local people who organised the social activities emphasised the importance of learning democracy and Danish way of living, learning the language and finding jobs as a mutual activity of the locals and the newcomers. These were the AE actors' reflections during the field study 2017 (Kuusipalo & Niiranen, 2019). We are aware of the change in the refugee and migration politics by the present Danish government that has questioned the integration policy.

In Sweden Kuusipalo and Niiranen (2019) researched the work-oriented integration training supported with students' native language pedagogy (Yrkes-SFI). The programme is targeted to newcomers with refugee background for learning Swedish and in parallel for the faster entrance to the labour market. The programme focuses on work branches of labour shortage, such as forestry.The market-orientation and the job centres steering the process and

the selection of students has somewhat diminished the AE provider chances to influence recruiting process. The competition between AE providers was a risk for the continuation of the programme. Since the programme was dependent on the job centre sponsorship and other stakeholders' interests, the provider invested resources to the programme development at their own risk (Kuusipalo & Niiranen, 2019).

4 Good Practices And Challenges In Adult Education For Refugees In Turkey

Armağan Erdogan, Güzin Aydemir Decker, Onur Unutulmaz and Murat Erdogan

Adult education seems to be a second chance for those who have not benefited from the formal education. In the recent years the new comers, refugees or migrants are among those in need of adult education to integrate into the society they moved in. However their multiple vulnerabilities such as language, cultural, social and economic difficulties and traumas they faced make their access and participation to adult education more challenging both for themselves and also for the education planners and providers. Therefore a new approach in adult education is needed to touch their actual needs for their active involvement into society.

This paper will examine two education initiatives prepared specifically for the Syrian refugees in Turkey, based on field work of a research conducted in the context of the Horizon 2020 project entitled "Adult Education as a Means of Active Participatory Citizenship (EduMAP)". Turkey, with more than four million refugees, is hosting the highest numbers of refugees in the world. Therefore Turkish team focused on good practice examples where AE programmes target Syrian refugees. First GP is an NGO which was established by a municipality in the peripheries of Istanbul; the second one is the branch of an NGO working on national scale for vulnerable groups, now serving mainly for the refugees. Both GPs have integrated approach towards refugees from providing the very basic immediate needs to language, vocational courses and legal or psychological counselling.

Both the numbers and also the emergency of the situation triggered new approaches in terms of structure, legislation or mind-set, to respond to the challenges this refugee flow created. The study analyses the new steps taken in adult education of Syrian refugees in Turkey and also attempt to list certain areas for improvement and provide policy recommendations at various levels.

5 Conclusions and recommendations

The findings have indicated that policies, programmes and actions need to pay attention to young learners' specific needs, aspirations and risks of vulnerabilities. The project has highlighted several points of consideration (Kersh & Toiviainen, 2017). (1) With the exception of programmes for newly arrived migrants and/or refugees, the majority of AE courses do not demonstrate an explicit focus on citizenship education/skills. (2) However, different dimensions of active citizenship, such as economic, social and political dimensions, have characterised (often implicitly) AE programmes and initiatives across all the countries considered in this project. While some programmes may specifically focus on citizenship (e.g. programmes for migrants), often 'citizenship' is not used explicitly and/or may be embedded. (3) One critical limitation, however, as identified by the project findings, is that current AE policies and the manifestations of active societal participation are often driven by national policy developments and agendas rather than by the needs of vulnerable groups. (4) Specifically in the most recent decade, developments and policies related to AE and active citizenship have been strongly influenced by both the economic crisis and the influx of migrants across the EU28 and Turkey. These trends have resulted in the prevalence of market-oriented approaches and strategies to integrate refugees and migrants across AE programmes.

Through targeted research, the project aimed to identify and explore educational programmes (good practices) that proved to be successful in re-engaging young people,

addressing their specific needs and facilitating their APC (rather than just focusing on addressing current policy agendas). The following elements of good practice (drivers for success) have been identified (EduMAP, 2019):

- Relevance and contextualisation: contextualising APC dimensions in ways that are relevant to young adults' personal backgrounds and/or professional aims, ambitions, and gender differences need to be taken into account;
- Opportunities and affordances: creating opportunities to exercise active citizenship in all its dimensions and related to young adults' experiences and personal situations;
- Flexibility and personalisation rather than 'one size fits all' approach: ensuring flexible provision that provides personalised approaches in developing educational programmes;
- The role of the educational professional: the importance of the mediating role of educational professionals needs to be better recognised and taken into account by relevant stakeholders;
- Multiculturalism and tolerance: promoting learning in diverse and multicultural groups in a safe environment;
- Resilience and confidence: fostering resilience, confidence, self-esteem and aspiration of young adults;
- Communication: promoting communication between different stakeholders; Favourable and supporting policies: which (1) recognise vulnerabilities as complex and multifaceted issues, thus addressing the danger of providing a limiting definition that fails to address all young adults' needs; (2) avoid policy responses to put 'blame' on individuals (e.g. refugees, in countries affected by acts of terrorism); and (3) ensure issues of equality and equal access to resources.

The role of policies and practices in contributing to strategies to enhance the inclusion, engagement and active citizenship of young adults has been considered within both our desk and empirical research. In considering the interplay between policy and practice the project aimed to shed light on the ways in which policy and practice developments may either undermine or contribute to cultivating APC for young adults, and what might be learnt from these developments. As part of EduMAP's project aims and ambition, the research findings and recommendations have been utilised to enhance dialogue between educational actors and vulnerable groups. The research findings have been used to generate an Intelligent Decision Support System (IDSS) to give policy-makers and other stakeholders easy access to the information required to address the needs of vulnerable minority groups.

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Strategies and Training Models for promoting Digital Competences in the field of Vocational Education and Training - Reflections on Policies, Conceptual Frameworks and Innovation projects

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Abstract

This paper builds upon the work of different European cooperation projects that have focused on promoting digital competences for teachers and trainers in different educational sectors. The current TACCLE4-CPD project has the task to develop *continuing professional development* of teachers and trainers with focus on *promoting digital competences*. This task requires a critical rethinking on the prior approaches to 'scale up' the promotion of digital competences via TACCLE courses or training campaigns related to digital tools (as was the case with the Learning Layers project). From this perspective the paper works with policy analyses and discusses different boundary conditions in general education and in the field of vocational education and training (VET). Thus, the paper gives a differentiated picture on the follow-up of the TACCLE projects and of the Learning Layers. Here the concept 'innovation paths' is used to specify different ways to integrate digital tools into new learning arrangements.

Keywords

promoting digital competences; vocational learning; training of trainers, innovation paths; training models;

1 Introduction

This paper builds upon the work of a series of European cooperation projects that have focused on promoting digital competences to teachers and trainers in different educational sectors. The TACCLE projects (TACCLE1, TACCLE2, TACCLE3) have worked in the field of general education and addressed the needs and challenges of classroom teachers. The other 'root

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project', the Learning Layers project focused on developing digital tools to support learning in working life and in vocational education and training (VET).

Currently, the TACCLE4-CPD project has the task to develop *continuing professional development* of teachers and trainers with focus on *promoting digital competences*. This task shifts the emphasis from the work with individual teachers and trainers to their organisations. Likewise, the new task shifts the perspective *from* the use of digital tools and web resources in particular teaching/learning contexts *to* overarching development of digital competences across the education and training providers. Altogether, this new task requires a critical rethinking on the prior approaches to 'scale up' the promotion of digital competences via TACCLE courses or training campaigns related to digital tools (as was the case with the Learning Layers project).

Therefore, it is necessary to provide a critical re-examination of the project histories and to identify research challenges that need to be met when the project shifts the emphasis to the development of CPD and to scaling up the innovations. From this perspective the presentation proceeds to policy analyses and to different boundary conditions in general education and in the field of VET. When looking at the outreach approaches the paper gives a differentiated picture on the follow-up of the TACCLE projects (in general education) and the far more complex settings in the field of VET. Here the concept 'innovation paths' is used to specify different ways to integrate digital tools into new learning arrangements. In this context the prospects to use the European DigCompEdu framework as support for CPD are discussed. Furthermore, the paper draws attention to different challenges that have been observed (by practitioners) regarding the learning behaviour of younger and older learners. These have given rise specific reflections, how to introduce digital tools in such a way that the users will adopt them as their own tools for their own uses.

As a consequence, the analyses do not suggest a 'one best way' to promote the use of digital tools in the context of VET. Neither do they provide a basis for 'one best way' to organise CPD measures in the field of VET. As a contrast, they give rise to revisit the "Theme Room" training approach that was initially developed in the Learning Layers project for multimedia training arrangements. In this context the format of 'theme rooms' is proposed for discussing the policy-contexts, innovation paths and pedagogic challenges that have been brought forward by the analyses. Also, the 'theme room' format provides an opportunity to discuss the impulses of the DigCompEdu framework.

In the light of the above it is apparent that the approach of this paper differs from traditional innovation research or studies on innovation transfer. Instead of focusing on a specific innovation concept and related transfer-promoting measures the paper draws upon two kinds of 'root projects' – the TACCLE projects and the Learning Layers project – and their follow-up activities. Here it is worthwhile to note that the TACCLE projects focused on training of teachers and trainers – both in the fieldwork and in the transfer-promoting measures. As a contrast, the Learning Layers project was a research and development (R&D) project and the preparation of the follow-up phase was also based on further engagement of researchers. In this respect some researchers of the Learning Layers published a joint article with a Dutch research team that was engaged in similar projects in the field of VET (see Burchert, Hoeve & Kämäräinen 2014). However, the present effort to draw upon different kinds of predecessor projects provides new challenges. Also, the ambition of the TACCLE4-CPD project to cover several educational sectors gives rise to consider the differences between general education and the field of VET.

2 Promoting digital competences in the predecessor projects

This section gives firstly a picture of role, training arrangements and transfer-promoting measures in the predecessor projects – the TACCLE projects and the Learning Layers project. Based on this background analyses it is possible to discuss, how the approaches have changed

in the course of the project histories and what lessons can be learned for the development of continuing professional development (CPD). In particular these changes are important when studying the changing policy contexts as well as changes in education and training practices with a new emphasis on digital competences.

2.1 Training as support for TACCLE handbooks – transfer via TACCLE handbooks[1]

The development of the TACCLE projects was characterised by finding ways to inspire teachers of enhancing their digital competences *and* making use of the new competences in their teaching. From this point of view the hands-on exercises with digital tools and web resources provided the basis for the TACCLE handbooks. Since the handbooks were written as materials for teachers, they were central for transfer-promoting measures.

However, when launching new TACCLE projects the promoters had to consider also new challenges regarding *specialisation* (focus on different subject matters and/or age groups) and *different media* (use of hard copy handbooks vs. online resources). From this perspective the evolution of the TACCLE approach can be characterised as follows:

- **The TACCLE1 project** started the tradition as an effort to raise teachers' awareness of digital tools and web resources as support for classroom teaching. From this perspective it produced the initial TACCLE handbook as a generic introduction to digital tools and web resources. During the project the TACCLE courses served as an essential support environment for finding the way to address interested teachers. After the project the handbook (and its new language versions) provided valuable support for further TACCLE courses. Thus, the transfer-promoted measures relied on the courses and hard copy handbooks.
- **The TACCLE2 project** responded to the needs of different subject teachers to find appropriate ways to use digital tools and web resources in their subject areas. Parallel to this the project worked with primary school teachers. From this perspective the project produced a set of parallel handbooks and translations for four subject areas (mathematics and sciences, humanities, creative arts, key skills) and for primary education. In a similar way as in the initial phase, the TACCLE courses served an important support environment for the project. However, at this phase the project work shifted primarily to an online platform (http://taccle2.eu/) via which the online handbooks and other information services (e.g. scoop.it) were made available. However, with this transition it became difficult to deliver the products in all desired languages.
- **The TACCLE3 project** responded to a completely new challenge in promoting the digital competences of teachers. It focused on the work of teachers who were newly required to teach programming and coding in primary education. From this perspective it became essential that the project is able to provide support for active teachers in national languages. Therefore, the mode of work was transformed into an umbrella project and knowledge sharing partnership between national projects. This is also reflected in the fact that the project website was shaped as a portal that provides access to the national websites. From this perspective the transfer-promoting measures were relying on the national web resources and follow-up initiatives.

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[1] The information on the previous TACCLE projects presented in this subsection is mainly based on video interviews with Jenny Hughes (2012a, 2012b). Further information has been obtained from the initial TACCLE Handbook (Hughes 2009), from the TACCLE2 and TACCLE3 websites and via internal communication in the TACCLE4-CPD project.

2.2 Training as support for making the Learning Toolbox – transfer via using the toolset[2]

In the Learning Layers project and its Construction pilot the training activities served as bridging activities between different phases of co-design, co-development and pilot testing of digital tools. Here it is worthwhile to note that the participative design activities only gradually led to the development of the Learning Toolbox (LTB) and that this toolset reached a mature stage only after different phases of training activities. Furthermore, after the LTB had been pilot tested, the transfer-promoting initiatives focused on the use of this toolset in different working and learning contexts, From this perspective the evolution of the Construction pilot and of the follow-up initiatives – and the specific role of training activities – can be characterised as follows:

- **At the initial phase** of the Construction pilot there was a search for an appropriate design idea (for introducing digital tools to support vocational and work process -oriented learning). During that time the project team and an application partner organisation (training centre Bau-ABC) agreed to organise a series of voluntary training sessions for trainers of Bau-ABC. These were started as generic introduction to digital tools and web resources (as in the earlier TACCLE courses) and the continued as training for video production and editing. During this period some of the trainers shaped their blogs as repositories for domain-specific vocational learning.
- **At a later phase** some of the pioneering trainers of Bau-ABC initiated a new training campaign to prepare for the introduction of the LTB (which was not yet available). A key point with this initiative was to overcome the gaps in digital competences and to prepare all trainers to use digital tools. From this point of view the concept "Theme Room" training was developed and implemented as a series of workshops with specific sets of training materials and learning tasks. The pioneering trainers and supporting researchers were involved as peer tutors for parallel groups of trainers during four training sessions on Friday afternoons.
- **In the final phase** of the project the digital toolset LTB reached the stage of a viable product and it was successfully tested in Bau-ABC by several trainers. After the end of the project the LTB developers set up a start-up company that took responsibility on the further development of the toolset. In Bau-ABC – after a transition period with several preparatory measures – internal decisions were made to introduce the use of LTB in all areas of initial vocational training. For this phase the pioneering trainers developed their own frameworks for domain-specific use and for overarching themes (such as health and safety).

In this context it is not necessary to follow the project history of the Learning Layers to the successor initiatives that sought to promote the use of Learning Toolbox in other contexts. From the perspective of developing CPD measures for teachers and trainers in VET it is essential to capture the experiences with peer learning (in using digital tools) *and* the transition from piloting with a co-designed digital toolset into deployment of the toolset in the apprentice training.

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[2] The information on the Learning Layers project in this subsection is mainly based on the following contributions to the final reporting website: Kämäräinen et.al. 2017a (Accompanying research ...) 2017b (Training interventions ...) 2017c (Learning Toolbox as support ...) 2017d (Uses of Learning Toolbox ...). Newer information has been obtained via working visits and interviews in the context oft he TACCLE4-CPD project.

3 The research challenges: How to interpret the transitions from the earlier projects to support for *continuing professional development*?

3.1 Interim conclusions

The overviews show that already during the work and in the transition to successor projects the project promoters have had to adjust themselves to new needs, demands and challenges. This has been reflected in the training measures, in the use of learning materials and in the role of digital tools. As such these transitions have taken place within the evolution of the projects through different phases:

- In the TACCLE projects the major transition was the shift from working with a hard copy handbook that presents generic digital tools and e-learning arrangements to all interested teachers. The next phase was characterised by producing specialised web-based learning contents in particular subject areas and mobilising both teachers and learners in the work. In the subsequent phase the focus shifted to coding and programming as the subject matter and to partitioning of the project into national sub-projects working in their own national languages. Altogether this can be characterised as a successive specialisation based on a common working agenda.
- In the Learning Layers project the major transition was the shift from the earlier co-design and training workshops to the introduction of Learning Toolbox (LTB) as the common toolset. In the earlier phases the project promoters and application partners only approached the idea, how to use digital tools in work process-oriented learning. The earlier multimedia training had equipped the trainers with capability to shape some tools for their own use (in particular the trainers' blogs). The Theme Room training raised the awareness of the whole organisation on the importance of working with digital tools. Yet, only when the LTB was available as a user-friendly integrative toolset, the trainers were in the position to link different third-party apps, stand-alone tools and web resources to their own training arrangements and to guide the apprentices' projects. Altogether this can be characterised as transition to users' own digital learning culture that is supported by peer tutoring and peer learning.

However, the above-discussed transitions have occurred in the course of the project histories and had an impact on the work of partners and their organisations. For the TACCLE4-CPD project the key challenge is, how to promote transfer of innovations and enhance digital competences beyond the realm of project work. With the emphasis on *continuing professional development* (CPD) the project has taken into account a wide range of formal and informal learning opportunities for educational actors in different educational sectors. However, all this makes it necessary to look beyond the boundaries of the groups, organisations and educational contexts that have been involved earlier.

3.2 The research challenges and the key questions

The new working context poses new challenges for the *research and development* (R&D) approach of the TACCLE4-CPD project:

1. Efforts to promote digital competences and to organise CPD measures need to be **adjusted to educational policies and priorities** that have an impact on such measures. Therefore, promoters of innovations need to develop policy awareness and position themselves as contributors to policy implementation.
2. Efforts to reach new actors to promote digital competences beyond the earlier pilot contexts have to **create awareness on the user-needs and user-prospects** in the newer contexts.

Therefore, promoters of innovations need to develop context-sensitive outreach strategies so that new users will take ownership of innovations.

3. Efforts to get the use of newly gained digital competences grounded in education and training have to face challenges that are posed by the **learning behaviour of younger and older generations**. These challenges are related to resistance vis-à-vis using digital tools or to narrow and consumerist use of them.
4. With all these efforts the promoters of innovations need to consider, what kind of support they can get from **strategic frameworks** and **flexible training models**.

Below, the above-mentioned challenges are discussed as preconditions for developing appropriate CPD measures and support materials. The following sections bring together policy analyses and results from the fieldwork – paying attention to the differences between school education and the field of vocational education and training (VET). From this perspective the sections treat the following questions:

- **On enhancing policy-awareness:** How can the project raise awareness of current education and training policies (that promote digital competences) among actors in the field? How can the project help practitioners to engage themselves as contributors to policy implementation?
- **On supporting outreach activities:** How can the project promote context-sensitive outreach activities by new multiplier-actors (with enhanced digital competences)? How can the multipliers at best promote innovative use of digital tools in specific vocational education and training contexts?
- **On enriching the vocational learning culture with digital tools:** How can the project help to overcome resistance to using digital tools (from the perspective of craftsmanship)? How can the project help to enrich *vocational* learning culture with appropriate use of digital tools? How can the project best support the sharing of experiences and innovative practice of the multipliers?
- **On the use of overarching frameworks and specific training models:** How can the project make use of the overarching DigCompEdu framework (see Redecker 2017) for shaping CPD approaches? What kind of context-specific training models can be used to shape CPD approaches for the field of VET?

4 Policy-awareness and engagement of innovative actors in policy implementation

This section discusses the processes for identifying current policies and of engaging innovative actors as contributors to policy implementation. The first subsection presents a process model that has been developed as spin-off from a pilot workshop that TACCLE4-CPD project had with two with Romanian schools (in secondary education). The second subsection presents a reinterpretation of the model with reference to policy analyses in the field of vocational education and training (VET).

4.1 Identifying and pursuing policies to promote digital competences in general education[3]

In May 2019 the TACCLE4-CPD project organised two workshops with secondary schools in Bucharest, Romania. These were initially planned as participative events to pilot test two planning tools (the EMM tool for educational management and the Routemap to specify the needs for continuing professional development). However, the workshop gave rise to create a model that demonstrates, how the teachers can position themselves in a bigger picture of shaping, specifying and implementing educational policies.

After the workshops the project team shaped a Four-Step Model for finding policies and developing strategies to enhance digital competences in local educational contexts.

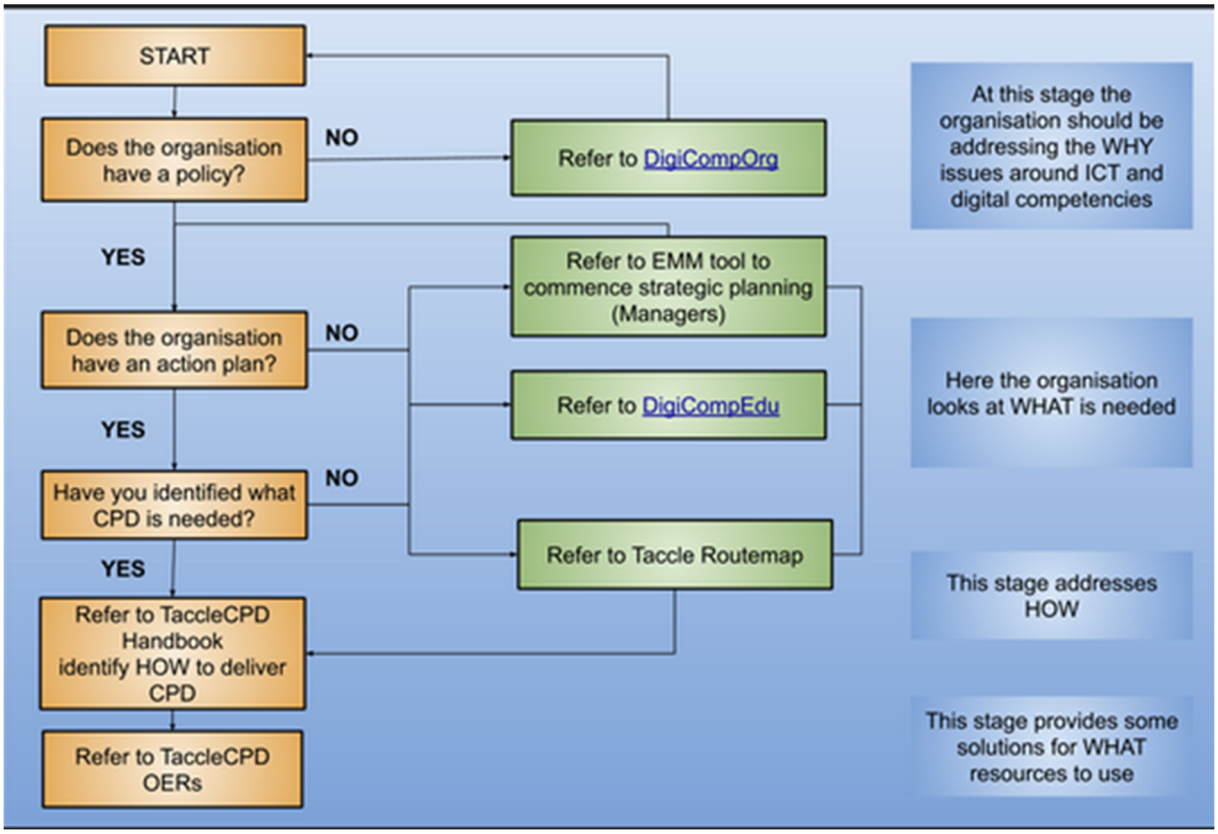

Figure 1 The Four-Step Model for finding policies and developing strategies to promote digital competences in educational contexts

In general, the model speaks out to school managers, educational authorities and curriculum developers who are in charge of staff development and teacher training. Yet, the model can also be used in participative workshops in which teachers are invited to consider, whether their organisation is following a policy for promoting digital competences and how such a policy could be shaped.

[3] This subsection is mainly based on internal discussions of the TACCLE4-CPD project and field workshops with teachers in general education. The planning and management tools (the EMM tool and the Routemap) had been developed in the previous TACCLE projects. The insights into the Welsh curriculum processes are interim observations from the fieldwork for the current TACCLE4-CPD project.

In order to keep the model simple, it refers only to very few reference materials that could advise the process of policy shaping. If the mapping has not brought into picture an existing policy, there is a need for a conceptual framework. For such cases, the European DigCompEdu framework (prepared by the Joint Research Centre (JRC) of the European Commission) serves as a generic framework both for initial policy shaping and for setting accents and proceeding to policy implementation.

For the next steps – action plans, needs analyses and specification of CPD measures – the model suggests the use of the above-mentioned TACCLE tools (EMM and Routemap) alongside the more specific sections of the DigCompEdu framework. Then, for the final implementation of the CPD measures the model indicates further TACCLE resources that are being developed by the current project.

The implicit assumption of the model is that all countries have educational policies and priorities that can be taken as a starting point for using the model. As an example it is possible to give a picture of the Welsh educational policies and specific priorities:

1. Currently, there are statutory strands running through the Welsh curriculum. One of them is the digital competence framework. Thus, alongside 'computing/ ICT' as a subject area, digital competencies are embedded across the curriculum.
2. A new curriculum framework for Wales is due to be implemented by the year 2020. It will have 6 'Areas of Learning and Experience': *Expressive arts, Health and well-being, Humanities, Languages, literacy and communication* (including Welsh and modern foreign languages), *Mathematics and numeracy, Science and technology*. It will also include 3 cross-curricular responsibilities: literacy, numeracy and digital competence.

4.2 Mapping policies to promote digital competences in vocational education and training[4]

As has been mentioned, the Four-Step Model has been developed to support school managers, adult education providers and educational authorities – to promote the digital competences of teachers. When shifting the emphasis to the field of VET, it is essential to take into account *education and training partnerships* between vocational schools, enterprises and intermediate training centres. In such contexts the schools are contributing to the enhancement of digital competences together with the other partners. Moreover, the introduction of digital tools for learning is part of the enhancement of digital competences in the occupational domain.

As an example of the multitude of policies that have an impact on the field of VET it is appropriate to look at the German policy landscape:

1. Concerning the regulation of the German dual system, the legislative powers on school-based education have been given to the federal states (*Länder*). The legislative powers on the workplace-based learning have been given on the federal government (Bund). Federal states have a coordination mechanism – the Standing Conference of Cultural Ministers – that coordinates their educational policies and promotes joint initiatives (such as "Education in digital world").
2. Alongside policy development on the basis of regulations, the recent federal governments have introduced new formats for promoting strategic initiatives via joint agreements. During the year 2019 the federal government and the federal states have reached an

[4] This subsection is based on interim findings of document analyses and expert interviews with focus on the field of vocational education and training (VET). The results of these analyses will be published as a specific project report of the TACCLE4-CPD project.

agreement on promoting digitization in education (*DigitalPakt*). In a similar way the ministries of education and employment have launched a joint strategy for promoting continuing training and lifelong learning (*Weiterbildungsstrategie*). These central agreements provide a basis for the allocation of resources to regional and local initiatives.

In addition to the above-mentioned diversity, it is worthwhile to consider, what kinds of strategic initiatives are available for enhancing digital competences in the field of VET. From the perspective of curriculum design/development it is possible to specify the following options:

- Introduction of vocational curricula to new occupational domains or reshaping the existing training with a new (whole curriculum) approach;
- Enrichment of existing vocational learning arrangements with integrative digital toolsets;
- Enrichment of particular vocational learning arrangements with domain-specific digital tools and web resources;
- Incorporation of simulated learning opportunities into workplace contexts that do not provide opportunities for on-the job training.

In the current phase much emphasis is given on promoting innovations under policy themes like "Industry 4.0"or Building Information Modelling (BIM). In these contexts the introduction of digital tools is not merely a matter of 'digitisation' of traditional work processes and tasks of individual craftsmen. Instead, these processes can be characterised as 'digital transformation' across entire chains of production, supply, marketing, delivery and recycling. Such changes provide major questions on the future role of skilled workers and on the sustainability of current VET provisions.

5 Shaping outreach approaches to involve new actors in promoting innovations

This section provides insights into outreach approaches that have been developed in the context of TACCLE projects (with focus on general education) and in innovation projects in the field of vocational education and training. Here it is worthwhile to note that the outreach and follow-up activities of the TACCLE projects have engaged individual teachers. As a contrast, the VET-related cases bring into picture activities that involve whole organisations or multiple organisations.

5.1 Shaping outreach activities on the basis of TACCLE projects[5]

Looking back at the work of the earlier TACCLE projects, there has been a tendency to provide opportunities for the engagement of a wider range of contributors (mainly interested teachers and their learners). Also, the transition from handbooks to web resources has all the time been linked to efforts to encourage participation:

- **The TACCLE1 project** provided generic examples and lesson plans to help teachers create digital content to aid their teaching. The first TACCLE handbook was produced as a beginners guide to generic digital competences. However, it also encouraged participants to use learning platforms like Moodle and to write blogs.
- During **the TACCLE 2 project** the work for different handbooks engaged subject specialists to identify examples of using ICT in the classroom to teach a specific subject

[5] The information on the follow-up of the previous TACCLE projects is based on internal communication with partners of the TACCLE4-CPD project who have been involved in TACCLE2 and TACCLE3 projects.

area. Lesson plans and links to resources were produced and the 'best' selected for inclusion in a printed handbook. However, the website contains more ideas and resources than the books. Here it is worthwhile to note that there was a deliberate shift towards collaborative work and having the pupils produce content – rather than to consume what the teacher had created. At the end of the project a group of teachers attended a launch conference in Brussels with workshops and talks around using ICT in the classroom.

- In **the TACCLE3 project** the focus shifted away from promoting digital competences in general to support the shaping of curricula for the new learning area 'coding'. The project focused on web resources, printable resources and face-to-face training rather than handbooks. By the end of the funding period the project had trained some 40 – 50 practitioners as peer tutors. They went then back to their schools to disseminate/cascade what they had learned.

The work of the TACCLE projects has been taken up in a Facebook group that is linked to Taccle3. It is being used to promote the results of all TACCLE projects. Posts in that group tend to reach between 50 and 2000 views. So, there is a core group of users who interact with the posts and occasionally share content. The twitter feed is popular with a couple of prominent educational technology researchers who use the #taccle3 hashtag to share information. The group from Wales who participated in taccle3 training has used a messenger app to keep in touch in addition to communicating via Facebook and e-mail. There is also some web communication initiated by the Local Educational Authorities and other government bodies aimed at all teachers and interested parties, about the new curriculum for Wales. Yet, throughout the United Kingdom the major networks on digital competences are the TES forums (Times Educational Supplement) in which teachers share their own resources *and* the Twitter conversation groups using the hashtags #edchat and #edtech.

5.2 Different innovation paths for promoting digital competences in vocational learning[6]

As has been indicated above, the initiatives to promote digital competences in the field of vocational education and training (VET) have to adjust themselves to different learning interfaces. In such contexts the introduction of digital tools in the context of occupational work and use of digital tools to support learning may have clearly different dynamics. Also, the initiatives may be linked to major curriculum development (or redesign) processes or to more specific developmental initiatives. Below such exemplary cases are presented as parallel innovation paths in promoting digital competences in the context of vocational learning.

1. **The "Kompetenzwerkstatt" path:** The Kompetenzwerkstatt project tradition grew from vocational curriculum development projects in which the project team mobilised vocational teachers and trainers to analyse their occupational field and to shape curriculum structures. Later on, the project tradition was enriched with digital tools for managing learning situations, checking prior competences and presenting learning achievements. In the current phase the Kompetenzwerkstatt approach is being implemented in an occupational field that is developing holistic curriculum structures for initial and continuing training (the occupations for sanitary, heating and air-conditioning technologies).

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[6] This section is based on document analyses and expert interviews with focus on parallel innovation projects and innovative practices in the field of vocational education and training (VET). The results of these analyses will be published as a specific project report of the TACCLE4-CPD project.

2. **The "Learning Toolbox" path:** The Learning Toolbox (LTB) was developed as the main product of the EU-funded innovation project "Learning Layers" and its Construction pilot. After a complex iterative process the partners involved in the Construction pilot developed an integrative toolset to support vocational and work process -oriented learning. From the trainers' and apprentices' point of view it was essential that the toolset supported a holistic view on working and learning tasks and a culture of self-organised learning.
3. **The "Brofessio" path:** The Brofessio project was launched to support work process -oriented learning processes in such industries in which it is not possible to provide learning opportunities alongside working. In particular this is the case with sealed processes with major time constraints. For such industries the Brofessio project developed the concept of *agile learning* – based on SCRUM project management techniques, inquiry-based learning strategies and interactive learning culture. Thus, the learning arrangements were organised as a series of learning sprints with key questions and with responsible coaches. In such an approach the use of digital tools and web resources is dependent on the policies of the partner enterprise.
4. **The Smart OER-users' paths:** The fourth type doesn't refer to a major project but instead to parallel initiatives of responsible teachers and trainers. The key point is to integrate the use of domain-specific Open Educational Resources into vocational learning arrangements. Due to the pattern variance it is more appropriate to refer to paths (in plural) rather than to a single path. Also, it is worthwhile to highlight the creativity of the users in finding the appropriate learning resources (rather than celebrating the existing OER communities and their products).

The above-presented set of innovation paths is not meant to be an exhaustive list of all possible innovation strategies to promote digital competences in the field of VET. However, it gives an overview of pattern variance in linking the introduction of digital tools to vocational curriculum processes or to shaping of specific vocational learning arrangements. In this respect the development of CPD measures has to take into account, what kind of innovation path may be closest to the context of education and training in concern.

6 Incorporation of digital tools into vocational learning culture[7]

When discussing the promotion of digital competences in the field of vocational education and training (VET), it is essential to consider the readiness of trainers and learners to accept digital tools as their own tools. When looking back at the introduction of the Learning Toolbox (LTB) at the end of the Learning Layers project, it was not clear that the pilot testing would lead to a sustainable and expanding use of the toolset. From this point of view the further history of working with this toolset provides interesting insights into overcoming the resistance and gaining ownership of new tools. From this perspective several interviews were carried out with trainers in the training centre Bau-ABC. Below, some of the key points have been summarised.

6.1 Views of trainers regarding the acceptance of digital tools

Below some points of the trainers give insights into the acceptance issues (regarding digital tools) among older trainers and craftsmen. Then, some points are made on the appropriate ways to introduce digital tools to enhance the vocational and work-related learning of young apprentices.

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[7] This section is entirely based on recent interviews with full-time trainers in the field of vocational education and training (VET). These interviews were carried out in the context of the current project TACCLE4-CPD.

a) Views on traditional craftsmanship and on the use of digital tools

One of opening themes that the trainers raised was the traditional idea of craftsmanship – to make something with your own hands. This refers to the sense of *working with manual tools*, to *feel the materials with your own hands* and to be able to *assess the quality with your own senses*. From this perspective older trainers and craftsmen have often reservations regarding the use of digital technologies as support for working and learning: "*That's how we have always done these things …"*.

Also, the earlier phase of introducing stand-alone tools and apps for construction sector was not always successful. Moreover, many allegedly user-oriented apps or instruction videos have not been of sufficient quality to support vocational learning.

Furthermore, when introducing new technologies, there is often an anxiety that this brings more work to the trainers or craftsmen – instead of offloading them. In the light of the above it is important to approach the trainers and craftsmen with solutions that work in practice and support working and learning in their trades.

b) Views on vocational learning and the use of traditional and digital tools

Concerning the newer generations of apprentices, the trainers noted that they have been less exposed to manual work and working with traditional tools. Also, the computing skills of young people tend to concentrate on operating smartphones. This provides a challenge for trainers and craftsmen – how to incorporate the use of digital tools into *vocational* learning. There is a need to induct the learners to working with traditional tools instead of making shortcuts to using only digital tools. Otherwise, there is a risk of losing touch with the basic work processes and the material and transforming the learning process into a virtual world.

In the light of the above it is of vital importance that the use of digital tools shall serve the planning, preparation, implementation and assessment of learners' *working and learning* projects. Here the role of digital tools is to deepen the understanding of one's learning, not as a shortcut to answers provided by someone else. This is in particular the case when using digital tools with the cross-cutting theme 'health and safety' at work.

6.2 Views of trainers on the enrichment of vocational learning with digital tools

The main themes in the interviews were the trainers' experiences in using the digital toolset Learning Toolbox (LTB) in their training. In particular it was essential to have their views, how the apprentices had made use of the digital toolset to enhance their vocational and work-related learning. Below this is discussed with reference to the apprentices' trade-specific working and learning projects and to the cross-cutting theme 'health and safety'.

a) Trainers views on using Learning Toolbox in apprentices' projects

According to the trainers, their apprentices got well along using the LTB – once they had got through login process and created their own account. After the Learning Layers project the WLAN was upgraded and at the training workshops were equipped with iPads for apprentices. Via LTB the apprentices have got advance information on the forthcoming training projects of the next presence period in the training centre. When they are working with the projects the LTB serves as a documentary toolset for recording the interim results and final results.

Moreover, the apprentices can check whether they are working correctly and eventually ask for advice (with reference to their photos etc.). And if something is not quite right, they can take the necessary measures and update their documentation.

b) Trainers views on using Learning Toolbox with the theme 'health and safety'

Concerning the theme 'health and safety', trainers from different trades had worked as an informal working group. This effort supported the creation of a coherent LTB stack and helped the trainers to prepare their domain-specific instructions in a coherent way. Now that the trainers and apprentices in all trades are using LTB, this makes the 'health and safety'

material present in a new way. The materials are no longer papers in a bulky folder, instead they are accessible via LTB from the tablet PC or from smartphones. The LTB can be accessed by trainers and by apprentices at any time. This has helped to make the training in health and safety more creative and situation-adjusted – as lived practice.

6.3 Views of the trainers on the future of craftsmanship

The main theme of the interviews was, how to promote digital competences in the current training for craft trades. At the end of the sessions there was a brief discussion on the bigger picture of digital transformation (through entire production, service and marketing networks). Here, some questions were raised on the role of skilled workers in craft trades in the context of major technological changes. From the perspective of their own trades the trainers made the following points that – instead of following the negative scenarios – outline new possibilities for advanced craftsmanship:

- Concerning carpenters, there will always be a need for advanced craftsmanship in the renovation of traditional buildings. Parallel to this, thanks to the new construction techniques, wooden constructs are being used as the structures of high buildings. Moreover, even when human workforce can be replaced by robots, this can be used as a basis for new complementarity in which craftsmen are engaged in creative tasks and robots in heavy tasks.
- Concerning well-builders and tunnel-builders, there are new possibilities for using geo-data and advanced sensors and new techniques for drilling. Yet the risk analyses, when starting drilling (horizontal or vertical) require communication between craftsmen on the site and authorized experts.
- Concerning welding, the use of welding robots is widespread in the industries. Yet, in outdoor construction work in which the results should sustain heavy strain and climate changes, it is essential to have a good understanding of materials, circumstances and differences in the quality of work. The sensors of welding robots may not be in the position to guarantee the required safety and sustainability.

6.4 Reflective commentary

As has been indicated above, the interviews focus on the follow-up of the work of the Learning Layers project in a partner organisation and on the use of the Learning Toolbox in apprentice training. However, it is likely that the trainers' observations on the resistance to digital tools with reference to the tradition of craftsmanship *and* on the possibilities to overcome such resistance are valid in wider contexts. In a similar way the trainers' observations on narrower digital competences of young learners (who focus mainly on operating smartphones) give a picture of a general challenge. In this context it is worthwhile to note the trainers' reflection, to what extent the apprentices should be inducted to traditions of craftsmanship and how the introduction of digital tools could then enhance *vocational* learning culture.

From this perspective the positive comments on the usability of Learning Toolbox can be seen as progress reports in one innovation path but at the same time indications, how peer tutoring and peer learning can function within a training organisation. Also, the statements show that the use of digital tools or toolsets can be successful if it makes sense both for the trainers and for the learners. Altogether, these interviews have drawn attention to the challenges in the learning culture of older and younger generations *and* to the necessity to introduce digital tools in such a way that the learners make use of them *as their own tools* for their own uses.

7 The role of overarching conceptual frameworks and specific training models

The two previous sections have given insights into the diversity of policies (section 3) and into pattern variance between outreach activities and innovation paths (section 4). From this perspective it is worthwhile to reflect on the role of overarching conceptual frameworks (such as the European DigCompEdu framework) and the kind of support it can give to CPD measures. Also, it is appropriate to consider the role of more specific training models (such as the "Theme Room" training of the Learning Layers project).

7.1 The role of the European DigCompEdu framework[8]

The DigCompEdu framework provides support for the continuing development of digital competences and for upgrading them. The idea is to promote digital competences as bridging elements between educators' *professiona*l competences, educators' *pedagogic* competences and learners' competences. From this perspective the digital competences should not be treated as stand-alone competences but as elements of *competence areas* that need to be mediated with matching competences. This is illustrated in Figure 2 that visualises the DigCompEdu competence areas and their scope.

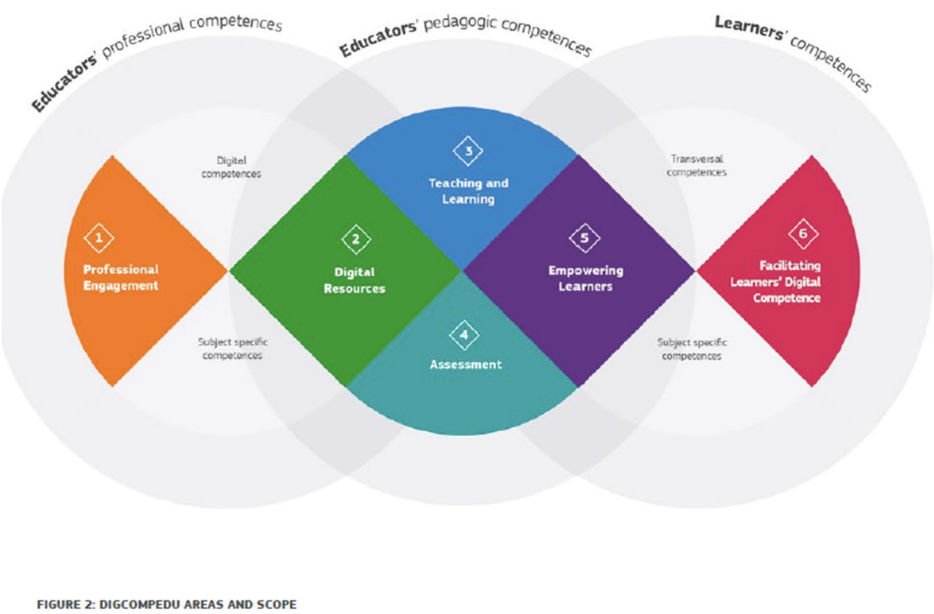

Figure 2 The scope and the learning areas of the DigCompEdu framework

The purpose of the framework is to promote **integrative *digital* learning processes** that link to each other educators' *professional competences* and *pedagogic competences* in order to promote *learners' competences*. Furthermore, the framework outlines between six stages of competence for a progression model. For each competence area and each stage the framework provides proficiency statements. Altogether they can be presented as a progression ladder.

These brief characterisations and the illustrating figure give already an overview, how the DigCompEdu supports continuing development of digital competences of teachers and trainers

[8] This subsection is based on the parts of the DigCompEdu framework (see Redecker 2017) that have been discussed in the TACCLE4-CPD project.

in an educational context. It focuses on the six areas of learning and takes into consideration the six stages of competences. For each area and for each stage it provides proficiency statements with which trainers and learners can reflect the current level of competences and progress in professional development. However, in the light of the above, it is apparent that the DigCompEdu framework is not addressing the specific issues of the field of VET that have been discussed in the previous sections.

7.2 Revisiting the Theme Room training model from the perspective of CPD[9]

As has been indicated above, the DigCompEdu seeks to integrate the promotion of educators' professional competences and pedagogic competences in order to enhance learners' digital competences. However, from the perspective multiple learning venues and different contributing partners in the field of VET, the framework (as such) is not very context-sensitive. From this perspective it is worthwhile to discuss more specific training models that provide opportunities to treat context-specific challenges. Here, it is appropriate to revisit the Theme Room training model (that was used in the Learning Layers project) and consider its potential use in CPD measures for vocational teachers and trainers.

a) The idea and the process dynamics in the proposed Theme Room training model

The starting point of the initial Theme Room training model was the interest of vocational trainers to have a training scheme for the whole training staff of the organisation. They wanted to make jointly progress with digital tools and to share ideas, how to use them it their trade-specific activities. Since they were partners in the EU-funded Learning Layers project, there was a possibility to implement some of their ideas with the help of the research partners. Below some of the main points of the initial idea are recapitulated briefly:

- **The setup based on thematic blocks:** The model was based on thematic blocks that are linked to each other (from the perspective of promoting digital competences). The idea was to organise a flexible rotation model between the 'rooms' (that enables sufficient time for working with each theme).
- **The use of practical learning exercises:** The model was looking for ways to combine background information and practical exercises. From this perspective each session sought to mobilise all participants in hands-on-exercises and give a picture of jointly achieved learning results.
- **Combination of physical and virtual spaces:** The model was based on joint face-to-face training sessions but it envisaged also the use of 'virtual learning spaces' for each 'room'. (In practice this was implemented with a set of Google Drive folders.)
- **The aim to promote progression of groups and individuals:** The model was proposed to promote shared learning and enhancement of digital competences across the whole training organisation. From this perspective the model put a major emphasis on peer tutoring and peer learning – in order to progress jointly from one theme to next ones. Yet, the model envisages support for flexible individual learning.

Looking back, the Theme room approach was implemented as a limited pilot during a very short period. Immediately after this period the introduction of the Learning Toolbox (LTB) took place with a limited number of trainers and apprentices involved. Then, due to the fact that the

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[9] This subsection focuses on the Theme Room training model that was developed in the Learning Layers project (see Kämäräinen et al. 2017b). The further development of the framework has been discussed in the TACCLE4-CPD project as a strategic approach for promoting digital competences in the field vocational education and training (VET).

project came to an end, it was not possible to continue the training with emphasis on using the LTB in a wider range of trades.

b) Refocusing the 'Theme room' model for CPD with digital competences in VET

Looking forward, it is worthwhile to consider some aspects in the Theme Room training model that are relevant for the purposes of the TACCLE4-CPD project – to develop CPD approaches that are appropriate for teachers and trainers in different educational sectors. Here, it is appropriate to discuss the following working issues when shifting the emphasis from generic multimedia training to specific challenges – for promoting digital competences – in the field of VET. Below, some of these issues are discussed briefly:

- **Adjustment of the model for new target groups and training goals:** From the perspective of the TACCLE-CPD project, the newer target groups those who are in charge of shaping CPD measures and/or serving as peer tutors or peer coaches.
- **Taking into account wider sets of learning challenges:** Originally the Theme Room model was used to encourage older trainers to join their younger colleagues as users of digital tools. Now there is a need to look at different ways to overcome narrowly oriented learning behaviour and to introduce digital tools as enrichment of *vocational* learning culture.
- **Introducing new combinations of digital tools and vocational learning designs:** As has been mentioned in previous sections, development of vocational curricula and learning arrangements is now characterised by new learning interfaces. The concept of 'innovation paths' was used above to draw attention to different ways to combine digital tools with vocational learning arrangements.
- **Shaping of learning arrangements for different learning venues:** Originally the Theme room training model and the Learning Toolbox have been piloted in an intermediate training centre. However, the pioneering trainers were already at that time looking for ways to involve other learning venues (including Internet as the 'fourth learning venue' alongside enterprise, school and training centre).

Here the point of interest is to outline the potentials of the Theme Room training model in a broader perspective – regarding participants, challenges, learning interfaces and new combinations of learning venues.

c) Outline of a revisited Theme Room training model for CPD developers in VET

In this context it is not appropriate to try to develop a full-scale training program based on the Theme Room training model. Instead, it is worthwhile to open a discussion, what kind of thematic blocks could be proposed as a starting point. Below, some tentative blocks are drafted to demonstrate, how the above presented analyses can be used as inputs to such training:

- **Learners, learning cultures and digital tools:** Under this heading it is possible to share experiences of challenges met with older and younger learners. These have been discussed above with reference to interview material (see section 6.).
- **Policies, projects and engagement of educational actors:** Under this heading it is possible to raise awareness of policies, project-based initiatives and possibilities to engage as multipliers of innovation (see section 4.).
- **Innovation paths, networks and new learning interfaces:** Under this heading it is possible to share knowledge on innovation concepts and processes in different innovation paths (see section 5.).

- **Continuing training with digital competences for changing world of work:** Under this heading it is possible to consider the progression prospects opened by the DigCompEdu framework in conjunction with reflections on the future of work (see above sections 7.1 and 6.3).

8 Conclusions and discussion

This paper has focused on the role of research in the context of the TACCLE4-CPD project, which is primarily a development-oriented project. The aim of the project is to develop concepts and models for continuing professional development (CPD) for promoting digital competences of teachers and trainers. The project seeks to cover different educational sectors – including general education, adult education and vocational education and training (VET). This paper focuses on the preconditions, challenges and impulses for shaping strategies and models of CPD for the field of VET.

From this point of view the paper has revisited the project histories of the predecessor projects – the TACCLE projects (working in the context of general education) and the Learning Layers project (with focus on working life and vocational learning). The paper has firstly developed an interpretation on the internal transitions within the project histories. Then the paper has shifted the emphasis to working beyond the accustomed project contexts and introducing CPD measures for wider range of new target groups. In this respect the paper has brought into picture the following working issues:

- ***Raising policy awareness of educational actors and engaging innovation leaders as contributors to given policies***: Here the paper has discussed the Four-Step Model proposed by TACCLE4-CPD partners and presented complementary points on the field of VET.
- ***Shaping outreach activities to promote innovations (in using digital tools) to wider education and training contexts:*** Here the paper has discussed firstly the outreach activities and the successor networks of prior TACCLE projects. As a contrast, the paper has outlined four parallel 'innovation paths' in the field of VET.
- Reflection on challenges posed by the learning behaviour of older and younger learners vis-à-vis the introduction of digital tools: Here the paper has presented interview material the discusses the prospects for overcoming resistance and for enhancing vocational learning culture (when introducing digital toolsets).
- ***Using generic and overarching frameworks and/or context-specific training models to shape CPD initiatives:*** Here the paper has presented the general idea and the progression ladder of the European DigCompEdu framework. Parallel to it the paper has revisited the Theme Room training model that was initiated in the Learning Layers project.

As an interim conclusion for the field of VET the paper has outlined the prospect of developing a revisited Theme Room framework with a wider scope of participants, contents and potential action contexts. Here, the paper has suggested reusing some of the analyses as inputs for the new thematic blocks. In this respect the paper has tried to fill a gap between primarily development-oriented projects (like the prior TACCLE projects) and research & development projects (like the Learning Layers). The former ones have produced training and learning materials, whilst the latter ones have documented analysed co-design and piloting processes until the final results have been delivered. The analyses that have been presented above have been discussed as contributions to strategies and models for shaping CPD measures in the field of VET.

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The Perception of Subjective Vocational Success of Young Adults with prolonged Transitions in Switzerland

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Abstract

In a context of increasing non-linear pathways into vocational education and training (VET) and later into occupation, a differentiated understanding of vocational success is needed. This paper aims at reflecting on a multidimensional understanding on subjective success, adding to the more frequently investigated concept of objective success. Based on theoretical reflections on what could be understood by subjective vocational success, analyses of variances between the group that participated in a transitional option and those with a linear path into VET were tackled using Swiss data from GÜRB[1] and TREE[2]. Results claim for a separated analysis of objective and subjective vocational success as well as for further reflections on the concept of subjective vocational success and the time of investigation.

Keywords

subjective vocational success indicators; discontinuous vocational biographies; transitional options

1 Relevance and Context

In a society in which discontinuous training and work biographies (Offe, 1984) and transitions (Weinhardt & Walther, 2016) are increasing, the concept of vocational success – by its narrow understanding of successfully finding an apprenticeship - is being challenged. Choosing a profession with the long-term goal of economic independence is perceived as an important development task during adolescence (Fend, 2009). The successful accomplishment of this task can be seen as individual prerequisites for the integration into working life and society (Hupka-Brunner & Wohlgemuth, 2014). This is particularly relevant in an employment-centred transition regime, as can be observed in Switzerland, where occupational status plays a key role for the social integration into society (Stolz & Gonon, 2008). Therefore the interest of this paper

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[1] *The project GÜRB (Gelingende Übergänge für Risikogruppen in die Berufsbildung) was a cooperative research project of the University of Teacher Education St. Gallen and the University of Zurich, funded by the Mercator Stiftung and the Bildungsdirektion Kanton Zürich.*

[2] The Swiss panel study TREE (Transitions from Education to Employment) is a social science data infrastructure mainly funded by the Swiss National Science Foundation (SNF) and located at the University of Bern.

is to understand how young people, with discontinuous vocational biographies, perceive their own vocational success.

While a large proportion of Switzerland's population undergoes a linear path with immediate connection to a vocational education and training (VET) or general education system, a significant minority of around 25% experience postponements and difficulties at this first transition into further education and training or general education (Bundesamt für Statistik [BFS], 2016; Meyer, 2018). This is especially true for young adults that attended a lower secondary school track with basic requirement or with a special education curriculum (BFS, 2016). Therefore this paper focuses on the perception of vocational success for young adults with discontinuous transitions in the early and highly selective educational context of Switzerland.

1.1 State of Research

Several research projects aim at defining vocational success by different success/risk indicators. With a focus on the first transition from lower secondary school into post-compulsory education and training there are studies which focus on several indicators especially of objective success indicators in one's vocational orientation. Illustrations of the latter may be finding a training place, successfully completing the training (Häfeli & Schellenberg, 2009), achieving good grades in final examinations in VET (Schafer & Baeriswyl, 2015) or regular training courses in VET (Berweger, Krattenmacher, Salzmann, & Schönenberger, 2013). Based on TREE[3]-Data, Sacchi & Meyer (2016) show that the risk of not graduating at upper secondary level is increased for young people with a non-linear pathway (Sacchi & Meyer, 2016). This risk, however, is much higher for those who do not participate in a transitional option than for those who do. Transitional options have therefore a positive effect on objective/extrinsic vocational success even though they cannot completely compensate the risk caused by discontinuous entry into post-compulsory education and training (Sacchi & Meyer, 2016). Further findings on objective/extrinsic vocational success for young adults who participated at a transitional option are given by data of the GÜRB[4]-Project (Gebhardt, Kamm, Brühwiler, Dernbach-Stolz, & Gonon, 2017). The analysis shows a significantly lower average grade in the qualification process for young people who visited a transitional option than those who did not (Gebhardt et al., 2017). On the other hand, there were no significant differences in finding a connecting solution or remaining in the training company after finishing apprenticeship (ibid.).

More recently we observe an increase in research focusing on subjective success indicators as for example satisfaction with the training process (Berwerger et al., 2013), satisfaction with one's career (Abele, Spurk, & Volmer, 2011), commitment to an organization / vocation (Neuenschwander & Nägele, 2014) or one's perception of professional fit (Nägele, Frey, & Neuenschwander, 2017). While the later research on subjective success indicators focuses on young adults with a direct entry into VET, the focus of the present article is to provide a better understanding on young adults with a non-linear pathway into post-obligatory education and training.

1.2 Research Gap and Research Question

In the context of a labor-market oriented transition regime as Switzerland (see Stolz & Gonon, 2008), transitions towards Vocational Education and Training (VET) play an important role in one's vocational orientation. Therefore it is relevant to focus on young adults with prolonged transitions into post-compulsory education and training and their perception on vocational

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3 Transition from Education to Employment

4 Gelingende Übergänge für Risikogruppen in die Berufsbildung

career success. While there is some research for objective vocational success indicators for young adults, who have participated in a transitional option (Gebhardt et al., 2017; Sacchi & Meyer, 2016), there is a lack of analysis focusing on subjective vocational success indicators for this group. In several studies the relevance of subjective success indicators for one's vocational orientation has been highlighted. Therefore the recent paper aims at filling this gap.

The research question is the following: How do participants of a transitional option experience subjective vocational success indicators during VET compared to the group with a linear path into VET?

Based on existing research on objective success indicators, it is expected that there will be a difference in subjective success indicators among the two groups. Moreover, we expect lower subjective success indicators for participants of transitional options than for those with a linear path into VET.

The structure of the paper is the following: after having (1) reflected the theoretical framework on transitions and vocational success indicators, we (2) consider its operationalisation, sample and methods for the empirical study. Based on TREE and GÜRB-data we (4) then try to answer the research question based on a variance analysis. The last part (5) aims at contextualizing the results by reflecting on the importance to integrate subjective indicators in the analyses on vocational success.

2 Theoretical framework

2.1 Transitions as pre-structured and biographic-shaped processes

Transitions from obligatory school to further education and/or training can be understood as both critical thresholds, structured by systems, and biographic-shaped actions in a life-course (Evans, 2002). These transitions are the longer the less a one-time and linear pathway in one's personal and working life, but rather an ongoing process starting at an early age and enduring with adulthood (Walther, 2006). Still, as research shows, the transition from school to post-compulsory education and training is of long-term importance for the further vocational path (Gomensoro et al., 2017; Künzli & Scherrer, 2013; Sacchi & Meyer, 2016). This is especially true for employment-centred transition systems as Switzerland, where young adults are navigated towards an early integration into standard trajectories (Stolz & Gonon, 2008).

As the paper focusses on non-linear transitions, we will reflect on functions, chances and discrimination mechanism of transitional options. Meyer (2003) defines three key functions of transitional options: 1) compensation addressing performance deficits of further education, 2) orientation to support vocational decisions and 3) systemic buffer to bridge mismatches between supply and demand on the apprenticeship market. Therefore transitional options can be understood as a chance to give the individual more time in vocational orientation. Nevertheless they can as well serve to conceal structural deficiencies (Künzli & Scherrer, 2013) or be understood as a hidden mechanism of allocation towards special treatment for specific milieus (Bourdieu, 2001). According to the theoretical approach of Bourdieu (2001) lower milieus were distracted towards special treatment as the rules of the social field „school" (and in this case we would enlarge it towards scholar and training systems) is not familiar to all milieus in the same way. Therefore those which know the rules of the game got more power of definition and choice. As the external selection is reinterpreted as individual failure not just by those which ascribe but as well by the young adults themselves it converts into self-selection. And as later research shows, one should enlarge the term ‚milieus' by a multidimensional approach on individual and familiar risk factors (Häfeli & Schellenberg, 2009; Kamm, Gebhardt, Brühwiler, Gonon & Dernbach-Stolz, 2018).

2.2 Vocational success indicators

There is no single definition of the term 'vocational success' in educational research literature. Depending on the research question and the objective of investigation we find different ways to define and operationalize the concept. Regarding perceived success indicators in the transitions towards VET and later towards employment, Häfeli and Schellenberg (2009) talk of a complex and multifaceted construct. As common ground, vocational success can be understood as the actual and perceived achievements that an individual has achieved in his professional experience (Abele et al., 2011). Of importance for the present research question is the differentiation between objective/extrinsic and subjective/intrinsic vocational success (Abele et al., 2011; Häfeli & Schellenberg, 2009;). As we consider early stages during the career, it is necessary to adapt the construct of objective and subjective career success by Abele et al. (2011) towards vocational success. According to the author, both aspects should be measured independently, especially in an employment-relationship of dependency. While objective vocational success focuses on observable, measurable indicators of success (as for example finding an apprenticeship, successfully completing it, finding a suitable job), the article focuses on subjective indicators. Subjective vocational success includes, according to Häfeli and Schellenberg (2009), aspects such as satisfaction with training and workplace, occupational fit and occupational self-efficacy. Occupational self-efficacy is understood as one's scope of action at a workplace, possibilities of participations and development. Furthermore according to Neuenschwander and Nägele (2014) we find subjective indicators such as commitment with profession and workplace, occupational fit and satisfaction as desirable outcome of vocational orientation in the first transition. Occupational fit is defined as that the abilities, interests and needs of a person is congruent with its occupation (Neuenschwander & Nägele, 2014).

2.3 Operationalization & methods

Based on the theoretical distinction of objective & subjective indicators of vocational success, special attention is given to the latter. In addition to GÜRB-data on subjective vocational success, we will further take into account data from the longitudinal-survey TREE. The GÜRB-Sample includes 406 young adults from the German-speaking part of Switzerland. The sample comprises 302 young adults who participated in a transitional option. For the TREE sample, the contribution focuses on a cross-sectional view of phase 2 (T3), in which the response rate is n = 4,877 young adults shortly before the transition to working life or tertiary education (TREE, 2016). Young adults who have not found a direct entry into vocational or general education are compared to those with a linear path into vocational education and training. Young adults who start general education after compulsory schooling or remain without education were therefore excluded from the analysis by a filter variable. Therefore we got an overall group of participants of a transitional option of n = 932 and an overall group of those with a linear path to VET of n = 1968 (n total = 2900).

The operationalization of subjective vocational success is based on the theoretical approach of Häfeli and Schellenberg (2009), Abele et al. (2011) as well as Nägele and Neuenschwander (2014). According to the authors, subjective vocational success includes the following aspects (see in brackets, which TREE scales can be used):

- Satisfaction with training (overall satisfaction, satisfaction with the training company, satisfaction with the training vocation)
- Occupational self-efficacy (scope of action at workplace, participation, opportunities for advancement and further education)
- Professional commitment (commitment with profession and workplace, (T8))
- Occupational fit (no scales)

Four indicators were developed in the GÜRB study on the basis of these theoretical considerations. For the TREE-Data the analyses are based on the existing constructs of the dataset which thus represent sub-aspects of the indicators. While the first three aspects can also be analyzed using TREE-Data, there were no scales for measuring professional fit. Professional commitment will be measured with GÜRB-Data during apprenticeship, while with TREE-Data a later time is examined, after entering the professional world (T8). All indicators for GÜRB and TREE have been tested for reliability and show an acceptable Cronbachs Alpha or Spearman-Brown[5] value. 'Satisfaction with training' for GÜRB-data is a single-item.

Starting with frequency distribution analyses on how these indicators were perceived by participants of a transitional option, we will then test the formation of indicators for the three aspects. To answer the question on how subjective vocational success is been perceived by the group with prolonged transitions into vocational education and training, analyses of variance will be tackled by Mann-Whitney-U-Tests (as assumption of normal distribution for t-test is not fulfilled) for GÜRB- and TREE-Data (Field, 2013). Effect strengths are calculated using Cohens-d.

3 Results: Subjective success indicators by different groups

According to GÜRB data, both groups of young adults (with or without having participated in a transition solution) can be classified as largely successful with regard to all subjective vocational success indicators (M >3 on a 4-point Likert Scale, right-sided distribution). The analyses of rank orders (Mann-Whitney-U) show no significant differences between the groups' median values.

Table 1 Perception of subjective vocational success indicators in GÜRB

subjective success indicators	N	Median	Mean	Mann-Whitney-U	Z	p (asympt.)
Satisfaction with training				8588.50	-0.348	n.s.
transitional options	299	3.00	3.24			
others	59	3.00	3.20			
Occupational self-efficacy				8809.50	-0.222	n.s.
transitional options	299	3.50	3.34			
others	60	3.50	3.35			
Professional commitment				8554.00	-0.576	n.s.
transitional options	299	3.00	3.15			
others	60	3.33	3.19			
Occupational fit				8939.50	-0.042	n.s.
transitional options	299	3.20	3.26			
others	60	3.20	3.25			

A more differentiated picture is possible for the analyses of the TREE data, as on the one hand the groups with/without a transitional option are massively larger and thus more representative for the German-speaking Swiss population and on the other hand the vocational success indicators are depicted in more detail. For example, there is a more differentiated indicator for satisfaction (in addition to satisfaction with profession as well general satisfaction

[5] The factors in the TREE-Sample ‚participation and information' as well as 'options for advancement' include just 2 items. According to Eisinga, te Grotenhuis, and Pelzer (2013) the Spearman-Brown test of reliability has been carried out.

and satisfaction with the training company), while occupational self-efficacy was selected from various scales of the TREE field "Stress and Resources in the Company". Furthermore, the analyses of professional commitment at time T8 extend the examination of subjective success to the time after training. For all of the scales we expect significant differences between the two groups, with significantly lower subjective vocational success for the group that attended a transitional option.

Table 2 Perception of subjective vocational success indicators in TREE

subjective success indicators	N	Median	Mean	Mann-Whitney-U	Z	p (asympt.)	r
Overall satisfaction				312470.00	-3.503	0.000	0.082
transitional options	537	4.67	4.74				
others	1298	4.67	4.56				
Satisfaction with training				314950.00	-2.441	0.015	0.055
transitional options	459	3.50	3.27				
others	1483	3.25	3.20				
Satisfaction with company				216288.00	-3.280	0.001	0.082
transitional options	402	3.40	3.25				
others	1207	3.20	3.14				
Occup. self-efficacy (scope of action)				240509.50	-0.779	n.s.	-
transitional options	403	3.67	3.50				
others	1225	3.33	3.45				
Occup. self-efficacy (participation and information)				219050.50	-3.738	0.000	0.093
transitional options	408	3.00	3.09				
others	1221	3.00	2.93				
Occup. self-efficacy (options for advancement)				228742.50	-1.031	n.s.	-
transitional options	394	3.00	2.70				
others	1202	2.50	2.66				
Commitment with training company				133721.00	-2.003	0.045	0.053
transitional options	243	4.50	4.49				
others	1198	4.67	4.66				
Professional commitment				145781.00	-2.466	0.014	0.063
transitional options	255	5.67	5.51				
others	1267	5.83	5.69				

For participants of the TREE-study a rather high mean values for overall satisfaction (7-point Likert scale), and a high mean value for satisfaction with training and training company (4-point Likert scale) is visible. A similar picture can be seen for occupational self-efficacy as we have a high level of agreement for the indicator participation and information (4-point Likert scale), while the agreement with scope of action (5-point Likert scale) and options for advancement (4-point Likert scale) can be described as modestly positive. The level of agreement for commitment with training company is above average and rather high for professional commitment at T8 (7-point Likert scale).

As can be observed from Table 2, there are highly significant differences ($p < 0.01$) for the scales ‘overall satisfaction’, satisfaction with training company’, and ‘participation and information’. For the scales ‘satisfaction with training’, ‘commitment with training company’

and ‘professional commitment’ (T8) there are significant differences at a scale level of $p < 0.05$, while for the scales ‘scope of action’ and ‘options for advancement’ no significant group differences are discernible. A closer look at the significant results reveals that the effect strength (Cohens-d) is weak for ‘overall satisfaction’ ($r = 0.082$), for ‘satisfaction with training company’($r = 0.082$) and for ‘occupational self-efficacy’ ($r = 0.093$). It can further be described as very weak for ‘satisfaction with training’ ($r = 0.055$), ‘commitment with training company’ ($r = 0.053$) and for ‘professional commitment’ ($r = 0.063$). Looking at the mean values, the indicators of satisfaction and self-efficacy show the same picture: contrary to the expectation, the mean values of the group ‘transitional options’ are slightly higher than those of the group ‘others’. Therefore participants of transitional options perceive their satisfaction and self-efficacy slightly better than those with a linear path into VET. Conversely, this is reflected for the scales ‘commitment with the training company’ and ‘professional commitment’ at the time when the majority of respondents are already in occupation (T8). Here the average values of the group ‘transitional options’ are slightly lower than the others.

4 Discussion: Importance of subjective success indicators and how to measure it

As the measurement method for subjective vocational success differs between the two datasets, the discussion will focus a) on a discussion of the results and b) on an appropriate measurement method for subjective career success taking into account the corresponding theoretical framework.

Contrary to expectations, the data for the difference hypotheses based on GÜRB data do not show any group differences. For the TREE data, there are some significant differences, but in terms of satisfaction indicators as well as participation and information the group ‘transitional option’ shows higher average mean and median values. Only for the indicators ‘commitment with training company’ and ‘professional commitment’ are the expected differences identified, but at a lower significance level, whereby the effect strength is negligible. This leads to the conclusion that young adults that participated in a transitional option perceive their subjective success in training to be just as or even somewhat better than those who have followed a linear path into VET. This could be interpreted with regard to the theoretical functions of transitional options in such a way that the additional time for vocational orientation has a slightly positive effect on satisfaction as well as on the experience of participation and information. In contrast to the group differences regarding objective success indicators (see Gebhardt et al., 2017; Sacchi & Meyer, 2016) participating in a transitional option therefore can have a slightly positive effect on subjective success indicators during VET.

Of course, the operationalisation of subjective vocational success must be examined more closely in this context. Based on the results, one would agree with the claim by Abele et al. (2011) to separately examine objective and subjective vocational success as well as to understand subjective vocational success as a multidimensional construct. The available data indicate that on the one hand the scale formation should be reflected carefully and on the other hand as well the time of the inquiry should be carefully chosen. Both aspects can be decisive for the understanding of subjective success.

With regard to scales, it would be desirable for future studies to develop a construct that sensibly reflects the sub-aspects of subjective vocational success as satisfaction, self-efficacy, occupational commitment and occupational fit. It could also be of interest to take into account the perception of social integration at workplace, as it is already done in some research projects (e.g. Neuenschwander & Nägele, 2014). With regard to the time aspect, an analysis of the construct subjective vocational success could be analysed with regard to various moments in vocational education and training and later in occupation to reflect how the perception of subjective success changes over time.

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Biographical notes

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Times of Change in the Engineering Industry: Practising Engineers, Undergraduate Students and Mentoring

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Abstract

This presentation reports on a mentoring trial that was implemented by the University of Canterbury's College of Engineering and School of Educational Studies and Leadership (EDSL) in partnership with the local branch of the Institute of Professional Engineers of New Zealand (IPENZ). Drawing in the expertise of leadership lecturers from EDSL, the mentoring trial trained seventeen practising engineers in aspects of effective mentoring. Students studying civil and natural resources engineering in years three and four were matched with the engineers. The pilot included pre and post-pilot surveys, training, and provision of supporting resources. Both mentors and mentees found that the experience was rewarding and beneficial. The mentoring program fostered an environment where students felt motivated to continue in their studies because they could now envisage their future in the changing engineering landscape.

Keywords

mentoring; engineering; university industry partnerships

1 Introduction

Internationally, vocational mentoring has increasingly become a feature of undergraduate engineering courses. Mentoring has been used for research training (Balster, Pfund, Rediske, & Branchaw, 2010), service learning (Hui, Mickleborough, & Chan, 2014) and building skills for culturally-diverse workplaces (Berry & Walter, 2013). Research has explored the benefits for young women of mentoring them into STEM subjects (Pisimisi & Loannides, 2005), the role of mentors in raising young women's persistence (Jackson, 2013) and their retention at a higher levels of non-traditional disciplines (Poor & Brown, 2013). A positive impact of mentoring on career planning in STEM disciplines has been found for students with disabilities (Sowers et al., 2017). Undergraduate students benefit from mentoring school students making tertiary choices (Gray & Albert, 2013) and undergraduate peers (Simpson, van Rensburg, & Benecke, 2017), indicating retention benefits for both mentees and mentors (Monte, Sleeman, & Hein 2007). A systematic approach to the development of undergraduate mentoring

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programmes is recommended (Gannon & Maher 2012), one that is attentive to both mentor and mentee benefits (Crisp & Cruz 2009; Koehler, Matney, Lavelle, & Robbins, 2007). Research offers the opportunity to enhance awareness of how mentoring can beneficially contribute to VET, particularly as young people transition to employment in the context of less linear career paths.

A wide variety of mentoring topics have been analyzed in previous studies more specific to engineering and STEM subjects, and consideration of earlier literature reinforced the potential of our trial to contribute to the experiences of undergraduate students. Related research on faculty mentoring of STEM students suggests 'non-intrusive' mentoring practices are effective in sustaining motivation and building a sense of autonomy (Lechuga, 2014). Non-intrusive practices are those that are based in a notion of self-determination; the role of the mentor is not to direct mentees but, rather, to support them in arriving at their own solutions and ideas. In attaining this form of mentoring practice mentors require 'qualifications' that go beyond their technical background. These might include attainment of a professional level and training expertise, willingness to help, communication skills and other individual characteristics (Pisimisi & Loannides, 2005). Research on a project similar to our own reports overwhelmingly positive educational impacts for undergraduate civil engineering students (n=345) in offering them role models, enhanced adaptation to industry, behavioral and attitudinal changes concerning CPD and additional access to vocational placements (Gannon & Maher, 2012; Murray, Ross, Blaney, & Adamson, 2015). However, as this paragraph suggests, mentoring also has the capacity to contribute to a range of strategic concerns that go beyond educational impacts including supporting initiatives around recruitment to the engineering as a career and, in particular, recruitment of higher numbers of female students and students with disabilities.

Mentoring makes a contribution to the ongoing continuing professional development (CPD) of both mentors and mentees, whatever their industry. Yet, key components of mentoring that have been identified in the literature are often unfamiliar at the level of practice. The intent of mentoring is that mentees, in our case the engineering student, arrive at their own solutions through a process of reflection facilitated by their mentor and it was this intent that drove the design of the mentoring pilot reported in this paper.

2 Methods

In designing the mentoring trial, we used a five-factor mentoring framework, drawing on the education literature (Tolhurst, 2007). This focused on building rapport, active listening, effective questioning, clear expectations and a framework of goal setting. The framework for goal setting drew on the 4C mentoring framework of challenge, choice, creative solution, conclusion established by Engineers Ireland (Harney, 2010). While Engineers Ireland had used an adult learning framework for their mentoring initiatives we choose to focus on skills of listening and questioning. Our goal in introducing mentoring to the educational experience was to foster the ability of the student to imagine himself or herself as a contributing and reflective member of an international industry even before making the transition to that industry.

2.1 Pilot process

Local professional engineers were contacted by IPENZ and a list of 17 volunteers (3 women) was developed. The ages of the mentors varied greatly with four aged 20-30, and three over 60 years of age, with an average age of roughly 42 years. Concurrently, third and fourth year university students in civil and natural resources engineering were invited to submit an expression of interest in the trial, commenting on their professional interests and goals, and what they hoped to gain from the mentoring. Within 12 hours, 20 expressions of interest had been returned, and another email was sent requesting no further applications.

One application was declined because the student had not provided a genuine attempt to describe career goals or the value of mentoring. Nine third-year students were selected (five women), and eight fourth-year students (three women). Roughly 25% of the overall student cohort for the combined years were women, so the representation by women in the mentoring trial was relatively high. Because of time constraints, the pilot was limited to eight weeks, at the end of the students' spring semester. The three women mentors were paired with women students, though five of the eight women students were paired with male mentors. Where possible, students were paired with mentors having professional background matching their declared professional interest. One mentor needed to leave the program after the pairing and pre-trial questionnaire, but before the first meeting.

A cross-disciplinary team from two university schools (Engineering and Educational Studies & Leadership) and a local leading practicing engineering manager organized the trial. A resource pack for participants was prepared by the academic from education studies; this drew on a range of literature on mentoring in education, and on prior research on mentoring for engineering and related disciplines. The resource pack included an introduction of the literature related to aspects of effective mentoring, along with record sheets that could be used to clarify goals and record meetings using the 4C mentoring framework of challenge, choice, creative solution, conclusion (Harney, 2010). This 4C model provides the framework for effective questioning by the mentor. It draws on ideas we were introduced to by Engineers Ireland and helps the mentor to keep the conversation on track and focused on questions around the professional development goals of the mentee, their options to achieve those goals, the identification of the best option of those available, and the identification of what 'quick wins' and next steps should be agreed. The information pack also provided a mentoring agreement template.

Three days before the meet-and-greet between the mentors and mentees, there was a 90 minute evening mentors training session that was run by one of the authors who is involved in teaching coaching and mentoring. This was a chance to inform the mentors on what would happen at the meet-and-greet session, to clarify our expectations of what a mentoring relationship should and should not be, and also answer any questions. The two-hour meet-and-greet session for mentors and mentees was held three days later. It included lecture content and exercises in building rapport, active listening and effective questioning. Mentors and mentees were paired early on, and each of the three exercises for the pairs was preceded by some background discussion to the group as a whole. The breakout sessions allowed for a highly-interactive evening and a strong sense of energy.

Mentors and mentees were asked to complete pre-trial and post-trial on-line surveys. The pre and post-trial surveys examined the expectations and reservations of participants in order to develop guidance on how best to communicate about a mentoring relationship with both students and practicing engineers. In addition, the nine third year students were surveyed late in their fourth year to reassess their longer-term views on the mentoring experience.

3 Results

Participation rates for the surveys are shown in Table 1. 18% of the mentees had been mentored before, while 78% of the mentors had been mentored before. Half of the mentors had been mentors before. The surveys showed an average of five meetings of 30-60 minutes between the mentors and mentees during the trial.

Table 1 Participation Rates for Surveys

Group Surveyed	Survey Type	Total Number	Number of Responses	Response Rate (%)
Mentors	Pre-trial	18	18	100
Mentors	Post-trial	17	16	94
Mentees	Pre-trial	17	17	100
Mentees	Post-trial	17	13	76
Third-year Mentees	One-year follow-up	9	4	44

Of the various components of the trial, both the mentors and mentees found the meet-and-greet session worthwhile. Of the three skills taught and practiced at the meet-and-greet session, the mentors found the skill of "effective questioning" to be the most difficult to master.

Other methods of support were less valuable to mentors. In relation to the forms provided, 31% used them, while 44% did not, and the remainder tried to use them, but found the format ineffective. The on-line resources, messaging, and chat room that had been established within the university Virtual Learning Environment were not used. The workbook was seen by mentors as a useful resource to call on when needed, but mentees did not make use of it.

The mentors and mentees both were positive about entering into future mentoring, and that their mentoring skills had improved from the trial. Both mentors and mentees were asked before they started about their reservations. For mentees, the top reservations were about 'knowing what to talk about in the mentoring conversation' and 'ensuring I have sufficient time for the meetings with my mentor'. For mentors, the top reservations were about 'mastering the skills of listening and questioning' and 'being able to establish rapport with my mentee'. After the trial, the mentors were asked to identify which reservations were justified, with the most justified being 'finding time to meet with my mentee'. Most reservations could be countered by careful design of the mentoring program. The survey noted that we had not done enough to explain what information it would be appropriate or inappropriate to share during the mentoring. The other challenge we had underappreciated was the demands on student time, particularly at that time of year.

A common issue for students was their desire for a strong match of professional issues, while mentors and the program organizers did not see this as much of an issue. One student commented before the meet-and-greet session:

> Was surprised to find I had been placed with a mentor who worked in a field nearly opposite to what I am hoping to go into (communications/electrical vs transport/civil). Unsure if this is on purpose or not, and partly worried we may not have much in common due to the differences in the industry, nevertheless still interested to hear about his experiences and how he excelled his career etc. Too early to tell if it will be an issue but was something I assumed would be based on matching mentors based on mutual career interests etc.

Two students commented in the post-trial survey on the issue of matching professional interests, with one responding:

> One comment I would make is that if it is possible, it would be most effective to pair a mentor and mentee who are in the same specialisation (eg. structural engineering) as this provides a common ground for discussion on professional matters.

On the other hand, one student (not the same student) who responded a year after the trial wrote:

> For me I had thought that I wanted to do structural engineering so I was paired with a structural engineer mentor. However I soon realised that structural engineering wasn't what I wanted to do. The mentoring experience helped me think more concretely about my career goals and how the discipline I choose would influence my goals.

The program organizers and the mentors agreed with this assessment. To the more experienced, the role of the mentor is to help the student find their own answers while counselling in ways to avoid problems that may be associated with student misconceptions (Marra & Pangborn, 2001). There could be a risk that some students will see the role of the mentors to be to make contacts for them or otherwise help them directly in their job, rather than help them in developing skills to succeed.

One women student commented in the immediate post-trial survey that

> "I know I am a person of few words but I very often found it difficult to get any words in as the mentor kept talking."

The program organizers noted, during the meet-and-greet session, more than one pairing that seemed to have the potential for difficulty because of a talkative extrovert matched with a quiet introvert. The effect on mentoring of a mismatch was worse in mixed-gender pairs, but seemed to be a potential issue in all matches. Here, being familiar with participants is valuable in developing coaching dyads.

In the pre-trial questionnaire for mentors, many mentors noted that they expected to gain from the mentoring experience through a contribution to their CPD record. Although this opinion was more muted after the trial, we recognize that many potential mentors appear to be drawn to mentoring for CPD reasons. Our experience with the trial supports a conclusion that mentoring schemes should develop the CPD benefits –could be through a formal recognition of CPD benefits or through university coursework credits. However, as a group the mentors were very positive about the trial, with all 16 respondents agreeing that they would be interested in acting as mentor in the future. Mentors saw great benefit in their own professional and personal development by being trained in mentoring, participating in mentoring, and then reflecting on the experience. This comment from a mentor on our trial is representative,

> 'Stick at it, it would be good to see this evolve - I think it has so much potential to help mentees and mentors alike!'

4 Conclusion

Of the various components of the trial, both the mentors and mentees found the meet-and-greet session worthwhile. Of the three skills taught and practiced at the meet-and-greet session, the mentors found the skill of "effective questioning" to be the most difficult to master. The surveys showed an average of five meetings of 30-60 minutes between the mentors and mentees during the trial. The workbook was seen by mentors as a useful resource to call on when needed, but was little used by the mentees.

Reservations about the trial were assessed by pre-trial survey. Most reservations could be countered by careful design of the mentoring program. The results confirm prior research on the importance of a structured approach to mentoring, including the provision of training for both mentors and mentees. Both mentors and mentees found that the experience was rewarding. For mentors, the top benefit (rated by all respondents) was a sense of satisfaction in assisting incoming engineers to gain a sense of inclusion in the industry. Other highly rated benefits were enhanced listening and questioning skills and how they could use these enhanced skills not only as professional skills but also in other contexts of their lives. For mentees, the item that was of long-standing value after the trial was an enhanced appreciation of how mentoring proceeds and the development of enhanced questioning skills.

In terms of lessons learned for future mentoring programmes, we note a number of points. The question of the identity characteristics of participants, both mentor and mentee, merits mention. Mentees had a tendency to expect mentors would match their current professional interests and help them directly in their jobs. There is a need to support students to have an understanding of the broader role of mentoring as a process of being supported by a mentor

listening and questioning to construct their aspirations for and through a career. The literature suggests that industry match is not essential, and our pilot supported that position. In terms of gender, many of the female mentees indicated a preference for female mentors. Given the gendered nature of the engineering industry, this was understandable and highlights the need to encourage female engineers to be engaged in mentoring programmes.

From a process perspective, both mentors and mentees expressed little need for support literature, or university-supported messaging and chat rooms. Rather, the practical exercise of face-to-face training and the opportunity to practice their mentoring experience as a group prior to the pilot was considered valuable. In this, participants gained a sense of what mentoring was; this sense was often at odds with their prior experiences of being a mentor. We identified that timing is of the essence and, at two months, the pilot was too short to enable us to test the benefits of a professional mentoring process. However, some of the mentors and mentees continued to meet, after the pilot had ended.

Significantly for the university, the mentoring program was that it fostered an environment where students felt motivated to continue in their studies because they could now envisage their inclusion in an engineering future. The university is considering the potential too for third year student mentees to serve as mentors in their fourth year for second year students. This not only develops their professional skills, but also contributes to the achievement of the UC Graduate Profile. For the engineering industry, the pilot team recognised the potential for such a process to contribute to the further development of industry professionals. On the one hand, this could be through offering mentoring as a course for practicing engineers with course credits that could be applied to post-graduate degrees. On the other hand, there could be potential to develop the programme so that practicing engineers benefit more directly in terms of credit for continuing professional development. Clearly, there is potential to use mentoring as a mutually-beneficial process for structured learning collaborations between the university and the industry. However, from a student perspective, the benefits could be profound:

> When doing an engineering degree (especially in the first 3 years) it's really hard to figure out where you're going with it. Most of us don't have an end goal, and we're usually just trying to get one assignment in after another, trying to stay afloat in the cut-throat degree system. … The mentoring program really helped to make me feel valued. Rather than wondering whether I would get to the end of my degree, I started to look at what I could accomplish after my degree. I didn't really know what I wanted to do after university, so the mentoring helped me to consider different options. I still don't know exactly what I want to do, but I have a better understanding of the system now, so I can make more informed decisions about my future. It's really helpful to have some time to just talk about career paths and goals, even if you don't come to any conclusions. I feel like a lot of adults hit retirement and feel as though they never accomplished what they wanted in their lives. Having a mentor helps us to figure out what we want and point us more in the right direction. It is an invaluable experience.

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Excellence in Creative-Technical Upper Secondary VET: Characteristics of Excelling Students

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Abstract

This paper reports on a study into the characteristics of excelling students in creative-technical upper secondary VET. Excellence is defined as dynamic and continuously under development. Excelling students in upper secondary VET are a diverse and heterogeneous group. Yet these excelling students have some things in common. Using literature and a multiple case study (N=4), a framework was developed containing five overarching characteristics of excelling students in creative-technical upper secondary VET: drive, agency, collaboration, craftsmanship, and innovation. Students who participated in the four excellence programmes central in this study, possessed these characteristics to a lesser or greater extent. These characteristics should always be seen in interaction between the students and their excellence programme. The different programmes require different aspects from students. Using these characteristics of excelling students can help in developing programs tailored to the needs of students.

Keywords

excellence; VET; excellence program; creative-technical; excelling students

1 Context and research questions: Excellence in creative-technical VET

In 2014, the Dutch Ministry of Education stimulated the development of excellence programmes in upper secondary vocational education (VET). The aim was to increase the attractiveness of vocational education, by providing ambitious courses for gifted students and paying more attention to top performances and role models. As excellence in VET was a rather new phenomenon, extra funds were made available a) to support VET-colleges in developing and experimenting with excellence programmes and b) for research on excellence in VET.

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Four VET-colleges with creative-technical courses (such as: (ships) furniture maker/ interior builder, decoration and restoration painter, multimedia designer, game artist, game developer, EQF 4 level) started a joined pilot to experiment with excellence programmes. From a collectively formulated framework, each of the four VET-colleges developed its own programme, executed during a pilot period of three years (2015-2018). This research project followed these four cases during a four-year period. The main research question leading this research was:

What characterises excellence programmes in creative-technical upper secondary VET that successfully support students in their excellence development?

To answer the main research question three sub-questions were formulated:

1. What characterises excelling students in creative-technical VET?
2. Which elements can be distinguished that the excellence programmes are made up of?
3. Which specific elements can be distinguished that contribute to the development of excelling students?

The study described in this paper is focused on sub-question 1.

2 Literature review: Positioning the concept of 'excellence' in this study

A literature research on excellence in the specific context of VET produced little results. As a consequence, a broader perspective was taken in order to gain insights into the concept of 'excellence' and characteristics of excellent performing students. Therefore, the literature study was focused on the concepts of excellence and giftedness in general, excelling students in higher education and excelling professionals. Included in the literature study were sources that seemed relevant in the specific context of (creative-technical) VET.

2.1 Beyond craftmanship

While intellectual abilities or abilities within a specific domain (craftsmanship) is often named as characteristics of excelling students (e.g. Coppoolse et al., 2013; Matthews & Dai, 2014; Wolfensberger, 2011), in general it is also acknowledged that excellence and giftedness go beyond intelligence or craftsmanship: it is not enough to be smart or to be skilled. Giftedness is often perceived as a multidimensional construct in which different characteristics, competences and/or capacities manifest itself in different ways (Reis & Renzulli, 2010). Renzulli developed the three-ring conception of giftedness that clarifies this point. He argues giftedness arises through three different clusters of traits and the interaction between them: above average ability, task commitment, and creativity. The interaction between these three different clusters of traits "creates the conditions for the creative productive process to commence." (Renzulli, 2012, p. 153).

As excellence goes beyond intelligence and craftsmanship, several other researchers have studied the characteristics of excelling students in different context, for instance:

- during an academic honours programme (Scager et al., 2012);
- after finishing an honours program (Coppoolse et al., 2013);
- in retrospective by examining what excelling professionals characterised as students (Pyvläs & Nokelainen, 2015);
- by using characteristics of excelling professionals as a frame of reference for current students to aim for (Paans, Robbe, Wijkamp, & Wolfensberger, 2017; van Heugten, Heijne-Penninga, Robbe, Jaarsma, & Wolfensberger, 2017).

Several clusters of characteristics can be identified from this literature. Besides craftsmanship or intelligence, excelling students are often characterised by motivational aspects such as the drive to excel, perseverance, and passion (Coppoolse et al., 2013; Cross, 2004; Matthews & Dai, 2014; Pylväs & Nokelainen, 2015; Scager et al., 2012; Wolfensberger, 2011). In several excellence or honours programmes students have more autonomy than in their regular program and the programs appeal to their self-development (Coppoolse, van Eijl & De Bruijn, 2010); students are characterised by being able to cope with this autonomy (Tiesinga, 2013). Moreover, students need to possess social skills: they often work together and share their knowledge (Coppoolse et al., 2013; Matthews & Dai, 2014; Tyson, 2015). A final set consists of creative and innovative characteristics, including for example thinking outside the box, being able to look at a problem from multiple ways, and being open to new experiences (Coppoolse et al., 2013; Cross, 2004; Renzulli, 1978, 2012; Sirius Programma, 2014).

These different characteristics can change alongside the situation and should therefore not be seen as absolute. For instance, Renzulli's theory takes into account that giftedness is contextual and situational as task commitment and creativity can change depending on context and situation (Renzulli, 2012).

2.2 A dynamic concept

This emphasis on the interaction between the different clusters of traits, which can vary throughout the time depending on context and situation, implies that excellence is dynamic and not a state of being. Excellence is a process that is continuously being developed (Matthews & Dai, 2014; Monteiro, Almeida, Vasconcelos, & Cruz, 2014). "[R]ather than a static quality or absolute state of being, giftedness involves continual doing, changing, and "becoming" toward a more advanced level" (Dai & Coleman, 2005, p.377).

Moreover, excellence is not only dynamic because of the continuous development of an individual and his/her excellence, but also because of the interaction between individuals and their surroundings. For instance, research on academic excellence illustrates that student's active role with their family context and school context contribute to students' excellent performance (Monteiro et al., 2014).

Perceiving excellence as a process, rather than as a state of being, and considering the interaction between context and individual leads to discussion about how to position and describe students in this perspective. Researchers such as van Veen and van der Lans (2011) and Lappia (2014) prefer talking about *excellent performance* rather than *excellent students*. Using excellent performance keeps in mind the characteristics of the student *and* the circumstances in which a student excels, while excellent students emphasises the characteristics of a student. Monteiro and colleagues (2014) argue that because excellence is never completed, but rather a process continuously being altered, *becoming* excellent rather than *being* excellent is more appropriate. Similarly, Renzulli (2012) prefers to use the adjective gifted, rather than the noun gifted. Also other researchers (e.g. Matthews & Dai, 2014) are strongly against labelling student as excellent, because doing so may surpass the differences between studentes and the different needs they may have. Some researchers also suggest using *gifted* for programmes, rather than students (Borland, 2005; Matthews & Dai, 2014). As Renzulli and Gaesser (2015) put it: "label the service rather than the student" (p. 93-94). In this light, we choose to speak of *excelling students* rather than *excellent students*.

Conclusively, we argue that excellence is dynamic and continuously evolving. This process develops through the interaction between student and environment. It includes but is not limited to the school environment. Hence, we speak of excelling students rather than excellent students. Furthermore, *the* excelling student does not exist, but it is a heterogeneous group (Lappia, 2014; Matthews & Dai, 2014; Monteiro et al., 2014; Renzulli, 2012). Yet, despite these differences between students, several researchers indicate that excelling students are different from other

students on specific characteristics (e.g. Scager et al., 2012). Taking these aspects into account we investigated which overall characteristics can be distinguished in excelling students in creative-technical VET.

3 Methods

The study was descriptive and cyclic; each data collection built upon on the previous, ultimately answering the research question. As four excellence programmes from four different VET-colleges were included in the research project, it can be considered a multiple case study. To answer the research question, a number of sources per case were included:

- Documentation from the schools regarding the excellence programmes (curriculum descriptions, policy documents);
- All students who participated in the excellence programmes and started in school year 2015-2016 (cohort 1) or school year 2016-2017 (cohort 2). The exact number differed per school (5-15 per school each year);
- Developers and teachers (D&T-group): the group responsible for the development and implementation of the excellence programmes within their VET-college. These groups consisted of, for example, the project manager, teachers, management, policy advisors and external experts.

Data were collected for each case separately. Focus group interviews were used for the D&T-groups (two times). A mix of focus group interviews and semi-structured individual interviews were used for the students (two to three times). The interviews were focussed on, among others, characteristics of excelling students and their motives for participation in excellence programmes.

4 Results: What characterises excelling students?

The combined results of both the literature study and the field stud revealed five overarching characteristics of excelling VET-students in the creative-technical domain, namely: drive, agency, collaboration, craftsmanship, and innovation. Furthermore, the results of the field study revealed five motives for participation in excellence programmes.

4.1 Drive

An important characteristic of the excelling students at all four VET-colleges is the ultimate *drive* they have: they are motivated, ambitious, perseverant, and full of passion for the creative-technical domain. Students often mentioned motivation as one of the first aspect when they were asked what excelling students in VET-colleges characterises. They are hard-working, studious, and interested. Students argued excelling students are more motivated than the majority of the regular students.

> As students we are excellent because we're almost always motivated, do everything we can and help each other. That's what makes us different from the other classmates in the regular program. (Student, case 2).

Not just the students recognised this drive to excel. The D&T-groups mentioned this will to achieve among the students in the excellence programmes as well. They said students want to take the extra mile, work extra hard and continue where others would stop. In doing so, they show perseverance and motivation.

4.2 Agency

Students in the excellence programmes need to experience or develop a sense of agency: the students are in control of their own choices, form their choices on personal aims, interests and motives, and act upon them. This means both self-direction and a pro-active attitude are important. These students are often able to formulate their own learning goals and they continuously develop themselves, reflect on their own work, and work independently. Being able to reflect on yourself and your work is an integral aspect of most excellence programmes.

The excellence programmes offer a lot of freedom to the students and students are not guided every step of the way. Consequently, a certain degree of self-direction is necessary to be able to succeed in the excellence programmes. The students take this responsibility; they act more responsible, mature, and professional than their fellow classmates in the regular programme. Students need to behave proactively. For instance, they may need to establish contacts to get things done. They need to profile themselves, look for guidance, a project, or knowledge.

> You are an excellent student for a reason. It goes beyond craftsmanship, it's also your attitude. The student who is dependant, who needs lots of guidance, they won't make it, because we call upon your independence. That is natural selection. (D&T-group, case 1).

4.3 Collaboration

Being able to collaborate with all kinds of people, inside and outside your field, and being able to establish and use contacts ('networking') is another important attribute of excellence.

The design of the excellence programmes called upon students' collaboration skills. Students need to perform properly in a (multidisciplinary) team, have an open mind towards others, and often undertake activities in teams, such as intervision meetings and multidisciplinary projects.

> Even for those who do not enjoy working in a group as much, it is a very important skill to be able to collaborate. (Student, case 4)

4.4 Craftsmanship

A fourth overarching characteristic is knowledge and craftsmanship in the specific field, necessary to be a good practitioner. The extent to which craftsmanship was required in the different programmes varied from the argument that students should excel on craftsmanship (technical skills) to the argument that students should at least not be too far behind in the regular curriculum.

> It should not be a burden, so to say, the excellence program. So yeah, you have to be able to keep up with the class. That was a demand. (D&T-group, case 4)

Students were also modest. They did not describe themselves as 'the best' or as a standout. Even if they considered they have above average abilities, they believed they still have plenty to learn. Being a pro in terms of skills is not enough. So while craftsmanship was often mentioned, at the same time it was clear that the students are not necessarily the best student in there domain.

Their craft may surpass other students' work, not necessarily because they can make better products than their classmates, but because they have a different attitude: they are more perfectionistic and they have more motivation to excel.

4.5 Innovation

Finally, being innovative and creative characterises excelling students. They develop creative or original ideas and solutions *and* they actually apply these ideas and solutions. Aside,

innovation is also perceived as experiment with new materials and styles. While regular students in the creative-technical sector also need to possess some form of innovation, for excelling students this was even more important.

> Particularly striving for new and better designs I think. To be innovative time and again, make better furniture. (Student, case 2)

4.6 Motives

Five overall motives for participation in excellence programmes came to the fore. Closely related to the aspect of 'drive', students who participated in the excellence programmes were often looking for more *challenge* than what they were offered in the regular program. They had 'spare time' and liked to learn more. Aside from the challenge, students were looking forward to *learn from and collaborate* with other students. In the regular classes these students were – according to themselves - often among unmotivated students. In group work in the regular programme they often had to take the lead and drag the others with them. For them, it was very motivating to be among like-minded other students who want to go the extra mile as well. Students in the excellence programmes were also pleased with the *recognition* they received by being able to participate in an excellence programme. First, because of the negative image of VET in the Netherlands. Secondly, because energy is usually spend on students with difficulties rather than on students who excel. Moreover, the excellence programme could possibly *contribute to the students' future perspectives*, in their future studies in higher education or in their career path. Finally, students enjoyed experiencing more *autonomy*: working from their personal learning goals and being able to co-create the programme.

5 Conclusions

Using literature and a multiple case study we developed a framework with five overarching characteristics of excelling students in creative-technical VET schools: drive, agency, cooperation, craftsmanship, and innovation. Both participating students and the developers and teachers recognized these characteristics in their students at their programmes. However, as also articulated by the students in the focus groups, not every student is the same. Excelling students are a diverse and heterogeneous group (for example Castejón, Gilar, Miñano, & González, 2016; Reis & Renzulli, 2010) and there is not one type of excelling student.

Furthermore, what an excelling student entails also depends upon the programme characteristics and needs. The design and focus of the programme affects how excellence is perceived. For example, in describing what excelling students are, students in our study mostly reflected upon themselves, what they saw in their fellow-students and what was emphasised in the programme (e.g. more emphasis on craftsmanship would lead to craftsmanship being an important characteristic according to the students). Moreover, students do not passively consume excellence programmes, but rather actively engage with them (Monteiro et al., 2014; Renzulli & Gaesser, 2015). They make the excellence programme their own, and in doing so, give shape to how they perceive excellence. Excellence is dynamic and continuously being developed, and interacts with the students' surroundings. Hence, the characteristics of excelling students differed among the four cases and for each case the set of characteristics and the importance awarded to each characteristic, was slightly different.

Several studies have shown that excelling students are more intrinsically motivated than other students (e.g. Kazemier, Offringa, Eggens, & Wolfensberger, 2014; Stamm, Niederhauser, & Kost., 2010). To become and especially stay motivated, it is, according to the Self-Determination Theory, important to fulfil three basic needs: competence, relatedness, and autonomy (Ryan & Deci, 2000). This corresponds with the motives of the participating students. They were looking for more challenge, working together with like-minded students

and wished for more autonomy and control. Motivation can be further stimulated by being surrounded by like-minded others (Lappia, 2014; Tiesinga, 2013). For participating students following an excellence programme is thus a way to remain motivated. Furthermore, it creates the opportunity to gain recognition for their effort and could possibly help them in their future, either in their career or in their continued studies.

6 Implications

For developers of excellence programmes the overarching characteristics formulated in this study can be useful as inspiration. However, they should not be taken as static traits, but seen in the light of context and development. Thereby it is advisable to take into account for whom the programme is developed and what the aim of the programme is. In the end, there should be coherence in students' motives, selection criteria for the programme, characteristics students should have after finishing the programme, and the characteristics that will be developed during the programme.

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VET for Inclusion and Identity Development: The Cometa Approach with Young Migrants

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Abstract

Cometa, located in Como, Italy, provides services to minors and young adults and is serving an increasing number of migrants. These young migrants are vulnerable due to their marginalization in areas such as language, cultural differences, and class status, and they face potential risks in not being able to find meaningful employment. This research proposal reports on findings from a qualitative study whose main objective was to examine students' (who are migrants) and staff members' growth and development through their involvement in a one-year long training course entitled the "Minimaster". The Minimaster's success relies on (1) a mix of training on professional subjects, e.g., enology, labour law, and Italian and English language literacy; (2) socio-emotional learning, e.g., communication skills, relationship building with local entrepreneurs; and (3) a combination of didactic methodology, e.g., strong work-based approach, as well as daily coaching and mentoring.

Keywords

inclusion; VET; migration; identity development

1 The context

Migration is not a new phenomenon, however its increase, worldwide, in the last years is dramatic. In 2017, more than 258 million people (3.4% of global population) experienced migration, mainly toward the more developed countries, where their presence raised from 10% to 14% (UNESCO, 2018). Among them, approximately 20 million are refugees and most of them are minors (UNHCR). The impact of refugees, in Europe, has been huge: between 2013 and 2016 their number has been increasing exponentially (Bertelsmann Stiftung, 2016b).

Of all the migrants that have crossed the Mediterranean Sea to Italy's shores in the last few years, a large number are unaccompanied minors and young adults (Demurtas, Vitiello, Accorinti, Skoda, & Perillo, 2017). The percentage of refugees has approximately raised to 2.8 every 1000 inhabitants (in Europe: 1.3); among them, minors (0-19 y.o.) were 2.4% in 1990 and 5.6% in 2017 (UNESCO, 2018).

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Notwithstanding the debates on media, the real challenge is not their increase rather their integration, reducing the risk of social exclusion and segregation: as emerged in several studies, "The faster refugees move into the labour market, the faster their integration will be. Successful integration is associated with early contact with the labour market" (Bertelsmann 2016a). At the same time, migrants and refugees usually present poor performances in the labour market, "which can be only partially attributed to the lack of qualification or skills" (OECD, 2015). Many barriers can be mentioned: basic and technical literacy of the host country, poor knowledge of the local job culture, habits and rules, lack of job experiences and adequate training, no link to recruitment networks, and, unfortunately, still racism, stereotypes, legal uncertainty, slow bureaucracy, often leading to dropout and psychological crisis (Bertelsmann Stiftung, 2016b; OECD, 2015; UNESCO, 2018).

The existence of these problems outlines the relevance not just of finding a job, rather to have a specific vocational training providing them not only technicalities but also basics on language, culture and, even more, support for legal issues, job intermediation and, last but not least, human relations (Bertelsmann Stiftung, 2016a). TVET system can offer the best way to prepare people not just for a job but for a career and, as a consequence, social inclusion. However, the risk of dropout from VET courses for migrants is significantly high: CEDEFOP data show that dropout migrants in Europe (18-24 y.o.) is approximately 30%, in some countries even much higher, including Portugal (37%), Italy and Spain (45%) and Greece (50%). UNESCO (2018) identifies some factors affecting dropout: age, selection of class and social and economic background.

It is important to identify the conditions making VET provision for migrants more effective. Requested reforms include didactics, language, teachers' skills and deeper personalization of training; a stronger connection with the job market to boost employability and encourage school-job transition. More concretely, several agencies stress the importance of:

- a work-based approach, including internships or apprenticeships, making school-job transition smoother;
- including in the training offer not only language and literacy, but also culture of the host country, in order to support migrants in better understanding social dynamics and to decrease the risk of social exclusion (Carrera 2006; OECD, 2016; Schuller Lochner, & Rother, 2011);
- a strong personalization of the training provision, based on age, gender, skills and social and cultural background: as outlined by the Deputy Director di CEDEFOP, Maria Brugia, "there is no quick and simple fix and no one-size-fits-all solution: support services for adult refugees need to be tailored to the specific characteristics, qualifications and needs of the different groups". Interesting examples of "customized approach" come from Norway where a 2-year program for refugees let them develop "an individual career plan consisting of an aim – normally a type of job – and various schemes deemed relevant to achieve this" (Hagelund, 2005); or the UK "Life CV" program, aiming at discovering "new ways of knowing themselves and presenting themselves to potential employers" (Schultheiss, Watts, Sterland, & O'Neill, 2011).
- including "non formal" activities, such as cultural events, sport activities, as well as counselling and psychological services.
- a specific training for trainers, enabling them to develop a multicultural approach, useful to prevent intercultural conflicts or to identify and manage psychological problems. UNESCO (2018) outlined that only 16% of teachers in 34 educational systems got an adequate training, including a practical experience beside theory.

2 The research: Focus and methods

Cometa, located in Como, Italy, provides services to minors and young adults and is serving an increasing number of migrants. The relevance of this experience emerges not only from the positive results of placement of learners after completing their courses, but also for the original approach which is one of the objects of analysis developed by this research. Although there are many studies that examine the impact of vocational training on participants (Zimmerman et al., 2013), few have examined the identity development of unaccompanied migrants balanced with the expectations of a program like Cometa that encourages them to integrate into Italian society. Cometa has been supporting migrants and refugees since the very beginning of its activities for dropouts, although, the recent increase of the number of migrants has requested a significant investment in this specific program.

The research, still in progress, aims at outlining the main elements of the Cometa approach with migrants, in order to identify potential elements of transferability in other context: the description of the case study, presented in this paper, outlining the main elements of Cometa approach. The second part of the research is a qualitative study whose main objective was to examine students' (who are migrants) and staff members' growth and development through their involvement in a one-year long training course the "Minimaster".

In the following sections, the case study will be presented as an introduction to the main elements characterizing the training provision. Those elements guided the qualitative study, whose preliminary results are described in the last section.

3 The Cometa approach: a case study

Cometa Formazione since 2009 has been developing special programs for migrants aiming at providing them with an effective training, a social support and a guided transition to job market. The collaboration with local institutions, social cooperatives dealing with migrants and companies, has always been crucial. This research outlines those factors which can be considered essential for the success of the program.

Cometa operates in Como, a town at the border between Italy and Switzerland. This condition makes Como an intermediate destination for many migrants whose final destination is usually Germany or, in some cases, the same Switzerland. However because of controls at the border and the international agreements (Dublin agreement), leaving Como is always impossible. According to the analysis of the Regional Agency "Eupolis Lombardia", Como hosted almost 1.000 migrants in its Centres for Assistance; others live in the neighbourhood or close cities including Varese and Lecco, not to mention Milan and Bergamo. Since few years ago, Cometa has been supporting migrants, and in particular minors, coming from all these places. All of them face the same challenges:

- no social support in a foreign context;
- no or low knowledge of Italian language;
- poor conditions of the family in their own country and need to support them from Italy;
- barriers to enter the job market
- social exclusion

More in details, migrants attending Cometa courses are mainly minors or young adults. Minors live in special communities managed by NGOs, funded, according to the Italian law, by the local Municipality. They get a temporary visa, although, in many cases, they ask for asylum because of their origin from unsafe countries (war conditions, persecutions based on religion or gender).

Young adults, who are often former minors now of age, loose the right to the assistance granted by the local Municipality; they cannot stay in the same communities they were hosted in. They have a very scares or no social support in Italy, sometimes neither in their home countries. The migrants supported by Cometa during the period 2017-2018 included more than 10 different nationalities, approximately 28 years old. Their journey, as emerged during the interviews, has been dramatic, with significant psychological impacts on them, which requires the intervention of specialists, in particular in the case of women.

All of them had a very low understanding of Italian language at the moment of their arrival to Italy; in particular in the case of minors, they are provided with some basics in Italian by the communities where they are hosted developing a good level of comprehension and speaking (43%); 37% show a medium level of comprehension, while 17% a very low level. Speaking remains more difficult task to grasp: still medium for 29%, scares for 25% of them. At the same time, English and French can be spoken, mainly as second language, while local dialects are the most frequent language they are fluent in.

Moving from these conditions, Cometa has been promoting different programs and training courses based on similar concepts: basic literacy and numeracy, training in one of the local economic sectors where job offers are significant, counselling and legal support, internship and, eventually, transition to job.

The experience developed in the last 10 years let Cometa to consolidate a specific structure of intervention played by key actors:

- One coordinator is in charge of supervising training projects and programs, supporting staff and, above all, meeting every beneficiary.
- Welcoming staff: two people (in collaboration with staff from the communities where migrants live) take care of the first welcome to migrants, interviewing them according to a specific protocol where their profiles emerge and a preliminary personalized project is designed. Their role does not end with welcoming migrants, but continues during their training giving them a personal support, including the evaluation of their training needs and scouting. They suggest beneficiaries not only specific formal training activities, but they also involve them in non formal moments, including voluntary jobs and social or cultural activities, in order to evaluate their intrinsic motivation and promote also a social integration in the local context.
- The Business-Education relationship manager, supported by the Cometa Career Service staff and by the coordinator, takes care of the needs (vacancies, skills) companies highlight. The role is crucial in addressing the training needs as emerged from the local job market; as a consequence, the manager can more easily match every beneficiary with a company for their internship, supporting both the learner and the company tutor in facing problems or challenges emerging during the job experience.
- A tutor is in charge of a class of migrants attending a specific program; this role is not just supportive during the training activities at school or on the job place during internship; their role include an educational and human support to recover beneficiaries' self-efficacy. Due to its daily contact with each learner, the tutor offers a crucial support to the coordinator in the process of integration of each beneficiary, including legal and administrative procedures and, mainly, personal psychological advice. In some problematic cases, the tutor can suggest the migrant to meet an ethnopsychologist.
- Trainers are mainly professionals involved in the program for their direct contact with the real activities; trainers include also teachers from the TVET courses at Cometa, as well as teachers with competencies in teaching Italian to foreign people or experts in explaining main pillars of Italian culture.

- Career service is the Cometa department which supports the Business-Education relationship manager, thanks to the huge network of company partners developed in the almost 15 years of Cometa activity in TVET. On a regular basis, they monitor learners placement after the conclusion of the training, giving important feedback in terms of employment rate and, indirectly, of quality of the training.
- A dedicated project manager takes care not only of daily management of the programs, but also of the sustainability of the programs and communication.
- The involvement of the local network of stakeholders is of paramount importance for increasing the success of each intervention. First of all, the NGOs or social cooperative active in the first assistance and hospitality to migrants. They can share their knowledge and evaluation about the single beneficiary, as well as support the coordinator and the welcome staff in the identification of the training needs every learner shows. Companies are another crucial partner, as their needs become, concretely, the trigger for most of courses; their interest in filling not just vacancies but skill gaps in very specific sector make them to be involved in the same training at school, in offering internships and, in most cases, a contract.

It is possible to identify 4 main actions in the Cometa approach with migrants: 1) welcoming and scouting; 2) training; 3) tutoring; 4) transition to work.

3.1 Action 1 – Welcoming, interview and scouting

This is the first step of the approach developed by Cometa. The coordinator and the welcoming staff will meet the migrants and will interview personally each of them, analysing their expectations and skills and creating a profile. Migrants arrive to Cometa because of different reasons: in 2018, 46% were sent to Cometa to attend a training course in Cometa by the NGOs where they were hosted; 30% arrived to Cometa because a personal contact invited them to go; finally, 24% knew about the possibility to attend an effective training in Cometa and decided to go without any previous introduction or reference.

During the first interview, a specific protocol to collect information is used; the protocol requires the following information:

- personal data
- previous training and education
- previous job experience
- competences in finding a job
- personal legal situation
- psychological profile
- expectations

For every new learner, a dossier is activated including the form filled during the first interview and a collection of the legal documents. On the base of this preliminary analysis, the team identifies key competences and further basic training needs.

3.2 Action 2 - Training

After an evaluation of their competences (and in most cases the level is quite low), a personalized training is proposed. Usually short courses to learn basics in Italian language and a preparatory training enabling learners to have the minimum level to attend a complete training in one of the sectors where Cometa operates: hospitality, wood and textile. Modules include Italian language, safety certifications, specific training in the selected sector and a short internship.

After this first training, it is possible to have a wider knowledge about the real motivation and skills of the migrants. For those who decide to keep attending a more specialized training, Cometa offers a 1,300 hours course in Food&Beverage (to become waiters or waitresses) or Housekeeping, called "MiniMasters", where the involvement of companies is deeper, in terms of professionals involved as trainers and in terms of opportunities of a longer internship (960 hours) in the most relevant hotels and restaurants in Como and neighbourhood. For the others, there is the possibility to attend other short courses or to go to work.

3.3 Action 3 – Tutoring

Tutoring is an essential function during training. The tutor plays a crucial role in defining the personalized pathway of each learner, including not only professional skills but also human development and soft skills. Few examples of that:

- personal order: being on-time, active presence during lessons;
- educational care: the tutor identifies potential threats or challenges the learner is facing and give support to face them;
- personalization: every educational project has to be continuously re-adapted according to the reaction of the learner
- Tutor's activity includes many non-formal moments: dialogues, socio-emotional support, in order to help the learner in building a self-trust beyond professional goals.

3.4 Action 4 – Matching with companies

The existing collaboration with a network of more than 700 companies, enables Cometa in getting a concrete support in placement. In the specific case of MiniMasters, the same companies operating in the hospitality sector proposed Cometa to train young people for some jobs where the vacancies could not be covered by Italian people. Companies become partners in the planning of the programs, funding them, contributing with their own professionals as trainers and offering internships and, in most cases, a contract. There is a direct and smooth connection between companies and Career service at Cometa, so that vacancies, training needs and any problem are immediately faced.

4 Preliminary results

The Minimaster targets minors and young adults who are, usually, 17-22 years old NEETs. The program prepares future waiters/waitresses and housekeepers for the (mainly local) hospitality sector, including hotels/restaurants directly involved in the course offering both internships and work-based learning on their premises with their own professionals. In the last 10 years, the number of migrants attending the Minimaster has been increasing (approx. 80 students, 40% of the total). Placement results keeps being very positive. One year after obtaining their certificate, 60% of students have a job. The Minimaster's success relies on (1) a mix of training on professional subjects, e.g., enology, labour law, and Italian and English language literacy; (2) socio-emotional learning, e.g., communication skills, relationship building with local entrepreneurs; and (3) a combination of didactic methodology, e.g., strong work-based approach, as well as daily coaching and mentoring.

5 Next steps

The overall purpose of the second part of the research is to explore growth and learning of students and staff associated with Cometa's Minimaster course (MC). Research questions include:

1. What have student/staff learned from their experiences with MC?
2. What led the student/staff member to get involved in MC?
3. What was life like before the student or staff member became involved in MC? And, how has life changed?
4. What challenges have the student/staff member had to face and/or overcome as part of MC, e.g., holding onto cultural customs, identity and language in contrast with embracing new customs and language and social norms held by Italian society)?

This qualitative study explored students' and staff members' experiences of growth, development, and challenges in Cometa's MC. This study is guided by a naturalistic paradigm based on assumptions that there are multiple realities or perspectives of a particular phenomena such as the young migrant's journey to and integration in Italian society. The sample included students ages 17 through approximately 25 years old and staff members who have been voluntarily recruited from Cometa's MC through verbal announcements in classes and other activities associated with Cometa. A consultant panel was also developed consisting of former students, current staff, and others to provide feedback on the study's design. Not every student participants could fluently speak or read in English. An Italian to English interpreter was made available to these students and staff to interpret study materials.

In June 2019, semi-structured face-to-face interviews were conducted at the agency, Cometa or in the community of Como at a place agreed upon by the research participant. Students, staff, local stakeholders were involved; former students, already working in local companies were also included in the sample. More than 40 interviews were audiotaped and transcribed, and the researcher(s) assigned a pseudonym for each participant, deidentify all data, and load it into two work computers that both researcher(s) will use for this study. Both computers use data protection software so as to keep all data confidential.

The authors have already started analyzing the interview data based on the constant comparative method described by Lincoln and Guba (1985). The constant comparative method uses a recursive process of moving back and forth between the raw data and tentative codes until final coding categories are developed. This analytic process allows for inferences, tentative conclusions and preliminary perspectives to emerge from the data for the purpose of discovering how research participants understand or make meaning of their involvement, growth and development through Cometa's MC. The software program Atlas.ti is used to assist in the management of all text data. Strategies were used to establish trustworthiness in this study's findings including obtaining feedback from consultant panel members on introductory themes that emerged from data analyses of interview; and conducting member checks throughout the interview process. The use of these strategies helped to expand, add to, and refine the codes thereby increasing the credibility of findings (Lincoln, 1995; Lincoln & Guba, 1985).

Outcomes are expected to be available by the end of August 2019. They will focus on 4 areas. First, by exploring students' and staff members' growth and development associated with Cometa's MC, we can develop a greater awareness of the challenges and strengths that students (who are migrants and represent a vulnerable group) and staff have in working in this program. For example, how do we help students who are without family develop nurturing systems (e.g., through peer support) so that they can develop a healthy identity rooted in their cultural and ethnic background? Second, because these students may have migrated alone and are without family, it becomes pivotal to strike a balance between supporting their healthy, cultural and ethnic identity development while at the same time assisting them in integrating into Italian society. Third, if we fail to nurture these students in developing an identity linked to their cultural and ethnic roots, they may experience greater stigmatization and have difficulties

functioning in the larger Italian society. We may be introducing a permanent underclass in Italian society.

Both the evidences described in the case study and the emerging results from the qualitative analysis based on the interviews, Cometa and its MC are an example of the kind of program that provides a process not only for supporting migrants, but can also better prepare teachers, trainers, mentors and others to help them understand exactly what tensions migrants are likely to face (e.g., in balancing their cultural identity development and integrating into the larger Italian society) and how best to support and work with the migrants

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Repositioning Policy Making: The Clash Between Policy Makers and the Field[1]

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Abstract

This article explores new types of disadvantage which are produced by global scale dynamics, and adopts the phenomenology approach to propose a new kind of metrics. The paper builds its theoretical argument on the latest sociological approaches of disadvantage understanding it as effective functioning and positioning in spatiotemporal terms within a space of appearance. The paper translates the above working hypothesis into a methodological protocol using visual methodologies and elicitation interviews, and conducts a mixed methods qualitative research taking 222 vocational education students, aged 14-19 years old, from Italy, France and Greece as a case study. The results reveal a new type of disadvantage that moves beyond the concept of educational inequality and brings into scene the notion of dispossession as a form of clustering relational disadvantage preventing students' effective functioning across the educational, social and political sphere. The paper concludes with addressing the gap between policy discourse and the field and stresses the need for policy directives to match their context.

Keywords

vocational education; dispossession; time; space; imagination

1 Introduction

*Homo sapiens, homo sociologicus, homo oeconomicus, homo strat*egicus are only some of the homo-profiles used to map the direction of society in a given period of time. Within the last two decades a triple turn is taking place, in the way that anticipated versions of society and individuals are profiled in the economic and policy making discourse. First of all, there is an unprecedented strong coupling between education, economy and social exclusion as low skills are explicitly associated with unemployability and accordingly with social exclusion. The OECD (2012, p.10) in the document *Better Skills, Better Jobs, Better Lives* underlined that "people with poor skills face a much greater risk of experiencing economic disadvantage, and a higher likelihood of unemployment and dependency on social benefits", whereas the EU has, in the *New Skills Agenda* (2016), but also in almost every EU education policy document since 2001, equally clearly stated that "low skills are associated with higher risk of unemployment,

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poverty and social exclusion". Secondly, on the individual level, character qualities and resilience come progressively to complete previous profiles that focused predominantly on cognitive competences and work related skills (World Bank, 2015, p. 1, p. 15; World Bank, 2017; World Economic Forum, 2015, p. 3). Finally, there is a growing interest for a new kind of metrics and a new paradigm of thinking. In the Beyond GDP approach (Stiglitz, Sen, & Fitoussi, 2009; Wesselink, Bakkes, Best, Hintergerger, & ten Brink, 2007) the EU has acknowledged the need to make differentiate between growth and development, to move to a different direction and to look for better metrics that could produce different outcomes. Given the fluidity of the context Cedefop (2018a) resumed under the profile of homo adaptus both the fluidity of the current context and the need for high-skilled and resilient people able to adapt to the ongoing changes of the context.

This paper argues that all of the above approaches are actually one-dimensional as they only incorporate what profiles the individuals have to develop in order to avoid social exclusion and to contribute to the building of sustainable, secure and well-functioning globalised societies. But in this process they don't explore the ways the individuals position themselves and are developing in these global scale dynamics. This one-dimensional focus becomes apparent in the New Skills Agenda of Europe (2016) which highlights that policies need to a) improve the quality and relevance of skills formation; b) make skills and qualifications more visible and comparable; and c) improve skills intelligence and information for better career choices. Moreover, the Riga Presidency conclusions (2015) also express this top-down approach, underlining the need for a learning outcomes approach with the aim to a) promote work-based learning in all its forms; b) further develop quality assurance mechanisms in VET in line with the EQAVET recommendation and […] to establish continuous information and feedback loops in I-VET and C-VET systems based on learning outcomes; c) to enhance access to VET and qualifications for all through more flexible and permeable systems, notably by offering efficient and integrated guidance services and making available validation of non-formal and informal learning; d) to further strengthen key competences in VET curricula and provide more effective opportunities to acquire or develop those skills through I-VET and C-VET and e) introduce systematic approaches to, and opportunities for, initial and continuous professional development of VET teachers, trainers and mentors in both school and work-based settings (Council of the European Union, 2015).

This paper takes a different stance and argues that any policy discourse on skills, competencies and learning outcomes is doomed to fail unless the perceived realities and ways of positioning oneself in the world of the people in question are taken into consideration. In order to theoretically back up this argument, the paper draws on sociological approaches of disadvantage and capability (Nussbaum, 2011; Sen, 1995; Wolf & de Shalit, 2007, 2013), on Arendt's (1958, p. 199) notion of the "space of appearance" and on Butler's theorization of performativity and dispossession (2015). In order to methodologically back up this argument, the paper proposes the coupling of visual methodologies and elicitation interviews as an early warning system able to capture emergent and invisible lines of demarcation that go unattended by the existing analytical categories focusing on skills and learning outcomes. In order to prove the above working hypothesis, the paper presents a mixed methods research on 222 vocational education students in Italy, France and Greece. The research results revealed the existence of a new type of disadvantage that transcends the educational, social and political sphere and has the same phenomenology in all three population groups.

In the first part, the paper presents the main pillars of the theoretical positioning, in the second part, it presents the methodological approach and a summary of the main research findings, and in the third part, the paper underlines the social and political significance of the results. Finally, the paper concludes by focusing on the clash between policy making and evidence from the field and the need for a different type of metrics.

2 Changes in the Nature of Disadvantage

This paper argues that the mainstream academic positions on educational disadvantage and inequality cannot fully capture how global scale dynamics impact students' educational pathways, since in the majority of cases, the relevant literature is focusing on students' micro-scale characteristics. More specifically, the mainstream has diachronically focused on two dimensions: the notion of relation from a micro-scale perspective, developed from either a psychological (Bruner, 2008; Wallon, 1997) or under a sociological approach (Charlot, 1999; Dubet, 1997; Durkheim, 1963), and the notion of the context, also considered at a micro-scale. Students' characteristics such as school engagement (Appleton, Christenson, & Furlong, 2008), self-regulation (Shunk & Zimmermann, 1997), self-beliefs (Bandura, 1997), expectations (Morgan, 2005), ethnic minority background and socio-economic disadvantage (Bouhia, Garrouste, Lebrere, de Saint Pol, & Ricroch, 2011), peer-influence (Rubin, Bukowski, & Parker, 1998), as well as school characteristics such as ethnic and socioeconomic composition (Van Ewijk & Sleegers, 2010), teachers' expectations (Brophy, 1983), type of school and duration of compulsory education (Wenger, 2002), are repeatedly among the strongest determinants of educational disadvantage and low performance.

Given the up-scaling and the complexification of the globalised environment, this paper underlines the limitations of previous theorizations of educational inclusion and argues that the global scale dynamics are so powerful that they alter the previous conditions of disadvantage and create new forms of disadvantage that transcend the educational sphere. Based on this positioning, the paper chooses three theoretical pillars. First, it argues that disadvantage should not only be viewed from the perspective of skills and learning outcomes, but given the latest approaches of resilience and character qualities, should be conceptualized under the more dynamic and dialectic perspective of *functioning* as proposed by Wolf & de Shalit (2007, 2013). Second, it argues that the change of scale on the social, economic and political level calls to revisit Arendt's (1958, p. 199) notion of "the space of appearance" and to explore how students "make their appearance explicitly". Third, it draws on the invisible lines of demarcation drawn by global dynamics and argues that since "the act of demarcation operates both a discursive and a performative act" (Butler, 2015, p. 6), educational research should aim to locate and make visible the lines of demarcation that affect students' appearance in the educational, social and political setting.

3 Research Methodology

Our sample consists of 222 vocational education students in Italy, France and Greece. For the choice of our sample, we took into consideration two parameters related to the choice of countries and the choice of students. First, France, Italy and Greece were chosen because for the last ten years all three countries had to face, to a different degree and extent, a form of economic, security and migration crisis. Besides the differences related to the socio-economic and cultural profile of the country, France, Italy and Greece also show different profiles in educational terms and more specifically: a) in terms of public expenditure for education as a proportion of GDP (Eurostat, 2019a), b) in terms of student-teacher ratio and number of students per class (OECD, 2018a, p. 350-355), and c) in terms of modernization of vocational education and training (Education and Training Monitor, 2018, pp. 98, 131, 164). However, if we explore the attainment of ESL (Early School Leaving) rates (Education and Training Monitor, 2018, pp. 102, 125, 158) and the PISA results (OECD, 2018b, p. 5), we notice important similarities across them but not in a way that would allow us to establish common trends.

Second, in order to explore our working hypothesis, we made two further choices regarding the choice of students for our sample in terms of age and educational structure. In terms of educational structure, we chose to have vocational education students, since the vocational

education has due to its nature more direct links with all three spheres of education, economy and society affected by globalization. According to the Cedefop Report (2018b, p. 15) "VET is more differentiated and complex than other education sectors. It is interlinked, and needs to interact, within a pedagogical framework, with industry, employment and social policy". In terms of age, we chose the age group of 14-15 years old, because this age is a critical stage given that it marks in all three educational systems both the transition from the lower to upper secondary education and the most common risk of dropping out of school. This choice provided us with a sample of 222 students that had two common socio-demographic characteristics: low-educated parents, working either both in low-paid jobs or with one of them getting recently unemployed.

For the design of the research methodology we adopted the phenomenology approach and a mixed methods qualitative research using a) visual methodologies (reflexive cartographies) (Caravero, 2000; Casti, 2015) and b) semi-structured elicitation interviews to explore, to understand and to capture the meanings emerging in visual productions given that the meanings of visual productions, may vary from the one viewer to the other. Our aim was to create a metric that goes "beyond the standardization of statistics and language" (Banks, 2007, p. 119) and that "is theoretically consistent, politically relevant and empirically measurable, able to ensure compatibility between countries and regions" (European Parliament, 2011).

The variables of the reflexive cartographies were coded and elicitation interviews were transcribed, coded and analyzed with the MAXQDA 18 software. Our research results revealed a highly common discourse around the students of the three countries revealing a clash between students discourse and policy makers which was resumed under a triple phenomenology of absence of speech – expressed either through the visual discourse or through the elicitation interviews. More specifically, research results showed highly similar percentages across the three countries of students expressing inability a) to dream, b) to position oneself in space, and c) to position oneself in time.

4 A Phenomenology of Absence

If we consider the importance of imagination (Castoriadis, 1997; Jung, 1997; Rawls, 1971), space (Augé, 1995; Bachelard, 1994; Relph, 1976; Tuan, 1977) and time (Rosa, 2013; Weick, 1979; Zimbardo & Boyd, 1999) as the sustaining conditions for the construction of identity, we must realize that this triple phenomenological absence actually represents the absence of the conditions of possibility as "none of us acts without the conditions to act" (Butler, 2015, p. 16). The absence of the above sustaining conditions creates a new form of invisible vulnerability which can be qualified as dispossession. More specifically Butler and Athanasiadou (2013, p. 4) arguing on the concept of dispossession underlined that "we are interdependent beings whose pleasure and suffering depend from the start on a sustained social world, a sustaining environment". If we read Butler's positioning in relation to our findings, we see that the students' discourse reveals in fact a dispossession of the ability to build a relationship with space, time and the Self, and therefore a dispossession of the ability to build a meaningful relation with the world.

These results are important for three main reasons. First, this type of dispossession is alarming on the social level, because it represents an invisible form of exclusion in regards to socio-demographic characteristics since students' educational structure, and parents' education and working status are the only common elements in our sample. Although our research sample is limited because of the qualitative nature of the research, research findings are in line with larger statistical data showing that socioeconomic origins are still important. According to the Education and Training Monitor (2017, p. 10) "in PISA 2015, the difference in the shares of low achievers in PISA between pupils from the bottom and top 25 % segment of the PISA index of socio-economic and cultural status (ESCS) is striking". Moreover, in the same report, it is

recognized that "not only inequality remains a challenge for Europe but it also is intergenerational and that school do not play its role in the fight against inequality" (ibid, p. 21). Furthermore, the above takes a different significance if we consider the size of population coming from vulnerable socioeconomic environments. "In 2017, an estimated 24.9 % of children in the EU-28 were AROPE (At-risk-of-poverty or social exclusion rate) compared with 23.0 % of adults (18–64) and 18.2 % of the elderly (65 or over)" (Eurostat, 2019b), whereas in the Joint Employment Report, it is underlined that although "the share of people at-risk-of poverty or social exclusion decreased markedly in 2017 […] the risk of poverty or social exclusion remains a challenge for groups, such as children" (EC, 2019, p. 8).

Second, these results are important because of their political implications. The visible manifestation of the above mentioned phenomenology of absence comes to remind that "the visible is a representation of a certain absence" (Merleau-Ponty, 1968, p. 132), and in our case is the absence of a space of appearance. Arendt (1958, p. 242) argued that in a political space of appearance "each individual in his unique distinctness appears and confirms himself in speech and action" (1958, p. 241). The absence of this space of appearance, meaning the absence of speech and of the correlated action in students' discourse is fundamental if we consider that "without a space of appearance and without trusting in action and speech as a mode of being together, neither the reality of one's self, of one's own identity, nor the reality of the surrounding world can be established beyond doubt" (ibid, p. 242).

Third, these results are important because they bring into scene the question of social justice. The absence from the world expressed as absence of time, space and dream, reminds on the one hand Ryan's (2012) argument that "for a world to be possible, it must be linked to the actual world by a relation of accessibility" and on the other hand, that students are "also produced by the conditions of possibility of their appearance" (Butler, 2015, p. 19). This double relation of accessibility and appearance is related to Wolf and de Shalit's (2007, p. 72) conception of disadvantage as functioning and on their statement that "one central way of being disadvantaged is when one's functionings are or become insecure involuntarily, or when, in order to secure certain functionings, one is forced to make other functionings insecure, in a way that other people do not have to do". In other words, the problem of social justice in our findings is related to the fact that different (either perceived or real) conditions of possibility and appearance are related to different functionings and these seem to be population specific.

Finally, the above results reveal the clash between policy discourse and evidence from the field as on the one hand they reveal a different kind of disadvantage that is not addressed by discourses focusing in skills and learning outcomes and on the other hand they reveal a phenomenology of absence which needs different compensatory measures, and calls for different metrics reminding that "we are almost blind when the metrics on which action is based are ill-designed" (Siglitz et al., 2009, p. 9). This clash could explain the long lasting difficulty of the EU to tackle educational inequality and underperformance. The EU benchmarks concerning the reduction of early school leavers and of low educational attainment were not attained by all Member-States during the ET 2010 program and are repeated in the Horizon 2020 agenda. Still, according to the latest results, in 2017, an average of 10.6 % of young people (aged 18-24), in the EU-28, were early leavers from education and training, and 13 Member States had not met the relevant benchmark. Furthermore, according to the latest PISA 2015 results, not only the EU as a whole is seriously lagging behind in all three domains of basic literacies and has taken a step backward, but also results have deteriorated in relation to PISA 2012. The turning point in the policy making therefore in regards to the need for better metrics is that on the one hand, "many exclusions are made without the knowledge that they are being made" (Butler, 2015, p. 4) and on the other hand, the process of policy convergence itself is undermined, if we do not possess the analytical categories and the respective metrics to render visible the invisible lines of demarcation across different population groups.

5 Conclusion

This paper has argued that we need a new set of transversal categories to complete the existing ones in order to capture the way global dynamics affect students' perceived conditions of possibility, accessibility and functioning. Research results revealed a new form of disadvantage resumed under the concept of dispossession of the ability to dream and to position oneself in space and time in highly similar percentages and phenomenology across the three population groups of our sample. The paper has concluded that the clash between policy discourses and evidence from the field should be further explored as it undermines the effectiveness of education policies and ignores emergent forms of exclusion.

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Leino, M. (2019). After university to vocational school. In B. E. Stalder & C. Nägele (Eds.), *Trends in vocational education and training research, Vol. II. Proceedings of the European Conference on Educational Research (ECER), Vocational Education and Training Network (VETNET)* (pp. 241–244). https://doi.org/10.5281/zenodo.3371509

After University to Vocational School

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Abstract

Since 2013, the university degree is free for everyone in Estonia. Now there is a new trend in Estonia to enter into a vocational school after the university degree; and/or after one vocational education in to another vocational school. The **aim of this research** is to analyze the background of the fact that many adults in Estonia with vocational education (36%) or higher education (20%) have started acquiring vocational education alongside adults without any professional education (44%). **The subjects/respondents** of this research were people who decided to influence the quality of their life through education. **The object** of the research were shcolars' opinions about the type of education. The **research question**: which background impulses influence the choice of educational institution? The **methodology** of this research was qualitative (based on the small sample of respondents); the **research method** was a content analysis of scholars opinions, and of the case study.

Keywords

university; vocational education; pro-social behaviour.

1 Introduction

The National Audit Office of Estonia studied the progress of adults aged 25 and over, who had started acquiring vocational education in 2010/11 to 2014/15 academic years before and during their studies, and in their working lives after the completion of their studies. The focus was on adults, because the decreasing number of young people means that adults are and will remain an important target group for vocational education. (Mattson, 2016, p. 1). Study eagerness is always nice, but the question here is about the reasons – is this kind of behaviour rather the sign of lifelong learning, or of wrong choices? For the State it probably could be better to get many people at least with one diploma than part of people with many professions (Leino, 2018). But from social pedagogical point of view every personal action in context of improving the quality of life is excellent.

2 Methods

The **methodology** of this research was qualitative (about the small sample). For this paper I collected the empirical data from **two different researches:** the first one was the **case study** about the highly educated person with two master degrees, who was going to start studying in a vocational school. I interviewed her before she left the job at one university in Estonia. She agreed to share her thoughts and feelings, because she was proud of her decision/solution. In

this article the anonymity of her is guaranteed – as this is an ethical way to handle the personal information.

The **research strategy** was to move from a particular case study till the general opinion of the younger generation. As the case study was kind of 'turning back' to a lower educational level, I was interested in opinion of university students about the possible alternatives before and/or after the academical higher education: what kind of image is connected with a specific level.

3 Theoretical background

Going to school helps to survive: if one experiences challenges in the labour market with an university diploma, adaptible individuals are prepared to enter the vocational school, if needed. Social benefits in East-European countries are not high, which means: escaping from a poor quality of life depends on the people themselves (as the state only takes a minimal responsibility).

According to Bierhoff, the studying is a pro-social behaviour as part of social competence (Bierhoff, 2002, p. 228). Everything starts from the idea or from a dream about the future. As an example, dreaming about a wellbeing provides motivation (to study, for example), influences behaviour (to go to the school, for example), and the result might be a better life (or at least the feeling of being in the right place). In this context Webb stresses the concept of 'life planning' (Webb, 2006, p. 94), which also becomes an important activity: such life planning is thought to offer us the best security against the failures we are likely to experience in trying to come to terms with a complex world.

It is well-known fact that life in the 21st century is unpredictable everywhere in the world: the only certainty is continuing uncertainty. Flexibility helps to cope, and it is always better to lead a life rather than to be led by it. This idea is central in social pedagogy also. As next, the case of Mrs Nora illustrates one possible journey from university to vocational school. This story gives us some background information about the reasons for choosing the educational institution.

4 Research results

4.1 The case of mrs. Nora

Mrs Nora has two masters degrees: the first she got during the Soviet time from a famous university of Estonia. After five years studying hard she graduated as a linguist of Estonian language. She got her next degree about ten years after the first one, as a teacher of children with special needs. Now she is 52 years old and works at a university in Tallinn for almost 17 years already. Her main responsibility is to organize the student- internships. She likes the university because of the intelligent work environment and the relative freedom (there is no need to sit at the office from 9 – 17 every day). The salary is small, but fixed and safe.

In her heart Nora was prepared to work for this university until her retirement, for another 13 years. Maybe even longer, because the pension is not big enough to cope, and in Estonia there is no law restricting the highest age of working: one can keep the workplace as long as s/he is able to work. But now Nora's plans had changed, and not because of her personal reasons.

This curriculum at the university, where Nora is involved, did not achieve the long-term international accreditation; and her job is therefore only guaranteed for three more years. There is still the possibility that within the next three years the curriculum will be fit again and the long-term accreditation will be achieved. But – you never know for sure. In three years Nora will be 55 already, and every year it will be harder to start a new chapter of life. At least it would be easier to change something three years earlier. As the age of getting a pension in

Estonia is 65, Nora doesn't want to risk of being unemployed for ten years before the retirement as the unemployment-money is insufficient to cope and also only very temporary. So, Nora started to think about alternatives. Being an introvert, she actually hates change, but in this case that is almost obligatory, and she would prefer to change the life completely. Especially with the encouragement and support of the family.

The case of Nora is an illustration of 'manufactured uncertainty'. Her previous education was not a wrong choice; the need to change something is rather a sign of an unpredictable life. Nora knows, that in the 21st century workplaces are not 'for ever' anymore. This is the reason why she reacts to changes so peacefully.

4.2 Opinions of university students: Why an university and not a vocational school?

In the spring of 2017, 39 students from the first and second year of the bachelor program at the Tallinn University social work department, wrote their answers to the question: **Why university and not a vocational school**? Answers can be divided into three main groups:

1. For 13 students, vocational education is not worse, but the profession they are interested in is not represented at any vocational school. This group I'd call *'focused professionals*'.
2. For 12 students, a university degree enables to apply for positions with a higher salary and to pursue a better career in the labour market. This group I'd call '*pragmatic utilitarians*'.
3. For 11 students, the university education provides a deeper and also broader knowledge. This group I'd call '*universal wisdoms*'.
4. Varia (3 students).

5 Discussion

The case of Mrs. Nora demonstrates one reason for lifelong learning. Actually, every person has an unique story, which makes the creation of stereotypes impossible. In reality, nobody is constantly happy. It is told that feeling well is like the shape of the letter **U** – younger and older people are more pleased with their lives. According to Kasearu and Trumm (2015, p. 28), middle age people are more critical about their life conditions. Obviously this is one more impulse to start studying once again to obtain a new profession (especially in middle age). Mattson (2016) indicates, that the vocational training has an extensive positive impact: adults who graduate from vocational schools achieve better results on the labour market than they did before acquiring vocational education. Vocational education helps to increase people's income, promote their involvement in enterprise and reduce unemployment, including among people with higher education. (Mattson, 2016, p. 2). Giddens (1991, p. 114) uses the concept 'fateful moments' which are times when individuals or families reach a crossroads in terms of their own life planning capacities (Giddens, 1991, p .114). Since plans in late modernity are constantly revised due to the contingency of social life, individuals often resort to expert advice to help them (Webb, 2006, pp. 94-95).

6 Conclusions

The aim of this research was to analyze the reasons for the fact, that many adults in Estonia with vocational education (36%), or higher education (20%) have started acquiring vocational education alongside adults without any professional education (44%) (Mattson, 2016, p. 1). The question was about the reasons – is this kind of behaviour rather the sign of lifelong learning, or of wrong choices? According to the research, the type of higher education is not relevant: there are other background-factors influencing the decision – mostly social reasons. As the life in 21.th century is becoming unpredictable, all people should be aware of possibilities to continue the life (despite of what ever happens) – whether with a new education or without it.

The target group in this research were adults: students from university; and a highly educated lady who had to change the profession because of restructures in her workplace. According to the research, the image of vocational education is good: some people come to the university just because the area of their interest was just not represented in vocational school. In social work and social pedagogy this knowledge should be used in everyday life. In case of (social) problems education (including vocational schools and/or change of profession) could be more advertised – I think, in all Baltic countries.

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Convergence in VET Caused by Technical and Regulative Standardisation: A Comparative Study in Aircraft Apprenticeships in England and Germany[1]

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Abtract

Workplace learning is an essential part of initial training in England and Germany and in both countries the central model of learning is an apprenticeship system. The learning process is affected by governance factors at different levels. This paper is to examine the impact of international technical standardisation and regulation on the design, organisation and delivery of apprenticeships in the aeronautical and aerospace sectors in England and Germany. With interviews and non-participant observation in workplaces and training centres of companies in England and Germany, this study investigates the convergence across the workplace learning approaches in both countries. Findings show how international technical standardisation and regulation is leading to convergence to an apprenticeship which is designed under different national context.

Keywords

regulation; standardisation; apprenticeship; convergence; training practice

1 Introduction

The global organisation of work leads to a convergence of working methods and technologies between different countries. Organisations within and across sectors respond differently to these external pressures, and this in turn affects the capacity of workplaces to create effective environments for learning (Felstead, Fuller, Jewson, & Unwin, 2009; Unwin, 2017). Countries have mostly different vocational education and training approaches and different cultures of workplace learning. Technical standardisation, regulatory frameworks and legislation have an

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impact on the workplace learning as well (Bremer, 2008). Workplace learning is an essential part of initial training in England and Germany, and in both countries the central model of learning is an apprenticeship system. What content is learned and how successful the learning process is, depends on the context in which learning takes place. These conditions are affected by governance factors at the macro-, meso- and micro- levels. For the aeronautical and aerospace industry, factors operating at the macro and meso-level are particularly pertinent as they include international technical and regulatory standardisation.

Despite standardisation across the industry, the impact on the learning process is not well discussed in international comparative VET research. Whilst international effort by organisations such as the European Union and the OECD promotes greater convergence across national vocational education and training (VET) systems through the use of measurable competence standards and qualification frameworks (Brockmann, Clarke, & Winch, 2011), very little attention has been paid to how far global standardisation has had an impact on learning processes within and across national VET programmes. In response, this small-scale comparative research project is set out to examine the impact of international technical standardisation and regulation on the design, organisation and delivery of apprenticeships in the aeronautical and aerospace sectors in England and Germany. It asked: To what extent is international technical and regulatory convergence in the aerospace and aeronautical industry leading to convergence of process and outcomes in apprenticeship training?

2 Methods and research design

The generic occupation of 'aircraft mechanic' was selected as being the closest match for comparison across England and Germany. The research design was informed by insights from three perspectives. Firstly, we use the economic concept of productive systems (Felstead et al., 2009). Secondly, we use the theoretical approaches of work-based learning including skill formation and utilisation (Beckett & Hager 2002; Billett 2002; Fenwick & Nerland 2014; Fuller, Unwin, Felstead, Jewson, & Kakavelakis, 2007; Lave & Wenger 1991;). Thirdly, we draw insights from the concept of convergence and divergence from comparative education (Jørgensen & Aarkrog, 2008; Green, 1999). The investigation is structured by an input-process-output-model of apprenticeship programmes.

A case study started with a one-day workshop in Germany with academic experts in the field of aerospace and aeronautical standardisation and regulation, VET, and business organisation. In the next step government documents relating to the national standards for apprenticeship training in Germany and England were analysed. The fieldwork included semi-standardised interviews with managers, trainers, coaches and apprentices. Additional non-participant observation of apprentices in workplaces and training centres in three companies in England and four in Germany were conducted. The selection was focused on large companies with leading rolls in the sector. Three companies in England and four in Germany were approached. The investigated companies operate in component production, aircraft manufacturing as well in maintenance. The interviews and non-participant observations in each company took between six and 20 hours and were conducted by at least three researchers. The interview and observation guidelines are semi-standardised and based on the research design. The guidelines have been adapted to the group of training manager, trainers and apprentices. Ethical concerns and business sensitivities meant that neither video nor audio recordings were made in situ. Detailed field notes were therefore taken by all researchers and later shared to produce a single document.

3 Results

The research findings were analysed by conceiving apprenticeship as a production model of training comprised of the following intertwined components: Input, Process and Output. Due

to the input factors, the convergence is shown in recruitment of apprentices. In all investigated companies, the recruitment of apprentices is very competitive and takes between nine and up to twelve months including assessment centre, individual interviews and cognitive and dexterity tests. The prescribed curricula reflect the technical and regulative standard both from the national and international authorities. Each company need to negotiate between the international and national training requirements. The companies stress that the national training framework does not restrict them as they are able to creatively manage these frameworks. An over-arching sense of 'adding value' was apparent across all companies. The apprenticeship programmes start with a basic training in the training centre followed by workplace learning on the placement. There is a close interplay between company training centre and production. The findings due to the process factors show that there is considerable convergence across apprenticeship programmes in England and Germany in relation to pedagogical approaches related to the fostering of the capacity to take responsibility for the quality of one's work. We found an overall commitment to situated learning and to promote creative problem-solving across all investigated companies. Increasing international regulation and technical standardisation underpins a shared language about learning through practice in technologically advanced workplaces. The use of English as the technical language of production can be seen to serve the cause of standardisation and was evidenced in manuals and documents used on the shop floor. The findings with regard to the output factors show convergence due to the internal company specific career progression and the progression towards gaining international licences. We did not find big differences between both countries, instead there is evidence for differences between companies from production and maintenance focuses. In the production companies the international regulations e.g. EASA regulations are delegated to companies and require internal certification systems. The internal certification processes end in the award of a personal 'stamp'. Through the personal stamp, the company could track back production mistakes by the personal stamp for 60 years to charge the workforce. In maintenance companies a CAT A licence is required for employment in general, which is certified by EASA and its national authorities. The apprenticeship alone is not sufficient. Further theoretical and practical trainings according to the EASA regulations are required.

In summary, all the companies continually emphasised the centrality of safety to every aspect of their work, both as individuals and for the company as a whole. The emphasis, which was recounted during interviews, was also captured in the observational narratives of production contexts. There was a common consideration across the two countries about the implications of knowing that everyday there are millions of people in the air who put their trust in these companies for their safety.

4 Conclusion

As a conclusion, the international regulatory framework and technical standardisation has led to a level of convergence of input, process and outcomes in apprenticeship training that challenges the widespread assumption that apprenticeship training in Germany and the UK continues to be markedly different.

Given the globalised context of the aerospace and aeronautical industry and the safety critical nature of the work, it is perhaps unsurprising that each company regarded quality apprenticeships as being vital for the long-term sustainability of the industry. In term of input, the companies need to deal both with the national and the European regulatory requirements at the same time and find a balance between the different levels. Additionally, the standardisation of input factors is in some cases the indirect reaction of strict regulatory requirements at the output level; for example, the achievement of the CAT-A licence. In particular, the EASA regulations, which require technical and regulatory standardisation both within a company and between the cooperating companies around the world, influence the convergence of training

curricula. The findings show that technical innovations not only affect production, but also have an impact on training content and framework. There are also collective difficulties and challenges in developing an apprentice's knowledge, skill and understanding, irrespective of country context, which is reflected by the state of the art of the theories of workplace and work-based learning including pedagogical approaches to skill formation (Fuller & Unwin, 2013). As is the case in other contexts using situated, workplace pedagogy, challenges include arriving at a balance between hitting production targets whilst producing a 100% reliable engine or identifying problems/finding solutions to maintenance issues and bringing on new recruits. There is also the challenge of providing a training programme for apprentices, which will serve them as they respond to the introduction of face-paced technological change in the industry. Nevertheless, our exploratory research has evidenced approaches to pedagogy designed to address and overcome these challenges. These strategies are not only sector-specific, but also reflect the specific company location in the competitive aerospace and aeronautical industrial landscape. In terms of outputs we have shown that regardless of respective country's domestic certification of apprenticeship completion, the progression routes in the industry are universal. This is a specific output of the international regulatory framework and technical standardisation.

The investigations in the companies might be to acknowledge that just as parts of aircraft are built by different companies and in different countries and where the production line can vary between the companies, the result should be the same. For this to work, there has to be a shared level of trust based on the recognition that all involved are working with a shared regulatory framework and technical standardisation. These findings highlight a less discussed function of convergence of VET systems. Convergence in education and training is often discussed in light of recognition of learning results across countries for individual mobility and in view of human capital as a production resource (Gibb & Wallace, 2014; Lauder, 2011). Instead, this study points out the necessity of convergence to build trust between the companies that is caused by the safety critical industry.

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Digital Competence of VET Teachers: Illustrations from Non-Technological Professions

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Abstract

Within the TaccleVET Erasmus+ KA2 project, in this paper we provide illustrations of the survey we conducted in Spain and the UK. We describe the methodology we have used, the conditions in which we conducted the interviews and the framework we used to analyse them. Given the exploratory and qualitative nature of our survey, we focus upon the extremes among the cases we have researched and we also point to commonalities and trends we have identified. We conclude by giving some hints about possibilities for motivation and fostering staff development in the domain of digital competence, while in the paper we focus upon the self-perception of teachers about their teaching abilities and the use they make of digital recources.

Keywords

interviews; self-perception; teaching competencies and digital competencies.

1 Introduction

Within the TaccleVET proposal, we have conducted interviews with VET teachers in four countries so far: Portugal, the UK, Germany and Spain.

In this paper, we will provide results and commentaries on the work conducted in the UK and Spain, as results on Germany are presented in the other paper within this ECER symposium and results from Portugal are still being handled in a way to make them comparable with the rest.

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The paper concerns the following research questions:

1. What are the digital competencies VET teachers perceive they have and they lack?
2. What is the role of digital competencies VET teachers perceive as needed in their professional activity?
3. What is the relation of the digital competencies VET teachers use in their classes and that demanded by the professional sectors in which they work?
4. In order to answer these questions, we will use examples from our interviews with VET teachers, using some excerpts and referring to the DigCompEdu framework of reference.

2 Theoretical framework

In 2017 the DigComEdu was proposed for the Joint Research Center of the European Union (Redecker, 2017). The objective of the DigCompEdu framework proposed "is to reflect on existing instruments for educators' digital competence and to synthesize these into a coherent model that would allow educators at all levels of education to comprehensively assess and develop their pedagogical digital competence" (Redecker, 2017, p. 13). We find the DigCompEdu model valid to raise the analysis tools and pedagogical proposals for the development of the teaching tasks and duties in the VET sector.

Under the DigCompEdu framework, the conception of TTDC is determined by 22 specific competences organized in 6 areas (Table 1). There are also six levels of development of this competence: the first two are basic, Newcomer (A1) and Explorer (A2), the following two are intermediate, Integrator (B1) and Expert (B2) and the last two are assumed as high level of competence development, Leader (C1) and Pioneer (C2).

Table 1 The six DigCompEdu areas (Redecker, 2017)

European Framework for the Digital Competence of Educators	
Area 1	Professional Engagement: Using digital technologies for communication, collaboration and professional development.
Area 2	Digital Resources: Sourcing, creating and sharing digital resources.
Area 3	Teaching and Learning: Managing and orchestrating the use of digital technologies in teaching and learning.
Area 4	Assessment: Using digital technologies and strategies to enhance assessment.
Area 5	Empowering Learners: Using digital technologies to enhance inclusion, personalisation and learners' active engagement.
Area 6	Facilitating Learners' Digital Competence: Enabling learners to creatively and responsibly use digital technologies for information, communication, content creation, wellbeing and problem-solving.

We take as a starting point a part of this model to develop it in the VET area. However, it is not a thorough and mechanical application of the model, but a pedagogical development on digital teaching competence in a specific field of professional teacher development. Therefore, we find it necessary to point out some considerations about application we have made of this model for our purpose:

- To consider digital competence as an aspect of the teaching role that is not specifically constrained to a technical skill. This is visible by analysing the 6 areas in which these competencies are organized.

- Beyond an adaptation of the digital competence of the overall citizen, given that the digital competence is not equivalent to the Digital Teaching Competence, this model suggests a set of own dimensions for this professional profile.
- In this effort to define the professional features, this model clearly integrates the pedagogical variable as an unequivocal feature of the Digital Teaching Competence. This aspect can be appreciated in areas 2, 3, 4 and 5.
- The model offers a complete framework including areas and levels, able to guide in a consistent way both the study and the development of digital competence.
- Since there is the possibility of replicating this framework in different educational scenarios as in various countries of the European Union, the possibility of unifying the analysis language is broadened by assuming it as a common framework.
- At an operational level, it is also valid for research, since this model comes to offer a series of specific indicators that allow those interested to evaluate this competence, as well as to validate and improve it.

In our research we have tried to cover all six areas through our interviews with teachers in different VET occupational domains, even though the cornerstone for your analysis in order to improve VET teachers' digital competence is focused upon the relation between the pedagogical approach, the digital resource and assessment, a rather concrete, indivisible, articulated and significative core.

Given that learning aims and contents in VET practice are a varied, specialized and heterogeneous palette, that cannot be limited to the nature of disciplines, the educational dimensions we can identify as appropriate for a significative view of the competent use of technology are the how (pedagogy), the what (resources) and the value attached to learning (assessment).

Pedagogy, resources and assessment are at least three of the elements that interrelate to each other. From an educational perspective, they can be analyzed separately, but the three of them form a unity of basic representation that is needed in order to understand the use of technology not just as a step or technical activity, but as a wider strategy.

Due to this, instead of offering VET teachers a pedagogical solution on the one side, a list of resources on another one and a vision of assessment as separate to the previous two, we attempt to integrate all three in a holistic view.

Therefore, both the analysis of the interviews to VET teachers as well as the suggestions to improve VET teachers' digital competence will be introduced as a unity able to provide more than just a simple technical recommendation. All three aspects, considered as a unity, are key to understand the change that teachers' digital competence is able to produce in VET.

It is well known that teaching practice aim and content are key dimensions, although neither in VET nor in other educational levels they are enough to guarantee a significative educational experience. To the content that every VET teacher determines according to the combination of the planned curriculum and his/her professional experience, we must add the opportunity to think of technology as articulated to a pedagogical view that conditions the use of resources and defines an understanding of assessment. Pedagogy is here the guiding principle of the use of resources and assessment.

3 Method and sample

Based upon the literature survey we have conducted (Lizandra, Suárez, Ros, & Marhuenda, 2019), we have devised an interview guideline that was discussed and agreed in the TaccleVET partnership and that we piloted in early 2019.

Our interviews were conducted between February and May 2019. 11 interviews in the region of Valencia, Spain, have been used for this report; and three interviews in Wales, UK,

as well. The 3 Wales and 6 of the Spanish ones are in the professional field of personal and social care (social care, child work), while 3 are in the domain of physical activity and 2 in the domain of FOL[1].

Interviews lasted between half an hour and one hour and a half, depending on the detail that teachers wanted to go into. Most of them were recorded. Some of them happened in the VET schools while others took place in other locations and off working hours.

We used a common template to gather information on the interviews and to portray the most relevant dimensions addressed. The template was agreed at a project meeting in Valencia in early April 2019 and it focused upon three dimensions of the DigCompEdu.

Portuguese interviews have been handled in a quantitative way, and these results are also summarized in the paper, even though they have not been portrayed using the agreed template.

The features of the interviewed people are the following:

Table 2 Description of the people interviewed

	Sex	Age	Occupational field	Teaching experience	Self-perception
Spain1	Male	>50	Social care	>30	Advanced
Spain2	Female	>40	Child education	>7	Beginner-Intermediate
Spain3	Male	>50	FOL	>19	Intermediate
Spain4	Male	<30	Social care	>3	Beginner
Spain5	Male	>40	Social care	>12	Mixed
Spain6	Male	>50	Physical activity	>28	-
Spain7	Male	>30	Physical activity	>8	-
Spain8	Male	>50	Social care	>25	-
Spain9	Female	>30	Child education	>7	-
Spain10	Male	>40	Physical activity	>18	-
Spain11	Male	>40	FOL	>10	-
UK1	Female	>40	Early childcare	>20	Beginner-Intermediate
UK2	Female	>40	Social care	>18	Intermediate
UK3	Female	>40	Social care	20	Intermediate-advanced

The Portuguese sample included 13 teachers, 10 of them worked in the child care sector, all of them older than 35 (and three of them older than 50), 10 of them female and all with more than 10 years teaching experience.

4 Results

We present our results organized around the three dimensions we have stressed in the theoretical framework: pedagogy, resources and assessment.

It is relevant to point to the fact that, in contrast to the German sample, presented in the third paper in this symposium, the teachers we have dealt with in the UK, Spain and Portugal do work in occupational areas in which the implementation of technologies is low, as they are not productive areas but rather service provision to people and, therefore, most of the work still

[1] FOL stands for 'Formación y Orientación Laboral', a compulsory subject in all formal VET qualifications which content consists in health and safety issues, labour relations and its legal arrangements and search for employment (see Marhuenda, 2018).

happens at an analogical rather than a digital level. Technologies play therefore an instrumental role rather than being part of the core of the work developed.

4.1 Pedagogy

Pedagogy consists oft he notions on teaching and learning a teacher has and that therefore provide a nest of conditions to foster, stimulate and define learning activities relying upon the use of technologies. Technology relies upon pedagogy to be able to haven an educational impact (Suárez-Guerrero, Lloret-Catalá, & Mengual, 2016).

Educational innovation comes through a pedagogical approach (Gros, 2016) and implies an articulation of disciplinary knowledge and technological knowledge within a pedagogical knowledge (Mishra & Koehler, 2006). The pedagogical decisions the teacher has to take are to do with the educational vision and have an impact upon resources and assessment. In a way, pedagogical innovation does not rely upon technology but preceeds it, in such a way that we may speak about four broad dimensions (Figure 1): teaching with ICT, individual learning, collaborative learning and students' self learning.

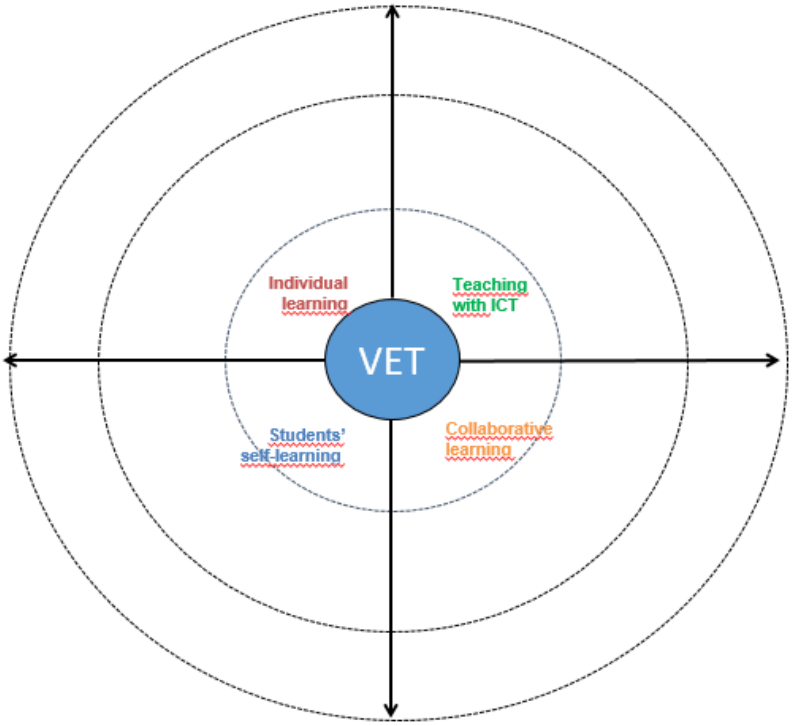

Figure 1 Four main domains of digital competencie in VET (Lizandra et al., 2019)

These four possibilities imply, foster and hinder any teaching proposal in the classroom and will have an effect upon the resources chose and the assessment conducted. Let us see what results we have found in our interviews. In most of them, particularly with the most experienced teachers, we have found that technology is embedded in their teaching practice in a way that digital competence, no matter to what extension has been developed, is a part of the wider teaching competence.

They do so by instructing students in selection of relevant information available online, encouraging active participation of students which in the occupations studied is also part of the

vocational profile; assisting in the selection of content (therefore searching for accuracy, relevance, ethics and appropriateness) and, in certain ways, bringing a non-digital approach to digital media, addressing issues such as authorship acknowledgment; or the combination of audiovisual media with written text, hence considering reading as a key competence no matter what. It is customary to bring to the classroom the technologies and tools used in professional practice and collaborative learning is enhanced as it is inherent to the vocational field in social and child care.

> «As case UK1 holds, the students love my facebook pages since the materials I provide ...They actively use it as an extension of the classroom. The lower level students seek assessment guidance actively through yammer because they can get an immediate response from myself which allows them to make informed decisions regarding their own learning needs and helps them submit their tasks on time. Some students lack confidence in asking face to face for help but the tool of yammer means they can do this remotely»

4.2 Resources

There is a huge array of digital resources available to VET teachers, and this is both varied and changing. There are some prospective essays listing these regularly (Becker et al., 2017), ranging from smartboards to social networks, open resources or databases, smartphones or augmented reality, blogs, wikis and so on. Of course, the technologies employed in the companies in the professional sector can also be used as teaching and learning resources. Open Educational Resources, as defined by Butcher (2015) are also part of these, and they may lead to a wider understanding of education (Ricaurte, 2016).

VET teachers in the field of physical activity hold that Internet and social networks can be very useful; and they also make frequent use of the mobile phone even if students have very limited search capacity, so teachers try to help them to have better competence and autonomy. Selection of appropriate and accurate content is the main problem they face. Youtube tutorials, professional websites and podcasts are also used. In some cases, digital resources are fully embedded in a digital pedagogy, like is the case of Spain7:

> «All the contents are structured in OneNote and the Microsoft Teams applications…We use the "Miniprofes360" for learning anatomy... They create all the contents, respecting the original authorship… We use personalised learning or Flipped classroom. Students have access to the net whenever and wherever. Then we provide online lessons through skype … Students can contact at any time with teachers and classmates. The chat gives us higher possibilities for feedback … Students create contents collaborating each other Moreover, they use traditional office tools in a collaborative way.»

However, in the area of resources we have also found teachers reluctant to their use. Again, we refere to case UK1:

> «I am a bit of a techno phobe and need lots of support with new technologies and I do lack confidence in trying new resources in case they go wrong. I rely on technical support from staff to support me and I shy away from volunteering to trial new technologies that the college may introduce... It is also more appropriate for this generation to work with technology since at schools they are already learning about ICt and digital communication as part of the secondary curriculum... The creativity of lessons that technology can bring is very important especially since tutors are having to differentiate widely in their delivery more so these days with the rise of learners who have dyslexia and other learning needs. Simplicity though is important for me because If something goes wrong with the digital technology then my lesson will be ruined due to my insufficient expertise.»

4.3 Assessment

Assessement with the support of digital technologies may be a different assessment to traditional one or it may also consist of the traditional assessment stressed through the use of technological resources; hence facing the same dilemmas of learning assessment (Crisp, 2011). We can consider which (technological) tool we may use to assess students' learning, or rather take into account that technologies may be used to assess for the sake of learning instead of just to check how far it has gone, keeping in mind that digital tools can ease the automatization and management of information that is part of assessment (Benson & Brack, 2010).

Furthermore, digital competencies allow us to think of new assessment domains or objects, such as online communicative skills, management of uncertainties in the learning processes due to amount of information at hand of the student, or the online chances to increase cooperation in learning activities (Williams, 2017). It will therefore be relevant to check whether assessment is part of the digital pedagogical model of the teacher, whether it is product or process oriented and whether it makes use of digital tools to handle evaluation.

Here is how Spain1, an expert in the incorporation of digital tools to teaching processes, well acknowledged in the region and him being the most experienced teacher in our sample, deals with assessment: «No on-line assessment, though I am able to do I do not want to… The blog produced by students in groups of 4 is used to assess students learning; prior to that I myself write a blog so the students can have it as a reference… Formative assessment is often used, for finding out previous knowledge of students, also their ideas and expectations, and also used for follow-up, but not for final assessment. However, moodle is the platform where students have to upload their products to be assessed, but I use it as a repository, not an evaluation tool. Nevertheless, transversal skills can be taught and assessed thanks to technologies, where more than one skill is behind almost every task.»

A different view is held by case UK3, also an experienced teacher and with expert use of digital tools:

> «Technologies are used for both continuous and final assessment of students, as well as to explore previous knowledge they may have. Referring to these tools allows me to gain information from activities performed by students, to adapt planning of the teaching and learning processes and to introduce new aspects of the occupational domain. I have created assessment tools to provide specific feedback to students.»

5 Preliminary conclusions

Even if we have provided just a few excerpts from our interviews to try and illustrate the three areas upon which we have focused, pedagogy, resources and assessment, where pedagogy is the core dimension around which all other are integrated, and even if our study is still under progress, we may already identify some issues that despite initially shocking may provide suggestive reflections.

First, to our surprise, the most experienced teachers are and, therefore, the older they are, the more open, less reluctant they show themselves in incorporating digital competencies to their teaching and learning practices, even though these are part of a wider and better developed understanding of what pedagogical knowledge and practice is. The overall pedagogical understanding of their trade is the relevant aspect that gives meaning and sense to the incorporation of a digital perspective. We have of course found some example of younger less experienced teachers with a similar holistic approach to digital competencies, but that has been the case among those whose training was embedded in a digital pedagogy view and with much specific training behind it, as was the case Spain7.

Second, the use of resources is a support from which teachers feel enriched but it is the lease relevant one among the different dimensions we have studied. Even if it may seem the

most updated one, rapid change makes it vulnerable and teachers stick to their preferred tools and resources, particularly those who want to have an approach to them as producers and not just consumers: these are the teachers that want to foster their students' creativity and ability to handle the tools instead of being subject to a limited use. In this sense, some tools prove to be powerful while others become less relevant for their restrictions in use. All teachers in our sample were also clear that resources are resources and that they must obey the interest of an overarching pedagogy, without which tools may become useless.

As for assessment, it is probably the least developed area among our teachers and one dimension that needs to address both technical and ethical issues. Most teachers rely upon assessment criteria among which digital dimensions are not so present. However, most of the teachers in our sample reckon there is wide room for a better understanding of assessment as an educational practice rather than a punitive one, a vision that using digital tools may enhance.

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Who Stays – Who Moves? How Core Self-evaluations Are Linked to Changing Resources in the Workplace and School

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Abstract

Drawing from conservation of resources (COR) theory (Hobfoll, 1989), this paper explores the development of situational resources among learners (N_{t1} = 1185, 49.6% female) in their second (t_1) and third (t_2) year of apprenticeship and their relationship with personal resources (i.e. core self-evaluations, CSE). Using latent transition analysis (LTA), we found four resource profiles that differed in the overall level of resources and the level of resources in the workplace and school. Results showed that most of the apprentices stayed in the same profile whereas only a few moved to a different one. Individuals with high CSE were more likely to remain in favourable resource profiles and more likely to improve their situation than apprentices with low CSE. This is in line with COR theory, which states that personal resources might be used to generate and maintain situational resources.

Keywords

resources; core self-evaluations; latent profile analysis; latent transition analysis

1 Introduction

The development of vocational competencies during initial vocational education and training (IVET) depends highly on the learning resources that are provided to learners and on their motivation to engage in learning (Billett, 2001; Nägele & Stalder, 2019). Teachers and trainers must ensure that environments are conducive to learning, and learners must be willing and capable to use these possibilities to regulate their learning.

This paper explores situational resources for learning during apprenticeships and how apprentices' personal resources are linked to situational resources. Drawing from conservation of resources (COR) theory (Hobfoll, 1989) and the thesis of "resource caravans" (Hobfoll, 2002, 2011), we use a person-centred approach and look at patterns of resources (Nylund, Asparouhov, & Muthén, 2007). We examine whether learners' situational resources remain the same over time and how personal resources are related to movements between different situational resources patterns. Finally, acknowledging that workplaces and schools are integral

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parts of IVET and valid places for learning, we examine situational resources of both learning locations (Stalder & Lüthi, 2018; Stalder & Nägele, 2011).

1.1 Situational resources in IVET

Following the definition of job resources of Bakker and Demerouti (2007), we refer to situational resources in IVET as those physical, psychological, social, or organisational aspects of workplaces and schools, that are either/or functional in achieving learning goals, stimulate learning, professional development, and personal growth (Bakker & Demerouti, 2007). Situational resources can be located at the level of the tasks (e.g., learning opportunities through skill and task variety, autonomy), the social relations (e.g., quality of instruction by supervisors and teachers, organisational or school climate) or the organisation and school at large (e.g., career opportunities, learning provisions of schools).

Situational resources provide conditions through which apprentices can learn (Kyndt & Baert, 2013). For example, supervisors, teachers or co-workers provide resources by sharing information, giving feedback and guidance, and by stimulating learners' reflection on tasks, processes and learning outcomes (Coetzer, 2007; Nikolova, Van Ruysseveldt, De Witte, & Syroit, 2014). Or, tasks which demand the development of different skills, and possibilities for decision-making are resources for learning, as they encourage learners to engage in exploration and experimentation (Hackman, 1980; Igic, Ryser, & Elfering, 2013). Having enough and adequate resources helps individuals also deal with challenges and demands (Bakker & Demerouti; De Witte, Verhofstadt, & Omey, 2007; Elfering et al., 2016). High and enduring demands exhaust an individual's mental and physical resources, may result in a depletion of energy and hamper learning. On the other hand, demanding tasks require the development and use of higher-level skills and might motivate for further learning (De Witte et al., 2007). Demands – especially if coupled with resources – can also be a resource for learning.

Research has found that learning environments vary considerably from one organisation to another, between occupations, and between workplaces and educational institutions (Filliettaz, 2012). Also, and this is a challenge of apprenticeships, it has been shown that workplace resources such as learning opportunities or supervisor support decrease as learners get more experienced (Kammeyer-Mueller, Wanberg, Rubenstein, & Song, 2013; Stalder, 2003). A decrease of resources in the workplace and school does not only threaten the continuous development of vocational competencies but might also lead to reduced satisfaction with the apprenticeship (Stalder & Schmid, 2016). This is in line with COR theory (Hobfoll, 1989), which states that individuals want to acquire and preserve resources over time and that a loss of resources impairs health.

Given that situational resources might not be stable over time, we first explore the likelihood of stability and change. What is the probability that apprentices stay in a favourable resources' situation over time? How likely is it to change from less favourable conditions to a better learning environment? Further developing our cross-sectional studies on situational resource profiles (Lüthi & Stalder, 2018, 2019), our first research question is: How likely are apprentices to stay in a certain situational resource profile over time or to change into a different one?

1.2 Personal resources: Core self-evaluations

According to COR theory, individuals with greater situational and/or personal resources are less vulnerable to resource loss and more capable of initiating and managing resource gain (Hobfoll, 2002). Personal resources are aspects of the self that refer to individuals' sense of their ability to control and impact upon their environment successfully, such as self-efficacy, optimism, or self-esteem (Hobfoll, 2002).

Core self-evaluations (CSE) are some of the most prominent personal resources which affect learning, performance and well-being (Judge & Bono, 2001; Kyndt & Baert, 2013). CSE

are fundamental premises that individuals hold about themselves and their self-worth. They include four dispositional traits: Self-esteem, generalised self-efficacy, internal locus of control, and emotional stability, which together build a higher-order construct (Judge et al., 2001). Individuals who have high CSE think positively of themselves and their abilities. They view their environment more positively and are confident that they can control and alter their environment. Learners with, e.g., high self-efficacy believes seek and engage more often in challenging tasks, are more confident to cope successfully with demanding tasks, and more likely to identify and mobilise social support (Hobfoll, 2002). In contrast, individuals with low CSE might perceive new situations as threatening and jobs with high demands as stressful (Judge & Bono, 2001). They may be more likely to withdraw from complex jobs if they experience failure because they do not believe in their abilities (Judge, Bono, & Locke, 2000). In our own research, we have shown that learners with high CSE are more often in favourable resource patterns (Lüthi & Stalder, 2018), i.e. in learning situations characterised by a high VET quality and many learning opportunities. In general, following Hobfoll's thesis of resource caravans, it can be assumed that learners with high CSE are more likely and more successful in identifying, gaining and maintaining situational resources in IVET. Accordingly, it is plausible that apprentices with high CSE are not only more often in favourable resource profiles than apprentices with low CSE, but also that they stay more often in such profiles or – if not yet given – seek to improve their situation by moving to a profile with better learning conditions. Assuming that CSE is related to stability and change, our second research question is: Are apprentices with high CSE more likely to stay in or to move to favourable resource profiles than apprentices with low CSE?

2 Method

2.1 Sample

Our analyses are based on data from the Swiss youth panel TREE (TREE, 2016) [1], which analyses the post-compulsory pathways of a school leaver cohort in Switzerland. We chose a sub-sample of apprentices in the second and third year of IVET (N_{t1} = 1186, 49.6% female) who had filled in the standardized questionnaires. The mean age of the apprentices in t_1 was 16.5 years (SD = .65).

2.2 Measures

Situational resources in the second and third year of VET were assessed with five indicators for each learning venue, including instruction quality, climate, learning opportunities, autonomy, and demands (TREE, 2016). Means, standard deviations and scale score reliabilities (Cronbach's alpha) for the variables used in this study (t_{1-2}) are reported in Table 1. All items were rated on a 5-point scale, except for instruction quality, climate and self-efficacy which used a 4-point scale. We recoded these indicators to a 5-point scale to fit the other indicators of situational resources.

Instruction quality of trainers and teachers was assessed with five items each (e.g., If I ask a question, my instructor has time to explain; usually my teacher tells me whether I solved a task well). The o*rganisational climate* was assessed with three items (e.g., "My company is a place, where I like to be"), the *school climate* with two items (e.g. "I appreciate how we treat each other in class") (TREE, 2016). *Learning opportunities* were measured by three items each

[1] The Swiss panel study TREE (Transitions from Education to Employment) is a social science data infrastructure mainly funded by the Swiss National Science Foundation (SNF) and located at the University of Bern.

(e.g., At work/at school I can learn a lot; lessons at school are varied) (Prümper, Hartmannsgruber, & Frese, 1995; TREE, 2016). *Autonomy* at work and school was measured with three items each (e.g., I take part in decision-making about which tasks I have to do; I can decide what I have to learn) (Prümper et al., 1995). *Demands* were assessed with five items each. We built two scale means for demands at work to distinguish between qualitative demands (three items describing the difficulty and complexity of tasks, e.g., I must do tasks, which are too complicated for me) and quantitative demands (two items, e.g., I have too much to do) (Prümper et al., 1995).

To measure CSE, we used self-efficacy, self-esteem, and affectivity. S*elf-efficacy* was assessed with four items from the German General Self-efficacy questionnaire by Schwarzer and Jerusalem (2002) (e.g., I can always manage to solve difficult problems if I try hard enough). *Self-esteem* was measured by eight items from the Rosenberg Self-esteem Scale (Rosenberg, 1979) (e.g., I feel that I am a person of worth). *Affectivity* was assessed using ten items from the German version of the Positive and Negative Affect Schedule by Krohne, Egloff, Kohlmann, and Tausch (1996) (e.g., Over the last month, did you feel annoyed? Negative items were inverted to positive).

Table 1 Descriptive statistics for all variables in t_1 and t_2

	t1			t2		
	M	SD	α	M	SD	α
Situational resources in the workplace						
Trainer instruction quality	3.99	.85	.88	3.87	.91	.89
Organisational climate	4.13	.75	.74	3.97	.80	.75
Learning opportunities	4.05	.68	.76	3.90	.77	.81
Autonomy	3.36	.84	.70	3.35	.87	.71
Quantitative demands	2.08	.61	.56	2.09	.63	.58
Qualitative demands	3.13	.87	.58	3.25	.84	.63
Situational resources at school						
Teacher instruction quality	3.55	.88	.87	3.52	.97	.89
School climate	4.07	.90	.79	3.99	.89	.76
Learning opportunities	3.53	.69	.70	3.45	.68	.71
Autonomy	2.58	.89	.72	2.48	.92	.77
Demands	2.28	.76	.81	2.25	.79	.83
Personal resources						
Core self-evaluations	3.60	.47	.75	-	-	-

2.3 Procedure

First, confirmatory factor analysis (CFA) was employed to evaluate the empirical distinctness of our study variables and to test whether the theoretical measurement model fitted the actual data. We obtained acceptable model fit for t_1 ($\chi 2 = 1354.617$, $df = 505$, $p < .001$, CFI = .93, TLI = .92, RMSEA = .04, SRMR = .04) and t_2 ($\chi 2 = 1157.902$, $df = 505$, $p < .001$, CFI = .94, TLI = .93, RMSEA = .04, SRMR = .04).

Second, applying latent profile analysis (LPA), we examined resources heterogeneity by identifying latent apprentices' resource profiles in t_1 and t_2 (Nylund et al., 2007). LPA is a

person-oriented clustering approach that assumes that a heterogeneous population is composed of homogeneous subpopulations (Vermunt, Magidson, Hagenaars, & McCutcheon, 2002).

Third, we employed latent transition analysis (LTA) to analyse to what extent apprentices change into another resource pattern and how such movement was related to CSE. LTA is a longitudinal method to explore the probability to stay or move between the latent pattern over time (Collins & Lanza, 2010).

CFA and all latent models were developed using the maximum likelihood with robust standard errors (MLR) estimator in Mplus 8.3, where missing data were treated with full information maximum likelihood (FIML). All other calculations were run with SPSS 25.

3 Results

3.1 Situational resource profiles in t_1 and t_2

We performed a series of LPA for t_1 and t_2 separately and tested models with two to six profile groups (Table 2). We considered the Bayesian information criterion (BIC), the sample-sized adjusted Bayesian information criterion (SaBIC), the Vuong-Lo-Mendell-Rubin likelihood ratio test (LMR LR), the parametric bootstrapped likelihood ratio test (BLRT), and entropy values to find the best fitting model. A good model fit is usually indicated by lower BIC values compared to other model solutions, an entropy value approaching 1, and LMR LR and BLRT statistics should be significant at $p < .05$ (Geiser, 2011). Overall, the four-profile model seemed to be the best solution.

Table 2 Fit indices for cross-sectional LPA models for t_1 and t_2

Number of profiles	BIC	SaBIC	Entropy	LMR LR *p*-value	BLRT *p*-value	Number of profiles	BIC	SaBIC	Entropy	LMR LR *p*-value	BLRT *p*-value
LPA t1						*LPA t2*					
1	29699.36	29629.48	1	n/a	n/a	1	25461.04	25391.16	1	n/a	n/a
2	28872.10	28764.10	.741	.01	.00	2	24708.17	24600.19	.734	.00	.00
3	28551.39	28405.28	.700	.16	.00	3	24519.54	24373.45	.683	.00	.00
4	28409.14	28224.91	.726	.05	.00	4	24415.40	24231.19	.693	.01	.00
5	28357.75	28135.40	.696	.19	.00	5	24366.29	24143.97	.694	.44	.00
6	28337.18	28076.72	.719	.47	.00	6	24344.67	24084.23	.724	.64	.00

Note. * $p < .05$. ** $p < .01$. *** $p < .001$

We then run LTA with again 2 to 6 profiles each (Table 3). The fit indices BIC and SaBIC decreased as the number of profiles increased, which suggests that the number of profiles to be extracted should be as high as possible. Since the entropy value decreased with five and six patterns, we chose the four-pattern solution for further analyses.

Table 3 Information criteria and entropies for fitted LTA models with different numbers of patterns

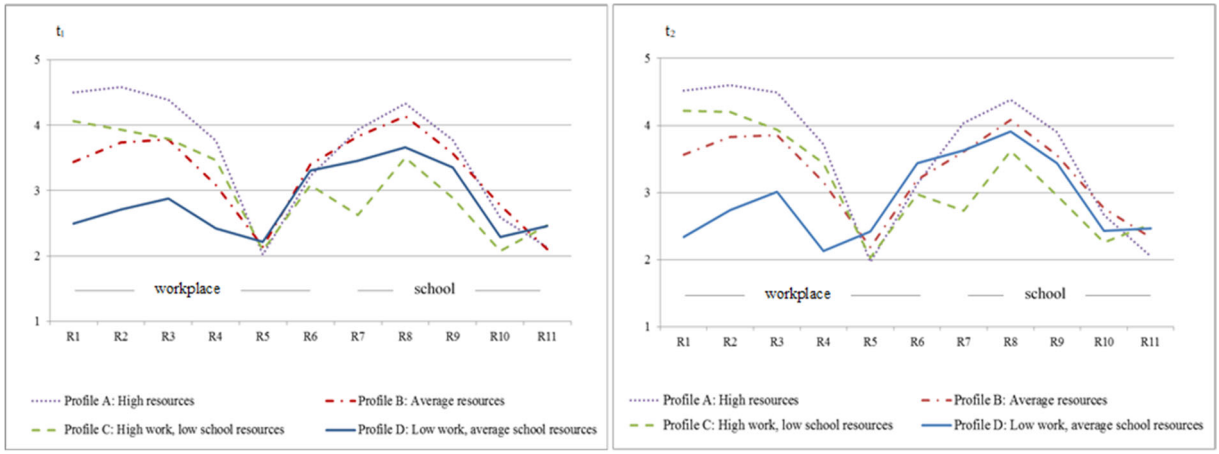
Number of profiles	df	BIC	SaBIC	Entropy
LTA				
2	72	54785.978	54557.279	.853
3	103	54112.569	53785.403	.848
4	138	53834.654	53396.315	.853
5	177	53684.393	53122.176	.839
6	189	52054.240	51453.906	.809

Note. * $p < .05$. ** $p < .01$. *** $p < .001$

The four profiles were labelled (A) high resources, (B) average resources, (C) high work and low school resources, and (D) low work and average school resources.

In general, the four profiles differ with respect to the overall level of resources and to specific resources levels in the workplace and at school. Figure 1 illustrates the means of the eleven indicators of the four resource profiles in t_1 and t_2. Resources vary strongly between profiles regarding the workplace but less so for school. They differ only to little regarding qualitative and quantitative demands in the workplace and demands at school which are low to moderate at both learning locations, as well as for autonomy at school which is low in all profiles.

Profiles A and B contain together more than 60% of the apprentices (Profile A: N_{t1}=285, 24.0%; N_{t2}=281, 23.7%; Profile B: N_{t1}=441, 37.2%, N_{t2}=441, 37.2%). Profile C is found for one third of the apprentices in t_1(N_{t1}=386, 32.5%) with a slight decrease in t_2 (N_{t2}=343, 28.9%). Profile D is the smallest one. It increased from about 6% in t_1 (N_{t1}=74, 6.2%) to 10% in t_2 (N_{t2}=121, 10.2%).



Note. Profiles were plotted using the scale range of all constructs (1 to 5).
Workplace: R_1 = supervisor instruction quality, R_2 = organisational climate, R_3 = learning opportunities, R_4 = workplace autonomy, R_5 = qualitative demands, R_6 = quantitative demands.
School: R_7 = teacher instruction quality, R_8 = school climate, R_9 = learning opportunities, R_{10} = school autonomy, R_{11} = school demands.

Figure 1 Profile plots of apprentices' resources in the second and third IVET year at both learning locations (means).

Profile A (high resources) is marked by an overall positive evaluation of work and school and favourable learning environments: Trainers and teachers support these apprentices highly, learning takes place in a good climate and apprentices have ample learning opportunities and possibilities to co-decide on work tasks. In general, apprentices in this profile seem to perceive the workplace and the school as places where they feel comfortable and enjoy being.

Profile B (average resources) is characterised by an overall moderate evaluation of the learning environment at work. Learning opportunities in the workplace, task autonomy, the instruction quality of the supervisor, and the organisational climate are significantly lower than in profile A. In contrast, the evaluation of the school environment is like profile A.

In profile C (high work - low school resources) relatively high resources seem to be available in the workplace, but resources at school are limited. In comparison with other

profiles, the evaluation of the school environment is least positive, and in particular, apprentices perceive the instruction quality of their teachers as rather low.

In profile D (low work - average school resources), which contains only a small group of apprentices, resources in the workplace are rather poor. Compared to other profiles, the apprentices seem to be rather badly instructed by their supervisors, and the organisational climate seems to be quite bad.

3.2 Transition probabilities and their relationship with CSE

Research question 1 asked about the likelihood of apprentices to stay in a certain situational resource profile over time or to change into a different one. Results are reported in Table 5 (Model 1). In general, the probability of staying in the same profile (i.e. prob. = .89 in profile A and prob. = .90 in profile C) is higher than changing to another profile. Relatively few apprentices move to another resources pattern. The movement is highest from profile B to D, whereas the movement between B and C is equal to zero.

Table 4 Transition probabilities with and without moderator CSE

	Model 1: Without moderator				Model 2: Low CSE				High CSE			
Profile	A t_2	B t_2	C t_2	D t_2	A t_2	B t_2	C t_2	D t_2	A t_2	B t_2	C t_2	D t_2
A t_1	.89	.08	.03	.01	.85	.11	.03	.01	.99	.00	.00	.01
B t_1	.08	.79	.00	.13	.00	.88	.00	.12	.11	.75	.00	.15
C t_1	.05	.00	.90	.06	.04	.00	.91	.06	.04	.00	.91	.06
D t_1	.04	.05	.11	.79	.08	.08	.20	.65	.03	.03	.10	.84

Note. Reading example Model 1: The probability that a person who is in profile A at t_1 will switch to profile D in t_2 is .01 (1%).

To answer research question 2 that addresses the relation between CSE and transition probabilities, we run LTA with CSE as moderator. We split CSE at the median and grouped apprentices into those with high and low levels of CSE. Model 2 (Table 4) resumes the transition probabilities of apprentices with high and low CSE. It shows that the probability of remaining in one of the patterns or changing into another is related to the level of CSE.

We assumed that apprentices with high CSE would be more likely to stay in or change to favourable patterns (especially to A) than apprentices with low CSE. In line with our assumption, apprentices with high levels of CSE remained more often in the high resources pattern (prob. A→A = .99) than apprentices with low CSE (prob. A→A = .85). Also, they had a higher probability of changing from pattern B (average resources) to pattern A (11%) than apprentices with low CSE (0%). In contrast, movements from pattern C (high work and low school resources) to A, as well as those from D (low work and average school resources) to A seem to be similar for apprentices with high and low CSE. Interestingly, changing from D – the profile with the lowest overall resources – to A or B seems to be a bit more likely for learners with low CSE.

Downward movements from A to B, i.e. from overall high to average resources, we assumed to happen, were not frequent, but more often found for apprentices with low CSE. Against our expectation, 15% of the apprentices with high CSE and average situational resources changed to the least favourable pattern D, similar to apprentices with low CSE (12%).

Surprisingly, we found that changing from profile B to C was not linked to CSE. The transition probabilities are the same regardless of whether CSE is high or low.

4 Conclusion

The goal of this study was to explore whether learning resources of apprentices change from the second to the third year of apprenticeship and how stability or change is linked to core self-evaluations. The results show that in terms of work- and school-related resources, including autonomy, instruction quality, learning opportunities, climate and demands, apprentices can be grouped into four patterns which differ in terms of overall levels of resources. In line with COR theory we found evidence that apprentices having high CSE were more likely than those with low CSE to stay in IVET environments that provide plentiful resources for learning in the workplace and at school. Also, they were more likely to change form a situation with average resources to an environment with high resources. CSE might figure as a protective factor that helps to conserve and create new resources (Hobfoll, 1989).

The present research expands our research on resources pattern and is a first attempt to observe apprentices' latent resources trajectory patterns in IVET. The person-oriented approach of the LPA and LTA proved to be highly suited to investigate the construct of situational resources as it allows considering homogenous subgroups that follow different trajectories (Nylund, 2007). Our results allow to get an integrated view about variations in learning environments and underline the importance of considering workplaces and schools together (Stalder & Lüthi, 2018). In profiles A and B, apprentices seem to evaluate workplaces and schools similarly, which would be in line with the thesis of resource caravans (Hobfoll, 2011). In contrast, profiles C and D show a resources pattern where learning seems to be encouraged at one location but less so at the other. It seems that workplaces and schools are seen as different spaces, which are not sufficiently aligned. Especially learners in profile D seem not to have found an adequate fit for their workplace and with regard to their professional development may appear as an at-risk group (Stalder & Schmid, 2016).

Further research must explore resources development after the transition to qualified employment and integrate other influential factors, such as age, gender and occupational field. Also, additional analyses are needed to examine the conditions of change. E.g., it would be important to know, whether changing to more favourable situations is related to changing the employer or the occupation, and to elaborate the reasons for changes to less favourable conditions.

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Life Project Clarity in Vulnerable Adolescents

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Abstract

The objective of this study was to identify if there is a relationship between the clarity of the Life Project of the 3rd and 4th year students of Compulsory Secondary Education enrolled in a secondary education center in Asturias (Spain) and some sociodemographic variables. The study was carried out with a sample of 131 students and a non-experimental, descriptive design was used. The information has been collected using an elaborated "ad hoc" questionnaire with closed-question answers on the Lickert scale and an open-response question. The results obtained allow us to affirm that adolescents, regardless of their characteristics and situation of vulnerability, have, in general, clarified their life project, but they need counselors, teachers and family to help them adjust their future goals.

Keywords

life project; vulnerable teenagers; inclusive education

1 Introduction

Changes in the production system as a result of scientific and technological advances make it difficult to predict the needs of the labour market in the coming years. Thus, some experts say that some of the professions that today's high school students are going to perform do not yet exist (Echeverría & Martínez, 2018). However, there seems to be agreement that future professionals will have to be competitive in an increasingly open and complex work environment, which will require workers to be able to generate and apply knowledge (Sánchez-Teruel, 2009). Therefore, the professionals of the future knowledge society, in order to be effective, will have to acquire and put into action competences related to creativity, initiative, emotional and communicative skills, the capacity to adapt to changes and teamwork, among others (Loshkareva, Luksha, Ninenko, Smagin, & Sudakov, 2018; Secanella, 2011).

The demands of the business world are a challenge for professionals who have the responsibility to guide the personal and professional decision making process of adolescents.

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The challenge is greater when the process is carried out in an educational context and has to be carried out according to the principles of quality and inclusion (Echeita & Ainscow, 2011). Orienting from an inclusive approach implies taking into account all students, but especially those who are most vulnerable or most at risk of being excluded from society. From these approaches, the guiding action should focus on strengthening self-esteem in the students and implementing actions that favour academic and professional decision-making aimed at their insertion into the labour market. In order to achieve this, the principle of equal opportunities must always be borne in mind. This model of orientation is located within the parameters that allow effective schools to be identified (Stoll & Fink, 1992). One of the main objectives of this type of school is for its students to reach the highest possible level (Melendro, González, & Rodríguez, 2013; UNESCO, 2010;).

The orientation to be developed at this stage from educational centres, taking into account the new challenges posed by the world of work, must be proactive and, therefore, must consist of promoting processes of accompaniment and mediation throughout the school period (this is what is stated in the Spanish regulations on educational orientation). The main function of the counsellor in these processes is to help all students to be able to identify the changes and demands that occur in their social, cultural and economic environment, but above all, to know themselves so that they can answer the questions: who am I, how am I, what would I like to do professionally? (Martínez-Clarés, Pérez-Cusó, & Martínez-Juárez, 2014). This task is important at any point in people's development, but it is particularly important during adolescence. This is a vital moment when the person has to start making important decisions about different aspects of their life. It is the moment, according to some authors, in which objectives, interests and professional values are configured (Martínez, 2007; Peterson & González, 2000; Super, 1990), and it is also a moment of exploration of the real world, of self-exploration of its potentialities and of the context that surrounds it (Santana Vega, Feliciano García, & Santana Lorenzo, 2012).

With this in mind, guidance professionals in schools are responsible for helping young people identify in themselves the knowledge, values, attitudes and skills they possess. In addition, they have to help them identify the demands of work contexts, and reflect on them so that they can make responsible decisions and shape their professional future autonomously (Rodríguez Moreno, 1992; 2003). These decisions will not be limited to specific moments, but constitute a process that will be constructed and reconstructed throughout life (Longworth, 2005).

In this context, the work presented forms part of a broader study whose main objective is to identify the needs of students in the third and fourth years of Compulsory Secondary Education in the Principality of Asturias, in relation to the configuration of their personal, academic and professional objectives. Specifically, the objective of the work is to identify whether there is a relationship between the clarity of the Life Project of students in 3rd and 4th years of Compulsory Secondary Education enrolled in a secondary school in Asturias (Spain) and some sociodemographic variables.

In this work, we understand that the life project includes desires, plans for the future and actions to achieve what has been planned, and that all of this influences the decisions made by adolescents (Barbosa et al., 2016, p.36). The selection of a sample of students in the third and fourth years of compulsory secondary education has been motivated by the fact that this is a time when educational regulations oblige students to make some decisions in relation to optional subjects or training itineraries. These decisions, although they may be modified in later years, will generally determine the academic itinerary of the students and, consequently, their academic and professional future.

2 Methods

The study is conceived as a non-experimental, exploratory and descriptive research design based on a survey. Specifically, a questionnaire has been used to ascertain the assessment made by students in the 3rd and 4th grades of a Secondary Education Institute of the Principality of Asturias (Spain) with respect to the clarity of their Life Project formed up to that time. For the selection of the sample, a non-random sampling has been carried out by clusters in which the characteristics of the students were considered: sex, course and academic performance.

In order to compile the necessary information, the survey method has been used, for which an ad hoc questionnaire has been prepared, adapting some of the items from questionnaires validated in other studies (Santana Vega, Feliciano García, & Santana Lorenzo, 2012), and taking into account the age and educational level of the students. This instrument has undergone a subsequent validation process by eleven experts. Taking into consideration the recommendations of the experts, the final questionnaire is composed of a total of 62 open and closed-ended questions, structured in three dimensions (Clarity of Life Project, Career Preparation and Priority of Goals) and 3 sub-dimensions (Perceived Family Influence, Career Exploration and Career Planning).

Based on the dimensions established in the questionnaire, we present in this work the results in relation to the "Clarity of Life Project" dimension, which consists of three Likert scale questions with answer levels between 0 "totally disagree" and 10 "totally agree". This dimension includes items from the questionnaire by Santana Vega, Feliciano García and Santana Lorenzo (2012), focused on the study of the personal, academic and professional objectives of compulsory and post-compulsory secondary education students. Items refer to: "beliefs about gender and professional development", "personal life project" and "clarity of life project". The wording of the items mentioned is as follows: "I am clear about what I want to achieve in my life"; "I often think about what I will become in a few years' time"; "I stand firm in my decisions about what I want to be". And an open-ended question: What would you like to do professionally in the future? (profession of interest).

Once the data were collected, a quantitative analysis of the data was performed using IBM-SPSS (v.24) to calculate frequencies, percentages and correlations between different variables. Through this analysis, not only were the responses provided by the students to the questionnaire analyzed, but also their academic performance was recorded through the grades obtained in the third and last quarter of the course (number of subjects passed and not passed). Simultaneously, a qualitative analysis was carried out of various diagnostic reports and incidences in which the measures taken throughout the course are recorded, especially in relation to those students considered most vulnerable.

3 Results

The initial population consisted of 145 students enrolled in the third and fourth years of compulsory secondary education at a publicly owned educational centre in the Principality of Asturias (Spain). Finally, as shown in Table 1, 131 students (90.34%) participated, distributed as follows: 63 students in the third year of secondary education (48.1%, 31 men and 32 women) and 68 students in the fourth year (51.9%, 38 men and 30 women). The ages of the subjects who have participated are between 15 and 18 years old. The majority of students are of Spanish nationality (95.4%), but there are students of three other nationalities: Chinese (2.3%), Venezuelan (0.8%) and Colombian (1.5%). In addition, nine students (6.9 per cent of the sample) have been the subject of a diagnostic report prepared by personnel specializing in educational guidance at the center, which determines that they are particularly vulnerable students and require individual educational measures and specialized support.

Table 1 Distribution of participating students according to sex and academic year.

	N	Third course	Fourth course
Male students	69 (52.67%)	31 (49.20%)	38 (55.88%)
Female students	62 (47.32%)	32 (50.79%)	30 (44.11%)
Total	131 (100%)	63 (48.09%)	68 (51.90%)

The reports and other documentation from the centre and the Guidance Department have made it possible to identify the students with the greatest vulnerability, listed in Table 2, given the needs and problems they present, several students stand out with the following characteristics: one student with special educational needs, another with autistic electro-spectrum disorder, two with physical and sensory disability, two students with depressive disorders, and three with high capacities and with difficulties in integrating with their peers. This group of students also includes a group of absentee students (9 cases).

Table 2 Situations of special vulnerability detected (or with specific needs for educational support, according to the term used in Spanish legislation)

Vulnerability type	Frequency
Special Education Needs (SEN)	1
Autism Spectrum Disorder (ASD)	1
Depressive Disorders	2
High capacities	3
Physical and sensory (visual and motor) disability	2

The results obtained in the items corresponding to the dimension analysed "Clarity of Life Project" after carrying out a process of recoding the values in each of the variables analysed in order to avoid excessive dispersion of the scores (Total disagreement: between 0 and 4, value 1; Total agreement: between 6 and 10, value 3; Neutral position: 5, value 2), the mean and standard deviation of each of the items raised are presented in Table 3.

Table 3 Descriptive statistics of the scores grouped in ranges of values

	N	Minimum	Maximum	Mean	Std. Deviation
I am clear about what I want to achieve in life.	131	1	3	2.6183	. 64995
I often think about what I will achieve within a few years.	131	1	3	2.5878	. 72186
I remain firm in my decisions about what I want to be.	131	1	3	2.4275	.77490
Valid N	131				

The results of Figure 1 show that the majority of students (71%) state that they are very clear about what they would like to achieve in their lives with respect to their academic, training and employment goals and priorities for the medium and long term future. Nevertheless, 9.2% of the students who answered the questionnaire stated that they had not yet reflected on their academic goals, let alone on their future employment. In an intermediate position are located 19.8% of students who, although they know with enough certainty which is the academic-professional path they would like to follow, do not know the different ways of access to those studies and / or professions. Similar results have been found in relation to the item "I often think

about what I will become in a few years' time", as 72.5% state that they very often have thoughts and even idealisations about the success of their future performance in a given profession. On the other hand, 13.7% said they had never reflected on the profession they would like to pursue in the future. The same percentage (13.7%) of people indicate that although they do not think much about their professional future, if they admit to having thought on occasion about possible professional opportunities at the end of their secondary education.

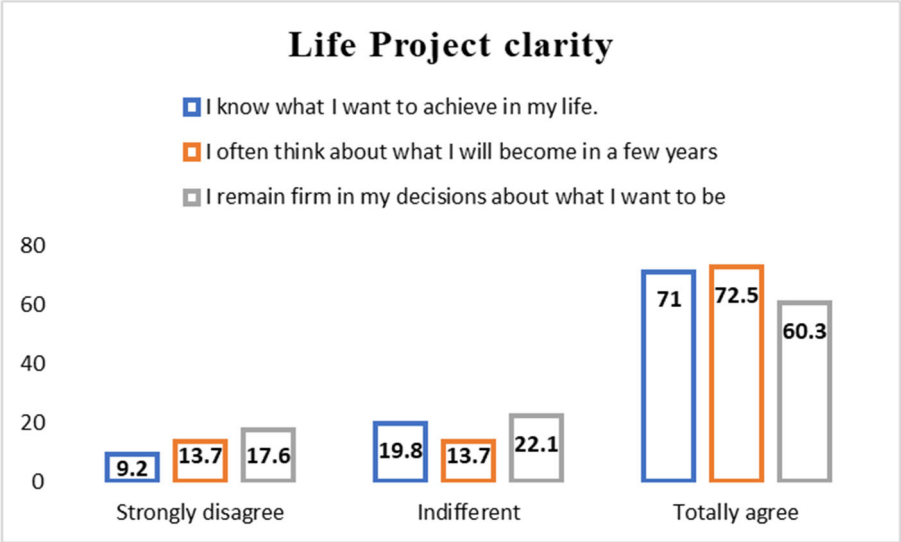

Figure 1 Clarity of the Life Project

As indicated above, academic qualifications were also taken into account in the analysis. The results shown in Figure 2 show, in general, an acceptable trend: 66.1% of students passed all subjects, 5.5% failed one subject, 11% failed two subjects, 10.3% failed three and 7.1% failed 5 or more subjects.

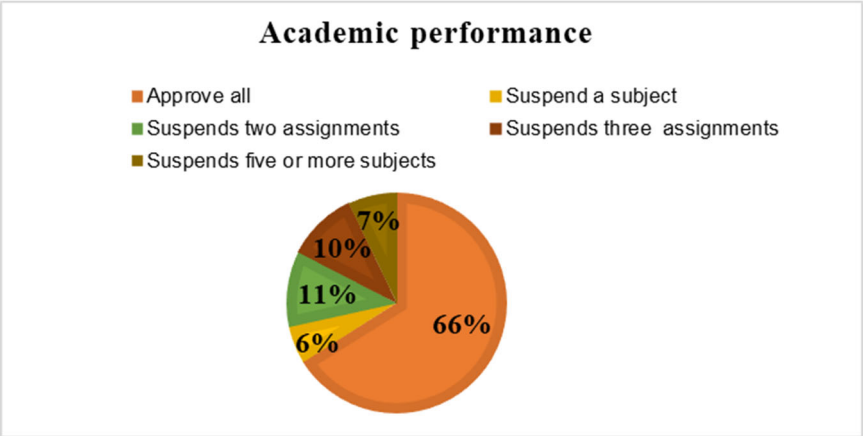

Figure 2 Academic performance. Third quarter.

In addition, analyses have been carried out to identify possible associations between the classification variables (sex, course, country of birth and diversity) and the variables of the dimension studied (I have clear what I want to achieve in life; I often think about what I will become in a few years; I stand firm in my decisions about what I want to be). Analysis of contingency tables indicates that there is no significant association ($p > .05$) in any of the crosses of each classification variable with the variables that make up the dimension under study.

The bivariate correlations between the variables have also been analysed: I am clear about what I want to achieve in life; I often think about what I will become in a few years' time; I stand firm in my decisions about what I want to be that make up the dimension under study. Positive and statistically significant correlations are observed in all cases ($p < .05$).

Among students diagnosed as vulnerable, a positive and statistically significant correlation ($p = .013$) has been found between I am clear about what I want to achieve in life; and I remain firm in my decisions about what I want to be.

These results must be interpreted with caution since the size of the informant sample is quite small and comes from a single secondary school.

Two groups of students can be differentiated among the students that make up the sample. On the one hand, students who, in spite of showing below-average academic performance and school absenteeism, show in their answers to the questionnaire a certain clarity regarding their Life Project in the medium and long term. On the other hand, students who, despite showing acceptable or even outstanding academic performance, are totally indecisive and find it difficult to make decisions for themselves regarding their academic-professional interests and goals.

In this sense, regardless of the grades obtained that show their academic performance throughout the course, the majority of students (58.2%), to the question What would you like to dedicate yourself professionally in the future? (profession of interest), state that among the professions preferred by them are those that require a high level of training, for which a university degree is required. In addition, in their responses, a total of 22 professions were registered, distributed in 4 professional branches (Health Sciences, Sciences, Social and Legal Sciences and Engineering and Architecture). Likewise, 24.3% are inclined towards professions that require a Vocational Training degree and 5.3% towards professions or jobs in which no further education is required after completing secondary education, such as the police and soldier professions.

In short, despite revealing various personal conditions and circumstances that may interfere with their performance, students maintain high expectations and are optimistic about their professional future. Despite the above, a small percentage of students (12.2%) were found to be totally unaware of the academic-professional environment or the profession of interest around which to project their future.

4 Conclusion

The analysis of the information obtained allows us to draw the following conclusions:

Considering the answers of the students to the questions of the dimension "Clarity of the Life Project", the majority of them state that they have a clear idea of what profession or work they would like to do in the future.

This conviction is observed among both third and fourth year students, since there are no statistically significant differences in their valuations of the proposed items. The students of both courses present similar levels of clarity and uncertainty regarding the planning of their personal and professional Life Project.

These data are surprising when we see that they are independent of their academic performance, measured in terms of the number of subjects passed, since, in general, only 66% passed all the subjects in the course.

Nor have statistically significant differences been found in the case of students diagnosed as especially vulnerable, except in relation to the variables I have clear what I want to achieve in life; and I stand firm in my decisions about what I want to be.

It is also positively valued that students, regardless of age, course, or other personal characteristics, generally have high expectations of the profession they would like to pursue in the future. Almost all of them decide for professions that require a higher degree (undergraduate or postgraduate).

We also consider it interesting, from a point of view related to the labour market, that almost a quarter of the subjects who have responded to the questionnaire would like to carry out a profession for which a Vocational Training degree of intermediate or higher is required.

This situation is interpreted in a positive way, because motivation and the illusion to reach goals in life can be used by school counsellors and teachers to work on the competencies they need to achieve their goals.

The results obtained in this study should be interpreted with caution since they come from a small sample of students, from a single educational centre, and there are no data available that other agents may contribute. It would be advisable to take into consideration, in future research, the opinions and assessments that other voices may contribute, those of other groups such as teachers, counsellors and students' families.

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Understanding Learners' Conceptions of Work-Based Learning Pathways to Design Effective Curricula

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Abstract

This paper describes a part of my Ph.D. research related to the point of view of the students involved in work-based learning paths. The dissemination of work-based learning methologies has been and is at the heart of the most significant European recommendations relating to education and training. The European Commission documents particularly insist on need to improve the attractiveness of VET, in the forms of apprenticeship and traineships , hence the need to oversee the issue of "Quality Assurance" of the forms of teaching and tutorship applied to VET. Therefore quality of WBL is a central aspect for improving the quality of education and vocational training. Within this scenario it is crucial to understand learner's perceptions of their work based learning experience such as: relationship with the teacher and with the company tutor, the ability of self-orientation, the acquisition of soft skills through work, etcc. This in order to design more effectives curricula that can facilitate difficult school-work transitions giving them an integral education that combine knowledge, technical skills and soft skills.

Keywords

curriculum development; learner's agency; teacher's training; school-work transitions; capability approach

1 Introduction

The quality of work based learning is a central aspect for improving the quality of education and vocational training. In fact the main VET objective consists of helping learners to improve their knowledge, skills and competences, as these are essential in the working life (European Commission, 2013). WBL, moreover, values the advantages of alternating between classroom learning and learning in the company and therefore implies a link between formal, informal and non-formal learning (Cedefop, 2015a).

The recent scenarios relating to the transformations of work, of the industry 4.0, have brought to the forefront of the international debate, the theme of economic growth and above all the need for contraction of youth unemployment which continues to advance inexorably.

The underlying theme, which concerns the pedagogical dimension of the analysis related to the question of the future of work, is above all related to medium and long-term processes, capable of generating development opportunities, which affect the plan economic but also and above all in terms of human development. From here it is fundamental for education policies

and work to start again, facilitating and continuously monitoring transitional processes in the initial phase from school to work, through tools that support these processes and above all through new professional skills that can facilitate some delicate steps for young people especially in a historic working time so "disprutive".

In Italy since the early 2000s, the adoption by the European Union of policies based on the concept of Lifelong learning (Alberici, 2002; Di Rienzo, 2014) and the appeal to the plurality of formal, non-formal and informal contexts for learning have begun to modify in depth the scope of the school- work alternance (SWA). The SWA is a teaching methodology that allows students who attend secondary schools (vocational schools, technical institutes, high schools) to play a part of the course with a company or institution, and, together, a tool to combine the theoretical study of the classroom (school preparation) with forms of practical learning carried out in a professional context (Miur, 2015). This methodology was profoundly changed in 2015 with Law 107 (the so-called “Good School Reform”). With this law some important innovations were introduced such as:

- compulsory training hours (400 hours in technical and professional institutes; 200 hours in high schools)
- first time for high schools
- evaluation in the state exam
- national register of companies

Now it is clear that the legislator's intention was to enhance the educational aspect with the increase in the number of training hours and with the opening to high schools. And it is clear that it is a further step towards a "dual logic" of training and work typical of the German-speaking countries. The traditional "sequential" model that consists in first learning the theoretical knowledge in the classroom and then "putting it into practice" in the workplace has been rooted in the Italian system for over a century (Marcone, 2018). It is clear that a process of cultural change has also started in our country for at least a decade, with the aim both of combating youth unemployment and the negative phenomenon of NEETs, which facilitate transitional processes from school to the world of work as required by the European Strategy and European Policies on VET (Cedefop, 2017).

Even in Italy, therefore, in recent years, attempts have been made to overcome the traditional teaching methods based on the school model, based on the offer, in favor of the proactive one. It is therefore up to the school to connect to the social demand, then collect it, structure it and organize it starting from the interaction that it must be able to guarantee to all those involved, in particular by strengthening the dialogue between schools and companies that is still very far away. In fact, another critical issue in Italy in addition to the growing number of NEETs is the so-called “skill miss match” with a high gap between skills offered by companies and those demanded by students coming out of tertiary education (Cedefop, 2015b). On this question a careful reflection must be made on the design of new curricula starting from secondary schools that can anticipate these so widespread problems, which can integrate multiple aspects not only didactic but also social. In this perspective, school-work alternation, promoting social and participatory learning, activates processes of awareness, change, skills, which involve (students, teachers), institutions (school and business) and territorial contexts.

2 Thereotical framework

One of the main objectives of my research was to try to understand some pedagogical aspects of WBL patways.

The research project started from the awareness that the education experiences of the young people engageed in the WBL pathways should be observed and studied not only and not so

much in the measure not only from the perspective of employability, but in particular with respect to the characteristics of the cognitive processes activated, the relevance of changes in the relationship with knowledge, participation in the process of constructing meanings (Margiotta, 2014, 2015).

It is crucial to understanding the effects of work experience on the training plan with respect to the cognitive structures of the subjects, and therefore on a long-term plan and the transferability of the willingness to learn. Therefore, learning is seen as "experience", as "action" and as "becoming" in a perspective of a "formativity" of the subject who learns in a context of work-based learning.

In order to study work-based learning processes, I assumed some relevant theoretical frameworks which I believe can be useful for understanding some pedagogical aspects such as: Experiential Learning (Dewey, 1938); Situated learning and construct of the practice community (Lave & Wenger, 1991); Transformative learning (Mezirow, 1991); Capability approach (Nussbaum, 2012; Sen, 1983,1999).

At the center of these thereotical postulates there is undoubtedly the student, and his learning. So I asked myself some questions: how work-based learning pathway can be formative and generative for personal development of learner in his transition from school to work? How WBL can contribute to the growth of the student in terms of human development?. How teachers can facilitate student learning in this perspective as a tutor or mentor?

The Learner's agency (ability to act) is the fulcrum of an educational project centered on the professional dimension. It is not a question of developing professional behaviors, functional to the processes of adaptation of young people to work contexts in some way already given, but to set the conditions for development, through the enhancement of the ability of young people to act, of a profitable collaborative experience between business and educational institution.

The theoretical framework to be considered for development new learning curricula is the capability approach (Nussbaum, 2012; Sen, 1985,1999). In fact the capability approach can be considered a new approach to education and training through which each person is considered as a goal, placing them in the condition of being and doing so that, freely, they choose from a set of opportunities as best as it can express its freedom to act and to build its own and others development. The "mission" of a society that wants to promote the most important human abilities is to encourage the development of internal capacities, through education, resources to enhance physical and emotional health, support for care, an educational system efficient. The context in this perspective assumes importance in the formation of the combined capacities, since the internal capacities emerge only if the external conditions allow it (Ellerani, 2014). It is therefore necessary in the school to rethink and redesign capacitive learning contexts that place the student at the center and prepare it - not only from the standpoint of professional skills, but also from that of the mindset -, for the scenarios of the new paradigm of the fourth industrial revolution (Marcone, 2019a, 2019b)

The scenarios of Industry 4.0 will have to focus more and more on training levers that are centered on the person, on his "mindset" and on the ability to interact in professional groups by elaborating forms of sharing and coworking. The experiences of work based learning such as apprenticeships and school work alterntions, traineships are increasingly at the center of the attention of companies and the world of work (Alessandrini, 2017, 2019).

3 Methods

The emprical survey has required the construction of a pedagogical device "Taxonomy of Quality Indicators named TIQ-WBL related to the study of work-based learning processes derives from the aim of transferring some main issues linked to thereotical framework into a schematic way in order to create a hypotethic "road map" within the practice communities of trainers, training process experts in the field of work-based learning

Every theoretical construct that I explored has been fundamental to understand in depth some pedagogical aspects inherent WBL pathways

The taxonomy is subdivided into five areas or indicators ad every indicator contains two dimensions. Below I report this device divided by area and related to the theoretical framework (Table 1).

Table 1 The Taxonomomy of quality indicators in work based learning pathways (TIQ-WBL)

Indicators		
1. REFLEXIVITY	*Self-awareness* *Self orientation*	• Is the learner able to practice cognitive with regard to professional practice, including through the tutor's mediation? • Is the learner able to independently elaborate development objectives of his work-based learning path with particular attention to improving his herstrengths("professional mastery")?
2. PARTICIPATION	*Identity* *Responsability*	• The learner is able to elaborate in a personal way a conscious participation in the work activities related to his learning path, configuring his identity, in different relational contexts (school, company)? • Is the learner capable of developing "responsible" behaviors in the context of learning at work (an idea of mutual commitment, of shared values, of legitimizing one's own "membership" in the group)?
3. AGENCY	*Personal development* *Self-efficacy*	• Is the learner able to identify the goals of his professional development by negotiating with the tutor, medium-long-range training objectives? • Is the learner able to develop his potential autonomously in an effective way?
4. CAPABILITY	*Projectuality* *Functionings*	• Is the learner able to exercise his ability to act on a project level, pursuing his / her objectives as values through negotiation with the tutor and the group? • Can the learner develop observable skills of action in relation to the professional context that characterizes his process of learning at work?
5. GENERATIVITY		• Has the learner acquired the necessary learning to develop a consolidated and adaptable mental and professional habit for new work contexts?

In details, the case study presented in this paper focuses on experience of school work alternation within two Technical and vocational Institutes (in the province of Mantua in

Lombardia; in the province of Avezzano in Abruzzo). The sample is relative to the students of the fourth and fifth classes of two different courses:: graphicals and geotechnicals.

The tools adopted for the empirical research basically consists of focus groups , interviews semi-structured and self-assessment questionnaires, which have been built on the basis of the pedagogical reference research tool (TIQ_WBL).

The focus groups were eight and the participants were 120 students and 10 teachers. I developed 18 questions divided by each indicator and size of the taxonomy (Table 2).

Table 2 Focus group questions

First indicator: REFLEXIVITY
a) Self-awareness
1. What do you think are the strengths and weaknesses of your WBL experience?
2. Do you think that it is clearer what the work actually means. Give me some practical examples (work schedules, work context, relationship with other colleagues).
b) Self-orientation
3. Do you think that the SWA has improved your ability to connect what you learn at school with what is needed for the world of work?
4. Do you believe that this experience can facilitate you to choose a possible job? If yes, how?
Second indicator: PARTECIPATION
a) Identity
5. Has the SWA made you understand what it means to work together and feel part of a group? How? What are the things that help you feel part of a group when you work?
6. In your opinion, how important was the company tutor for your workplace training?
7. What moments or experiences have helped you socialize with your colleagues? Can you tell someone about it in particular?
b) Responsibility
8. Do you think that this experience can give you more responsibility in carrying out a task or engaging?
Third indicator: AGENCY
a) Personal development
9. Do you think that the SWA can be an opportunity for your personal growth to better understand the meaning of work? How?
10. After this experience , did you realize that you need knowledge that you did not have at school? Which? How do you plan to fill this gap?
b) Self-efficacy
11. During the SWA did you perform tasks following the instructions of the tutor company? Or have you proposed your initiatives? If yes you can give me an example.
12. How did the tutor help you understand the work you had to do? Were there moments or ways of confrontation with your company tutor that were important for you to understand the work context?
Fourth indicator: CAPABILITY
a) Projectuality
13. Speaking at home about your experience of SWA, did your parents give you advice?
14. Have your past experiences (informal context) been useful in giving you guidelines for doing the assigned task better?
b) Functionings
15. When did you see during your work experience that you lacked the knowledge or skills what you did to fill them?
16. What differences have you found between learning in school and how to learn at work? Do you give me concrete examples?
Fifth indicator: GENERATIVITY
17. Do you feel through this SWA experience that you were able to integrate your theoretical knowledge learned in the classroom with the technical skills in the workplace? How?
18. Has the experience of the alternative only helped you to understand technical things or even to acquire other values connected to the world of work? Which?

4 Results

The main goal of my research was to carry out an overall verification of the correspondence and / or contradiction between the emerging information between the two research phases for the following reasons:

- a summary of the validity of the results obtained with the focus group;
- the possibility to identify - through the comparative examination of the elements coming from the two phases of the survey - the "conceptions" present in the students about their experience.

This research phase was able to confirm the criteria used for the elaboration of Taxonomy ("TIQ-WBL"). The learners' conceptions emerged as a synthesis of the two phases indicated above. The are summarized in Table 3.

Table 3 Description of learners' conceptions

Learners' Conceptions	Description
1. Perception of the separation of the "two worlds" (school-work)	The different positioning of the two worlds has not overlooked by the student, both in terms of communication strategies and in terms of expected and accepted behaviors.
2. Difficulties in transferring learning in most of the cases of the students	The student cannot perceive clearly the logical and methodological links between what learned in the classroom and what at the workplace.
3. Acquisition of responsibility for behaviors at work	The student feels invested with completely different expectations and responsibilities in working contexts in the sense that in working contexts he/she becomes deep awareness in perceiving responsibility.
4. Self-orientation	The student acquires a greater awareness of his/her "professional vocation" by understanding the more or less congenial activities for his/her future.
5. Collaborative relationality	The student at the workplace understands the added value of the "help relationship" with the colleagues or the experienced adult more than he can do in the classroom.
6. Increase of reflective capacity	The student perceives his / her ability to exercise a reflexive action while acting (knowledge in action) and then learns by doing.
7. Alternating negotiation management in the relationship with the tutor	The student understands the role of the tutor as a mediator in the work environment perceived as "hostile" and "cold".
8. Perceptions of the positive value of the practice for the acquisition of skills	The student understands that putting knowledge into practice (using laboratory tools and tools) involves reinforcing his/her skills.
9. Orientation integration of work with life experiences (family, groups of equal, free time)	The student understands that the reference communities (family, peer group, etc.) are in continuity and that the permeability of boundaries can be a value added for his/her growth.

From this partial analysis it emerges in a strong way, how the students themselves are trying to understand the experience they are living and through experience in the work context they are able to improve themselves. Also emerges that the teachers' action as tutor can be decisive for many aspects such as, for example: facilitating the connection between the knowledge learned in the classroom and the technical and practical skills in workplace; carrying out an activity in the workplace and also improving their approach in the classroom once they return, as emerges from a response drawn from a focus group by "Ludovica" who says: «surely I believe that this experience of work-based learning can make us understand things we do not understand at school: being more responsible is one of them! ». The value of this experience can help improve their perception of theoretical learning in the classroom, through greater mutual commitment within a community of practice (Wenger, 1998), different from the school community for example, through a collaborative relationship with more experienced people, through participation in a new context of practical learning, laboratory, which develops a "manual thinking" (Bertagna, 2017).

5 Conclusions

In a future perspective, it is necessary to consolidate and integrate the WBL methodologies as require the evolving scenarios and the European VET strategies. Curricula must be redesigned starting from a general education to learn a method of analysis, integrating it with practical education. Only in this way an integral education is possible in future perspective for young people. In my opinion, the education through work can be one of the fundamental pillars for a qualitatively based approach to personal development.

The key issue is the perspective of the idea of employability not leveled on the present and substantially not of an adaptive type but anchored to the development of the expansive capacities of the learner towards acting and thinking in the context of professions and work scenarios that can enhance the "generativity" and creativity of human agency.

It is crucial in this perspective to train a new class of teachers who can also play the role of tutors in order to contribute to stimulate students who are able to become first "good citizens" and then "good workers".

Experimentation of new WBL methods can become the opportunity for the development of "laboratory teaching" that is able to structure training situations that go beyond the relationship between theory and practice, expanding towards the social, towards sustainability and contributing to the following actions:

- to free the student's internal capacities towards greater autonomy and responsibility;
- to facilitate teacher's action in empowering the student's learning;
- to create new forms of cooperative learning in the classroom;
- to train students who know how to "read life contexts" and pursue goals as autonomous and responsible people;
- to create social, intercultural, multiple interdependencies, mutual recognition between student and teacher.

This approach makes it possible to go beyond technicality and a performance-centered vision, and is focused on aspects that are essential for a integral education of the learner.

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Innovation Transfer in Vocational and Educational Training (VET) System Switzerland

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Abstract

Trends such as technological and digital change or globalisation are leading to an increasing dynamism in Swiss working environments (SBFI, 2017). The VET system needs to assess the significance of these developments for basic vocational training. Moreover, it constantly needs to integrate the recently identified requirements into the vocational training of learners in all three learning sites of the Swiss VET system (vocational schools, workplace and intercompany training centres). Studies show the institutionalized five-year revisions of education ordinances in Switzerland to be lagging behind the high level of innovation in the economy. For that reason, this project analyses the strategies vocational school teachers have in evaluating and integrating innovation of the industry into their teaching. Based on a qualitative survey procedure with twelve VET teachers, the analysis shows that they use both formal and informal strategies while planning and implementing new developments into their lessons. The interviewed VET teachers mentioned for example the curriculum, literature or further education courses as formal strategies to get known about the latest developments in the field. Furthermore, informal strategies as personal contacts to the field, exchange of experience between colleagues and trainees or company visits play a particularly important role. One explanation of strategies are different teachers' motives, which are described in the conclusion.

Keywords

innovation transfer; crossing boundaries; vocational and educational training, formal and informal strategies; VET teacher

1 Introduction

The innovation-driven Swiss economy is closely connected to the professional practice. On the one hand, innovations lead to constantly changing demands on employees. On the other hand,

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Switzerland's innovative strength requires a professional practice that keeps pace with new developments. The purpose of basic vocational training is to prepare the next generation of employees for the professional practice of the future.

A preliminary study written by Degen (2018) and supported by the University of Teacher Education Lucerne shows a lack between curricula of VET schools and the developments in the economy. Therefore, the risk arises that learners will be trained with technologies and learning content that are out of date. At the same time, the great heterogeneity between sectors and companies generates different demands and expectations for basic vocational training. This diversity increases the difficulty for vocational school teachers to recognise and evaluate the relevant developments for an occupation as a whole, and to integrate them systematically into VET.

Furthermore, in order to get and stay employed in an innovation-driven economy, young employees need to know how to operate in dynamic environments driven by sector-specific digital developments and technological innovations. Previous research has demonstrated that students experience problems in their attempts to transfer their learning and reflect on knowledge and skills developed in school when entering in complex workplace settings (Tanggaard, 2007). Therefore, cooperation between and within learning sites in the sense of crossing boundaries must come more to the fore. Aarkrog (2005), Berner (2010) as well as Jonasson (2014) show that various learning sites in VET can complete each other in student learning and offer specific opportunities for learning. However, there is no automatically school-workplace transfer. It requires complex processes of recontexualisation and transformation of the different learning impulses form the learners (Van Oers, 1998). In that sense teachers, trainers and learners need to recognise and reflect on the experience of learning in different learning sites and continuously provide possibilities for further student learning in VET (Akkerman & Bakker, 2012; Sappa, Choy, & Aprea, 2016). The learners can only be successful in this process if the learning contents of the different learning sites relate to each other (Krapp & Weidenmann, 2006).

However, there is a lack of institutionalised and sustainable forms of cooperation, which incorporate a linkage of content between the learning sites and a transfer of innovation into the training of learners (Euler, 2004). Literature shows that crossing boundaries between all three learning sites is lacking and rarely practised (Aprea & Sappa, 2014). This not only complicates the process of building up competences for learners. It also makes it impossible to continuously integrate new developments of the economy into teaching. The rigid structures of the VET system increases the discrepancy between the rapid developments in the innovation-driven economy and the educational contents. For that reason it is necessary to elaborate and define further formal and informal transfer process strategies to ensure the innovations transfer between the learning sites.

Based on the literature, there are three different approaches to innovation transfer. According to Bormann (2011), they are characterized by the terms of diffusion, dissemination and knowledge transfer. Dissemination refers to the planned and controlled dissemination of innovations within an overall system. Diffusion means a rather spontaneous, unplanned dissemination process and knowledge transfer refers to the dissemination of an innovation that has been tested in a specific context to another, similarly structured context. Wiechmann (2002) describes another transfer approach by the concept of the active use of knowledge. The transfer of extended responsibility to the schools shall initiate self-active processes of innovation use without external control. In this study, the diffusion of innovation and the active use of knowledge between learning sites are of particular interest.

Various studies identify factors that influence the rate of innovation transfer (ex. Aprea & Sappa, 2014; Sappa, Choy, & Aprea, 2016, Wiechmann, 2002). Wiechmann (2002, p. 98)

analysed these factors in relation to schools. He identified the following four different spheres of influence:

- **general conditions** as the size and the location of school
- **organisational characteristics** as the relation between learners and teachers, collegiality or women's quota in teaching team
- **different impulses for development** as requirements from the local environment or perception of teachers for new developments
- **importance of transfer channels** like literature usage, willingness of teachers for further education or personal contacts. Fürstenberg (2005) emphasises the importance of the social acceptance of the stakeholders for a successful innovation transfer. Based on this principle, Tilmann (2019) examines in his work the social acceptance of an innovation and the subjective willingness to its transfer. In order that the transfer takes place, innovations must be confirmed by the various actors through their actions based on their subjective interests. A reason for a positive interest can for example be a relative advantage for the acting person. Therefore, the expected benefit represents the motive for the corresponding action. In their study, Pareja Roblin et al. (2018) analysed the willingness of teachers to use tablet PCs. In this process, they identified further motives that influence teachers in their decision to adapt an innovation. Teachers guided the decision to integrate innovation for example on the compatibility with their pedagogical beliefs or with course content, on the familiarity with the task or on the opportunities to achieve instructional goals more efficiently.

When the strategies of VET teachers in innovation transfer are presented in the following explanations, the mentioned influencing factors and motives must also be taken into account.

2 Methods

Flick (2016) describes the actions and interactions of subjects in everyday life as an object of qualitative social research. As we are primarily interested in the subjective perspective of the interviewees and the associated contexts, we have decided to use a qualitative survey procedure in this project. The aim was to examine formal and informal innovation transfer strategies as well as cooperation schemes based on twelve qualitative semi-standardised guideline interviews with vocational school teachers from German-speaking Swiss vocational schools. We conducted guideline interviews with vocational school teachers from the technical field based on the assumption that digitalisation and constant innovation affect this specific sector strongly. The study focuses on the technical occupations of computer scientist, electronic engineer and automation engineer. Being a full-time employed teacher was another important selection criterion as they do not work part-time in the industry in order to stay up to date with the latest technological state-of-the-art and therefore need to develop their own strategies to keep track of current developments.

In order to evaluate our data, we followed Mayring's qualitative content analysis. Since we also wanted to identify the personal mindset of the teachers in addition to the implemented strategies, the categories were determined both inductively and deductively. The goal was to narrow down the text elements without distorting the core content and essence of the material. The intent was to create a clear and structured overview of the data using this reduction but still adhering to the basic form of the material (Mayring, 2010, p. 65). Lastly, we wanted to compile initial findings on formal and informal strategies that show for what reason and how new training content is adapted and integrated in a high-quality manner into basic vocational training in times of rapid technological change.

3 Results

The analysis of the interviews confirms the assumption that vocational school teachers pursue different strategies in order to obtain information about innovations in the occupational fields. It turns out that they use both formal and informal strategies for this purpose. In addition, further subcategories as well as combinations of formal and informal strategies were identified. In order to obtain information about the strategies that vocational school teachers pursue, we describe the strategy categories in more detail below and illustrate them using representative extracts from the interviews.

3.1 Formal strategies

When planning their lessons, a group of VET teachers orient themselves in particular on the contents and specifications of the training plan. They justify this procedure with a 1:1 reference of qualification procedure to the curriculum. However, the data show that some VET teachers switch to other strategies when it comes to incorporating current developments into teaching, as these fast-moving trends have not yet been integrated into the training plan.

For example, in the profession of automation technician the technical standards change at regular intervals. Since these standards change more quickly than the training plans are adapted, the VET teachers must keep up to date. They do this by reading technical journals or books, which are considered as a formal medium.

> "Unless we take the reference book, we work with the European books, and in there everything is up to date, there's always the newest stuff."

Furthermore, VET teachers regularly attend further training courses offered directly by the industry. In these trainings they keep their knowledge up to date, upgrade their competences and expand their professional network by establishing contacts to representatives from other learning sites.

> "This is, of course, a prerequisite for us as teachers, […] from a technical point of view, to constantly adapt to current circumstances and our training regulations usually ensure that."

Institutional support plays an important role for VET teachers in order to use formal strategies for innovation transfer. This support reveals itself in form of school-specific further training regulations or timetable reductions. With regard to the qualification procedure, institutionalised and formalised exchanges with other VET professionals are very important for the transfer of new developments.

> "This is what we discuss with the professional organisations. More precisely, we discuss this with our department manager, who is in contact with the professional organisation. We have expert commission meetings, where I'm also part of. The last agenda was, when we plan to implement the new technical standards."

3.2 Informal strategies

In order to orient their teaching to current developments in the practice, our study indicates that VET teachers particularly depend on informal strategies. All teachers interviewed highlight personal contacts to representatives of industry or professional organizations, to the vocational trainers, to the examiners or other VET teachers as a very important informal strategy. The importance of these networks arises on the one hand from knowing about current developments, on the other hand from asking questions or also clarifying the quality of new developments, their relevance for the industry and thus the importance for the learners.

> “I have various companies where I know the people responsible for apprenticeships or training and then when I have a technical question, then I call them and ask them."

In addition, VET teachers also visit companies, where they can learn about new developments and current technological changes. There are VET teachers who carry out these company visits on a regular basis and others who also explicitly use these company visits, for example to expand their knowledge about new machines.

> "For me, these rare company visits are relatively valuable. While visiting the companies I sometimes realise, this and that has changed quite a bit and is no longer the way I knew it before."

> "Yes, I know all our training companies; I've actually been to all of them before. Well, I wanted myself to know the companies. And as I’m an examiner too, I always go to different companies to perform the exams."

In the last interview quote a further factor becomes apparent which favours the transfer of innovation. VET teachers, who find themselves in various functions within vocational education and training, also have the opportunity not only to be better informed about current developments, but also to better assess their relevance. Some of them are examiners, so called experts in qualification procedures, others are examiners at a university of applied science, yet others are involved in the professional organisations, or take up a position as department manager at school and thus repeatedly receive input about current changes in industry.

> "Because of my work as an examiner at the university of applied science, I also get many inputs about what is in demand. From that point of view I think it is good for me. I have the feeling that I recognize what’s important, what I should do."

The data also point to the importance of public media as an informal source of information. In contrast to trade journals, which have a formal character, the public media play a subordinate role. Nevertheless, it could be stated that knowledge about current developments does not necessarily have to be found in the specialist literature.

> "Much of what is about to come is not hidden, which means that I do not necessarily have to read a trade journal, but these are often concepts which are carried by the media."

VET teachers also rely on their practical experience in the occupational field when it comes to incorporating new content into teaching, informing themselves about innovations in the field of work or also when trainees bring their own experiences into class and these experiences have to be assessed for their quality. In general, one's own experiences seem to serve as quality assurance when it comes to assessing new developments, current events and information that could potentially be included in the classroom.

All VET teachers interviewed use their own experience in the occupational field to assess the relevance of new information or developments.

> "Much is of course manifested. I must confess, after 25 years of practical experience in the occupational field. Well, in that case it is actually already relatively clear what is really important in the technical industry."

Trainee’s experience is another subcategory when it comes to how VET teachers integrate current developments and technological changes into their teaching. However, there are differences in how they deal with the experiences of the learners. Some teachers conduct regular conversations with the learners in a formalised form. They have thus created a method for themselves to receive information on current developments in the companies.

> "Every year I have a semester interview. Then I always ask them, that's my style, that I ask them, what are you doing in the company right now? What are you working on?"

The interviews also showed that almost all VET teachers have designed their lessons in such a way that there is room for an exchange of experiences. For example, homework is set in such a way that learners can or must solve these homework tasks in their company and then share their experiences in class. As a result, VET teachers get insights into the everyday working life of the learners and, at best, gain insights into current developments in industry. Digital tools also seem to favour this exchange of experience.

> "Thanks to the fact that we now have smartphones, I can say ok, take a picture, bring these pictures to class and show them to each other."

If the shared professional experiences of learners contain elements that are not part of the curriculum, teachers can learn about these new developments through the exchange of experiences.

> "They are allowed to bring in new topics which are not in the curriculum. [...] If anything special happens, like if there's one, who can enter the Internet with a Raspberry, I need to say, I haven't done that yet. I think that's great. Even if I don't know anything about that topic. Those situations are inputs for me."

When different trainees from different classes of the same profession address the same current developments, it is easier for VET teachers recognise the relevance of these new developments in industry

> "Well, new information won't just be addressed by one class. That will be addressed in most system classes. They will come with that issue and say, well, today we configure our servers with Powershell and not with the graphical tools that are available here in school. Why is it, that we can't learn that? And then I just have to make it clear that we're not there yet, but we'll integrate that development in a later revision."

4 Conclusion

The results of the study show that VET teachers surveyed are well aware of the dynamic developments in the occupational fields. To a large extent, they also recognise the importance of not closing their minds to these developments and incorporating innovations into their teaching. In doing so, they pursue different strategies. Some teachers refer to the formally regulated structures that the vocational training system or their own institution prescribe.

One group of VET teachers implement training plans or school curricula without major deviations. They justify this approach with different arguments. On the one hand, the training plans are revised at regular intervals and new developments are thus implemented in the school curricula. If more frequent changes impact the curriculum, they see a danger of overstrain the system. On the other hand, they see it as their primary task to implement the training plan one to one and prepare trainees as best as possible for the qualification procedure. As Roblin Paraja et al. (2018) identified, these teachers focuses on the compatibility with course content in making their decision to integrate new teaching material. They pursue the motive of enabling their trainees to complete their apprenticeship with success by strictly following the curriculum.

Some VET schools offer their teachers a relatively wide range of opportunities to identify and exploit innovations in the occupational fields. Teachers are therefore expected to participate regularly in further training, for which they also receive appropriate financial support. In addition, round tables are held with VET professionals, where an exchange on new developments and teaching content is facilitated. According to Wiechmann (2002), these are influencing factors that have the potential to promote the transfer of innovation.

Many VET teachers interviewed supplement the existing formal structures with informal strategies in order to find out about the latest developments in the occupational field. They do this for different motives. Interest in the occupational field can certainly be mentioned as one of the central reasons why teachers want to familiarise themselves with the developments. This seems to happen primarily out of personal, intrinsic motivation and only secondarily for reasons of an ongoing innovation transfer and for the benefit of a high quality education in the sense of crossing boundaries in the VET system. Roblin Paraja et al. (2018) describe this motive as the desire for familiarity with the task.

Some VET teachers seem to act on methodological-didactical considerations. They collect the occupational experiences of their trainees in class. In this way, they support their learning effect and increase their competence as demanded by Akkerman and Bakker (2012) by linking the previous knowledge and experiences of the trainees with action-guiding knowledge. The central motive seems to be the implementation of the teachers own pedagogical belief (Roblin Paraja et al., 2018). The transfer of innovation from new developments in the occupational field to the classroom is a practical side effect, but appears more as a secondary motive.

There is another group of VET teachers who find themselves in additional functions which require knowledge of new developments in the occupational field. As examiners or representatives in occupation-specific offices, they must be informed about new trends in the occupational field. According to Tilmann (2019), their motive results from the expected personal benefit of the innovation transfer.

Besides these rather unconscious motives regarding a transfer of innovation, also very consciously executed informal strategies are mentioned in order to be able to incorporate new developments into teaching. It is explicitly pointed out that the formal structures are not sufficient, for example, to meet the frequently appearing new technical standards. Some VET teachers see it as their responsibility to keep their teaching content up to date through personal contacts in professional practice. According to Wiechmann (2002), both the teachers' perception of new developments and the teachers' willingness to use them play an important role here.

The interviewed teachers seem to act basically on their own initiative and less on the basis of external requirements. According to Fürstenberg (2005), the majority of them act on the principle of social acceptance while transferring new developments into the lessons. Methodological-didactical considerations regarding teaching and learning at different learning sites play only a secondary role. With regard to the personal professional development of the VET teachers, the vocational schools apparently grant them a relatively large degree of autonomy. This is hardly surprising, since it is part of the professionalism of a teacher to undergo continuous further training. In view of the increasing dynamism in many occupational fields, however, supporting structures on the part of the institution or more intensive cooperation between learning sites would be highly desirable.

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Typical Career Pathways of Academically and Vocationally Qualified Employees - Competition and/or Complementarity?

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Abstract
The relationship between higher vocational certificates and higher education certificates – in particular with regard to their usability in the job market – has been discussed in the course of the higher education structural reform and in the context of the equivalence of higher education and vocational qualifications as stipulated in the German Qualifications Frameworks. This paper presents the concept and first conclusions of a project aiming to trace typical qualification sequences and career paths in selected industry sectors (commerce, banking, logistics, tourism) and identifies competitive situations. The usability of selected qualifications in the job market (for example, employment status, position, income) is evaluated from the companies' and the individuals' perspective by using a combination of qualitative and quantitative methods. The main goal of the project results is the future development of qualification profiles for vocational education and training which are perceived by companies and by individuals as an attractive and equivalent alternative to academic education.

Keywords
higher VET; academic qualifications; labour market; equivalence; career pathways

5 Introduction

The buzzwords of the (new) "educational expansion" or "academicisation" outline a continuing debate about a possible decrease of the relevance of vocational career paths. Current discussions are triggered by a shift of participation patterns from vocational training to higher education. This trend is reflected by a growing precentage of university students among school leavers with (higher) education qualifications. Between 2005 and 2015, the share of new entrants into university rose by 39 percent, while in the same period the number of entrants into dual vocational training on the legal basis of BBiG decreased by seven percent (Bundesinstitut für Berufsbildung, 2016; Dionisius & Illiger, 2015).

At the same time, the introduction of three-year Bachelor's degree programmes as part of the Bologna reform has increasingly raised the question of displacement and substitution effects

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between those with vocational and academic qualifications at the upper specialist level (cf. e.g. Weiß, 2009; Werner, Hollmann, & Schmidt, 2008). The underlying question, whether classical vocational education and training paths with initial vocational training and advanced further training are increasingly less sufficient to reach positions for upper skilled workers or middle management has been answered differently in previous studies. In addition to different methodological and branch specific approaches, one of the main reasons relates to database limitations with too small numbers on career paths of Bachelor graduates.

Hence, the current state of research is characterised by different and sometimes contradictory statements. It can be systematised according to different core theses to which the respective studies refer: competitive thesis, complementary thesis and convergence thesis. In the following section we presents main research findings and contributions on academisation using this differentiation.

Competition Thesis

Under the generic term of the competition thesis we summarize contributions that assume increasing competition between vocationally and academically qualified persons as well as literature which identifies increasing indicators for substitution processes (Baethge, Kerst, Leszczensy, & Wieck, 2014; Baethge & Wolter, 2015; Bosch, 2016; Drexel, 2012; Weiß, 2009). Estimates vary here between a progressive process towards higher qualification, which could lead to a devaluation of initial and continuing vocational training qualifications and as a consequence to an erosion of the middle subject level. This so called polarisation thesis (Frey & Osborne, 2013), which is also known from the digitisation debate on "Industry 4.0", implies that between standardised, modularised work with low qualification requirements and highly qualified activity segments, work areas in intermediate subject positions break away due to an increasing need for higher qualifications. Although there is so far little empirical evidence for these scenarios of disruptive changes, a current study by Euler/Severing also assumes a tendency towards a high substitution potential between vocational training and academic study programmes, especially for commercial occupations (Euler & Severing 2017; p. 37 f.).

Complementarity Thesis

Particularly with regard to recruitment strategies of firms for vacancies for operative (management) specialists, a significant body of literature does not observe any fundamental change - despite of the introduction of Bachelor's degree programmes. Furthermore, there are still different areas of responsibility and activity: depending on the job-design, vacancies are more likely to be filled, either by professional or academically qualified employees (Bott, Helmrich, Reymers, & Schöngen, 2012; Hippach-Schneider, Weigel, Brown, & Gonon, 2013; Wünsche, 2011). However, even these studies do not rule out possible competitive situations that could develop in the labour market because of increasing numbers of Bachelor graduates over time.

An even clearer emphasis on complementarity and competitive relationships in the relationship between professional and academic career paths can be found in the studies by Krone and Mill (2014) and Neu, Elsholz, and Jaich (2017). According to these research findings, there are quite different constellations depending on the sector. From a perspective of changing competitive situations due to the emergence and growing relevance of dual study programmes, the empirical findings of Krone/Mill on the one hand strengthen the thesis of complementary employment segments in which entry positions and career paths of vocationally trained persons differ from regular Bachelor graduates and from graduates of dual study programmes. This applies in particular to the technical/commercial sector examined by the authors. On the other hand they observe competitive relationships for commercial occupations

in the financial sector, since, according to the authors, there is no separation of professional and academic career paths here (Krone & Mill, 2014, p. 57).

Convergence Thesis

Under the heading of the convergence thesis, publications are summarized which identy a growing overlap and permeability between vocational training and higher education on a systemic level (Severing & Teichler, 2013) and in this respect the emergence of hybrid training models (Euler, 2017). These contributions assume a growing sub-sector in the education system in which vocational and academic qualification paths are combined. In this regard, the growing mutual permeability between vocational and academic education segments is addressed (Wolter & Kerst, 2015).

However, a progressive development towards convergent areas of education that combines elements of vocational and academic training can already be seen in the growing relevance of dual study programmes. This applies not only to the growing number of dual degree programmes and dual students, which, in the field of initial training, more than doubled between 2006 and 2016, but also to the growing institutionalisation of providers of dual degree programmes, for which umbrella brands and umbrella associations are increasingly developing at the federal state level (Länderebene; Hofmann & König, 2017).

In addition to the presentated state of research, this research project addresses the topic of academisation in a multifaceted way. Special attention will be paid not only to the selected sectors, which represent different areas of commercial professions, but also to the special exploitation context in order to obtain information on the design of regulated further training regulations.

6 Project aims and theoretical framework

One of the project aims is to achive a better overall understanding of the extent, causes and concrete forms of academization in commercial professions. For this reason, three different analytic dimensions will be inluded and observed: First, the curricular dimension of a (possibly) changed educational landscape with growing overlaps between initial and continuing vocational education and training on the one hand and academic degree programmes with a stronger practical orientation on the other. In a second step, on an enterprise level, recruitment and training strategies are analysed in terms of possible competitive situations between occupationally and academically qualified employees. Finally, the dimension of individual educational and career decisions, which is considered particularly important in the current literature, is taken into account in the research approach.

In order to analyse these different dimensions of academization the theoretical framework of this research project includes the interaction of central actors as well as the respective structural constitutional contexts. Referring on Giddens (1984) theory of structuration it is assumed that companies as well as employees on the one hand refer to relevant structures of the educational system, the respective organisational structures and the individual socio-economic contexts (e.g. social origin). On the other hand, they also have the ability to change previous framework conditions in a mutual constitutional relationship, which in turn ultimately affect the educational system (and possible shifts in the educational landscape).

The interaction process between companies and employees is characterised by "signalling" and "screening". The concept of signalling refers to the core idea of Spence's signalling approach (Spence, 1973). According to Spence information asymmetries between different (labour) market actors are reduced by the "signalling" of not directly recognisable characteristics and abilities by the more informed interaction partner. Drawing on the screening concept of Stigliz (1975), the less informed party reduces its lack of information using relevant screening criteria (e.g. performance tests). Drawing on these core theories and concepts our

theory model assumes that companies and individuals send out mutual signals of ability (employees) and attractiveness (companies). These signals in turn play a role in the selection of employees, but also in the choice of employers by the employees.

In their selection and decision-making processes, both actors - companies and employees - refer to structures of the education system, the respective labour market situation and relevant sector- and region-specific contexts. Building on the current state of research, the specific influence of company structures (company size, personnel structure, and personnel policy, work organisation, training and further training activities) on recruitment and deployment strategies at company level are taken into account. With regard to the educational and further training decisions of employees, the importance of career and further training aspirations is included in addition to the influence of social origin, which has often been the subject of research to date (Figure 1).

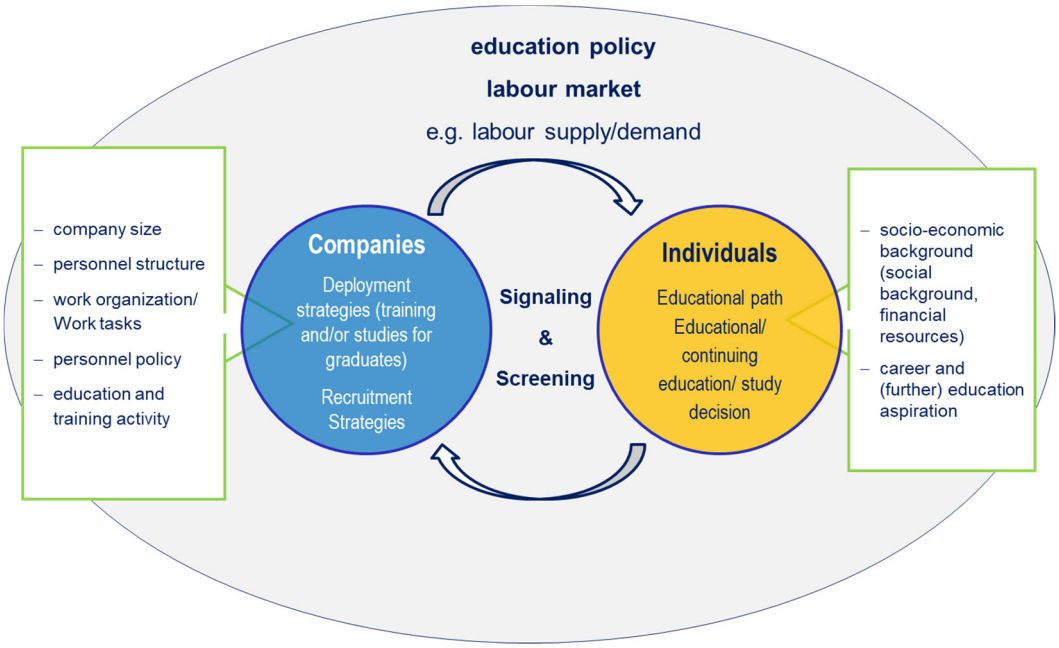

Figure 1 The signalling and screening process

7 Methodological approach

The research design comprises a mix of qualitative and quantitative methods of analysis and survey instruments. On the one hand, the different dimensions of the curricular framework conditions, entrepreneurial personnel recruitment, development and deployment strategies are to be captured as comprehensively as possible. In addition, the interaction relations between companies and individuals must be included in the analysis.

The combination of different methods also makes it possible to combine the advantages of the principle openness of qualitative research instruments for explorative information acquisition and pre-structuring of the field of investigation with the generalizability and reach advantages of standardized quantitative surveys.

Table 1 Overview on the methodological approach

Level of analysis	Research Method
Curricula	Comparative curricula analysis of selected advanced training regulations and BA/ MA study programs (GQR level 6 and 7)
Enterprise level	Semi-structured qualitative Interviews with HR managers Quantitative enterprise survey 2018, target person: HR manager or managing director; n=802; response rate: 40.8%
Employee level	Semi-structured qualitative: vocationally and academically qualified employees, DQR 6/7 BIBB/ BAuA Employment Survey 2012 und 2018 BIBB/ BAuA Employement follow up Survey 2019 (selected industries, n=1.111),

7.1 Curricula dimension

The method of document analysis is used to investigate curricular differences and similarities. The subject of this analysis are documents that form the basis of and describe vocational and academic qualifications, i.e. initial and in particular continuing vocational training regulations and the corresponding curricula in the area of academic qualifications. The reference point for a selection of the documents are the qualifications listed for the respective industries and differentiated according to the German Qualifications Framework (GQF) levels, with a special focus on level 6. Within the framework of the analysis, the documents are examined with regard to their formulations of objectives and descriptions of competences. The dimensions and descriptors of the GQF serve as reference values. In particular, the curriculum analysis aims to gain insights into the content of the vocational and academic qualifications examined as well as their reference points and degrees of coverage. Due to the large number of qualifications in the field of Bachelor and Master Programmes, an exemplary selection is necessary here. In the area of vocational education and training, all relevant curricula of the occupations with the highest number of examination candidates in the selected occupational areas were taken into account in the document analysis.

7.2 Company Dimension

The method of qualitative, semi-structured interviews is used to gain information and pre-structure the quantitative surveys in order to capture deeper motives and general contexts. This method on the one hand is characterized by the openness of qualitative interviews and, due to its lower degree of standardization, enables not only a more comprehensive gathering of information but also a better recording of the complexity of the individual case. The pre-structuring of the lead topics and lead questions, however, also allows a certain comparability between different interviews and a comparison between the respective industries. In addition to gaining information and a better understanding of meanings, qualitative interviews also make it possible to generate or further develop hypotheses.

The target persons of the semi-structured qualitative interviews are personnel managers, who provide detailed information on personnel development, recruitment and deployment strategies of senior specialists and middle managers at German Qualifications Framework level 6 (and partly 7). In each sector, companies were selected based on the sector structure. In addition to company size and the selection of different sector sub-segments, relevant criteria

included characteristics such as the range of services offered, the company organisation and the employee structure.

Based on the results of the case studies, a representative, standardized, quantitative enterprise survey was conducted. This survey served to confirm the qualitative results of the case studies empirically. The analysis unit consisted of companies out of the four focused industries. The survey was designed as a computer assisted telephone survey (CATI) of personnel managers or managing directors. The target group were nationwide companies with at least five employees, who had middle management level or employed upper-level specialists. For this purpose, a stratified random sample by industry and company size was drawn in order to map detailed differences between industries and company sizes. The survey includes 802 interviews with a response rate of 40.8%.The central topics of the survey covered questions on the companies' training and further training models, educational qualifications, recruitment and deployment strategies for senior specialists and middle managers, competence requirements and measures to cover competence as well as future personnel strategies with a view to the target group mentioned.

7.3 Employee Dimension

For the explorative acquisition of information and pre-structuring of the quantitative survey of the labour force, introductory qualitative, semi structured interviews were conducted. The target groups were professionally and academically qualified employees who were surveyed about their respective career paths, educational decisions, positions, areas of activity and deployment as well as their own assessment of the employability of their qualifications. These interviews allowed a detailed reconstruction of the respective educational pathways in order to capture the individual contexts and context factors for the respective educational decisions.

In addition, the interviews intend to reflect the employees' subjective perception of their employability and their competences acquired in the respective educational pathways. This concerns both the dimensions of qualification adequacy as well as position adequacy and income adequacy of the respective education with the current activity or position. For this purpose, 40-60-minute interviews were conducted with employed people who hold middle management positions and are professionally or academically qualified according to the research question.

A follow-up survey of the BIBB/BAuA survey of employees was conducted for the selected sectors in order to conduct a quantitative analysis of educational decisions and employment histories. The BIBB/BAuA surveys of employees are representative surveys of core employees in Germany. The employment survey offers the opportunity of carrying out follow-up surveys specifically groups of employees (those who have undergone further training, those working in the commercial sector) or certain topics (activities). 1,111 interviewees who had agreed to further participation were interviewed successfully in a follow up survey between May and August 2019.

8 First results

8.1 Curricula analysis

The results of the comparative curricular analysis still show target group-specific differences between further vocational education regulations and selected sector-specific Bachelor/Master programmes in the selected sectors, which are basically reflected in an overall stronger vocational and action-oriented orientation in regulated continuing education courses. However, a growing number of practice-oriented and specialised Bachelor and Master degree programmes in particular make overlapping areas visible. A direct comparison of the subject-specific contents reveals many similarities. With very few exceptions (e.g. further training to

become a certified business economist in accordance with the BBiG), the lack of international vocational competences in the current, regulated further training regulations for specific vocational areas is conspicuous. In comparison, the number of sector-related Bachelor's and Master's degree programmes with an international orientation has noticeably increased. While the number of students has risen in almost all relevant degree programmes, there are sector-specific differences in the relevance and (perceived) attractiveness of regulated continuing education programmes.

8.2 Company recruitment, training and continuing education strategies

The results of the qualitative and quantitative company surveys do not show the companies' general departure from the dual system of initial and continuing vocational training. Initial and further VET continue to play an important role in recruiting senior specialists and midlevel managers. The current 'status quo' of the surveyed companies' only shows academic degrees as a prerequisite for obtaining middle management positions for a small proportion of the companies.

At the same time, however, the range of different qualification paths has also expanded, with dual courses of study in particular gaining importance. In this respect, there are significant differences according to company size and sector. Large companies in particular pursue a multi-track strategy in which both vocational and academic education and training paths play a role. In addition to the use of traditional forms of dual initial and continuing vocational training, special programmes for school leavers that combine dual vocational training with regular further training and dual study programmes, external university graduates are also recruited for whom special trainee programmes are offered. Small and medium-sized enterprises rely primarily on internal recruitment channels, which can include dual courses of study in addition to initial and continuing vocational training, especially in the case of small and medium-sized enterprises. The main reasons for this, in addition to company-specific skills, are motives for employee retention. In sectors or areas with a shortage of skilled workers, the lack of suitable candidates on the external labour market is also a reason for increased efforts in internal personnel recruitment and development.

However, there are overlapping areas in both segments in which, there could be competition between professionally and academically qualified individuals. Further research will be necessary to clarify to what extent the current overlapping areas are attributable to generation-specific differences in educational pathways. First qualitative findings indicate that certain areas of position and activity, which previously could be reached professional means, are more and more filled by academically qualified people in the succeeding generation.

8.3 Labour market usability and training consequences

Initial analyses of the employability of the workforce in the sectors under consideration based on the 2012 BIBB/BAUA survey data point to sector-specific differences. The general qualification adequacy is higher in tourism and the banking sector than in trade and logistics. In terms of level adequacy, the results tend to point to fitting problems for academics who work in retail, logistics and financial services more frequently in areas of activity below their level of qualification compared with reference values for the economy as a whole. For tourism, no statements can be made on this because the number of cases is too small.

The quantitative analysis of training consequences underlines the overall assessment of the dominance of career paths in trade and logistics gained in the previous analyses. Moreover, these results also reflect the parallel importance observed for the financial services sector of vocational career paths with a high significance of advanced further training on the one hand and academic qualification pathways on the other hand for attaining senior specialist and middle management positions.

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Reforming VET in Eastern Europe, Central Asia, Northern Africa and the Middle East: Patterns of Risks and Reform Implementation

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Abstract

This contribution presents a cross-country analysis of risks to the implementation of new policies for vocational education and training, as reported by authorities and stakeholders in 25 countries in East and South-East Europe, Central Asia, the Caucasus, the Middle East and Northern Africa. The paper evaluates reform implementation in countries of these regions from the point of view of risks to reform process, points out commonalities in the ways in which countries address these risks, and discusses how the findings could support a better, more effective transition from planning to policy action.

Keywords

vocational education and training; education reform; skills development; Torino Process; VET reform; VET modernisation

1 Introduction

1.1 Background

This paper presents a summary from a cross-country overview[1] of approaches and risks to the implementation of new policies for VET in 25 countries in East and South-East Europe, Central Asia, South and East Mediterranean and the Southern Caucasus. The paper identifies the ways in which countries deal with these risks and looks for commonalities and lessons to be learned that could support peer learning for a better, more effective transition from planning to policy action.

The overview was prepared on the basis of results from the Torino Process – a biennial review of policies for vocational education and training (VET) in countries neighbouring the European Union, which is carried out under the coordination of the European Training Foundation (ETF) on behalf of the European Union.

In this paper we first present the research methodology, then provides an overview of extrinsic and intrinsic risks to reform and how shortcomings in the planning, justification and

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1 The full report can be found at https://www.etf.europa.eu/en/publications-and-resources/publications/reforms-vocational-education-and-training-etf-partner (accessed on 8 July 2019).

focus of reforms may influence the effectiveness of reform implementation. Finally, we draw some conclusions and provide an overview of next steps with this research.

1.2 Research question and methodology

With our research we wanted to explore whether there are similarities in the risks to which VET reforms are exposed in the different countries participating in the Torino Process and if yes, whether the risks are being addressed in similar ways.

The collection of primary evidence for this research took place between 2015 and 2016 in Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Egypt, Georgia, Israel, Jordan, Kazakhstan, Kosovo, Kyrgyz Republic, Lebanon, Republic of Northern Macedonia, Moldova, Montenegro, Morocco, Palestine, Russia, Serbia, Tajikistan, Tunisia, Turkey, Ukraine, and Uzbekistan. We relied on a structured, formal process of self-reporting by national authorities in charge of VET, which were carried out in consultation with VET stakeholders in each country.

The self-reporting took place with the help of an analytical framework featuring a collection of in-depth questions in the five review dimensions, and a uniform procedure for the formulation, validation, and quality assurance of responses to these questions which comprised a consultation, drafting, and review and validation phases.[2]

The findings were documented in the form of national reports, which covered five review dimensions: vision and VET strategy, economic and labour market context of VET, socio-demographic context of VET, internal efficiency of the VET system, and VET governance.[3]

The reports were then subjected to a secondary, cross-country analysis, the results of which are presented in this paper. The analysis involved multiple rounds of scanning of the national reports and the development of a matrix describing possible risks patterns, reform targets in VET, and national strategies to deal with the risks to these targets. The matrix was then used to extract evidence on the prevalence of risk patterns across countries and regions and the context in which the risks emerge and reforms are being implemented (Milovanovitch, 2018).

2 Results and discussion

2.1 Risks to reform implementation: An overview of common patterns

Risk is an inherent feature of reforms and can be defined as a 'potential for a loss' (Cline, 2003) or an 'uncertainty' (Cline, 2004) that is common to plans concerning the future. Our findings suggest that the countries we covered are confronted with various, but broadly similar uncertainties regarding their reform agenda and the future of their VET systems. Most of them can be traced back to structural problems in key areas of VET policy, which are substantial enough to fuel widespread resistance to change and endanger progress. Prominent examples include:

- Problems with the availability, capacity and competence of staff working in VET, specifically the quality of teachers and trainers (e.g. Tajikistan, Ukraine, Serbia, Lebanon, Tunisia) and their retention (e.g. Azerbaijan, Moldova);
- The low level of funding for VET, including wages (e.g. Georgia, Albania, Kosovo , Lebanon);

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2 A full overview of the guidelines and analytical framework of the Torino Process 2016 can be found here: https://www.etf.europa.eu/sites/default/files/m/56C067652F13DD66C1257F76005AFA6B_Torino%20Process%202016-17.pdf

3 A full selection of reports can be found here: www.torinoprocess.eu and www.etf.europa.eu/torinoprocess

- The legislative framework, governance, and organisation of VET management and provision (e.g. Albania, Egypt, Palestine, Georgia), which are subject to changes that are still not complete.

Quite a few of the risks to reform implementation seem to be intrinsic to the reform plans themselves due to the ways in which these plans were conceived, formulated, justified, or communicated to stakeholders and beneficiaries. In some countries the risk was due to a disconnect between goals and the reform actions that are supposed to serve them. In others, stakeholders were provided with little to no evidence of the need for improvement. In addition, some of the reform implementation plans depended on too many factors beyond the control of reform authors (too many 'moving parts'). Finally, it was common for reform priorities to be detached from the existing conditions and needs in the VET systems, which in turn limited the buy-in from stakeholders. The next sections provide further detail about these shortcomings.

Disconnect between strategic goals and actions

A strategic vision is instrumental in designing policies of value because it indicates what strategic goals should be achieved and by when. It also provides the context for deciding on specific, technical level actions to that end.

The plans of countries in our research varied greatly in terms of the extent to which they really are 'strategic' and manage to supply a proper strategic context for a change. Table 1 summarises the national visions for VET by country, type of vision (strategic and/or technical) and for countries with a strategic vision, whether this is described in a stand-alone strategy for VET or 'borrowed' from other strategic documents. It shows that there is a considerable disbalance across countries and regions, as quite a few have implementation plans while lacking a strategic framework.

Indeed, in close to a third of the 25 countries we covered, the plans described only technical-level actions, such as optimisation of the network of VET providers (e.g. Ukraine), structured involvement of employers (e.g. Armenia), tweaking of qualification frameworks (e.g. Belarus), infrastructure investment (e.g. Uzbekistan), curricular reform (e.g. Lebanon), and teacher (re)training (e.g. Jordan).Without implying causality, it is fair to say that most countries in this group have a track record of dependency on official development assistance (ODA; Table 1).

It is not clear how the long-term goals articulated in such plans relate to the choice of actions, or, in other words, how these actions will improve VET in the specific national context. Rather, the legitimacy and strategic dimension of these plans was 'borrowed' from broader national strategies for education or, even further away, from national strategies for economic and/or social development, none of which refer specifically to VET.

The plans for VET laid out in most of the other national reports featured elements of a strategic vision (Joyce, 2016). They set long-term goals; explained what current or anticipated needs and problems they address; and presented solutions that are intended to involve and benefit all stakeholders. In seven of the countries, the vision was presented in a stand-alone VET strategy, while in others it was formulated through a clear reference to VET in broader planning documents.

Table 1 also suggests that countries which in recent years have put in place long-term plans for economic and social development with a heavy emphasis on human capital development and education, such as Kazakhstan, Moldova, Morocco, Armenia and Tunisia, tended to have a comprehensive vision for VET, that is a vision combining long-term goals with technical-level plans to achieve those goals. The region with the biggest share of countries with a comprehensive vision for VET was South Eastern Europe. This might be a positive

consequence of decades-long donor presence and participation in international projects and policy processes, including those that adhere to EU requirements and conditions.

Table 1 National vision for VET, by country, type of vision and source

Region	Country	Strategic vision	Stand-alone strategy	Technical vision
CA	Kyrgyzstan			*
CA	Kazakhstan	*		*
CA	Tajikistan			*
CA	Uzbekistan			*
EE	Armenia	*	*	*
EE	Azerbaijan	*		*
EE	Belarus			*
EE	Georgia	*	*	
EE	Moldova	*	*	*
EE	Russia			*
EE	Ukraine			*
SEE	Albania	*		*
SEE	Bosnia and Herzegovina	*		*
SEE	Republic of N. Macedonia	*	*	*
SEE	Montenegro	*	*	*
SEE	Serbia	*		*
SEE	Turkey	*	*	*
SEE	Kosovo	*		*
MENA	Egypt	*		*
MENA	Israel			*
MENA	Jordan			*
MENA	Lebanon			*
MENA	Morocco	*	*	*
MENA	Palestine			*
MENA	Tunisia	*		*

Source: Milovanovitch, 2018

Lack of evidence on the need for improvement

Working towards a goal usually implies believing that it addresses a certain need, and that it makes sense, solves a problem, or provides a benefit. This is also true for reform goals in the domain of public policy, which usually require the motivation, trust and joint effort of many people before they can be fulfilled. If an improvement effort does not have a clear justification explaining why the change is good and describing the need it serves, there is a good chance that the process of change will head in the wrong direction (Wilson & Dobson, 2008) or even grind to a halt.

To justify reform priorities and explain why the changes they imply are needed, the national reports of countries in our research referred to problems in VET and its socioeconomic context

and argued that these need to be resolved. Among the most prominent and frequently quoted examples included the mismatch between skills delivered by education and VET and required by the labour market, and problems with the quality of teachers and trainers. Such problems are sufficiently fundamental to concern various groups of participants in VET and to justify action in more than one policy area. In the self-reporting of countries, this made them a preferred, all-inclusive justification for a host of difficult and complex reforms.

For example, the presence of skills mismatch was quoted as a reason to initiate changes in VET programmes and curricula, promote the formal involvement of employers and the diversification of funding, and/or justify the reshuffling of the provider network. More than half of the national reports also imply that there are problems with the composition, remuneration and quality of the teaching workforce and suggest that this is an area in need of urgent investment and change.

There is no reason to doubt the commendable intentions behind measures that are meant to bring a long-overdue improvement. Unfortunately, in a concerning number of instances described in the national reports, countries also had difficulties to make a convincing case for change because of the absence of evidence for the very problems that they were referring to when arguing in favour of reform.

The problem of mismatch between the skills delivered and those required is a good example. The national report for Kyrgyzstan noted the significance of the topic and stated that there is a mismatch which explains the VET reform targets, but then the authors admitted that there is no information on the mismatch itself. In the report of Kazakhstan, it is stated that there is no evidence that could help to determine the nature and extent of the mismatch, and the authors of the national report for Azerbaijan complained that data about the demand side of skills is lacking because of difficulties in developing proper methodologies and in reaching employers. In Georgia, there was no updated data on mismatch either and in the Republic of North Macedonia, the information was limited. The report even noted that this hinders policy planning and implementation. In Serbia, the authors of the national report remarked that data on the issue is not being collected at all and in Kosovo, evidence on skills mismatch was unsystematic and collected only ad hoc, without coordination. Mismatch was discussed as a key issue for reform in countries of the Middle East and Northern Africa, albeit with no data to corroborate the statements.

Similarly, the issue of unsatisfactory quality of teachers and teaching in VET was commonly quoted as a problem that requires action, but countries also reported that they lack evidence in this area. In turn, this undermined their arguments that the situation needs reform and improvement. The report for Egypt, for example, noted that data on teachers in technical and vocational education and training is difficult or even impossible, to find. In Bosnia and Herzegovina, the line ministries and pedagogical institutes did not possess official information about whether, and if so, how, their teachers are receiving in-service training, or what the impact of that training is. Albania reported the absence of a central repository of information about the same issue and about human resources in the teaching profession in general. The authors of the national report for Kazakhstan described how information about professional development is missing and also underlined that there was no reliable, comparable information on the quality of teaching. In Kyrgyzstan, the authorities seemed to lack even the most basic of data on the teaching workforce, such as gender and age composition.

The lack of objective proof that there are problems in need of addressing is likely to pose a risk to reform implementation. Certainly, evidence is not the only driver of reform. The choice of wording and the narrative in many national reports suggest that authorities and stakeholders are often motivated by aspirations for change inspired by global trends and ideas, and by initiatives in the EU to strengthen a trend towards improvement through, for example, work-based learning (WBL) or qualification frameworks. In some cases, for instance in countries that

are experimenting with the introduction of dual VET solutions, a strong driver of reform is the replication of solutions that are well established in countries known for their robust VET tradition, such as Germany and Switzerland.

However, although aspirations and replication can play an important role, they might not be sufficient to motivate a sustainable, informed, and stakeholder-owned change.

Complexity and interdependence of reform plans

The national reports describe how most partner countries have ventured into implementation of intentions by making their reforms depend on numerous parallel processes, which are fragile and thus could put the action at risk of obstruction.

A good example of such a conditionality is the pairing of the reform priorities relating to the involvement of employers and the modernisation of VET content. In their reports, all countries in our research referred to these two as a reform priority in which the first goal is a key precondition for achieving the second goal. At the same time in most countries (except in those with a tradition of governing VET through national councils or other forms of multi-stakeholder advisory bodies, such as Morocco, Jordan, Tunisia, Israel and, most recently, Palestine) there are difficulties to establishing and run a formal and effective mechanism of cooperation with employers for improvement of VET. Thus, countries tend to pursue the modernisation of VET and the engagement of employers in parallel, which means that decisions concerning the first goal are often taken before the second one has been achieved.

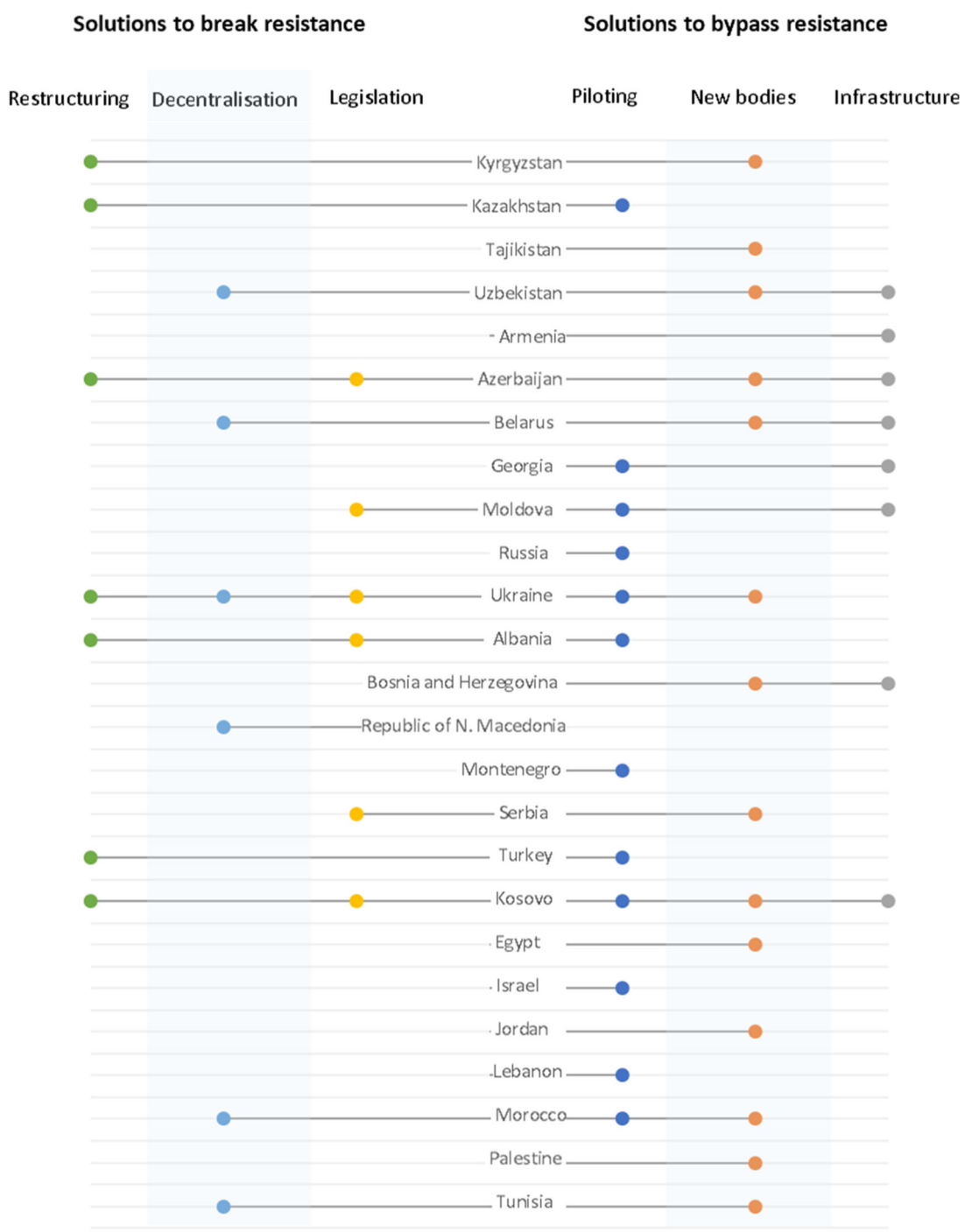
The parallel implementation of the two reform objectives, like in this example, can become a source of risk if some of the objectives depend on variables that are beyond the control and sphere of influence of those in charge of reform implementation. What if VET content modernisation starts, but stakeholder involvement does not progress as planned, as some country reports suggest? What if employers are keen on supporting and informing change, but the authorities fail to incentivise VET providers and professionals to engage in that (*e.g.* in North Macedonia)? What if, in parallel, the authorities initiate new legislation for VET (*e.g.* in Ukraine), effectively making the other two processes depend on one more layer of parallel change? At the time of this research there was no evidence that reforms have failed because of such discrepancies, but the overly complex and interdependent reform processes were slowing down progress.

2.2 Patterns of addressing barriers to reform in VET: Institutional bypasses and overhaul of framework conditions

The challenges to reform that we described in the previous section are difficult to resolve, yet countries report of common ways in which they try addressing them.

Most of the national reports describe implementation solutions that resemble what development assistance research calls ‘institutional bypasses’ – new pathways around blocked or problematic public institutions (Prado, 2011), which allow projects and reforms to progress, despite resistance and the lack of system-wide improvement. There are different ways in which countries do that.

In some cases national authorities may seek to limit the exposure of VET systems to reforms by postponing a system-wide implementation, piloting changes in just a few providers and/or regions instead. Another common approach is the delegation of responsibility for (and possible political costs of) implementation to external or subsidiary entities, often created for the purpose, such as agencies or research institutes. Some countries also reported of investments in physical infrastructure in lieu of progress with substantive reforms.



Source: Milovanovitch, 2018.

Figure 1 Addressing uncertainty and resistance to change in VET, by country and type of solution

A smaller group of countries reports confronting their systemic obstacles heads-on. The solutions to which they have committed aim at nothing less than a complete overhaul of the framework conditions under which VET planning and provision take place. These plans are reminiscent of models of radical reform (Murrell, 1992), which emphasise the obliteration of

the old and the speedy transition to a new state of affairs that is profoundly different from the one before. Examples of such radical solutions include adoption of entirely new primary and secondary legislation for VET, the full decentralisation of VET governance and funding, and the restructuring of VET, often combined with a reduction (optimisation) of the VET provider network.

Figure 1 provides an overview of prevalence of these "bypass" and "overhaul" solutions by country and type of action. It shows that bypassing through the delegation of responsibility to external, often newly established bodies, is quite common, just like the piloting of reforms instead of their system-wide implementation. The group of countries presenting infrastructure investments as a proof of qualitative improvements is smaller in comparison, but it is also diverse in terms of geographical distribution and includes countries from all regions covered in our research.

The figure also shows that many countries intend to overhaul their VET systems in response to a resistance to change. They do, or intend to do so through legislative amendments, but some also through decentralisation and optimisation of their provider networks. More than half of the countries in our research entertained such plans, mostly in parallel to their actions aimed at bypassing reform-related risks.

3 Conclusion and outlook

This cross-country overview describes what countries typically do to hedge against the risk of failure of reforms, discusses their choices of and progress with reform implementation, and considers the impact this has on their agenda for change. The analysis allows for several conclusions.

First, notwithstanding the differences between countries, their reforms are exposed to similar risks that are being addressed in comparable ways. This suggests that there is potential for peer learning, specifically on issues pertaining to overcoming resistance to change from within the VET system. That includes strategies on how to transition from delegating responsibilities for implementation and piloting reforms to a system-wide roll-out of improvement. The analysis suggests that problems with this transition might be a major impediment to reform progress. There are also some success stories, which might hold lessons that are important across national borders.

Second, contrary to common assumptions, not all lack of progress with policy action can be blamed on lack of political will. Often the problems are of a technical nature and could be addressed through better planning and a recalibration of reform focus, so that VET participants have a chance to understand and endorse the reform plans and feel that these plans address their needs and concerns. This could include the creation of incentives for improvement, for instance in the form of formal recognition and support for teachers and providers who endorse change or might even be among its initiators and drivers. The lessons learned from the piloting of novel approaches (see the section on hedging against adverse conditions) could be used to demonstrate the advantages of specific reform undertakings, but these seem to still be a largely underdeveloped and unexplored source of inspiration, motivation and guidance in this respect.

Finally, and closely connected to the second conclusion, it might be time to look for a new set of justifications for change that rely less on difficult-to-collect evidence, and instead connect the readily available, albeit impersonal, arguments in favour of reform (such as those around economic and social development) to research and to the specific situation of participants in VET – VET providers, professional staff and primary beneficiaries (learners) –and their needs at this moment in time. This might give the drive for improvement a new impetus, and secure ownership and buy-in from the very individuals in VET who are supposed to benefit from the change, a task that in many countries seems long overdue.

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The Source of Vocational Education's Systematic Procedural Knowledge

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Abstract

The source of vocational education's knowledge given most prominence in the literature is research. But another source of vocational knowledge is practice, and this paper considers how practical knowledge is transformed in several stages to become applied knowledge. Knowledge is not transformed just by applying it to a new context. It is transformed when it is expressed in a different epistemic form or at a different epistemic level for use by a different type of actor for a qualitatively different purpose from the initial practice. Transforming knowledge requires people with expertise and resources to devote considerable time, effort and imagination. This seems an appropriate role for vocational colleges and institutes.

Keywords

vocational knowledge; recontextualisation; artillery; gunnery

1 Knowledge transformations

Applied knowledge comes from 2 sources (Figure 1). The most prominently ultimate source of applied knowledge discussed in the literature is research. Research generates disciplinary knowledge (Young, 2006, p. 109). Arguably disciplinary knowledge includes all the results of research accepted as authoritative by the relevant experts. The process of experts' acceptance of research results as authoritative is not central to the argument, but it is labelled 'incorporation' since experts may incorporate research results in their understanding of their discipline by processes similar to Piaget's (1952, p. 7) description of the way people learn new knowledge. Research results may be assimilated or build on existing knowledge, or they may be accommodated by changing existing knowledge or by building a new knowledge structure.

Some disciplinary knowledge is recontextualised as applied knowledge in applied fields or regions as Bernstein (1996/2000, pp. 9, 52) called them such as architecture, business studies, cognitive science, communications and media, engineering, information science, management, and medicine. For recontextualised disciplinary knowledge to be taught it has to be reconceptualised a second time as pedagogic applied knowledge (Young, 2006, p. 55) in a step that is not shown in Figure . Applied knowledge is applied to or used in practice by trained practitioners.

Most discussions of knowledge including of applied knowledge read Figure only from left to right, from research to application and from the general to the particular. But applied knowledge or regions also include systematic procedural knowledge which is derived from the established rules and practices for organising work (Barnett, 2006, p. 149; Young, 2006, p. 62). Practice also includes tacit knowledge and practices which are uncodifiable and thus cannot be restructured as systematic procedural knowledge. The paper leaves open the possibility of

Figure 1 being read further from right to left, of systematic procedural knowledge being transformed as disciplinary knowledge, but takes no position on this possibility.

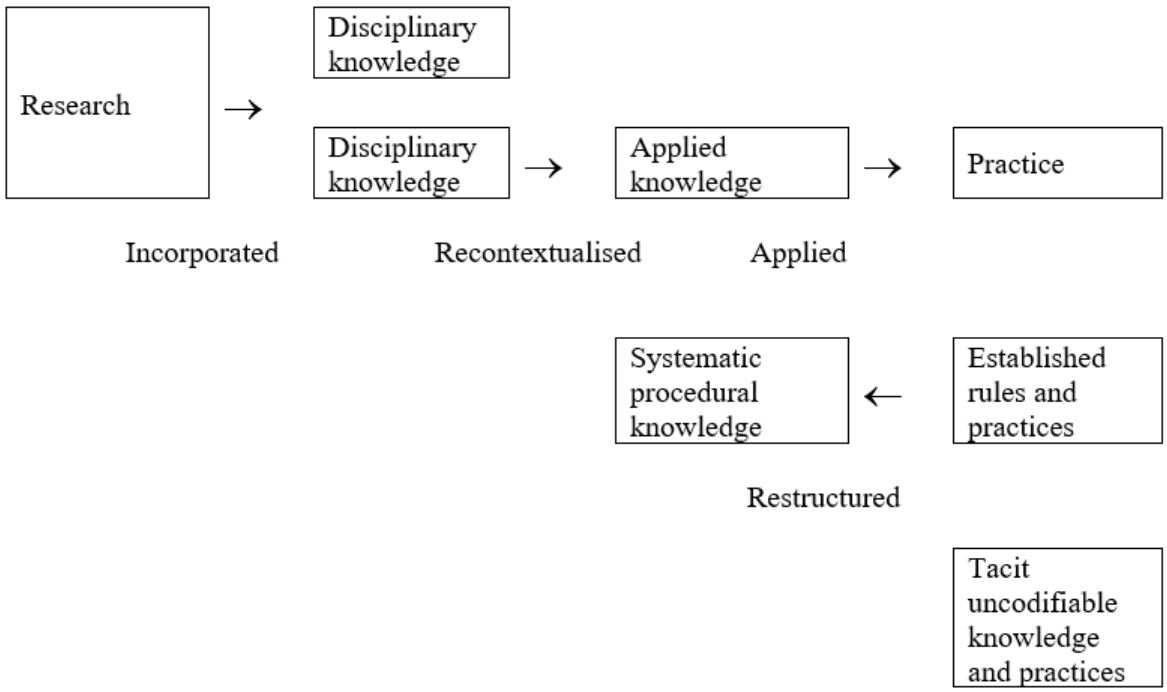

Figure 1 Knowledge restructured in stages between research and practice

The purpose of this paper is to describe established rules and practices being transformed as applied knowledge, to elaborate the figure from right to left, from the particular to the more general. Barnett (2006, p. 149) asserts that the 'varieties of situated [or practical] knowledge . . . need to be subjected to a single (possibly somewhat problematic) process of pedagogic transformation' to be included in vocational education. The paper argues that practice includes knowledge of several different epistemic forms or levels which have to be transformed multiple times to become applied knowledge (Table 1).

Most basically occupations include tacit knowledge, that is, practices which embody experience from previous practice. Such tacit knowledge may be transformed by making it explicit by expressing it symbolically orally or in gestures. Explicit knowledge may be transformed again by recording it in an enduring medium such as paper, on clay or wax tablets, bamboo slats, knotted cords, or in marks on a gunner's quadrant. Practical knowledge may be transformed further by being regularised, or repeated consistently because it follows a rule or principle which may be tacit or explicit. Part of such regularisation may be to structure the practice sequentially, as is typical with recipe books. Practical knowledge may be further transformed by being structured hierarchically, by, for example, developing a statement of knowledge which is more general than its constituents. At the top of this hierarchy practical knowledge may be explained by a theory or concept which relates it to other practices.

These transformations are not arbitrary, but are achieved by applying principles which are explicit (Young, 2006, pp. 118-119) and accepted by the audience.

Table 1 A hierarchy of practical knowledge

Conceptualisation	Instantiation
Explained theoretically	The practice is explained by a theory or concept which relates it to other practices.
Structured hierarchically	Knowledge of the practice is structured hierarchically.
Systematised	The practice is organised according to an explicit principle.
Structured sequentially	The practice is followed in a specified order.
Regularised	The practice is repeated consistently because it follows a rule or principle which may be tacit or explicit.
Recorded	The practice is expressed in an enduring medium such as on paper.
Explicit	The practice is expressed symbolically orally or in gestures.
Tacit	A practice embodies experience from previous practices.

2 The structures of practical knowledge (Valleriani, 2017a)

The paper describes the transformation of European practical knowledge of artillery during the early modern period. This is a fruitful source for observing the development of applied knowledge because during the early modern period artillery was one of several knowledge-intensive activities that were increasingly codified in treatises, commentaries, almanacs, tables, written recipes, drawings, woodblock prints, instruments, and models, some of which were disseminated extensively by the then newly established technology of print with moveable type, but without modern structures of qualifications, state regulation, and the specification of standards. The first source for this description is Valleriani (2017a) and colleagues' accounts of the restructuring of knowledge of artillery, ale-brewing and mining. These are instructive because while these activities required the use of intensive knowledge by several people working together, their work was not structured by an occupational association such as a guild or a profession during the early modern period, and thus practitioners relied on less systematic and formal means for restructuring their knowledge.

These activities' knowledge was structured by their workflow, by the social structure of practitioners and of those who managed the knowledge, and by the conceptual system within which practical knowledge is embedded (Valleriani, 2017b, p. vii). Practical knowledge didn't have to be restructured just to apply it to a new context. Gunnery on ships was and is very different from gunnery on land, but that just stimulated the development of a new art of gunnery and its recording in manuals for ships gunners separate and somewhat different from manuals for field gunners. Practical knowledge was restructured into a different conceptual system not to transfer it to different practitioners, but to inform a different class which mobilised the resources for the activity, supervised it, or were interested to learn about a new activity. Printed technical treatises, which flourished in the 16th century, were not sufficiently detailed to instruct a novice, but were written for the information of elites, investors and bureaucrats, according to Long (2011) as cited by Kremer (2017, p. 337). Treatises were written by experts who were intermediaries between rulers and practitioners who accumulated, integrated and managed practical knowledge, and translated and communicated it to outsiders (Valleriani, 2017b, p. 5).

3 Artillery

Europe's first artillery propelled by gunpowder were bombards, introduced in the early 14th century. Bombards were crude mortars and cannons of up to 500 cm long weighing up to 17

tonnes, which fired stone balls of up to 63 cm in diameter inaccurately over a short range of around 150 meters. These early artillery were not very effective: they were 'largely inaccurate, most battles in which they figured had few casualties from artillery and the sieges in which they were used more often than not ended through endurance, not breaching' (Walton, 1999a, p. 7).

In around 1425 the recipe for gunpowder was tripled in strength, and bombards were lengthened, increasing their range and accuracy. Cast iron cannonballs were developed which were cheaper to produce than manually shaping stone into spheres, and provided a denser shot which fitted the barrel more closely, which increased its effectiveness in destroying walls (Walton, 1999a, p. 6). Artillery started to win battles in the 15th century (Parker, 1976, p. 203).

By the end of the 15th century forged iron guns were replaced by cast bronze and then by cast iron guns, and 'boring machines came to be used to correct the bores of guns after manufacture, which increased the precision of shooting' (Büttner, 2017, p. 120). Artillery prominently established its efficacy in sieges at the end of the 15th century with the French blitzkrieg of Italy in 1494-1495 (Walton, 2000, p. 153). Even so, all of Roger Williams' (1539/1540-1595) accounts of the English use of cannon in the Low Countries in the late 16th century are of them being fired within 180 meters of their target, or well within the 'pont-blank' range of being shot horizontally with the ground (Walton, 1999a, p. 203).

As it transformed warfare (Büttner, 2017, p. 120) artillery attracted considerable interest outside the military, and this was reflected in 3 types of literature discussed below. There were several scholarly treatises on artillery, which were mostly concerned with ballistics which mostly sought principles and formulas to explain and predict shots' trajectories. Some such as da Vinci's notes remained in manuscript, but most were printed. In contrast, almost all gunners' manuals were in manuscript only. These were compilations of recipes and notes which recorded combinations of ingredients and processes used by gunners which may be easily forgotten. A third type of literature was printed books for interested lay readers. Extending Walton's (1999b, p. 11) observation, the 3 types of literature had 3 different purposes: research for the scholarly texts, mnemonic for the manuals, and didactic for the 'trade' books.

3.1 Scholarly literature on ballistics

Leonardo da Vinci sketched artillery trajectories in his notebooks of 1452 to 1519 (Büttner, 2017, p. 127). Nicolò Tartaglia (1499/1500-1557) published *Nova scientia* (A new science) in 1537, the first printed book on artillery (Valleriani, 2013, p. 5; Walton, 1999b, p. 8). Tartaglia elaborated his discussion of ballistics in *Quesiti et inventioni diverse* (Various questions and inventions) published in 1546. In *Discorsi e dimostrazioni matematiche, intorno a due nuove scienze* (Discourses and mathematical demonstrations relating to two new sciences) published in 1638 Galileo (1564-1642) demonstrated that ballistic trajectories were parabolas in the absence of air resistance and follow a retarded parabolic trajectory with air resistance. Evangelista Torricelli (1608-1647) extended Galileo's mechanical principles in *De motu* (On motion) published in 1644. Benjamin Robins (1707-1751) applied Newtonian principles to gunnery in his *New principles of gunnery* published in 1742. Newton calculated the effect of air resistance on trajectories in *Philosophiæ Naturalis Principia Mathematica* (Mathematical principles of natural philosophy) published in 1787.

Philosophia naturalis or scholarly works on ballistics were not directly applicable to gunnery until the 18th century, for at least 6 reasons: ballistics scholarship from the 15th to the 18th century was preoccupied with finding the elevation of a gun to get its maximum range ('the gunners' question', France, 2014, pp. iv, 1), but no contemporary gun could fire at the relevant elevation; while changes in elevation of a few degrees around 0° and around 90° greatly changed the shot's range, changes of elevation of plus or minus 5° around 45° made only small changes in range (Büttner, 2017, p. 139-141), and these changes would be swamped by the effects of many other changes over which the gunner had little control, such as variations in the

powder's moisture, granularity and composition; ballistics depends on knowing the gun's distance from the target (France, 2014, p. 44; Valleriani, 2013, p. 2), which was not always easy to find; even if the elevation for maximum range could be established empirically, it could not then be replicated even approximately in the field; even were ballistic theory and published range tables accurate for one piece of 'great ordnance' (Walton, 2006, p. 53), they wouldn't apply well to any other pieces even of the same type because ranges are affected markedly by different powder, and cannons' bores, balls and recoil, none of which were standardised and all of which were hard to measure; and scholarly techniques were hardly relevant to gunners' practice, which accounted for the numerous different factors affecting 'aimed shooting' (Büttner, 2017, p. 122) more by trial and error.

3.2 Gunners' manuals

Gunners 'tended to disseminate knowledge from one generation to the next more or less directly through the apprenticeship system rather than through written texts' (Walton, 2013, p. 221), 'but as far as we can tell, it was not regularized or codified in any way' (Walton, 1999a, p. 180). Craft treatises are therefore not necessarily typical expressions of craft knowledge. Gunners' manuals survive from the 1450s (Walton, 2013, p. 222). They are rezeptliteratur, or recipe literature, which were aides memoire rather than complete descriptions of the skills they memorialise (Walton, 2013, pp. 222, 225, 229).

Gunners' manuals record and disseminate in text practices that had previously or otherwise been only oral. They may also make explicit what had previously been tacit, altho this may have been achieved in the oral tradition before it was recorded in text. But the manuals report only procedural knowledge. And that knowledge was of practices that weren't even regularised let alone systematised until the 17th century (Walton, 1999a, p. 169).

The authors decided what to include as gunners' practice and knowledge, but they do not state explicitly the criteria for inclusion as gunnery knowledge. Gunners' manuals may be ordered, but their order is not explicit. Neither do manuals have an explicit hierarchy of knowledge. Gunners' manuals are not strongly classified and framed as text books (Bernstein, 1975, p. 29). They were presumably useful in the immediate context of their audience, but they do not structure their knowledge for use or even comprehension outside their immediate context. For this we turn to another body of artillery literature: books for untrained readers.

3.3 Artillery books for non specialist readers

The successes of new developments of the military technology of artillery generated considerable interest amongst readers who were not specialists, neither as practitioners nor as scholars. William Eldred (1563?-1646?) indicated the audience of this different type of literature in his dedication of his Gvnners glasse published in 1646 to the reader: 'Honourable and courteous Gentlemen'.

These texts were not sufficiently detailed to explain how to do anything, but they were explicitly structured by topic and by the steps needed to achieve an outcome. Their explanations were abstracted and idealised. They explained how artillery worked, not how to work it (Walton, 2013, pp. 223, 227, 229). They restructured the practical knowledge of gunners for a new audience by representing and expressing it in drawings, tables, mathematical symbols and expressions imported from other domains of knowledge (Büttner, 2017, p. 119). These books were in the vernacular and interpolated knowledge claims not particularly relevant to contemporary gunners' practice and inconsistent with their knowledge, such as the precise trajectory of munitions (Büttner, 2017, pp. 128, 129, 157). They included speculation, such as drawings of the shots' trajectories. These were speculative because trajectories were not apparent from observation and their shape wasn't demonstrated in broad principle until Galileo's *Two new sciences* in 1638 and more accurately by Newton's *Principia* in 1787.

Nonetheless, this attention 'led to the transformation of mechanics from a low-status art to a noble science' (France, 2014, p. 14) and to a convergence of manuscript manuals and printed conceptual descriptions of gunnery.

4 The development of vocational knowledge from practice

We have observed that research is transformed in several stages to become applied knowledge. Bernstein (1996/2000, pp. 9, 52) calls these transformations 'recontextualisation', and Hordern (2014) describes how vocational knowledge may be recontextualised. We have also observed that practice is transformed in several stages to become applied knowledge. Valleriani (2017a) and colleagues call these transformations 'restructuring'. Knowledge is not transformed just to apply it to a new context. It is transformed when it is expressed in a different epistemic form or at a different epistemic level for use by a different type of actor for a qualitatively different purpose from the initial practice.

Transforming knowledge requires people with expertise and resources to devote considerable time, effort and imagination. Some transformations are currently supported by extensive expertise, resources and infrastructure, tho this may be considered still imperfect or incomplete. Thus, there is extensive infrastructure in universities and expertise in scholarly associations to transform research into disciplinary knowledge.

There is also extensive infrastructure to transform disciplinary knowledge into pedagogic knowledge. Much of this infrastructure is in universities, colleges and schools, but there is also substantial infrastructure in curriculum bodies and in commercial publishers of textbooks, tests, and learning systems.

There is also extensive infrastructure to transform research and disciplinary knowledge into practice. Some of this is in universities and research institutes, most of it is in sizeable producers of goods and services, and some expertise is in intermediary bodies such as technology transfer bodies. But there is extensive literature on innovation systems and on translating research into practice which argues that the processes for transforming research and disciplinary knowledge into practice are imperfectly understood and practiced.

Some occupational associations and some occupational registering bodies contribute substantially to transforming disciplinary knowledge into vocational knowledge. Some also transform practice into vocational knowledge. Practical knowledge is also transformed by bodies which establish standards for goods and services such as the International Organization for Standardization (no date) and its 164 national standards bodies. Sadler (2014, pp. 279-281; 2017, pp. 85-89) describes how industrial standards are made and used, comparing them with the much less tightly specified academic standards.

Big and medium sized employers also transform practice into higher epistemic levels of rules and systematic practices which they develop for their production, systematic procedural knowledge which they develop to manage their production and to monitor its quality, and vocational knowledge which they develop to induct new employees and to develop the expertise of existing employees. However, over the last 20 years employers in liberal market economies (Hall & Soskice, 2001) have cut by up to half their investment in internal training and development (Australia - Oliver & Wright, 2016; Canada - Cotsman & Hall, 2015, p. 6; UK - Green, Felstead, Gallie, Inanc, & Jewson, 2016; USA - Cleary & Van Noy, 2014, p. 1).

The general response has been to transfer to students and to the public responsibility for developing (prospective) employees' practical knowledge, which is often renamed 'entrepreneurship' and 'employability skills'. Least helpfully, educational institutions are blamed for not producing 'work ready' graduates. Another response has been to expand very greatly various forms of work experience undertaken as part of or associated with students' educational program, known variously as internships, practicums, and work integrated learning. Some arrangements called 'apprenticeships' in some liberal market economies are

combinations of formal education and work experience little different from other forms of work integrated learning.

While the various forms of work based learning have strengths, they also have several limitations which are discussed extensively in the literature and need not be rehearsed here. Of more interest to this paper are the epistemic limitations of knowledge embedded in practice: it is not recorded, it takes a lot of time and resources to transfer, and it seems to have necessary limits to the scale at which it may transfer knowledge. There would therefore considerable benefits from transforming into higher epistemic levels at least the parts of practical knowledge that seem amenable to such transformation. This seems an appropriate role for vocational colleges and institutes.

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The Influence of Occupational Structure on Transfer from College to University Programs in Selected Fields in a Liberal Market Economy

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Abstract

This paper reports for Canada the types and fields of qualifications of occupations in selected general, applied and regulated fields at 3 skill levels: occupations that usually require university education, occupations that usually require college education or apprenticeship training, and occupations that usually require secondary school and/or occupation-specific training. The paper observes patterns by types and levels of occupations, but also that fields seem to be shaped to some extent by their own circumstances. The paper also reports fields' occupational structures which suggest that educational and occupational progression may be shaped as much by occupational permeability as by educational permeability. An implication is that while the demarcation of occupations characteristic of Europe's coordinated market economies facilitates a close correspondence of education and work, it may also inhibit occupational and corresponding educational progression.

Keywords

occupational structure; Canada; occupational transfer; education and work

1 Analytic context

The liberal market economies of the UK, North America and elsewhere have much looser relations between education and work than the coordinated market economies characteristic of continental Europe (Hall & Soskice, 2001). Nonetheless, regulated occupations in the liberal market economies share some of the characteristics of similar occupations in continental Europe. This study examined whether this may explain different relations between education and occupations in regulated, applied, and general fields in a liberal market economy.

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The paper considers the extent to which the potential for educational and occupational progression may be shaped by the macro characteristics of an economy that Hall and Soskice (2001) examined, and the extent to which they may be shaped by the specific characteristics of a field. Some fields seem to have sufficiently close coordination of educational and occupational progression to be a skills ecosystem that Finegold (1999) described, while others seem to be loosely coupled.

2 Method

This paper reports data from Statistics Canada's (2011) National Household Survey on the structure and educational background of people who were working in selected occupations in mid 2011. The National Household Survey was a random sample conducted by Statistics Canada of 4.5 million households. This was 30% of all private dwellings occupied by 13,320,614 usual residents.

The paper analyses data for each of the top 3 skill levels Statistics Canada (2012) uses to categorise occupations:

Skill level A2 - professional: occupations usually require university education;

Skill level B - occupations usually require college education or apprenticeship training;

Skill level C - occupations usually require secondary school and/or occupation-specific training.

The paper analyses data for natural sciences and for social sciences as examples of general fields; of business except accounting, and computing as examples of applied fields; and of engineering, and nursing as examples of regulated fields. Most of the detailed occupations analysed are shown in Table 1. Some of the more repetitive detailed occupations are not included for brevity.

We identified no science occupation and no social science occupation at skill level C. We chose to examine business as an example of an occupation which is not regulated but which has a prominent occupational identity and thus is associated with applied educational programs, which normally have business or commerce in their title. We excluded from the business analysis financial auditors and accountants which are formally regulated. There were 203,470 financial auditors and accountants reported in Statistics Canada's (2017) 2011 National Household Survey: Data tables. The remaining business professional occupations included in the analysis had 282,940 workers. Identifying non accounting business occupations at levels B and C required similar exercises of judgement. Statistics Canada (2012) identified 2 engineering occupational groups at skill level A2, which we adopted except we did not include in the analysis ‚Computer engineers (except software engineers and designers)', of which there were 25,620 or 11.5% of all professional engineers in 2011. Somewhat more judgement was needed to identify engineering occupations at skill levels B and C.

Table 1 Occupations chosen for analysis

Skill level A2	Skill level B	Skill level C
General: Natural sciences		
Physical science professionals Biologists and related scientists	Technical occupations in physical sciences Technical occupations in life sciences	None
General: Social sciences		
Social and community service professionals Economists and economic policy researchers and analysts Business development officers and marketing researchers and consultants Social policy researchers, consultants and program officers Program officers unique to government Other professional occupations in social science, n.e.c.	Social and community service workers Customer and information services supervisors Other religious occupations	None
Applied: Non accounting business		
Financial and investment analysts Securities agents, investment dealers and brokers Other financial officers Professional occupations in business management consulting Professional occupations in advertising, marketing and public relations	Administrative services supervisors Administrative and regulatory occupations Finance, insurance and related business administrative occupations Retail sales supervisors Technical sales specialists in wholesale trade and retail & wholesale buyers Insurance, real estate and financial sales occupations Insurance, real estate and financial sales occupations	General office workers Office equipment operators Financial, insurance and related administrative support workers Library, correspondence and other clerks Sales and account representatives - wholesale trade (non-technical Retail salespersons
Applied: Computing		
Computer and information systems professionals	Technical occupations in computer and information systems	Office equipment operators
Regulated: Engineering		
Civil, mechanical, electrical and chemical engineers Other engineers not including ,computer engineers (except software engineers and designers)'	Technical occupations Machining, metal forming, shaping and erecting trades Electrical trades and electrical power line and telecommunications workers Carpenters and cabinetmakers Machinery and transportation equipment mechanics	Machine operators and related workers in mineral and metal products processing and manufacturing Machine operators and related workers in food, beverage and associated products processing Mechanical, electrical and electronics assemblers Other assembly and related occupations
Regulated: Nursing		
Professional occupations in nursing	Licensed practical nurses	Nurse aides, orderlies and patient service associates

3 Qualification structure

Table 2 shows a summary of the types of qualifications held by each level of occupation in each field examined. Thus, we note that in business a postsecondary certificate, diploma or degree was not held by 13.7% of workers in professional occupations, those that usually require university education (skill level A2). This was by far the highest proportion of unqualified professional workers of the fields examined. The proportions of professionals with no postsecondary qualification are the lowest in the regulated occupations of nursing (1.9%) and engineering (2.6%). The relatively high proportion of nursing professionals with college qualifications only (31.3%) reflects the fact that only a college qualification was required to register as a nurse in most province until the 1990s, and this falls to 23.1% for 15 to 39 year old professional nurses. There are remarkably similar proportions of workers at skill level A2 with combinations of college/trades and university qualifications, ranging from 27.3% in computing to 33.0% in engineering.

Table 2 Proportion of workers at skill levels A2, B and C by type of qualification for selected occupations, Canada, 2011, %

Occupational field and level	None	College/ trades only	College/ trades and university	University only	Total
Business A2	13.7	21.3	29.6	35.4	100
Business B	31.3	35.4	16.3	17.0	100
Business C	48.9	31.1	9.6	10.4	100
Computing A2	9.8	25.1	27.3	37.8	100
Computing B	20.3	47.1	17.5	15.1	100
Computing C	59.0	31.7	1.5	7.8	100
Engineering A2	2.6	11.1	33.0	53.2	100
Engineering B	31.4	60.6	5.1	2.9	100
Engineering C	63.2	27.6	5.1	4.2	100
Nursing A2	1.9	44.3	30.6	23.3	100
Nursing B	2.5	80.0	11.0	6.4	100
Nursing C	25.2	61.0	8.2	5.4	100
Science A2	4.2	7.1	32.7	56.0	100
Science B	20.4	47.5	17.3	14.7	100
Social sciences A2	8.8	15.4	32.6	43.1	100
Social sciences B	23.0	38.4	21.1	17.5	100

Source: National Household Survey 2011.Nursing data extracted from the Toronto research data centre by Jennifer Hounsell and Norin Taj in February 2018, and other data extracted by Eric Lavigne on 16 November 2018.

Nursing is the only occupation at level B which is regulated in Canada, and accordingly 97.5% of these workers have a postsecondary qualification, most various combinations of college and/or trade qualifications. Even so, from 70% to 80% of workers at level B in other occupations have a postsecondary education qualification, indicating potential for educational and perhaps occupational progression. Around 34% of level B workers in the unregulated

occupations of business, computing, sciences and social sciences have a bachelor or higher, potentially qualifying them for employment at skill level A2.

Nursing is unregulated at level C yet a remarkable 75% of workers have a postsecondary qualification. Qualifications are well established for personal care attendants, and it seems that they are generally used if not required to enter the occupation. Of the other occupations at skill level C for which data were collectd, from half (business) to around 40% (computing, engineering) of workers had a postsecondary qualification, suggesting the potential to progress educationally and perhaps occupationally.

4 Highest qualification field

The proportion of workers at skill level A2 with their highest qualification in their field of work is highest in the regulated occupations of engineering (90.8%) and nursing (89.0%) (Table 3). Just over half (52.1%) of science professionals had their highest qualification in physical and life sciences and technologies, and the proportions of professionals with their highest qualification in a directly relevant field were lower for business (45.1%), computing (39.5%), and social sciences (27.7%). The common fields of the highest qualifications at skills levesl B and C for which colleges develop most workers reflect to some extent colleges' fields with big enrolments. Thus, in contrast to the USA, colleges in most Canadian provinces do not have sizeable enrolments in the liberal arts and sciences and so high proportions of science and social science workers are educated in cognated fields of engineering and technology, and business.

Table 3 Proportion of workers at skill levels A2, B and C by field of highest qualification for selected occupations, Canada, 2011, %

Occupational field and level	No qual	Same field	2nd field	2nd field	Other fields	Total
Business A2	13.7	45.1	16.1	Social and behavioural sciences and law	25.1	100
Business B	31.3	32.5	8.9	Social and behavioural sciences and law	27.3	100
Business C	48.9	19.1	6.1	Social and behavioural sciences and law	25.9	100
Computing A2	9.8	39.5	23.2	Architecture, engineering, and related technologies	27.5	100
Computing B	20.3	37.3	23.1	Architecture, engineering, and related technologies	19.3	100
Computing C	59.0	0.0	28.7	Business, management and public administration	12.3	100
Engineering A2	2.6	90.8	3.6	Business, management and public administration	3.0	100
Engineering B	31.4	56.2	2.7	Business, management and public administration	9.7	100
Engineering C	63.2	16.8	4.9	Business, management and public administration	15.1	100
Nursing A2	1.9	89.0	2.8	Social and behavioural sciences and law, and education	6.3	100
Nursing B	2.5	85.6	4.0	Business, management and public administration; and personal, protective and transportation services	7.9	100

Occupational field and level	No qual	Same field	2nd field	2nd field	Other fields	Total
Nursing C	25.2	52.5	8.6	Business, management and public administration	13.7	100
Science A2	4.2	52.1	19.9	Agriculture, natural resources and conservation	23.8	100
Science B	20.4	11.1	34.8	Architecture, engineering, and related technologies	33.7	100
Social sciences A2	8.8	27.7	33.3	Business, management and public administration	30.2	100
Social sciences B	23.0	21.9	25.3	Business, management and public administration	29.8	100

Source: National Household Survey 2011.Nursing data extracted from the Toronto research data centre by Jennifer Hounsell and Norin Taj in February 2018, and other data extracted by Eric Lavigne on 16 November 2018.

5 Occupational structures

Figure 1 shows the number of workers at each skill level for selected business occupations. These form a classic hierarchical pyramid, with a small peak of senior managers and progressively more workers at lower skill levels. Figure 1 also shows the number of each business skill level who has no qualification, college and/or trade qualifications, and at least a university qualification. It will be noted that 20.0% of business level C workers and 33.3% of level B workers have a university qualification and thus are formally qualified to progress to the professional level.

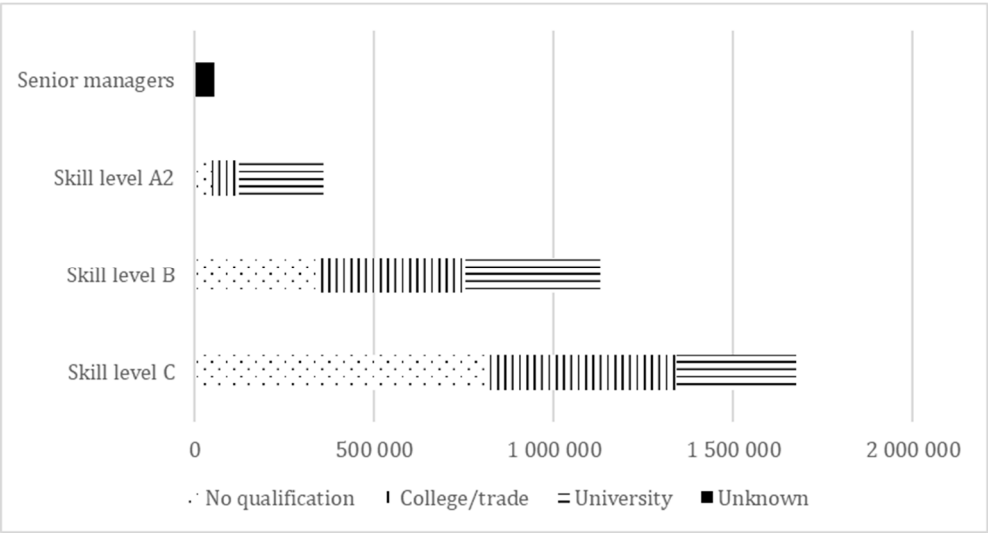

Figure 1 Occupational structure of selected business occupations

The structure of computing occupations is illustrated in Figure 2. Almost 80% of computing workers at skill level B have a postsecondary education qualification, and 25.1% of computing workers at occupation level A2 have trade and/or college qualifications, so there should be reasonable prospects for workers at skill level B to proceed to the much bigger skill level A2. The team plans to explore this in interviews with computer workers.

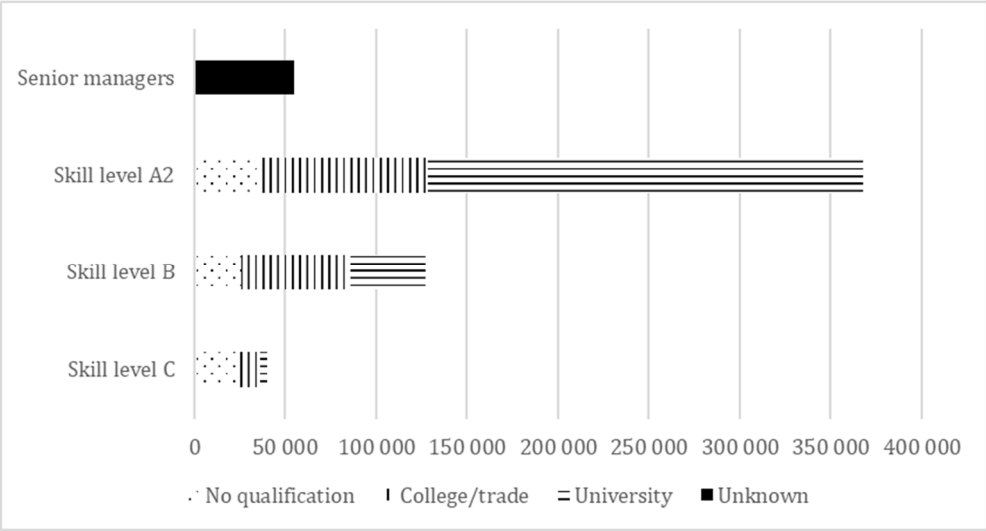

Figure 2 Occupational structure of computing occupations

Engineering's occupational structure is shown in Figure 3. Of the workers at skill level B only 5.2% have a university qualification, yet 85.0% of workers at skill level A2 have a university qualification so a low proportion of engineering workers at skill level B have the qualification that would qualify them for the overwhelming majority of jobs at skill level A2. Similarly but less pronounced, 29.9% of engineering workers at skill level C have college/trades qualifications which are held by 63.4% of workers at skill level B.

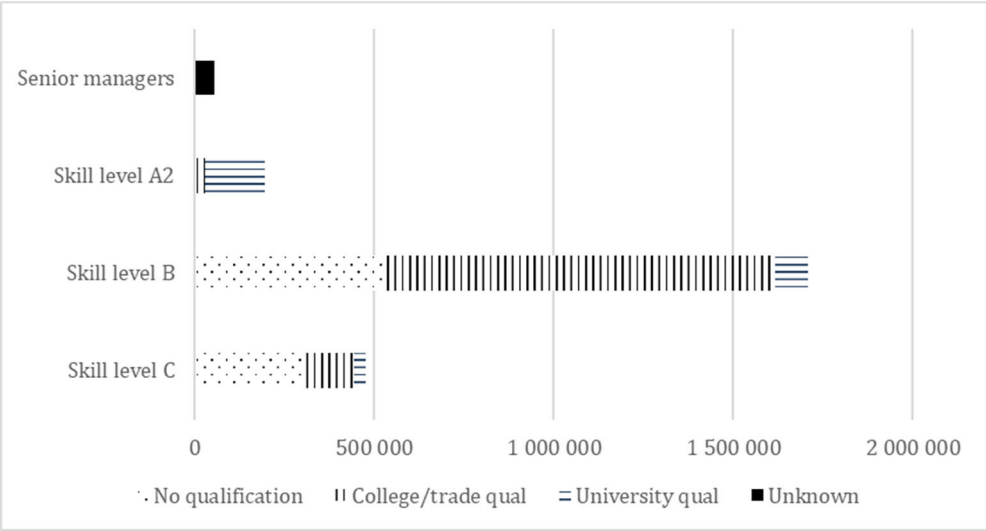

Figure 3 Occupational structure of engineering occupations

The structure of nursing occupations is shown in Figure 4. There are 212,400 nurses at skill level C, almost three-quarters of whom have a college or university qualification, which would qualify them to progress to a level B qualification. However, there are only 58,740 level B workers in nursing, producing a bottleneck inhibiting nurses progressing from level C.

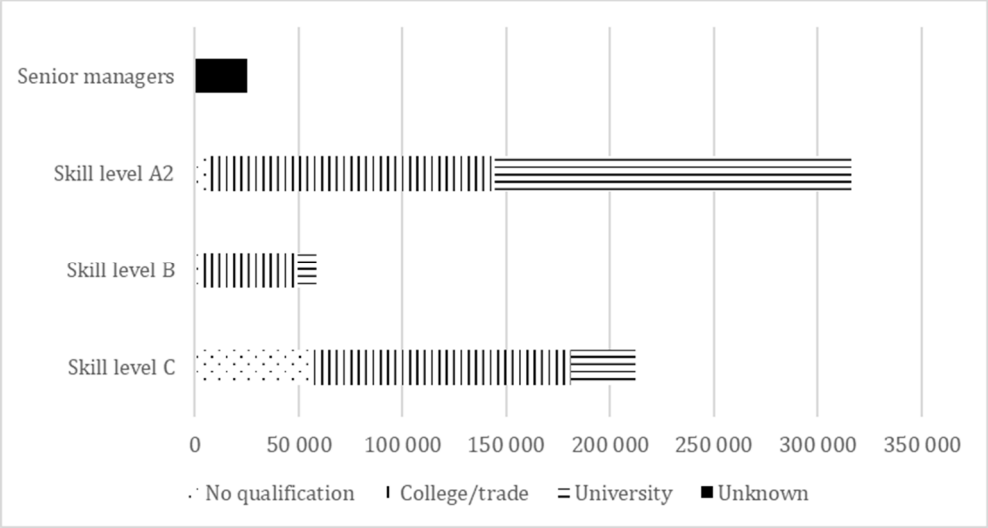

Figure 4 Occupational structure of nursing occupations

The occupational structure of sciences is shown in Figure 5. Some 32.0% of science workers at skill level B have a university qualification and thus are formally qualified to progress to skill level A.

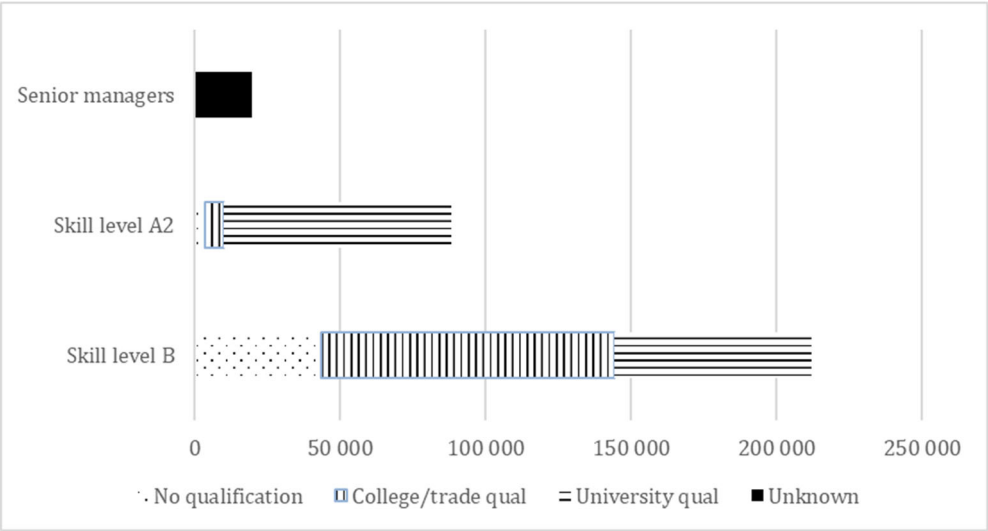

Figure 5 Occupational structure of science occupations

Finally, Figure 6 shows the social sciences occupational structure. Of the workers at skill level B 38.6% have a university qualification and thus are formally qualified for employment at skill level A2.

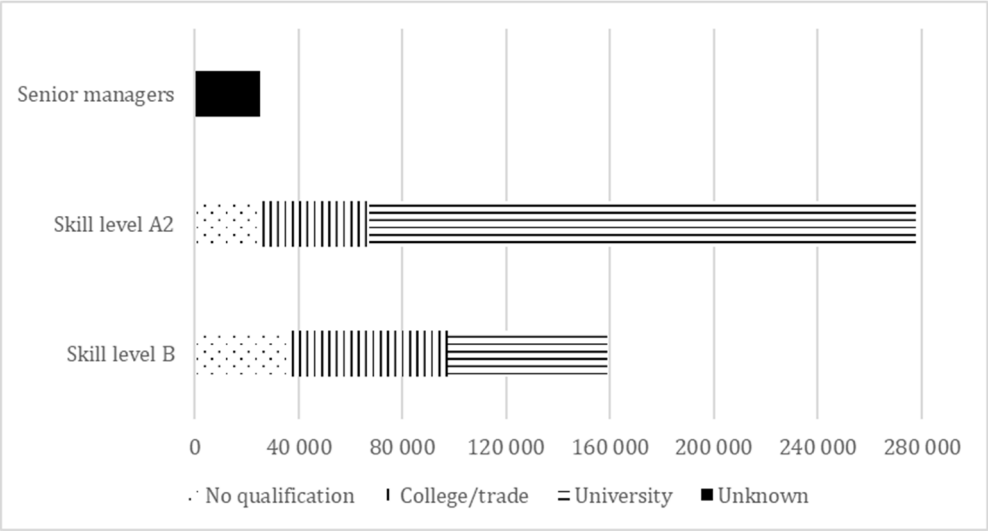

Figure 6 Occupational structure of social sciences occupations

6 Conclusion

The data reported here support our categorisation of fields into regulated, applied, and general. But they also show that higher occupational preparation and progression in at least 1 liberal market economy is as diverse as it is consistent.

Consistent with expectations, the regulated occupations have very high proportions of workers with a qualification of the level and in the broad field specified by regulation. But nursing and engineering are also very different. While regulations require a diploma to practice in nursing at skill level B, 17.4% of nurses at skill level B have a university qualification alone (6.4%) or in addition to a college/trade qualification (11%). In contrast, 8% of engineers at level B have a university qualification. Nursing is not regulated at level C, yet 75% of its workers have a postsecondary education qualification. In contrast, only 37% of engineer workers at level C have a postsecondary qualification. It is possible that level C nurses are part of a health carers' skills ecosystem: many work in health facilities many of which are regulated even if their main workers are not regulated; they work in teams with qualified nurses and other qualified practitioners; and perhaps share an ethos of patient care.

The applied disciplines are similar in having similar proportions of workers with university qualifications only, around 35% at level A2, 15% at level B and 10% at level C. The other occupations have rather higher proportions of A2 workers with university qualifiations only, except for nursing where more A2 workers have college qualifications for historical reasons. The applied fields were also similar in having similar proportions of workers with their highest qualification in the same field at levels A2 and B, at around 40% for A2 workers and 35% for workers at level B.

The general disciplines are similar in being constructed mostly by their educational qualifications, university qualifications for A2 workers and college qualifications for workers at level B. We could identify no science nor social science occupation at level C to analyse.

In most of the fields examined there is a reasonable correspondence between the level of workers' qualification and the level of their work. There are remarkably similar proportions of workers at skill level A2 with combinations of college/trades and university qualifications, ranging from 27.3% in computing to 33.0% in engineering. This suggests that there are opportunities for workers with qualifications that prepare them for level B occupations to progress to level A2 occupations. There are also substantial proportions of workers at levels B

and C who are at least formally qualified to enter an occupation at a higher level. There is much less correspondence between the field of qualification and the field of work in the unregulated fields examined.

Opportunites for occupational progression depend on may factors not considered in this analysis, such as the arrangements of sectors, industries and employers. But a limiting or contextual factor is a field's occupational structure: the number of jobs at each skill level and the opportunities that workers have to gain (higher) postsecondary education qualifications. From this analysis we infer that opportunities for occupational progression and thus incentives for educational progression may be shaped as much by occupational structure as by educational structures and proceeses.

The business occupations analysed form a classic pyramid and thus in principle offer opportunities to progress from occupations at level C to levels B and A2. The big majority of computing workers are at level A2, but at least structurally, those at level 2 seem to have opportunities to progress to level A2. However, there seem very few computing workers at level C who would have an opportunity to enter and progress in the field. In engineering there may be opportunites to proceed from level C to level B, but there seem few opportunities to progress to level A2. Progression in nursing seems to be restricted by the hour glass shape of the field, with few opportunities for the sizeable number of workers at level C to progress to level B.

This suggests that educational and occupational progression may be related as much to occupational structure as to educational structures and processes, that progression may be shaped as much by occupational permeability as by educational permeability. An implication is that while the demarcation of occupations characteristic of Europe's coordinated market economies facilitates a close correspondence of education and work, it may also inhibit occupational and corresponding educational progression.

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EU Research and Innovation Policy and VET: Concepts, Development and Challenges

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Abstract

EU strategy currently promotes science and research as they are considered key facilitators of Europe's advance towards smart, sustainable and inclusive growth, jobs and competitiveness (Europa 2020). Job skills and vocational education and training (VET) have therefore been integrated into Europe's public agenda as issues influencing employment and social inclusion in the EU (Copenhagen Declaration 2000, Educa2020, Skills Agenda for Europe, etc.). Given the topic's scientific interest and political relevance, this paper analyses the state of research into VET in the EU. Addressing the issue from the perspective of the formation of public policy and R&D and innovation systems, it will analyse the current state of VET research using a qualitative methodology based on bibliographical and documentary. It begins by contextualising research within Europe's political and institutional framework before analysing the main ideas and conceptualisations that underlie the mode adopted as Community policy. It will then look at how vocational education and training are integrated into Research and Innovation policy at both strategy and programme level (Horizon 2020; H2020). Finally, it sets out the conclusions reached.

Keywords

EU; research; development and innovation; science policy; modes of innovation

1 Introduction

Currently, EU research policy is of great political-institutional relevance, regarding both its strategic nature (Europe 2020) and its level of institutionalisation (Directorate-General for Research, Science and Innovation) and endowment of resources (Horizon 2020 Programme). In the period 2014-2020 its main objective is to promote open and global research and innovation to generate growth and employment in Europe, and to address the main social challenges. In this way, research and innovation is conceived as one of the key axes of European policy (COM, 2010; OECD, 2011, etc.). The formation of public policy and research programmes within the European framework has evolved from a linear approach to scientific production to a systemic one in which higher education is understood as a subsystem of the innovation system but vocational education and training one is not. In part, this is because in the political and institutional sphere innovation was initially and predominantly conceptualised in terms of science and technology (also called as research and development - R&D). When innovation was later recognised in business terms, it was as a mode of science and technology

(also called as research, development and innovation – RDI). Thus, the mode of innovation based on learning by doing, using and interacting (DUI) was relegated to a background role, which is precisely where vocational education and training has most potential. As a result, vocational education and training are not seen as the subject of innovation, but as the object of research —and one attributed scant scope and resources at that— in which there is a strong bias towards vocational skills. It is largely regarded as a research topic rather than as a separate area, which relegates it to the periphery of EU research and innovation policy. The outcome is that VET is not prioritised and is not allocated proprietary resources. Consequently, there is a lack of political focus on research into VET at both strategy and instrument level. This is reflected in the design and resourcing of the EU's most important policy instrument —the Horizon 2020 programme— which lacks specific lines of aid or calls for grant applications addressing VET or vocational skills, action on which is therefore scattered across a broad range of socio-economic and cultural areas. This situation is out of alignment with the relevance placed on vocational skills in other EU policies (particularly employment policy).

Following the innovation system literature, this study proposes that the motivation for this situation is largely derived from the innovation modalities underlying the processes of design and development of EU research policy (Lundvall & Borras, 2002; Uyarra & Flanagan, 2009; etc.). From an evolutionist approach it is proposed that there are two modes of innovation (Jensen, Johnson, Lorenz, & Lundvall, 2007): the STI one (Science, Technology and Innovation) and the DUI one (Learning by doing, using and interacting). The STI mode is based on scientific research and technological development activities, whose processes of access and creation of knowledge are explicit and codified, and usually immersed in scientific research institutions or R&D&I units. The DUI innovation mode is based on learning processes through experience, use and interaction, which usually happens more in the business environment. Both systems are complementary within an innovation system, opening innovation to low-tech sectors. This study points out that the prevailing innovation mode at European level is the STI one and proposes that both modes be combined to make vocational education and training an issue on the EU research agenda, thereby allowing greater advances to be made in understanding it in terms of both learning and innovation.

2 Methodology

The goal of this paper is to examine the state of research into VET in the EU given its relevance within Europe in terms of employment, competitiveness, inclusiveness and sustainability. It seeks to answer the question, 'What is the state of research into vocational training in the EU in conceptual, strategic and programme-related terms?'

The methodology used is qualitative and includes a literature review, documentary analysis and in-depth interviews. Adopting a perspective that combines public policy (Hall, 1990; Subirats, 1992; Stone, Maxwell, & Keating, 2001; etc.) and scientific research (Bitterberg et al., 2014, Dosi, Freeman, Nelson, Silverberg, & Soete, 1988; Freeman, 1992; Gibbons et al., 1994; Moso & Olazaran, 2002; Lundvall & Borrás, 2005) with a systemic and innovative conception of vocational training (Albizu, Olazaran, Lavía, & Otero, 2011; Billet, 2011; Navarro et al., 2018, Olazaran & Brunet, 2013), it reviews the literature on scientific research into vocational training in Europe (Gessler, Evans, Lasonen, Malloch, & Mulder, 2018; Grollmann & Sellin, 2000; Lauterbach & Sellin, 2000; Mulder & Roelofs, 2012; Nägele & Stalder, 2018; Descy, Tchibozo, & Tessaring, 2009; Rauner & Maclean, 2008). It also analyses official (European Commission, European Council, etc.) and working documents (Cedefop, Eurofound, Vetnet, etc.) addressing the strategic, programme-related and organisational approaches to VET research in Europe. In particular it analyses the documentation on the Horizon 2020 programme to determine which lines of research support it and to identify the corresponding calls for grant applications. Since there are no specific calls for grant

applications, the documentation is analysed thematically, with the corresponding methodological limitations. Further detailed study of the projects financed to further VET is therefore required to interrelate the aggregated themes and the level of funding.

3 Results

3.1 At a comprehensive level: Research and innovation and VET

After more than three decades of an explicit European research policy, the underlying concept of research policy has developed and evolved, highlighting the role of specific actors and institutions, as well as the main ideas, routines and norms in which they are immersed. This conceptualisation of research is based on an understanding of knowledge that interconnects scientific research, university education and entrepreneurial innovation. This approach is called the 'knowledge triangle' (rooted on the 'Triple Helix' model) (Leydesdorff & Etzkowitz, 1996), that has influenced the definition of EU research policies' strategies and priorities; funding programmes, governance structures; institutional leadership and stakeholder involvement. This study proposes that the motivation for this situation is largely derived from the innovation modalities (Jensen et al., 2007), underlying the processes of design and development of EU research policy (STI and DUI) where the STI mode prevails. Because of this approach, VET system is not understood as part of the research and innovation system. In this sense, it could be of interest to analyse some emerging regional innovation systems that are integrated into VET as part of the same, conceiving it as a subsystem of learning and technology transfer to micro and small enterprises, as is the case in the Basque Region.

In this respect, European research policy could explore these developments at other institutional levels to shape a more systemic policy, taking advantage of all the assets existing in Europe in terms of learning and innovation.

3.2 At strategic and discursive level: VET as skills

EU research and innovation policy does not understand that research into vocational education is a priority area and/or theme. The limited support for research on VET, in terms of calls for proposals, is focused on the field of professional skills, and residually, the relationship between schools and companies and innovation in certain learning processes is analysed. All this is very limited to the field of Social Sciences and Humanities (Bitterberg et al., 2014; COM, 2018), without prioritising an inter or trans-disciplinary vision. This scarce effort to promote collaborative competitive research in the field of VET and professional competences clashes with the political relevance that is being given to it in other political domains such as education and employment, which translates into political-institutional milestones such as the 2020 Education and Training Strategy, the Competitiveness Agenda for Europe (COM, 2016), the European Programme for Education, Training, Youth and Sport, Erasmus+, etc. None of them include any measure concerning research to have greater knowledge, contrast and evidence to help advance knowledge and improvement of VET and professional competences, except for the Erasmus+ programme. In this sense, DG Employment has recently begun to incorporate the research and innovation specialisation strategies (RIS3) in the discourse and actions (Erasmus+), with initiatives such as the 'Centres of vocational excellence', that will support the development of trans-national platforms of centres of vocational excellence closely integrated in local and regional strategies for growth, innovation and competitiveness (EC, 2018b, p. 6). Nonetheless, it s an emerging situation that needs to be further analysed.

3.3 At programme and funding level: Horizon 2020 and VET

The Horizon 2020 Programme is the main research funding instrument in Europe. It is in force for seven years (2014 and 2020), and its objective is "to build a society and an economy based on knowledge and innovation" (COM, 2010). It is endowed with a budget of almost €80 billion of EU funding, in addition to the national public and private investments that this endowment will attract (COM, 2014). Horizon 2020 is also an essential element of the European Fund for Strategic Investment, created in 2015, which is expected to mobilise investments of more than €315 billion.

In the current funding framework (H2020 2018-2020) the call most related to VET is "Transformations 01" (Transformations-01-2018: Research for Inclusive Growth: Addressing the Socio-Economic Effects of Technological Transformation), which covers a wide range of topics to be researched. The themes related to VET are mainly three (COM, 2018, pp. 18-19). First, the evolution of the contents of the work and of the new skills demanded, exploring new ways of measuring new skills that provide verifiable quality data. Second, ways of transforming education and training systems to address the evolution of new content, new skills and work organisation. Third, the assessment of the implications for social mobility and labour market polarisation (in terms of quality of employment, skills, wages, social security coverage, etc.) resulting from technological changes. Other themes of this call include issues such as the evaluation of tax and benefit policies, the evolution of patterns of labour market participation and divergent access to social services, social investment and social protection policies in relation to labour market and productivity, health and safety at work resulting from technological transformations, gender, the rise of digital platforms, etc. In any case, the funding effort made to investigate VET is very limited. If the financing weight of this call (2018-2020) is seen with respect to its main line ('Europe in a Changing World'), its allocation of budget is low (2%), being much lower with respect to the Social Challenges Pillar (0.1%) and to the total budget (0.03%) (COM, 2014). In the H2020 programme the effort in terms of R&D&I expenditure in the field of VET is characterised by high competition for resources with other areas of social research, and by a comparatively small budget. In short, it can be said that supranational research on VET is not attractively funded to enable researchers to seek the most promising avenues of scientific advancement at European level.

3.4 At the governance level: The triangle of Knowledge and VET

The EU governance structure has been built up, integrating European actors and institutions from the political level (STI government, European agencies, etc.), the research level (scientific groups, platforms and networks of researchers from both universities and other research centres) and at the business level (clusters partnerships, public-private research partnerships, etc.). The progress in some areas of knowledge is greater than in others and the level of development and institutionalisation of the system varies accordingly. However, this model does not include vocational education and training as part of the research and innovation system.

3.5 At institutional and system level: a weak structure

In the Copenhagen Declaration (2002), the EU showed its commitment to enhanced cooperation in the field of education and vocational training, but this has not led to the promotion of strategic lines of research or the creation of research groups at European level. European structuring of VET research is weak and scarce. This is reflected in the non-existence in some cases and the scarcity in others of transnational networks for research and innovation in VET, public-private partnerships in European research and innovation in VET, transnational mobility of VET researchers and European research groups and/or platforms.

Supranational research actors on VET are scarce and heterogeneous in profile, grow unevenly and are integrated into differentiated structures: European research networks in education, European centres and agencies and specialised consultancies. On the one hand, European networks for research in VET are scarce, predominantly scientific-academic in nature, and little institutionalised as agents of the system. They are made up of scientific researchers and operate with resources that are unstable over time, forming a weak relationship with the European institutional and decision-making framework. Research groups on VET continue to be based in the Member States or Associated States, with uneven developments, notably Germany, Switzerland and the Scandinavian countries. On the other hand, there is the research carried out by certain European VET centres and/or agencies, with a more institutional vision, with consolidated and stable resources and instruments, and focusing on issues of interest to policy makers. These European agencies draw on their own and external knowledge, and their knowledge providers include universities, specialised consultancies and experts. The connection between both spheres is discontinuous in time and fragile at network level, and shows different research cultures (academic and institutional).

4 Conclusions

4.1 Towards an integral and advanced conception of VET in the EU

At European level, the conception of VET is principally circumscribed to developing the capabilities, competencies and skills of the present and future workforce through vocational education and training for both young people and adults. While this understanding of VET is necessary and key to making progress, it only represents a partial conception as regards the potential that the VET system holds, which as well as providing training and encouraging learning, can become a catalyst for innovation in small businesses and microenterprises. Advanced VET requires direct contact between business and education/training to generate awareness about new trends, technologies and techniques and so deploy them rapidly and efficiently. VET centres could become testing, demonstration and validation laboratories for new products and/or services, thereby shortening technology transfer cycles and promoting rapid take-up by the small companies that make up most of our business fabric. An advanced conception of VET views the VET system as a key facilitator of learning and innovation.

4.2 Need to include VET in the European research and innovation strategy, agenda and governance system

International, comparative and systemic research into VET is relevant to the EU in terms of growth (competitive, inclusive and sustainable), policy (regarding European harmonisation and unification) and sociocultural issues (understanding of diversity and social catalysts). European research must aspire to supranational cooperation if it wishes to create, develop and promulgate a new, advanced and change-oriented body of knowledge on the VET system that breaks the current paradigm. To achieve this, it is necessary to prioritise it politically, reinforce it in EU programmes and allocate it resources under cross-innovation and -fertilisation schemes backed up by transparent assessment mechanisms.

4.3 More research and more resources

More high-quality knowledge, empirical evidence and applied innovation relating to VET is needed as input when designing, monitoring, assessing and enhancing policies and approaches in the European VET domain. This requires prioritised research, which in turn calls for greater quantities of stable and transparent resources and instruments. VET research, development and innovation should be provided with open, competitive and collaborative funding schemes.

Development and consolidation of VET research at European level requires nothing less than explicit and instrumental support.

In conclusion, to gain a robust, advanced and comprehensive understanding of VET, it is vital for there to be political commitment to research into it in Europe and for it likewise to be integrated into the European innovation system. This requires an advanced and systemic vision of VET, political leadership and resourced support that develops into a political agenda for VET research and innovation.

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Biographical notes

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VET and Regional Smart Specialisation Strategies: A Comparative Approach. A Panel Discussion

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Abstract

The purpose of this discussion panel is to discuss the role of the vocational education and training (VET) system within the framework of Smart Specialisation Strategies (RIS3) in different EU countries. Each member of the panel will present a regional experience showing whether and how these strategies integrate VET. The main question is: How are Smart Specialisation Strategies being worked out with regard to VET in your country or region?

Smart specialisation is an innovative approach that aims to boost growth and jobs in Europe by enabling each region to identify and develop its own competitive advantages. Through its partnership and bottom-up approach, RIS3 brings together local authorities, academia, business and civil society, working for the implementation of long-term growth strategies supported by EU funds. In this context, VET is usually limited to the issues of workforce qualification, separating it from the innovation service needs of small and medium-sized enterprises, especially in terms of technology adoption and use. The panel discussion will compromise perspectives from five countries/regions (Germany, Italy, Spain, Switzerland and UK) and a brief discussion. The main features of RIS3 regarding VET will be outlined as well as suggestions for enhancing the role of VET in this strategic framework and policy.

Keywords

regional smart specialisation strategies; VET; innovation systems; VET centres

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1 Introduction

1.1 VET system as a catalyser of learning and innovation

VET centres are more oriented towards technology dissemination than universities (Toner, 2010). They also have a more practical and incremental focus on innovation (learning by doing, using and interacting – DUI). This strength in dissemination is closely related to the territorial dimension, as VET centres have a more local focus than universities (Rosenfeld, 1998). It is also related to the business dimension as they work mainly with micro-enterprises and SMEs (Albizu, Olzaran, Lavía, & Otero, 2017; Olazaran & Brunet, 2013;). However, VET subsystems (initial VET and VET for employment), and VET schools or centres in particular are not usually included as one of the actors in regional innovation systems and have little prominence in European Smart Specialisation Strategies on technical training, provision of technology services to SMEs and local development. Supply of these services would imply converting VET schools (providing the traditional function of training) into multi-functional centres (teaching, technology transfer and dissemination, local development, etc.). This would not, however, mean performing every one of those functions, as those would depend on the needs in the local and cultural environment, the characteristics of the VET system, the local economy and business fabric, sociodemographic trends and collaborative routines. Increasingly, VET centres are conceived as a type of regional innovation player, as different regional case studies show their capability to develop strong interaction with micro-enterprises and SMES to support applied innovation, becoming a technology transfer catalyst for local innovation systems (Navarro, 2014, 2017; Navarro et al., 2018; Olazaran & Brunet, 2013; Rosenfeld, 1998).

Table 1 Value VET system contribute to the intellectual capital of a country or region, particularly its micro-enterprises and SMEs.

Intellectual Capital	System functions	Value contribution	Mechanisms
Human Learning assets	Vocational skills providers Facilitators of lifelong learning	Supply of young people with intermediate and higher technical qualifications required by businesses and strategic sectors	New agile, well-targeted curricula and qualifications
		Reskilling of the active population to meet technology's rapid advance	Personalised education and training programmes
Structural Innovation assets	Technology service provider Access to infrastructure Facilitator of new creative frames	Advisory and/or technical support services	Technology transfer projects
		Specialist technology centres	Shared infrastructure
		Testing and trial services	Extended laboratory
		New collaborative discovery frameworks with apprentices	Challenge-based innovation projects
Relational Connectivity assets	Clustering and collaboration	Meeting place	Networking
		Collaborative space	Project nexus
		Local antenna	Information

Source: Adapted from Moso-Diez (2019)

Those functions could improve the human, structural, relational and social capital of a country or region, adding value to the environment through a range of different mechanisms and instruments, especially in the face of the challenges of industry 4.0. (Moso-Diez, 2019). From an institutional approach (Lam & Lundvall, 2006), the VET system is understood as a subsystem of the innovation system of a country and/or region. This emerging approach involves new conceptualisation and development of the VET system, and specifically of centres in terms of innovation, and has mainly been developed scientifically in Regional Innovation System literature in the last decade (Porto & Doloreux, 2018). In any case, this emerging issue merits further research.

1.2 Smart Specialisation Strategies for strengthening innovation in Europe's regions

Smart specialisation is the capacity of an economic system to generate new specialities through the discovery of new domains of opportunity and the local concentration and agglomeration of resources and competences in these domains (Foray et al., 2012). Smart specialisation is an industrial and innovation framework for regions that integrate public policies, framework conditions, and especially R&D and innovation investment policies in order to improve the economic, scientific and technological specialisation of a region and, consequently, its productivity, competitiveness and economic growth path (OECD, 2013). The rationale behind the Smart Specialisation concept is that by concentrating knowledge resources and linking them to a limited number of priority economic activities, countries and regions can become competitive in the global economy. The difference between smart specialisation and traditional industrial and innovation policies is mainly the process defined as 'entrepreneurial discovery': an interactive process in which market forces and the private sector identify, gather and produce information about new activities and, at the same time, the government assesses the outcomes and empowers those actors most capable of realising the potential. Through its partnership and bottom-up approach, smart specialisation brings together local government, academia, strategic sectors and companies and civil society to define long-term strategies. A priori, RIS3 strategies have three main features. Firstly, they are 'smart' as they aim to identify the region's proprietary strengths and comparative assets. Secondly, they are 'specialised' as they prioritise research and innovation investment in a competitive area of the region. Thirdly, those regional initiatives are 'strategic' because they define a shared vision for regional innovation (European Commission, 2017). As result of this approach, more coherence, efficiency and connectivity is expected, avoiding fragmentation and duplication of initiatives.

The conceptualisation of Smart Specialisation is rooted in the scientific literature of regional innovation systems, including regional and innovation policies and policy-making, learning and innovation systems, economic geography, institutional economics and evolutionary geography (i.e. Asheim, Grillitsch, & Trippl, 2007; Lam & Lundvall, 2006). From that evolutionist approach, the innovation concept is based on different types of knowledge bases. The first is the 'STI' (Science, Technology, Innovation) mode, based on analytical knowledge/basic research (science push/supply-driven approach) and synthetic knowledge/applied research (user-driven approach), emphasising product and process innovation. The second mode is 'DUI' (Doing, Using, Interacting), based on synthetic and symbolic knowledge (market/user-driven), emphasising competence-building and organisational innovation (Lorenz & Lundvall, 2006). Although the DUI mode is strongly associated with the learning and updating of vocational skills, as well as with the strengthening of them to promote technology transfer to SMEs, the VET system practically has a low influence on design and development of the Smart Specialisation framework. In fact, the way it is conceptualised and structured does not take into account the VET system as part of the innovation governance system. Likewise, it fails to give the VET system (both initial and

continuous) a prominent role in training and lifelong learning, smart vocational skills, etc. (EC, 2013; Guzzo, Gianelle, & Marinelli, 2018; etc.).

1.3 Smart Specialisation Strategies (2014–2020)

Since 2014, EU regional and national authorities are required to develop RIS3 before investing European Regional Development Fund (2014–2020) finance in research and innovation (European Commission, 2010), aiming at leveraging public and private funds towards smart specialisation priorities. This ex-ante precondition has resulted in rapid deployment of these strategies, as Smart Specialisation is a central part of the EU Cohesion Policy. Over 200 Smart Specialisation Strategies have been designed at EU level, both nationally and regionally, depending on each country's features, such as its economy and business structures as well as its policy autonomy, political governance and administrative structure. Table 2 shows the breakdown of smart specialisation strategies by Member State and the institutional level responsible for them.

Table 2 Number of Smart Specialisation Strategies by institutional level responsible for Smart Specialisation in the EU

Type	Institutional level	Member States	Total
1	National	Bulgaria (1), Croatia (1), Cyprus (1), Estonia (1), Hungary (1), Ireland (1), Lithuania (1), Latvia (1), Luxemburg (1), Malta (1), Slovakia (1), Slovenia (1)	12
2	Regional	Belgium (3), Denmark (3), Finland (18), France (27), Netherlands (4), United Kingdom (4)	59
3	Both national & regional	Austria (10), Czech Republic (2), Germany (17), Greece (14), Italy (22), Poland (17), Portugal (8), Romania (8), Spain (18), Sweden (21)	137
	Total	28	208

Source: Adapted from Larrea, Estensoro, & Pertoldi (2019, pp. 26–27), gathered from S3Platform (2018), CEMR (2016) and OECD (2016).

These strategies define priorities oriented towards building the competitive advantage of regions and/or Member States by developing and matching their strengths in research and innovation to business needs. Regional Specialisation Strategies identify and select priorities, that will result in 'vertical actions' to select and reinforce sectoral research and innovation areas at regional level, as well as to prepare regional research and innovation organisations for participation in Horizon 2020, and 'horizontal actions', to provide the means of exploiting and disseminating research and innovation results.

Two types of priorities area are identified:

- *RIS3 horizontal priorities areas*

The main objectives of regional strategies are to create new jobs and generate growth, with strategic sectors being the target of policy action, e.g. by supporting the creation of new enterprises or new business niches, improving the competitiveness of existing ones, attracting foreign investors, etc. Depending on the features of each region, some schemes are more used than others (EC, 2013).

Table 3 RIS3 horizontal priorities, means, schemes and outputs

Regional policy objectives	RIS³ horizontal priorities	Means to be deployed	Schemes	Outputs
• Job creation • Economic growth • Sustainable development • Social inclusion	• Supporting private investment in R&D • Stimulating innovation • Enhancing SME competitiveness	• Supporting industrial research • Strengthening human capital development • Fostering University/ SME collaborations • Transforming publicly funded knowledge into market applications • Encouraging the creation of new firms • Boosting the introduction of new products/services into the market • Supporting non high tech innovation • Favouring geographical diversification • Helping sectorial diversification • Promoting the up-scaling of the product range • Supporting the reduction of raw material and adopting environment friendly practices	• Business support infrastructure • Financial support • Advisory services • Support to commercialization of innovative products/ services • Key stakeholder matching services	• Creation of start-ups/spin-offs • Growth of existing companies • Skills acquisition • Job creation • Attraction of foreign direct investment • Phoenix enterprises • Up-scaling the product range • Development of market niches

Source: EC (2013, p. 20)

- *RIS3 vertical priorities areas*

The most common ones at European level are energy, health, information and communication technologies, food, advanced materials, services, tourism, sustainable innovation, advanced manufacturing systems, and the cultural and creative industries.

In general terms, policy makers responsible for designing and implementing RIS3 are developing specific portfolios of priorities as few regions have developed similar combinations of priorities. An example of combination of strategic priorities, expected changes and results is in Table 4. (Sörvik & Kleibrink, 2015).

Various studies and surveys carried out by both the European Commission and external experts point out that while it is too early to assess the results of the EU's Smart Specialisation approach overall, the process of designing and implementing S3 has produced a positive change in the governance of innovation policy in many countries and regions (Tolias, 2019). However, one of the missing links identified is human capital in the broadest sense, especially the lack of the skills (within firms and within the labour market) needed to adopt/implement available innovations.

Strategic priorities	Expected changes	Result indicators
Priority 1 Process innovation in agro-food	Increased adoption of frontier technologies for fresh product preservation among local agro-food SMEs (expected adoption rate of 30% in 5 years)	# or % SMEs introducing process innovation for fresh products preservation # collaborations SMEs + R&D centres
Priority 2 Product innovation in biomedical technologies for degenerative diseases	Development of new products (Increase in patents by 20% in 5 years)	# new patents in this priority field # new R&D staff in sectors relevant for this priority field
Priority 3 ICT & digital communication	Increased adoption of digital communication systems by local SMEs (expected adoption rate of 80% in 5 years)	% firms using integrated web-based services % firms with social-network profiles

Policy mix
Policy mix 1 Vouchers for accessing high-value-added R&D services Competitive grants for SME consortia + R&D centres
Policy mix 2 Research grants via competitive calls Training workshops
Policy mix 3 Co-finance developmen of demonstration projects Awareness raising of new ICT solutions among local firms

Source: Adapted from Gianelle and Kleibrink (2015, p. 11).

Figure 1 An example of combination of strategic priorities, expected changes and results

One of the main needs from a human capital perspective is to analyse the current match between supply and demand for graduates and other types of adult learning provided by the VET system. This could be done by the regional observatories for VET and employment. Other weaknesses are the lack of demand for innovation from micro-enterprises and SMES, the lack of a strategic research plan to add value to leading products and a very limited culture of collaboration among RDTI actors. In response to these concerns, and with the forthcoming review of the RIS3 and the preliminary discussions for the post-2020 programming period in mind, the proposal is to reinforce vocational training and generate human capital able to use innovation in the sector (Marinelli, Tolias, Bertamino, Metaxas, & Grisorio, 2018). That implies improving coordination of complementary policies related to RIS3 such as the European Social Fund (which supports employment, training and education) and the European Regional Development Fund (which supports research and innovation).

1.4 Towards a new programme of Smart Specialisation Strategies (2021–2027)

In 2018, the EC presented a proposal for a regulation of the European Parliament and of the Council (EC, 2018a) that will shape the structural funds and influence the future of the research and innovation strategies for smart specialisation within the framework of the Cohesion Policy over 2021–2027. First, in this forthcoming programme Smart Specialisation Strategies will be circumscribed to the first policy objective ('a smarter Europe'). Second, it will incorporate a more intense focus on developing skills for smart specialisation, industrial transition and entrepreneurship. Third, regarding skills and education, the proposal includes a novelty, the ERDF would support training, lifelong learning and professional education. Fourth, ex-ante

conditionalities would be transformed into enabling conditions; and this implies that the proposed regulation will assure the application of the condition during the entire new programming period (not only as a prior condition). Fifth, a specific body would be created to manage the RIS3. Sixth, the emphasis is put more on industrial transition than research and innovation. The aim is to support more companies, especially SMEs.

In this sense, DG Employment has begun to incorporate the RIS3 in the discourse and actions (Erasmus+), with initiatives such as the 'Centres of vocational excellence'. This initiative will support the development of trans-national platforms of centres of vocational excellence closely integrated in local and regional strategies for growth, innovation and competitiveness, while supporting overall structural changes and economic policies in the European Union (EC, 2018b, p. 6). The Centres of vocational excellence are expected to act as drivers of quality vocational skills in a context of national, regional/local, and sectorial challenges by connecting existing training providers, their networks, etc. and offering high quality transnational joint vocational programmes and qualifications focused on meeting current and emerging sectoral skills needs with a strong element of work-based learning, digital content and mobility experience abroad. Each platform will share a common interest in a specific economic sector (sectoral approach: e.g. automotive, hospitality, social care, aerospace, etc.) or thematic societal challenge (e.g. upskilling the low-skilled, migrants, digital skills, etc.). With this initiative the EC aims to foster 'upward convergence' of excellence in the sector, so that VET providers go far beyond the provision of qualifications, and instead take a pro-active leadership role in regional development and Smart Specialisation Strategies. The novelty of the underlying vision is the understanding of VET as an active stakeholder in the 'knowledge triangle' (research, education and innovation), mainly as a training provider but also, though timidly, as a technological disseminator.

2 Method

To begin, the first question will be put to the participants, who will answer by referring to their respective countries and describing the situation there at regional level (presenting the region they consider most appropriate). An analytical table (Table 4) is provided to guide the discussion in a comparative and coordinated way regarding specific regional RIS3 strategy in each country.

- Question 1. How are Smart Specialisation Strategies being worked out with regard to vocational education and training in your country or region?
- (Describe a specific regional case)

Table 4 Guiding table for answering the first question

Country	National/ regional RIS3 case	RIS3 Priorities (P)	Governance VET as a stakeholder	Role VET Provider of skills	Role VET Applied innovation	Policy-mix (VET linked)
Germany	1	P1 P2 PN	No / Yes (how)	No / Yes (how) IVET/CVET	No / Yes (how)	PM1 PM2 PMN
Italy	1	P1 P2 PN	No / Yes (how)	No / Yes (how) IVET/CVET	No / Yes (how)	PM1 PM2 PMN
Spain	1	P1 P2 PN	No / Yes (how)	No / Yes (how) IVET/CVET	No / Yes (how)	PM1 PM2 PMN
Switzerland	1 (similar)	P1 P2 PN	No / Yes (how)	No / Yes (how) IVET/CVET	No / Yes (how)	PM1 PM2 PMN
United Kingdom	1	P1 P2 PN	No / Yes (how)	No / Yes (how) IVET/CVET	No / Yes (how)	PM1 PM2 PMN

Next, they will be asked about the relationship between the VET system in each country and/or region and the local innovation system.

- Question 2. Is the VET system understood as part of the innovation system in your country?

Table 5 Guiding table for answering the second question

Country	Concept of innovation	VET as part of the formal(1) innovation system	VET Centers as a stakeholder	VET- R&I Specific schemes	VET-SMEs Collabor.
Germany	STI and/or DUI	Yes / No	Yes / No	Yes / No	Yes / No
Italy	STI and/or DUI	Yes / No	Yes / No	Yes / No	Yes / No
Spain	STI and/or DUI	Yes / No	Yes / No	Yes / No	Yes / No
Switzerland	STI and/or DUI	Yes / No	Yes / No	Yes / No	Yes / No
United Kingdom	STI and/or DUI	Yes / No	Yes / No	Yes / No	Yes / No

As part of the regulatory and administrative framework for innovation, which provides access to innovation funding, R&D incentives and aid, etc.

Thirdly, they will examine the main functions that VET centres perform in terms of learning, innovation and connectivity to improve the intellectual capital of the country/region.

- Question 3. Do VET centres/schools tend to be single-functional or multi-functional in your country?

Table 6 Guiding table for answering the third question

Country	Initial VET	Continuous VET	Technical services	Access to Labs	Relational services
Germany	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Italy	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Spain	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Switzerland	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
UK	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No

Finally, they will be asked whether research is being conducted into this area in their respective countries.

- Question 4. What type of research is being done in this sense in your country?

3 Results and conclusions

Finally, as a result of the discussion, conclusions and recommendations will be drawn up for this research topic.

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Private and Public Business Models in Internationalization of VET

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Abstract

The funding program "Internationalization of VET", funded by the German Federal Ministry of Education, recently subsidizes different projects which are funded for implementing education and training services (initial vocational education and training as well as further education) in different countries abroad. This paper analyses two cases from the funding line in regarding their business model approaches and their (current) outcome. The project in Greece, dealing with modernization of curricula and vocational orientation, is successful in another way than the project in Serbia which strives for a demand-driven development and model-like implementation of a dual VET school in Serbia.

Keywords

VET reforms

1 Introduction

A special interest of the funding programme is to support the development of context-related and need-driven business models. This is a challenge for the involved VET providers as they mostly lack the experience of offering services abroad. Based on the "business model generation approach" by Osterwalder and Pigneur (2010) and Osterwalder et al. (2014) we present a comparative analysis of the developed business models with the focus on nine elements: key partners, key activities, key resources, value proposition, customer relationship, channels, customer segment, costs, revenue.

Results of our first online survey[1], completed by all funded projects of the funding program, conducted in fall 2018 and executed by our project partner IIT in Berlin, show that 69% (N=40) of the projects actually work on a project in their respective target country for the first time and only 31% have been active already in the country during the last five years. This

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[1] All projects of the IBB funding line which started between 01.07.2017 and 31.03.2018 have been asked to participate in the online survey.

means a large share of the organizations face the challenge of expanding to a new context and of having to establish new cooperations and connections with potential business partners, clients and local decision-makers such as government representatives.

Currently, 14 projects (which started between mid-2017 and end-2018 and run three years usually) work on the issue: How can a vocational education and training-related service be placed on the market – a foreign, in many cases even unfamiliar market? The countries of interest are Greece, Spain, Serbia, Tunisia, Iran, Kazakhstan, China, South Korea, Brazil, Mexico, and the Philippines.

The goals of the funding program are divided in two dimensions. On the one hand, the first objective is to implement a sustainable business model on the foreign market, meaning after the duration of funding, there should be a lasting business activity. This tagets the achievement of economic gains for VET providers next to the competitiveness of German companies on international markets. On the other hand, there is the target regarding the output-system-level: In how far can the projects support and push reforms and structural developments of the VET system in the target countries? Here, the aim to support international VET cooperation is included in the funding scope (respectively included in each funded project). This division is kept in mind for the analysis of the presented cases.

Hereinafter, we demonstrate the practical application and development of a Business Model Canvas (BMC), named by the kind of presentation of a business model, by drawing on two of the projects: NEMID[2], a project located in Serbia, and GRÆDUCATION[3], a project working in Greece. For NEMID and GRÆDUCATION, we present the categories of BMC and how and why they changed in an iteration process including political actors and other stakeholders.

Our research questions are:

- How are the nine elements defined and how are the relations between the nine elements defined?
- How and with which strategies are the change agents (VET providers) managing the challenges to offer their service(s) abroad?
- Which impact has the project approach on the development of demand-oriented and international VET business models and on the success of the project?

2 Methods

2.1 Case study methodology

We use the case study methodology. Selected by the funding regulation, our cases are projects that are funded in “Internationalization of VET”. This paper focusses on two contrasting justified cases. We focus on different cases: different in respect of the environmental conditions (e.g. regarding political and economic frameworks: Serbia is not a EU member state and is an accession candidate since 2012; Greece just went through a tough economic crisis; political upheaval in both countries but with very different backgrounds) and the service conditions (e.g. product: a dual VET school in Serbia and curriculum development in Greece).

We apply a mixed methods approach using qualitative and quantitative survey methods (Kuckartz, 2014). Our main data survey form is guided expert interviews which are conducted, transcribed and evaluated.

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[2] The acronym NEMID stands for "Nachfrageorientierte Entwicklung und modellhaften Implementierung einer dualen Berufsschule in Serbien“, which can be translated with “demand-driven development and model-like implementation of a dual VET school in Serbia”.

[3] GRÆDUCATION is an agnomination of the words *Greece*, *green skills* and *education*.

Each funded project has project coordinators and project personnel. With each project, we have the opportunity to interview several project participants within the project period: Firstly, an introductory discussion at the beginning of the project term; secondly, interviews with the German project participants within Germany; thirdly, interviews with project partners in each target country; fourthly, a final inquiry at the end term or after completion of the project.

Furthermore, regular online surveys are used to collect quantitative data. The surveys are filled out by different project actors to reach different varieties of perspectives (as project managers have different insights than project performers etc.).

For each target country, we draw up comprehensive context analyses, including not only the education systems but also labour market issues and political reform processes. The market of services for VET is being analysed as well. These studies are based on desk research mainly.

2.2 Business Model Canvas

Our theoretical research concept is located in a business model approach which is called "Business Model Canvas" due to its way of presentation (Osterwalder & Pigneur, 2010).

For the conceptual work, some of the projects work with the Business Model Canvas (BMC) already. Osterwalder and Pigneurs (2010) approach of the BMC is to compile an image of the own business model to improve the understanding of processes, relations and problems by visualizing. The scheme of the BMC is visualized in figure 1. The Canvas is all about thinking in categories of business and answer the following questions:

Value Propositions: What's compelling about the proposition? Why do customers buy and use it?

- Channels: How are the propositions promoted, sold and delivered?
- Customer Relationships: How do you interact with the customer?
- Customer Segments: Who are the customers? What do they think, see, feel, and do?
- Key Partners: What can the company not do itself?
- Key Activities: What strategy does the business do to deliver its proposition?
- Key Resources: What unique strategic assets must the business have to compete?
- Costs and Revenues: What are the business' major cost drivers? How are they linked to revenue?

The heart of the BMC is to link and to relate the elements with each other and with the business model environment. This can be done by prototyping, testing and trials to develop the "first ideas" to a running business model. After a testing phase, the BMC and its elements are supposed to be adjusted.

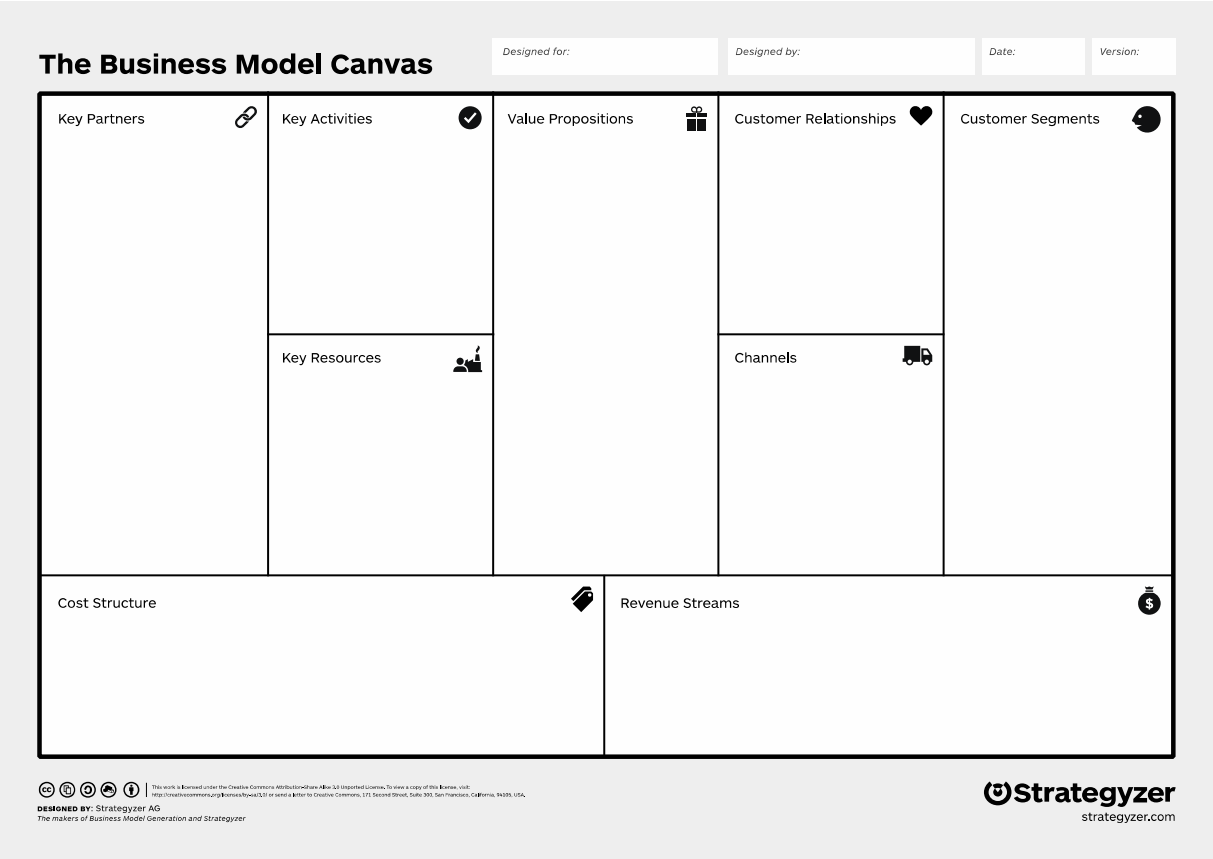

Figure 1 Business Model Canvas. https://strategyzer.com, CC-copyright.

In general, a private commercial business „describes the design or architecture of the value creation, delivery and capture mechanisms employed. The essence of a business model is that it crystallizes customer needs and ability to pay, defines the manner by which the business enterprise responds to and delivers value to customers, entices customers to pay for value, and converts those payments to profit through the proper design and operation of the various elements of the value chain." (Teece, 2010, p. 191). Therefore, a private business pursues a profit orientation per defition. For sustainability it is, thus, necessary to protect the business model by a copy protection (e.g., intellectual property rights) or at least to impede imitations. These are the basic priciples of a private business model: profit orientation and needed copy protection.

Another type of business models is a public business model which strives for opposite goals (in comparison to private businesses): The dissemination should be enabled and facilitated explicitely – it should be enabled and facilitated explicitely (e.g., open educational ressources). Hence, profit is not only to be regarded in an economic way. Other profit dimensions can be, corresponding to Bourdieu (1986) the development of social capital (such as the establishment of networks, trust), cultural capital (e.g., certification, development of competences) and symbolic capital (like prestige or reputation).

Therefore, we propose to extend the classical BMC category *Revenues* (which actually only includes economic profit) towards more openly thought out types of capital: Social capital, cultural capital and symbolic capital need to be taken into account. Within our two cases, we substantiate our claim by showing a private and a public business model, their approaches, similiarities and differences.

3 Results

3.1 The case of NEMID

NEMID, which was initiated by the German publishing house Klett Präsenzlernen GmbH, considered the following aspects for the first design of the BMC:

- Value Proposition. The product is a postsecondary theoretical vocational training in combination with productive workplace learning in a company. The duration is 2 years (Table 1). An accepted certification and good job prospects in the training company (for the trainees) as well as specialized junior employees (for the employer) are part of the proposition.
- Channels. A B2B (business to business) approach via chambers (PKS Serbian chamber of commerce; AHK Serbia) and direct contact with companies is used to reach customers.
- Customer relationships. Two focus groups need to be addressed in particular: teachers (VET school) and trainers (in-company trainers).
- Customer segments. The students in school and the companies are the customers whose needs the product (service) must be fulfilled.
- Key partners. Chambers (PKS; AHK) and ministries (German BMBF; Serbian Ministry for Education).
- Key activities. Theoretical training in professional expertise, methodical expertise and social expertise (in VET school); specific in-company training (workplace).
- Key resources. Teachers, teaching material, organization (VET school); trainers and company (company).
- Cost structure. For Klett, costs of ca. 150€/month/student will arise at full capacity; companies are supposed to pay school fees.
- Revenue streams. School fees paid by companies; revenue for companies results from the value added for the trainees during and after the training time.

The project chose the postsecondary education level due to two reasons: First, on the secondary level, general education subjects need to be included in the curricula and this is not the case in postsecondary schooling. Second, younger than aged 18 (which would be the case in secondary schooling) it is not allowed to young people to work for a company.

Table 1 NEMID first business idea. Based on Ayen (2018).

Increment 1: 2 years postsecondary dual VET course	
Year 1	Year 2

After some months of project activity, as well as different interviews and feasibility checks with the German Chamber of Commerce (AHK, Außenhandelskammer) in Serbia and PKS, NEMID decided to adjust the original plans due to two facts: Firstly, the responses made clear that the heterogenous educational levels of students were not considered. Secondly, a two-year school fee is too high a risk (and cost) for companies.

Therefore, an iterative process of BMC development was initiated: The product was modified towards a postsecondary VET school which is modularized and which offers pre-courses (to make up for deficits accumulated during secondary schooling) (Table 2).

Table 2 NEMID second increment. Based on Ayen (2018).

Increment 2: postsecondary dual VET course, modularized with pre-course		
Pre-course 4 weeks	Module 1 6 months	Module 2 6 months
	Module 3 6 months	Module 4 6 months

After professional content-related feedbacks, NEMID realized that a modularized form might be risky, because for companies, each module is a decision to invest (or to not invest) for the company. Hence, companies and trainees could tend to buy the pre-course and one or two basic courses and leave the VET school afterwards.

A third iteration followed: The VET school offers a pre-course (duration: 4 weeks) and a two-year course (Table 3).

Table 3 NEMID third increment. Based on Ayen (2018).

Increment 3: postsecondary dual VET course with pre-course and mid-term exam			
Pre-course 4 weeks	Year 1	Mid -term	Year 2

Considerations and responses of companies – which are supposed to use the service finally and also pay for it – were positive, but they first wanted to 'dip only a toe in the water'. Furthermore, companies do not want to pay for the entire amount of school fees. Therefore, a further adaption of the service offer has been made (Table 4):

Table 4 NEMID fourth increment. Based on Ayen (2018).

Showcase-course; 4 weeks	Increment 3: postsecondary dual VET course with pre-course and mid-term exam			Specific courses & staff retention; about 6 months
	Pre-course 4 weeks	Year 1	Mid -term	Year 2

Here, students pay the pre-course themselves and companies pay for both years of training, additionally to a training wage for the trainees in the second year.

NEMID plans to start implementation of this concept in autumn 2019 and the project is prepared to undergo additional conceptual changes. This actually is part of the approach: The

content and framing of the service is customized to the context of Serbia and the companies operating in the country which will draw benefits from the VET service.

3.2 The case of GRÆDUCATION

GRÆDUCATION was initiated by FIAP e.V., a German research center in cooperation with HBZ, the training center of the Chamber of Crafts Münster and cooperating with a private event and project management company. Moreover, being one of the projects of the funding program, GRÆDUCATION is offering the development and proving of new educational services related to VET. The first idea was to offer consultation to develop Greek curricula, as well as to implement Green Tech and sustainability in the VET system. Coming from this starting point, occupational profiles can be made more attractive to the youth, as vocational education and training is regarded only as the second choice compared to general secondary or higher education, for both parents and young people (Cedefop, 2018). Therefore, one of the project's goals is to develop vocational and career orientation campaigns in the field of environmental and technical occupations. Furthermore, the project's scope is on train-the-trainer qualification for companies and vocational schools.

The following elements of the BMC's elements have been filled out by project actors (GRÆDUCATION, 2019).

- Value Proposition. Modernization and Greening of VET curricula in Greece; service development; development of career and vocational orientation.
- Channels. Face to Face contacts and social media as well as a memorandum of understanding characterize the channels to reach the customers.
- Customer relationships. "Partnership and dialogue focused approaches" and "customer integrative development of educational services" describe the relationship to the target groups.
- Customer segments. Different groups belong to the customer segments: Companies that are working with green skills/green tech (regarding VET and in-service training), associations and schools regarding vocational and career orientation, as well as private and public institutions.
- Key partners. Educational institutions (public and private); companies; teacher; multipliers (DG-IHK; embassy; associations).
- Key activities. Within co-creative workshops, educational offers and services are developed; evaluated and optimized.
- Key resources. The main key resource of GRÆDUCATION are reliable cooperations in Greece combined with open, dialogue-oriented and appreciative approaches to reach the target groups. Additionally, technical infrastructure (e.g. virtual reality) belongs to the key resources.
- Cost structure. Personnel costs for lecturers, moderators, translators; development costs for material and concepts; marketing costs, technical infrastructure.
- Revenue streams. Not yet planned except for public funding/public projects.

The approach used by GRÆDUCATION so far was to communicate with Greek actors of VET, where they see needs and requirements to revise and improve their system. For example, in cooperation with the Greek EPAS schools[4], the curriculum of the electrician was chosen to be modernized. Also dialogue-oriented, the curriculum has been edited and greened (new green technologies were included) and is now being applied in all EPAS schools in Greece. Another

[4] Secondary vocational schools

example for the co-creative project approach is the organization of the first Greek Girls' Day: GRÆDUCATION demonstrated occupational perspectives within new, green and sustainable technologies to more than 300 participants.

4 Conclusions

GRÆDUCATION and NEMID with their differences (framework conditions; business models; experiences) are two contrasting cases and we expect differences with regard to the projects' success concerning success dimensions.

Both cases use a dynamic and adapting strategy to implement their initiatives in the target countries. One difference is the kind of product: NEMID sells a further education training to companies, which can be sustainable beyond the funding period due to a revised and polished business model. GRÆDUCATION offers institutional consultancy and is also accepted by Greek partners in this role. Therefore, it is not an aspired goal to develop a marketable business model. For this objective of the funding line, GRÆDUCATION is not successful (in sense of profit orientation and sustainability), because without public funding the project will end after the funding duration.

For the other goal of the funding program, namely for the effects within the VET systems of the target countries, the assay shows that here the result is vice versa. NEMID offers a postsecondary private VET school, financed by firms and adapted to the needs of specific firms. Effects on the Serbian VET system do not exist (so far). In Greece, GRÆDUCATION already shows effects within the VET system: Curricula are being developed and improved in a long-lasting manner and actors of vocational education and training that were usually not cooperating in Greece could be brought together.

NEMID, a project which strives for the demand-driven development and implementation of a private dual VET school in Serbia, uses the BMC for its strategic planning. After some months of project activity, as well as different interviews and feasibility checks with the German Chamber of Commerce in Serbia, NEMID decided to adjust the original BMC plans. Thus, an iterative process of BMC development was initiated: NEMID iterated the BMC several times. The project uses the business model canvas to elaborate a private commercial business. GRÆDUCATION uses the BMC rather selective at different points in the project progression. This project is an example of a public business model. With regard to social, cultural and prospectively also symbolic capital, GRÆDUCATION earns revenues as well.

Subsuming, both cases refer to a dialogue and needs oriented approach in the target country including the question "What is the demand of stakeholders?" (in Serbia: companies; in Greece: companies, official bodies, and teachers). NEMID developed a business model that is successful withinin economic profit dimension; however, this business is dissociated from the regular VET system. Therefore, in Serbia, we can see no effects on the systemic level. The reference – a private commercial business model – is the explanation as well as the guiding principle. GRÆDUCATION does not establish a profit oriented business model as a public business model is the reference framework. Here, an economic profit concept is not excluded per se, but not compulsory as sole objective. However, effects on VET system are apparent already and a successful VET cooperation meets the aims of the funding line as well. Business is not to be thought in classical, pure-gain oriented dimensions: As in the case of GRÆDUCATION, we can see other gains than profit. Until now, only economic profit was acknowledged within business modeling and consequently, the theoretical conceptualization of business modeling needs to be re-designed. This inference also counts for the targets and objectives of the funding regulation.

To validate our results as gainful in general, a wider appraisal is necessary with other cases from the funding line and also with others unbiased by the funding program. This point affects also the limitation of our research: The cases were given through the funding line and a

reasonable choice of cases in terms of the research interest was not always possible. Due to this reason, scope and validity are limited hitherto. Furthermore, both analysed projects are still running in the meantime and the outcomes cannot be evaluated finally, so all findings are temporary.

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Towards Excellence in Engineering Curricula for Dual Education

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Abstract

The TEEDE ERASMUS+ project (Towards Excellence in Engineering Curricula for Dual Education) aims to develop dual programs in higher institutions. So far, 12 BSc, 7 MSc and 1 PhD programs of all branches of engineering are under development, developed (but waiting for the official approval) or running in China, Cambodia, India and Russia. The first task was to perform regional needs analyses involving all stakeholders (i.e., university, companies, HE regulators…). During implementation practical aspects had to be considered (e.g., offered as a parallel track to a school-based scheme or not, development of a new program or modifying of an existing…). All programs define the learning outcomes in accordance with their national framework with compliance of the European Qualification Framework and the European Standards and Guidelines for Quality Assurance. Bologna principles, like the competence and student-centred approach or European Credit Transfer System (ECTS) are also followed. Research focusses on supporting and hindering factors for the development of Higher Apprenticeships (HA) via policy learning.

Keywords

dual study programmes; higher apprenticeships; engineering and technical professions; policy learning; blended education

1 Background

The main driving force of change in Higher Education (HE) was the increasing massification of higher education accompanied by the universalisation of the higher education offer (Trow, 1974). HE has experienced a considerable transformation in the last few decades, which can be identified by two trends:

1. Academic drift in the sense of traditional vocational education at secondary and post-secondary level becoming ‘professional’ at tertiary ‘academic’ education level (Harwood, 2010; Kyvik, 2004).

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2. Vocational drift whereby VET principles are integrated into higher education in the form of new teaching and learning methods, internships and different types of dual studies and sandwich programmes (Hippach-Schneider, 2014; Kyvik, 2009).

Both trends can be subsumed under the term of the vocationalisation of higher education.

Changes in the supply of graduates have not been matched by changes in demand in the labour market (Houston et al., 2016). This trend is said to have contributed to a re-definition of occupational profiles including a stronger academic orientation and in consequence, an increase in the demand for academic qualifications in occupations previously intended for those with primarily vocational qualifications. Today most countries are seeking ways to strengthen the linkages among employers, workers, higher education institutions, and governments. One of the possible ways to meet this challenge is dual education. We can find a plethora of (almost) synonyms to refer to the concepts of dual education (apprenticeship, work-based learning, on-the-job training, blended education…).

Dual learning is regulated in the vast majority of EU countries (*i.e.*, at least one pathway offers a combination of work-based learning and school based learning), but its practical application is very marginal, except in Germany (Euler, 2013), Austria (Langthaler, 2015), and Switzerland (Ebner, Graf, & Nikolai, 2013) (and recently in South Korea). Even a preliminary literature review (German Embassy, 2015; Spöttl & Windelband, 2013; Western Balkans Summit, 2015) reveals a lot of distinctive features how dual education is understood and implemented in different countries. The international landscape of dual education in other countries is even more diverse and flexible. Analysing the approach followed, we can conclude that there is no single model of dual learning in the EU, but a continuum of types of programs that integrate work-based learning.

In these programs, training for industrial trades is a shared responsibility of firms and schools. Trainees divide their time roughly equally between classroom and on-the-job training, with both pathways developed in parallel. As trainees, they (might) receive a lower wage than regular workers. In the best scenario, they have guaranteed well-paid jobs at the firm upon successful completion of the program and are receiving a certificate (Remington, 2017).

The advantages of dual educational systems are clearly far beyond any reasonable doubt, as all evidences indicate that any learning-by-doing methodology has a very positive effect fixing learning outcomes. The main handicap of dual learning is that when developing/implementing those schemes, significant time is required before the benefits/improvements are obvious or measureable and that the procedures must been properly adapted to consider regional/social particularities. Table 1 summarizes the main advantages and disadvantages of dual learning.

Table 1 Advantages and disadvantages of dual-learning education

Main advantages:
• There is some sort of labour contract (paid).
• The training at the company is developed under real conditions.
• Trainees also benefit from co-workers experience.
• Hard and soft skills are simultaneously developed.
• Facilitates school-to-work transition.
• Policy learning reduces the retention of employers.
Main disadvantages:
• Training is expensive. School-based is financed by governments (national or regional), while dual learning is primarily financed by employers. Governments might financially incentivize this approach (grants, subsidies, tax reliefs...).
• Companies have to follow many regulations.
• Quality of placements and their learning potential in SME/micro companies is unclear. Some companies are often specialized and unable to train in the overall range of knowledge, skills and competences.
• Strict quality control to avoid situations where dual learning is used as cheap labour or to substitute (unskilled) employees is required.
• More student effort is required.
• Universities have to follow organizational changes, and a certain resistance to flexibilize/rationalize procedures can be found.
• Dual apprenticeship is an elitist approach, as in some cases it is applicable just a few top-students.

1.1 TEEDE consortium

The objective of the TEEDE project (TEEDE, 2019) is to upgrade/develop dual learning programs in higher education that combine work-based learning in a company and class-based learning in the same course. The project challenge is to apply dual learning principles to engineering programs in a wide diversity of environments, such the ones found in Cambodia, China, India and Russia. In fact, the procedures have a very wide variety not just due to the different countries involved, but also due to regional differences and even due to the type of institution where the programs have to be developed. The idiosyncrasy of companies and their relationship with higher education institutions (HEI) should also be considered. To that extend, methodological guidelines on professions and qualifications based on the analysis of the economic needs of the different countries were developed.

The project has received funding under the Key Action 2 (Capacity building in the field of higher education) from the European Union. The TEEDE project consortium consists of the following partners:

- Association for Engineering Education of Russia, Russia.
- European Association for Quality Assurance in Higher Education, Belgium.
- Far Eastern Federal University, Russia.
- Indian Institute of Technology Madras, India.
- Indian Institute of Technology Kanpur, India
- Institute de Technologie du Cambodge, Cambodia.
- Institute Technology and Education, Universitaet Bremen, Germany.
- Jilin University, China.
- Katanov Khakass State University, Russia.

- Omsk State University, Russia.
- Royal University of Agriculture, Cambodia.
- Shenyang Ligong University, China.
- Tomsk Polytechnic University, Russia.
- University of Pavia (Università Degli Studi di Pavia), Italy.
- University of Tampere, Finland.
- University Rovira i Virgili, Spain: project coordinator.

All partners of the consortium have a strong focus on technology and engineering and serve as regional centres for implementation of national strategies for training professionals. The problem of training professionals for the real sector of economy has emerged with more emphasis in engineering due to immense development of high technologies, shortening the period from development to implementation and growing technological needs of the society. As a result, there exists a need for new approaches to the development of curricula sensitive and flexible to demands of companies based on innovations. This challenge is common for all regions involved in implementation of the project: EU, Russia and Asia.

1.2 TEEDE project objetives

To meet this challenge project partners are:

1. Identifying needs, selecting key professions and areas of training.
2. Developing and modernizing curricula via implementing the principles of the dual education with the help/experience of European experts.
3. Launching new or upgraded curricula, combining periods of study with periods of training at leading enterprises.
4. Creating a system of continuous professional development.
5. Creating communication and recourse centres at partner universities.

The specific objectives of the TEEDE project are:

- Modernization and creation of the bachelor, master's and/or PhD programs in engineering based on the principles of dual education.
- Development and implementation of a methodology of management of educational processes in universities following the dual education approach.
- Strengthening relations of universities with stakeholders of the economic and social environment, creation and development of variants of the cooperation of universities and enterprises, and promotion of employment of graduates.
- Creation of communication and recourse centres for the promotion of the projects results and further implementation of the dual education principles beyond the project life cycle.
- Establishment of the unified procedure of evaluation of qualification level achieved by the persons who are studying in engineering and their mutual recognition of learning.
- Construction of the trajectory of lifelong learning for the engineers.

2 Methodology

The vocational drift of higher education institutions (HEI) is observable by a stronger integration of practical learning in higher education (HE) and an increasing demand of work based learning. However, often, it is not adequately reflected in changes in the learning environment. Despite the difference of all partner countries covered by the TEEDE project, all higher education apprenticeship systems shared common challenges:

- Enhance cooperation between HEIs and non-academic organisations to develop dual curricula, with an adequate combination of theoretical and practical elements identifying the learning opportunities in the work process.
- Quality of HE (and work placement) through improving the tutorship. Tutors (from both, industry and academia) are the key element for the quality and sustainability of dual programs. Providing learning material/modules/guidance will better valorise this function.

First results of our analyses, project monitoring, project meetings and on-site visits in Asia and Russia revealed some basic questions that should be raised before implementing any dual system (and especially in this case, due to the diversity of partners' countries):

1. Needs analysis of new curricula in selected engineering areas at bachelor/master/PhD level.
    a. Verification of the accuracy and the reliability of the key professions selected and their relevance in the region.
    b. Inclusion of entrepreneurship aspects in the curriculum.
2. Implement dual education programs:
    a. Bridging the gap between academia and industry.
    b. Strengthening relations with other external economic and social stakeholders, creating/developing cooperation and promoting employment of graduates.
3. Resistance to change to dual education:
    a. Develop and implement a management procedure that includes dual educational processes, an issue where Universities might need to adapt some of theirs internal procedures.
    b. Establishment of a unified procedure of evaluation.
4. Regulations involved:
    a. Decision procedures and deadlines in higher education institutions and companies are different, and conflicts might appear due to the lack of flexibility and a period of adaptation might be required.
    b. Deadlines associated with academic courses might not match company needs.
5. Attitude of companies:
    a. To what extent the companies will be involved and committed.
    b. The access to external stakeholders might raise the question if public bodies should just provide actual labour market needs or train the population without considering market trends.

3 Results obtained: programs (almost) implemented

Another, not very surprisingly preliminary result is, that there is still a lot work to be done, as the decision procedures to implement any new program are quite long and involve several loops in all the partners organizations. Those external constraints that will affect the implementation of the programs are (in general, as all partners have minor differences in their procedures):

- Departments and Schools/Faculties involved in the teaching had to agree on the teaching tasks assigned, in the content and in the approach.
- University managers had to approve the new (or modified) program (Bachelor, Master or PhD level).
- National and/or regional quality assurance agencies had to provide feedback about the proposal of the new (or modified) program (Bachelor, Master or PhD level).
- Regional and/or National Agencies of Education: have to approve the study program and, in some professions, check if the study programs cover the minimum contents. Sometimes these contents are fixed by law at national level (*e.g.*, professional associations which

require a registration), while in other occasions the contents are fixed by international law (*e.g.*, several professions associated with the aeronautic sector).

A list of the dual programs implemented at all levels by all partners as a result of the TEEDE project is shown in Table 2.

Table 2 Preliminary list of dual education programs to be implemented, implemented or already running.

University	Name of the degree	Level
Far Eastern Federal University (Russia)	Shipbuilding and ship repair	B.Sc.
	Ship power plants maintenance	M.Sc.
Institute de Technologie du Cambodge (Cambodia)	Mechatronics and information science	B. Sc.
	Food technology and nutrition	M.Sc.
Indian Institute of Technology Kanpur (India)	Master of Technology	M. Sc.
	Bachelor of Technology	B. Sc.
Indian Institute of Technology Madras (India)	Petroleum Engineering	M. Sc.
	Petroleum Engineering	Ph. D.
Jilin University (China)	Geological Engineering	B. Sc.
	Civil Engineering	B. Sc.
	Design and Technology of Light Industry Products	B. Sc.
Katanov Khakass State University (Russia)	Civil Engineering and Urban Development	B. Sc.
	Engineering Protection of Industrial Enterprises	B. Sc.
	IT Project Manager	M. Sc.
Omsk State Technical University (Russia)	Artistic modelling and design of garments	B. Sc.
	Technology of oil and gas processing	B. Sc.
Royal University of Agriculture (Cambodia)	Agricultural Engineering	B. Sc.
	Food Processing and Technology	M. Sc.
Sheniang Ligong University (China)	Building and Practicing of Talent-cultivating Mode in Material Science	M. Sc.
	Patterns of Senior Applied Talents Training and Evaluation	B. Sc.
Tomsk Polytechnic University (Russia)	Electrical Insulation Systems and Cable Engineering	M. Sc.
	Mechanical Engineering	B. Sc.

4 Conclusions

The development of dual programs in different countries with very dissimilar cultures and a wide diversity of educational systems has been a great challenge that, according to the results, has been very enriching and fruitful. We also noted some differences within and across the partner countries and how this and national policy and educational structures can hinder or

enhance greater collaboration between both academic and non-academic stakeholders but also in promoting collaborative partnerships with industry and trade unions. In order to accomplish those results, all partners involved had to make big efforts to deeply understand their different systems to customize the educational approach followed, as successful approaches developed at the EU level cannot be applied without a deep modification to include on-site customization. If the implementation of the educational principles is not adapted and managed in a flexible way, the possibility to succeed is small. Concepts such as European Qualification Framework, Bologna teaching methodology, European Credit Transfer System (ECTS) and European Standards and Guidelines for Quality Assurance, must be adapted if a successful collaboration is to be started – there will never be a silver bullet in educational reforms.

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Sarıkaya Erdem, Y., & Yıldırım, A. (2019). Effective teaching and learning at vocational education at tertiary level: A qualitative study of administrators', teachers' and students' perceptions. In B. E. Stalder & C. Nägele (Eds.), *Trends in vocational education and training research, Vol. II. Proceedings of the European Conference on Educational Research (ECER), Vocational Education and Training Network (VETNET)* (pp. 366–375). https://doi.org/10.5281/zenodo.3371573

Effective Teaching and Learning at Vocational Education at Tertiary Level: A Qualitative Study of Teachers', Students' and Administrators' Perceptions

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Abstract

The aim of this study is to explore the phenomenon of teaching and learning at higher vocational schools through the teachers', students' and administrators' perceptions. In line with this, phenomenological research design was employed, and data were collected at eight higher vocational schools in Nevşehir, Turkey from 8 administrators, 16 teachers and 16 focus groups through semi-structured interviews and non-participant observation. Data analysis, conducted through inductive content analysis approach, revealed that effective vocational teaching and learning was defined from two perspectives: product-oriented teaching versus process-oriented teaching, and product-oriented learning versus process-oriented learning. Also, aim of higher vocational education, characteristics of effective vocational teacher, learner and program emerged from data. The challenges faced were found related to teachers, students, curriculum, context, system, employers and parents. Finally, the findings related to strategies to cope with those challenges were categorized as teacher-led, student-led and administrator-led practices together with recommendations made to improve effectiveness.

Key words

vocational teaching; vocational learning, challenges, higher vocational schools, Turkey

1 Background to the Study

Vocational education at tertiary level intends to develop craftsmanship, practical experience and practical problem-solving and to "prepare people for careers in higher level technical, professional and managerial positions through the provision of job-specific skills" (CEDEFOP, 2012; OECD, 2012) for it is the role of higher education to enhance learners' knowledge, skills, attitudes and abilities, and simultaneously empower them as lifelong, critical and reflective learners for the sake of employability (Harvey, 2000).

Though the common point is its being "vocational," "occupational," "professional," there have been varying conceptions of vocational education as the result of its heterogeneity in terms

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of its purposes, institutions, participants and programs, making it difficult to give a singular and unitary description of vocational education (Billett, 2011, quoted in CEDEFOP, 2017), and thus problematizing the accounts of effective vocational teaching and learning.

In an attempt to develop a theoretical framework in this context, the concept of vocational pedagogy has been coined by Lucas, Spencer, and Claxton (2012) in order to define working approaches to teaching and learning in vocational education (Commission of Adult Vocational Teaching and Learning (CAVTL), 2013) and develop models that work best in vocational education context (Faraday, Overton, & Cooper, 2011). Broadly, it is noted by CAVTL (2013) that excellent vocational teaching and learning depends on a clear line of sight to work; collaboration between employers, trainers and providers for the design and delivery of vocational programs; "dual" professional teachers with occupational and pedagogical knowledge and skills; and access to industry facilities and resources with recent technology and standard (p. 9). Going into deeper, the concept of vocational pedagogy deals with the outcomes of vocational education, identity of vocational teachers, models of and analogies for vocational education (Lucas, Spencer, & Claxton, 2012), and teaching skills, teaching relationships, teacher reflection and teaching models and teaching context (Faraday et al., 2011). More specifically, vocational pedagogy is concerned with:

- integration of theory and practice (CAVTL, 2013; de Brujin & Leeman, 2011; Kerna, 2012);
- use of variety of learning environments like real or stimulated workplace, classroom and workshops settings (Black & Yasukawa, 2013; Evans, Guile, & Harris, 2009; Mcrone, O'Beirne, Sims & Taylor, 2015; Moodie & Wheelan, 2012);
- use of authentic tasks in real or real-like contexts through practical problem solving, hands-on activities and reflection (CAVTL, 2013; de Brujin & Leeman, 2011; Lucas et al., 2012);
- responsiveness to diverse individual needs (CAVTL, 2013; Chappell, 2004; Cullen et al., 2002; de Brujin & Leeman, 2011; Harkin, 2012; McCrone, O'Beirne, Sims, & Taylor, 2015; Lucas et al., 2012);
- contextualized teaching and learning embedded in communities of practice (Barnett, 2006; Canning, 2011; Catts, Falk, & Wallace, 2011; CAVTL, 2013; Evans, Guile, & Harris, 2009; Smith & Blake, 2005);
- collective and collaborative approach to teaching and learning (Black & Yasukawa, 2013; CAVTL, 2013; Chappell & Hawke, 2003; de Brujin & Leeman, 2011);
- coaching and mentoring (de Brujin & Leeman, 2011; Evans et al., 2009; Jameson, 2012);
- use of variety of assessment and feedback methods (CAVTL, 2013; Lucas et al., 2012);
- dual identity of teachers with occupational and pedagogical knowledge (Barnett, 2006; CAVTL, 2013; Orr & Simmons, 2010; Palmieri, 2004); and
- eclectic and pragmatic approach to teaching (CAVTL, 2013; Chappell, 2003; Cullen et al., 2002; Harkin, 2012; Lucas et al., 2012).

In addition to these, as vocational education is "hands-on, practical, experiential, real-world" (Lucas et al., 2012, p. 9), situated and context-bound (Faraday et al., 2011), enacted through formal vocational and technical school programs, in training centers or institutes, and in the workplace, both on and off the job (Tsang, 1997), effective vocational teaching and learning also require recontextualization (Barnett, 2006; Evans et al., 2009), as a form of learning transfer, in order to put the knowledge generated and practiced in one context to work in another through the recontextualization of content, pedagogy, workplace and learner (Evans et al., 2009).

Moreover, teachers' pedagogical content knowledge, used to tailor pedagogy according to the content, includes up-to-date occupational knowledge and knowledge of disciplines/subjects

which underpin job knowledge and practices (Barnett, 2006; Chappell, 2003; Harkin, 2012; Lucas et al., 2012; Shulman, 2005; Young, 2004) and is needed to inform the practices and decisions of vocational teachers for the sake of effective vocational teaching and learning. However, as discussed by Cochran, Deruiter and King (1993, cited in Chappell, 1995), most research on teachers' knowledge dealt with these two domains: subject knowledge and pedagogical knowledge, disregarding other domains like knowledge of learners, technological knowledge, knowledge of educational contexts and curriculum knowledge (Robertson, 2008).

Concerning effective vocational learning, discussions centered on two perspectives: (1) learning as the acquisition of vocational knowledge, and (2) learning as the contextualized application of knowledge (Catts et al., 2011), conceptualized as quantitative (knowledge acquisition) versus qualitative (meaning making) perspectives by Biggs (1994), and surface learning approach versus deep learning approach by Säljö (1979, cited in Richardson, 2005). As a result of transition from teacher-centered to learning-centered approaches (CEDEFOP, 2004; Chappell, 2004), situated learning advanced by Lave and Wenger (1991) has been equated with effective vocational learning as it helps vocational learners construct vocational knowledge and skills through participation in communities of practice and interacting by members of that society (Barnett, 2006; Catts et al., 2011; CAVTL, 2013; Evans et al., 2009; Smith & Blake, 2005), namely employees and trainers at workplaces and peers and teachers at schools. Beside, experiential learning, together with problem-based and inquiry-based learning, is found requisite for effective vocational learning enacted through hands-on activities and supported with reflection and feedback (Clark, Threeton, & Ewing, 2010; Lucas et al., 2012; Scott & Sarkees-Wircenski, 2008). Therefore, vocational learning can be defined from a constructivist perspective as an active process in which learners construct occupational knowledge rather than acquiring it passively while vocational teaching can be viewed as facilitating that construction rather than imparting mere knowledge (Duffy & Cunningham, 1996).

Due to direct links with labour market, effectiveness of vocational education and training has been widely measured with the use of performance-oriented outcomes (Imel, 1990). Since the skills, knowledge and understanding provided through vocational education is necessary for the growth, productivity and competitiveness of economies (OECD, 2004) responsiveness of vocational education to the labour market has been the main objective and concern of policy makers, social partners and vocational education providers (see World Economic Forum Global Agenda Council on Employment, 2014). Bosch and Charest (2010) argue that the value of vocational education for the society and companies is determined when the trainees enter the labour market and put their gains into practice. For this end, outcome-based qualification frameworks are being inevitably designed by countries to regulate and contract the provision of education (Allais, 2014), and vocational education and training is labeled effective in case of responsiveness to competence standards.

As discussed by Bedi and Germein (2016) and Mitchell, Chappell, Bateman and Roy (2006) policy and research discourses mostly appropriate the term "effective vocational teaching and learning" by dealing with matters exterior to the pedagogical experience occurring between teachers and learners although higher vocational schools have mostly been viewed as being "teaching and training institutions" since its faculty is not required to conduct research, and can ,therefore, devote their time to teaching and learning (Vaughan, 2006). Although this view may be a popular long-held belief the idea that higher vocational school faculty have special knowledge about being effective teachers or that they utilize this knowledge has little empirical support (Palmieri, 2004; Shepherd, 2009). Likewise, Chappell, Solomon, Tennant and Yates (2002) criticized outcome-oriented perspective in vocational education as "the journey to vocational competence is now regarded by many as less significant than the arrival, with the quality of the journey largely left to the professional competence of the teacher or

trainer" (p. 7) although it is widely accepted that "the effectiveness of any education system also strongly depends on the quality of interactions and relationships that occur between the teachers and students." (UNESCO-UNEVOC, 2012, p. 5). Amongst others, Lucas et al. (2012), echoed similar concerns by suggesting that key to the delivery of excellent teaching and learning is knowledge and understanding about pedagogy. Therefore, shedding light on the teaching and learning practices, and the factors that have facilitative and distractive impact on those practices is required to understand and reveal the processes leading to those demanded outcomes and qualifications.

1.1 Research Questions

In line with the abovementioned thrust, the purpose of this study is to explore effective teaching and learning processes experienced by the teachers and their students at tertiary-level vocational education. Specifically, this study attempts to answer to the following research questions through the perceptions of administrators, teachers and students at higher vocational schools:

- What are the perceptions of administrators, teachers and students on effective vocational teaching and learning at vocational education at tertiary level?
- How do teachers and students assess teaching and learning activities at vocational education at tertiary level?

2 Method

Aiming to investigate effective teaching and learning processes at tertiary-level vocational education schools through the perceptions of administrators, teachers and students, I utilized a qualitative research approach. The study of lived experiences of teachers and students, who are the main actors of effective teaching and learning processes, calls for qualitative rather than quantitative methodology because it allows more in depth and detailed understanding of the phenomenon constructed by individuals (Yıldırım & Şimsek, 2018) in a certain context (Bogdan & Biklen, 2007).

2.1 Research Design

I employed phenomenological research design as in this approach, the researcher focuses on a concept or phenomenon and seeks to understand the meaning of experiences of individuals who have experienced or lived the phenomenon (Creswell, 2007). In other words, it is sought to examine how those individuals who experience any phenomenon "perceive it, describe it, feel about it, judge it, remember it, make sense of it, and talk about it with others" (Patton, 2002, p. 104).

2.2 Data Collection Procedures

Framed within purposive sampling, multi-level sampling strategy was employed to reach the data sources of the study which consist of administrators, students and teachers at the higher vocational schools in Nevşehir, Turkey. All of eight higher vocational schools serving in Nevşehir were included; and totally, 8 administrators, 16 teachers and 70 students (16 focus groups) participated in the study. At each school, administrators were first contacted and interviewed, and upon their reference, first teachers were selected for interviewing. Other teacher and student participants at each school were selected through concurrent utilization of maximum variation and snowball sampling strategies. Before the conducting interviews, four-hour session of a vocational course of the selected teacher was observed in order to provide supplementary data for interviews. Focus groups were selected through recommendations of teachers and these groups included 4-6 students with various performance levels while the

variation among participant teachers and was provided through including the teachers teaching at distinct programs and departments.

Data were collected from participants through non-participant observation, and individual and focus group interviews during 2017-2018 academic year. The semi-structured interview forms and observation guide were developed by the researcher through literature review and expert opinion. During the observation, the stream of behaviour records was utilized. Interviews were audio-recorded upon consent of participants and transcribed by the researcher for analysis.

2.3 Data Analysis

For analysis of the data, content analysis was used to identify main concepts and categories (Miles &Huberman, 1994; Patton, 2002; Yıldırım & Şimşek, 2018) to identify "core consistencies and meanings" (Patton, 2002). After organization of raw data in accordance with research questions, codes were identified, and these codes were grouped under upper level codes and categories through inductive content analysis approach.

Concerning trustworthiness, the credibility of the study was established through triangulation by supporting interviews with observation, member checks, peer debriefing and prolonged engagement. For transferability of the study, rich and detailed description of findings was provided and purposive sampling was utilized. As for dependability, detailed account of research context was given and data was triangulated by collecting data from administrators, teachers and students. Finally, confirmability was ensured by auditing account of research process, data, and findings by an external audit.

3 Results

The analysis of data indicated that teachers, administrators and students viewed effective vocational teaching and learning from two perspectives: process-oriented teaching versus product-oriented teaching, and process-oriented learning versus product-oriented learning.

Most of the teachers and students, and a few administrators defined effective vocational teaching as a process in which students gain job skills and knowledge. In this process, *teacher roles, teacher knowledge, curriculum design* and *content delivery* and arrangement of *learning environment* were considered to contribute to the effectiveness of teaching practices. As for the perspectives with regard to effective vocational teaching as a product, most teachers and students equated it with *the acquisition of job competences* by gaining job knowledge, skills, code of conduct and ethics, gaining vision about job and entry level job knowledge and skills. In other words, vocational teaching would not be considered effective if the students did not achieve job-related outcomes.

Similarly, perceptions of teachers and students about effective vocational learning were reflected in two perspectives: effective vocational learning as a process and effective vocational learning as a product. More teachers and teachers viewed effective vocational learning as a product by equating it with *the acquisition of job competences* and *curriculum objectives* while there were teachers and students who thought that effective learning was a process of gaining job skills and knowledge by adopting appropriate *learning strategies* and having required *personal traits*.

Besides conceptions of effective vocational teaching and learning, the aim of higher vocational education which is promoting *personal, occupational and intellectual well-being* of students emerged from data. Most of the administrators and teachers agreed that higher vocational education aimed to improve occupational well-being of the students.

With regard to the characteristics of effective vocational teacher, emerging themes were *teacher knowledge, teacher role* and *teacher traits*.

Interviewees' descriptions of effective vocational teacher revealed four types of *teacher knowledge*: content knowledge (subject knowledge and vocational knowledge), pedagogical

knowledge, technology knowledge and contextual knowledge. Among all, characteristics related to teacher knowledge were what administrators, teachers and students mostly touched upon, valued and provided definitions for. Interviewees also brought forward *the roles* required from effective vocational teachers. Mentoring, coaching and role-modeling were highlighted by most of the teachers, students and administrators while these roles were followed by being a leader, acting as vocational knowledge source and employer/workplace manager. Finally, *traits* of effective vocational teachers emerged from the data by producing three subthemes: personal qualities, interpersonal interaction and professional responsibility.

Likewise, themes regarding effective vocational learner characteristics evolved from data and these characteristics were grouped under *entry characteristics, affective characteristics, cognitive characteristics* and *personal traits*.

With regard to *entry characteristics*, students were required to have prior knowledge and meet the eligibility criteria for the sake of effective learning. Prior knowledge involved students to study at the relevant department at high school, have general knowledge and basic level knowledge of Turkish language, English language and Math. *Affective characteristics* of effective vocational learners included motivation and interest. It was mostly teachers and administrators together with a few students who highlighted the significance of motivation and interest of students for effective learning. They indicated that vocational learners should be motivated to learn the job and have job-related objectives. In respect to the *cognitive characteristics* of effective vocational learners, most teachers and students felt that effective vocational students adopted appropriate learning strategies like being research-oriented by making research for deep learning and doing extra practice out of classroom by working on part-time basis or spending more time in laboratories and workshops. Finally, *personal traits* of effective vocational learners were brought forward by the interviewees. Eagerness to learn and improve himself/herself was the most expressed personal traits while other qualities were perceived to be creative, observant, curious, patient, self-regulative, responsible, and have generic skills like problem solving and time management.

Characteristics of effective vocational program also emerged from data gathered mostly from the administrators revealing three themes of person-related factors, school-related factors, and system-related factors.

Person-related factors covered *student characteristics* and *teacher characteristics*. According to the view of one administrator, an effective vocational program offered at higher vocational schools enrolls students with prior knowledge, preferably knowledge acquired at a vocational high school. As for the *teachers' characteristics* working at effective vocational programs, as noted by nearly all administrators, they contribute to the program effectiveness through their job experience and teaching experience.

School-related factors which are the *curriculum* and *school context* played important roles for the effectiveness of vocational programs. Based on the experiences of administrators, teachers and students, curriculum, implemented at effective vocational programs, is designed according to the needs of labour market, involves hands-on experience for students, and is delivered through authentic materials and tools and offers more practice-based hours than theory-based courses.

Lastly, a few administrators, one teacher and one focus group expressed their opinions with regard to student *admission*, *further study* and *employment opportunities* and these perspectives were grouped under the theme of system-related factors.

As to the challenges hindering the effectiveness of vocational teaching and learning seven main themes evolved as the result of interview data analysis. These challenges were categorized as teacher-related challenges, student-related challenges, curricular challenges, system-related challenges, contextual challenges, employer-related challenges and parental challenges.

First of all, teacher-related challenges were found related to *teacher knowledge* and *teacher traits*. With regard to the first theme, the interviewees consisting of administrators, teachers and students reported the challenges derived from teachers' (lack of) content knowledge, (lack of) pedagogical knowledge and (lack of) technological knowledge while the problems originating from *teacher traits* were teachers' (negative) attitude, (un)professionalism, beliefs and (lack of) skills.

Second theme that data analysis revealed was student-related challenges that proved compelling during the teaching and learning processes at higher vocational schools. Student-related challenges were found to be pertinent to students' *entry characteristics, cognitive behaviors* and *affective behaviors* displayed at school.

Thirdly, concerning the curricular challenges faced by the teachers, students and administrators there evolved six themes, namely challenges related to *curriculum development, content selection, teaching-learning process, measurement and assessment, resources* and *evaluation*.

System-related challenges were the fourth main theme producing six themes, namely *prior education, admission, planning, implementation, resources* and *policy-making*. Highly influenced by system-related challenges, contextual challenges hindering the effectiveness of vocational teaching and learning were found related to *school environment, resources* and *administration*.

Data also revealed that employers and parents also posed challenges for vocational teaching and learning. Employer-related challenges were related to *workplace learning, characteristics of workplace* and *personnel selection* while parental challenges were based on *parental approach* and *parental involvement*.

Teachers, students and administrators also provided information about their practices to cope with these challenges. Teacher-led practices were grouped into four themes, namely practices for *curriculum,* practices for *instruction,* practices for *resources* and *peer collaboration*. Along with teacher-led practices, student-led practices evolved in two themes, which were *learning strategies* and *extracurricular activities*. As far as data analysis revealed, students developed and employed learning strategies like peer collaboration, in-classroom learning, out-of-classroom learning and workplace learning to cope with challenges derived from ineffective teaching and learning. Last of all, administrator-led practices were categorized under seven themes, namely *student learning, accommodation, teacher development, resources, curriculum development, community-student interaction* and *diagnostic evaluation.*

Finally, participants made recommendations for improving higher vocational education producing five main themes: student-centered recommendations, teacher-centered recommendations, curricular recommendations, contextual recommendations and policy recommendations.

4 Conclusion

The participants' perceptions and experiences indicated that teaching and learning at higher vocational schools are under the influence of: teachers' knowledge, conceptions and beliefs, industry experience and currency, teacher skills, teacher behaviours, personal traits and professional development; and students' learning orientation, prior learning experiences, prior knowledge, learning approach, cognitive and affective characteristics and personal traits. Besides these, educational context, its resources, administration, school environment, relations with employers and community, and the curriculum and its responsiveness to the demands and needs affect the teaching and learning processes at those schools. Among all, national education system, educational policies concerning vocational education, and local and institutional-level administration were found to be most determinant factors. The attitude and actions of employers

and parents, somehow indirect, were also found to influence teaching and learning practices at vocational schools.

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Logistics in Digitalisation and Human Factors – Digital Learning as Key Factor to Positioning in a Digital Change

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Abstract

This paper provides an insight into the first interim results of the german research and development project "Human and logistics in digitalisation". The joint project develops a sector-specific network for small and medium-sized (SME) transport and logistics companies, so that they can exchange information about the emerging qualification requirements within digitalisation. In addition, existing digital teaching and learning solutions will be shared and developed further. The joint project is funded by the German Ministry of Education and Research (BMBF) and the European Social Fund (ESF). The research intrest of the project is a) to study the development of the competence requirements of digitized logistics at the employee level and b) to study the determination of existing continuing vocational education and training (CVET) formats and their further development in the context of digitized logistics at the company level.

Keywords

VET; CVET; digital learning; work 4.0; network; transport and logistics

1 Introduction

The project “Human and logistics in digitalisation" (the German acronym is MeLoDi)” is funded by the German Federal Ministry of Education and Research (BMBF) and the European Social Fund (ESF). A special interest of the Ministry is to promote stronger networking and dissemination of digital learning infrastructures and educational solutions and to initiate competence and organisational development processes. The focus of MeLoDi and this paper is, in a frist step, to figure out the competence requirements in logistics 4.0 of skilled workers in transport and warehouse. In a second step, the project will enhance the necessary competence development at the workplace via digital learning.

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Digitalisation becomes crucial within society, at work and in education. The term digitalisation is used in this article to describe "the use of technologies and the construction of infrastructures, the comprehensive generation and exploitation of data, the networking of objects and actors and the emergence of new application systems and business models" (Pflaum, Schwemmer, Gundelfinger, & Naumann, 2017, p. 7)[1]. Digital technologies and processes can be found almost everywhere and change entire industries, job profiles as well as vocational education. Keywords such as work 4.0, learning 4.0 or vocational training 4.0[2] go hand in hand with this social development.

A glance at the statistics shows how present the small and medium-sized enterprises (SME) sector currently is in the German market. With 99.6%, SME present the majority of companies in Germany (BMWI, 2017). One of the most important sectors of the SME branch in Germany is the logistics industry with 60,000 companies and 1.34 million employees (Zanker, 2018). Numerous studies indicate that digitisation has also arrived in transport and warehouse logistics. Technologies such as cloud computing, Big Data and the Internet of Things lead to debates about a fourth industrial revolution (Pfeiffer, 2017, 2018), due to the introduction of new technologies or more automated processes in the workplace.

A study by the Federal Institute for Vocational Education and Training (BIBB) has shown that in companies with a high degree of digitisation, the continuing training rate for employees is 92%. For companies with a low degree of digitisation, the continuing training[3] rate is only 58%. This shows that the employees of companies with a higher degree of digitisation are more likely to engange in CVET (BIBB, 2019). In addition, digitisation makes new forms of work possible, such as home offices or flexitime, which can improve the work-life balance of employees (BIBB, 2019).

Due to digitalisation, various fields of activity are changing at different qualification levels and there by competence requirements of the employees are altered as well. At this point, the aspect of CVET in the context of the logistics industry in the course of digitalisation has a special significance, because "education is a key position in coping with the digital future of logistics in particular" (DSLV, 2018, p. 39).

Nowdays, learners live in an environment in which socialization influenced by modern media is selfevident (Zierer, 2017). This modernization is also subject to the term *education*.

The concept of education "includes the pursuit of the peculiarities of human ways of living and living, which apply to all human beings (according to their nature), also includes growing into a community, dealing with society, the willingness and ability to design and develop the living space, which brings different tasks with each person (to be fair)" (Zierer, 2006, p. 53)[4]. The information and communication technologies (ICT) touch the working world of our society with increasing transparency and bring along a construct of knowledge transfer (Kerres, 2001). A variant of digital knowledge transfer is provided by learning platforms[5] (Möhring-Lotsch, Salzer, & Geese, 2009). "A web-based learning platform is to be understood as software installed on the server that helps to convey any learning content via the Internet and supports the organization of the necessary learning processes" (Baumgartner, Häfele, & Maier-Häfele, 2002, p. 24)[6]. Following Baumgartner et al. (2002), learning platforms characterize five basic

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1 Translated by the author Alexander Pflaum (2017).

2 In cooperation with the Federal Institute for Vocational Education and Training (BIBB), the German Federal Ministry of Education and Research (BMBF) started the "Vocational Education and Training 4.0" initiative in 2016 (BMBF, 2017).

3 In this Study CVET includes advanced training, participation in courses, training courses or seminars and learning in work processes (BIBB, 2019).

4 Translated by the author Klaus Zierer (2006).

5 Learning platforms are also referred to as learning management systems (LMS) (Schulmeister, 2005)

6 Translated by the author Peter Baumgartner (2002).

functions. They serve as (1) tools for communication, (2) allow present content, (3) provide exercises, (4) serve evaluation and assesment (5) management of learners, for example study progress (Baumgartner et al., 2002).

The focus of "MeLoDi" is the development a sector-specific online platform for networking transport and logistics companies, to support companies in organizations of CVET and the integration of digital forms of learning. Based on the above-mentioned state of research, the following research questions arise from an educational perspective:

- To what extent and how have the work tasks changed by the digitalisation?
- Which requirements result for the individual competence?
- Which teaching/learning solutions are used in practice?

2 Methods

In the light of the research questions, these new insights should be incorporated into the design of digital teaching/learning solutions to meet the qualification needs in SME. In order to analyse the employee level and the company level in the context of Logistics 4.0, a mixed-methods design applied (Johnson & Onwuegbuzie, 2004). The advantage is to capture the complex conditions of Logistics 4.0 and to analyze assessing and comparing significant situations. Quantitative and qualitative survey methods were selected in the development process and findings from previous BMBF projects were synergetically incorporated.

Based on the research question – which requirements result for the individual competence – a deep insight into the subjective experience[7] of the actors is important. For this purpose, the status quo of CVET is one point of interest. The implementation of qualitative, partially standardized, guide-based expert interviews with executives of the SMEs are carried out, which are transcribed and analysed. The interviews were evaluated according to the qualitative content analysis by Kuckartz (2014).

The evaluation included 14 interviews with 18 interviewees. For this purpose, the management levels were surveyed. In addition, we used work process analyzes in the sectors of warehousing to determine the competency requirements of the skilled workers by changing the digitization. With work process analyses, different work processes in warehouse were recorded on the basis of predefined areas of competence, which have changed as a result of digitisation and entail new requirements. Furthermore, quantitative company surveys were conducted in order to gather indications to see how the companies are digitally positioned and which technologies are used currently.

The survey of the management level pursued the goal of gaining indications as to how SME transport and logistics companies are set up digitally, which technologies are used in warehousing and transport and how a digital working environment affects work and company processes as well as the competence development of employees in warehousing and transport. The survey of the upper company level started on november 2019 and ended on may 2019. The survey was completed by N=15. In order to show a trend, the companies should give a current and future (for the next five years) assessment.

The survey at employee level was previously conducted in the warehouse and serves to gain knowledge about the use of digital media directly at the workplace and should reflect the perspective of theses users. It started on february 2019 and also finished in May 2019. The survey was completed by N=19.

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[7] Extension and deepening of qualitative surveys in Flick (2011).

3 Results

We collected data about (1) the observed tendency towards the use of digital technologies, (2) the resulting competence requirement and (3) the existing teaching and learning solutions of bridge the gap. We got the following responds.

3.1 Changed work tasks by the digitalisation

All companies surveyed expect to see an increasing tendency towards the use of digital technologies over the next five years (Figure 1). In connection with the research question to what extent and how have the work tasks changed by the digitalisation, it can now be said that customer satisfaction will be a stronger focus of the companies surveyed in the future. This customer orientation requires the use of new technologies in company and work processes in order to create transparency for the customer.

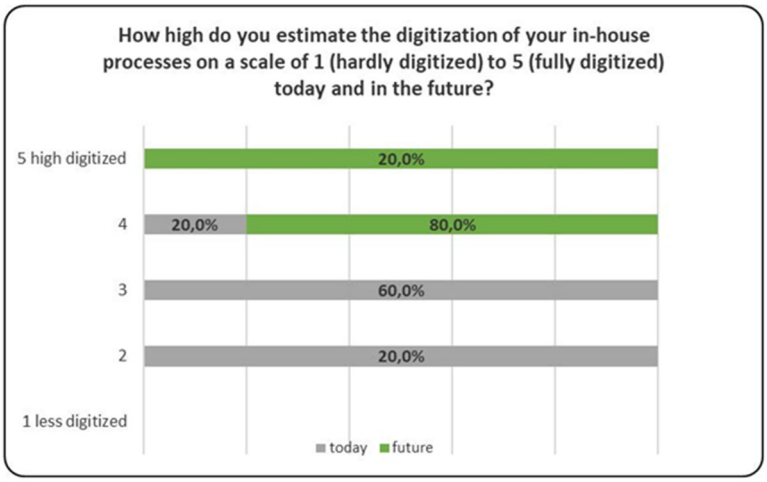

Figure 1 Assessment of the interviewed company representatives* regarding digitization their business processes as a whole

This increasing use (Figure 1) entails changes in workplace requirements, such as changes in work documentation or the implementation of work process management of skilled workers.

3.2 Competence requirements for skilled workers

In this context, the concept of competence according to Dehnbostel (2015) is used. This is based on the competence concept of the german Conference of Education Ministers (KMK; KMK, 2018) and contains an action-oriented, occupation-related focus. The KMK definition encompasses the areas of professional competence (technical knowledge and ability), human competence (also personal competence, i.e. value concepts, personality) and social competence (shaping social relationships), which have been expanded by Dehnbostel to include methos competence, communicative competence and learning competence (Dehnbostel, 2015).

In 2016, the KMK supplemented a specific competence framework for the "digital world" (KMK, 2017), in which IT competences in the areas of search, storage, (2) communication and cooperation, (3) production and presentation, (4) protection and security, (5) problem solving and action, and (6) analysis and reflection (ibid.) were be included (ibid.).

The development of the competence requirements of digitized logistics at employee level in the warehouse is based on a change in technical and social competences. In the future, the

focus will be on technical understanding and IT knowledge and specialist knowledge, particularly in the case of specialist competencies, and on communication skills and cooperation in the case of social competencies, supplemented by personnel competencies such as process responsibility and decision-making competence, autonomy and assumption of responsibility.

Especially the technical understanding and IT-knowledge are most often derived from the expert interviews. It remains unclear how exactly the experts define IT competence.

However, a need for training in the field of IT skills is also apparent in the survey of skilled workers in logistics with regard to their training needs. In addition to general topics from the field of specialist logistics knowledge, they also cite topics from the IT sector, such as using and understanding software, Excel/office training, automation, etc., as their favoured further training topics.

From the qualitative survey, with reference to Dehnbostel's competence branch (2015), we see the following results for expected future competence requirements of skilled workers in the fields of transport and warehouse. The competences that were mentioned most commonly are printed in bold (Table 1).

Table 1 Changes in competence requirements for skilled workers in transport and warehouse from the view of the management levels

professional competencies	human resources competencies	social competencies
• **IT-knowlege (programming knowledge, technical know-how)** • commercial knowledge • knowledge of the products and their specific characteristics form warehouse/transportation • Legal requirements • Knowledge of the control of vehicles for example forklifts and trucks.	• **Organizational ability/process responsibility (organization of operational information flows)** • **decision-making competence/autonomy** • flexibility • willingness to adapt • learning ability • self-reliance • time management • enthusiasm/motivation • planning and organisational skills	• **communication skills** • **ability to work in a team** • Intercultural Competences

The development of the competence requirements of digitized logistics at skilled workers level in the warehouse is based on a change in technical and social competences. In the future, the focus will be on technical understanding, IT knowledge and specialist knowledge, particularly in the case of specialist competencies, and on communication skills and cooperation in the case of social competencies, supplemented by personnel competencies such as process responsibility and decision-making competence, autonomy and assumption of responsibility.

Especially the technical understanding and IT-knowledge are most often derived from the expert interviews. One company mentions here the need for an overview of the meaning of technical terms in information and communication technology. The quantitative survey also shows that quality awareness on the part of warehouse employees will become more relevant in the future. Although this finding was not confirmed by the qualitative survey, it can be found in current studies such as the CMI-2017 study. Here quality awareness is understood as a factor for the competitiveness of the company (Institute for Change Management, 2017).

In the case of transport, a change in professional and social skills is particularly likely. In the future, technical understanding and IT knowledge will come to the fore, especially with regard to specialist skills. In the case of social skills, the ability to communicate becomes more relevant. This is confirmed by the results of the qualitative survey. The experts also see little relevance with regard to the perseverance and independence required in the future (personnel competence).

Studies point out that the changing competence requirements for employees will also change the significance of continuing training in the future (Kruppe et al., 2019). The results of the survey confirm this assumption, since the topic of continuing training is currently present in the companies surveyed against the background of digitization. This aspect becomes visible in different corporate strategies. For example, some of the SME surveyed conduct their own media-supported in-house training courses or develop digital further training courses in order to secure the qualification of their employees.

In addition, when asked about changes in work processes and procedures, the respondents pointed to a shift in tasks towards commercial occupations or technology monitoring activities for both target groups.

3.3 Existing teaching/learning solutions in practice

The qualitative survey shows that, in addition to the duty of CVET training courses, such as the modular training courses for professional drivers, some companies are currently conducting digital CVET training courses for skilled workers also for commercial employees. Topics that are currently being digitally trained in warehousing and transport by the companies for the skilled workers surveyed.

Table 2 Digital CVET training topics in warehouse and transport logistic

warehouse	transport
• lifting and carrying • alcohol and drugs • computer workstations • data protection • driving in the warehouse	• extending the loading area • alcohol and drugs • driving in winter • safety equipment • driving and rest times

The qualitative surveys show that, from the management level's point of view, digital CVET offers do not replace the formal face-to-face courses of continuing education, but digital offers are seen as a helpful supplement and preparation, especially for career changers or trainees.

Opportunities that the interviewed experts* associate with digital learning are flexibility, exchange of pure information, adherence to the individual learning rhythm or an integration of learning into the daily routine of professional drivers that is more easy. ***Challeng*es** are a lack of practical relevance/lack of haptic reference, the motivation of employees, that interaction/personal reference comes short and that it should be possible to map individual company requirements.

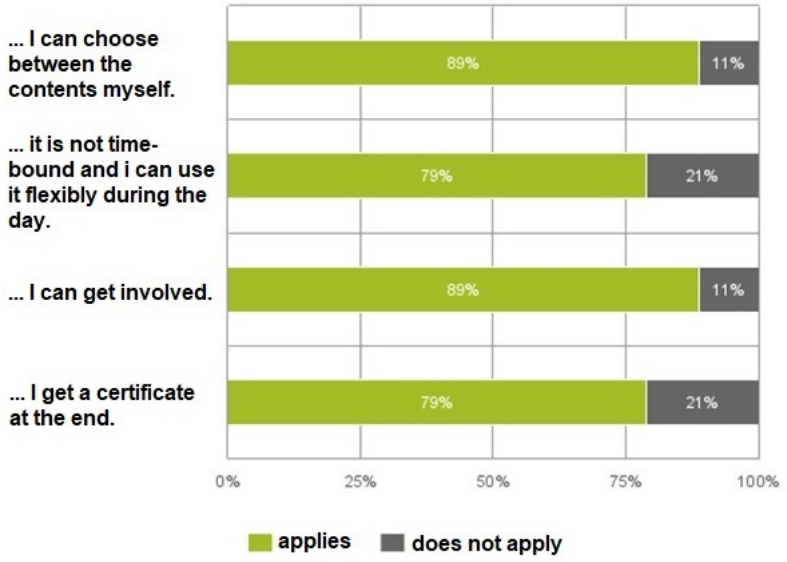

Figure 2 Willingness to participate in digital continuing training for employees
Question: Digital CVET offers are attractive for me if …"

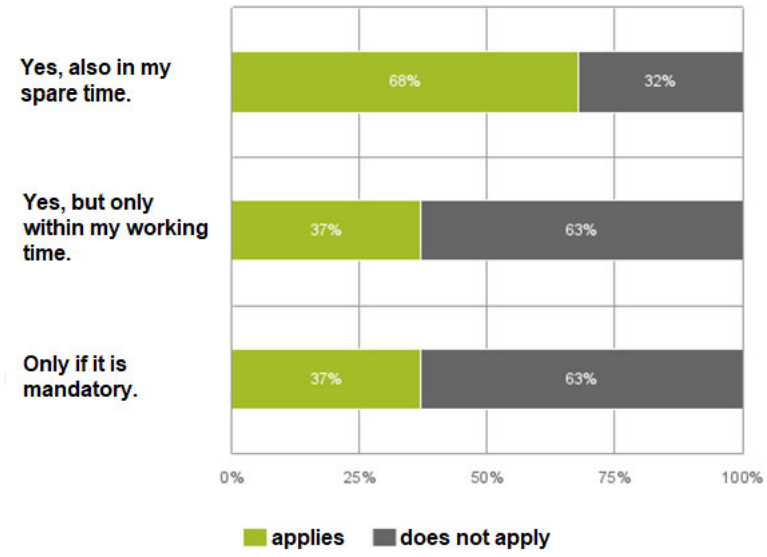

Figure 3 Requirements of skilled workers for digital CVET formats
Question: "Would you participate in a digital CVET training program?

The online survey at the skilled worker level has only been carried out in the warehouse so far and has shown that the willingness to use digital learning formats is highly rated for the warehouse sector. 68% state that they would participate in a digital CVET training offer both in their leisure time and in the company (Figure 2). In response to the question as to when a digital CVET training offer was attractive (Figure 3) for the respondents, all the aspects surveyed were rated as high, especially if the employees themselves were able to choose between the contents and to contribute themselves. But how do digital teaching/learning solutions need to be designed to meet the skill requirements of these professionals?

Table 3 Functions, format and topic of demanded teaching/learning offers

function	format	topic
• chat/groups/blogs/ comment function • training videos • learning profiles • declaration on type, content and form of the offer • success control • ensuring active learning • live stream function • competence check for classification	• learning scenario • blended learning • media • interactive formats: Simulation • displaying image sequences with subtitles • explanatory videos • intuitive, simple design, easy access • complementing the practice • playful elements for the purpose of motivation	• load securing • logistical processes in general (e.g. part manure, general cargo) • topics outside the working day • commercial topics (excel training) • dangerous goods • hazard analysis and critical control points (HACCP) trainings, good distribution practices (gdp) (loading technology) • liability, damage assessment • compulsory schooling

The online survey at employee level showed that a digital teaching/learning offer should cover the functions, contents and topics listed in Table 3.

4 Conclusion

In summary, we can state by now that the CVET landscape in transport and warehouse logistics does not represent enough offers and that from the individual‘s point of view belonging to SME, the demand in the course of digitalisation is considered relevant. The changing work processes bring along new competency requirements. These are currently not covered by CVET offers.

The current provision of CVET is being perceived as unsystematic, which implies the need for a clearer structure and categorization of the services. Digital CVET offers have found their way into some companies, but they are accepted in different regard.

A reason for this could be the presentation of self-made digital offers. With regard to the demand for digital training, some respondents see this only within the format of the learning video. However, digital training offers represent broader formats, such as interactive learning forms, e.g. learning games, simulations, auditory forms, e.g. podcasts (Arnold, Kilian, Thillosen, & Zimmermann, 2018).

The changing work processes come along with new competence requirements. Effects on work tasks and organisational models are described in particular in the expert interviews with the terms *increasing transparency of processes*, *increasing speed of the flow of goods* and *increasing complexity*. In the future, customer satisfaction will become a stronger focus of the surveyed companies and requires the use of new technologies in corporate and work processes. The online survey at the company level showed that an increase of 46.7% can be expected in the area of customer communication and cooperation within the next 5 years.

The company survey showed that the use of technologies can also be found in the area of continuing training and will gain importance in the future. Recently, most companies make use of formal offers, regarding topics of the module training courses for professional drivers and the compulsory training courses in the warehouse. The company management is aware of the potential of digital further training offers, especially for the skilled workers of professional

drivers, as their work-life balance is limited by participation in weekends. In order to validate our results, a broader survey in other transport and warehouse logistics companies is necessary. This point also concerns the limitation of our research: The skilled worker survey reached persons aged 20-29 in warehouse. Therefore, it cannot be assumed that skilled workers of another generation in the warehouse represent the same interest and the results cannot be transferred to the skilled workers in transport. For this purpose, older skilled workers in the warehouse would have to be interviewed in order to make a more comprehensive statement about the willingness of skilled workers in the warehouse.

Furthermore, MeLoDi is a national German project. The transfer of the digital CVET offers abroad would have to be examinatined as well. The legal bases existing in the target country must be considered then, e.g. customs conditions, contents relevant to training as well as forms of work in transport and warehouse.

In addition, MeLoDi is running for 14 months so far and the results cannot be final, so all results are preliminary.

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Exploring Knowledge Practices in a Building and Construction Program

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Abstract

This paper analyses knowledge practices in the classroom and in the workshop in a building and construction program in Norway. We draw on ethnographic data, and our analysis employs an analytical framework that enables us to explore key aspects of knowledge practices: tasks, knowledge processes, social relations between the actors and how actors utilize physical space, material objects, and time. By comparing knowledge practices in the classroom and workshop, we find that there are stark differences, for example, in the interplay of knowledge processes, tasks, and time. Our findings suggest that we need to look beyond the tasks and content of education to understand how knowledge plays out in vocational education beyond simplistic binaries of "theory" and "practice."

Keywords

knowledge practices; upper secondary school; vocational education; ethnographic study

1 Introduction

In this paper, we investigate knowledge practices in a vocational education and training (VET) program in Norway. Norwegian VET is to prepare students for future employment as well as for their participation in society in general. To achieve this aim, VET programs include knowledge from different epistemological traditions (Butler, 2000; Muller, 2006; Nordby, forthcomming). As in some other European countries, the initial VET programs in Norwegian schools consist of vocational subjects and academic subjects, such as science, mathematics and language, what in Norway is referred to as "common core subjects."

Wheelahan (2015) argues that this curricular model of including vocational and academic subjects is characteristic of VET in Northern Europe. She contrasts this kind of curriculum with what she calls "particularly impoverished models of VET" in some Anglophone countries (Wheelahan, 2015, p. 750). In these models, she says, "key curricular questions—what should

* Corresponding author

we teach and why?—have been reduced to the skills needed to get a job and for work" (Wheelahan, 2015, pp. 750–751). In a Norwegian context, such "key questions" have received considerable public and political attention. The general sentiment in these public discourses is that VET does not do enough to prepare students for work life. More specifically, problems of early school leaving and student disengagement have been attributed to VET being "too theoretical" or "not practical enough" (Hegna, Dæhlen, Smette, & Wollscheid, 2012; Spetalen, 2017). Several researchers have pointed out that this binary understanding of theory and practice is problematic and have called for more empirical studies of how vocational and academic subjects are enacted in school practices (Aakrog, 2019; Hiim, 2017; Spetalen, 2017). And while there are quite a few studies that examine individual subjects (e.g. Nordby, Knain, & Jónsdóttir, 2017; Rosvall, Hjelmér, & Lappalainen, 2016), fewer studies have focused on more than one subject or on the interaction between subjects. In order to get a firmer empirical understanding of how various knowledge traditions and epistemologies are enacted and interact in VET, we designed a study with an explicit comparative focus.

1.1 Aim and research question

In the following, we present data from an ethnographic study of a building and construction program in Norway. The goal is to identify and compare knowledge practices in the classroom and in the workshop. We use knowledge practices as an analytical lens, and we suggest that this lens allows us to see patterns and interrelationships that we might not see if our focus had been on the teachers, the students, or knowledge structures in individual subjects in isolation. The benefit of a focus on knowledge practices, then, is that it provides a systematic way of describing the relationships and dynamics between knowledge, actors, time and aspects of materiality. In order to explore this perspective, the research question guiding this study was: What are the predominant knowledge practices in the school workshop and classroom?

1.2 Knowledge practices

Our understanding of knowledge practices is informed by practice theory. We apply a definition of practices as "embodied, materially mediated arrays of human activity centrally organized around shared practical understanding" (Schatzki, 2001, p. 11). This definition implies that practices are patterns of activities, and that activities are social, embodied, and embedded in time and physical space. Knowledge practices are specific types of practices. We build on previous studies that have employed this concept in educational contexts. Nerland (2018) investigates how knowledge resources, collective epistemic practices and epistemic objects, i.e., inquiry tasks, are part of knowledge construction. Collective epistemic practices denote social enactment of processes, such as communicating, justifying, and assessing knowledge. Although we don't have room to explore this distinction here, we prefer the term knowledge practices over epistemic practices. Even if our terminology differs slightly, the work of Nerland and others form a helpful starting point for analyzing processes of knowledge construction.

We conceive knowledge broadly because knowledge in academic and vocational fields have different qualities and ways of expression. For instance, how to make mortar with the right consistency is usually not made explicit, not because it is "impossible" but it would be too cumbersome to verbalize or to make the knowledge "general" (Collins, 2010).

In our understanding of knowledge practices, we place a particular emphasis on the embodied nature of practices. This emphasis has three important implications. First, there is physical social space. Space tends to regulate and shape embodied activity (Nespor, 1997), for instance, how desks and chairs are placed in the classroom (Johansen, 2018). Second, the material objects that are used, such as tools or learning resources, are influencing and influenced by the actors, knowledge processes and tasks involved in a particular activity (Roehl, 2012). Third, an important aspect of embodied actions, is time (Alhadeff-Jones, 2018). The rhythms

in the activities say something about how “much time” there is. Is it urgent to produce answers and effective work skills, or is there enough time to nail the board once more to get it right? In an educational context, time is complex as it operates on several levels (organization, classroom/workshop or individual) and time is both qualitative and quantitative, biological and social (Alhadeff-Jones, 2018).

2 Method

2.1 Context and material

We followed a first-year class in a building and construction program for 20 days from January to May, 2018. The class had the subject Production, which consists of various aspects of building and construction work, for 20 hours each week. In the spring term, the students had Vocational specialization for 10 weeks instead of Production. Some of the students had this subject in local building firms, while the rest were in the school workshop. However, during this period all students had to attend Technical drafting and trade studies, and the common core subjects; Norwegian, Mathematics, English, Science, and Physical Education. All the teachers were experienced, and the vocational teachers had worked for building and construction companies before starting their teaching careers.

We conducted an ethnographic case study using participant observation. The field notes focused on descriptions of everyday events and knowledge activities among students and teachers in the subjects Production, Vocational specialization, Norwegian, English, Science and Mathematics. We compared field notes to calibrate our observational focus and to discuss our understanding of various episodes. In addition to the field notes, we conducted two focus group interviews with students and one with the teachers. Standard procedures for informed consent and anonymity were followed. A few of the students declined to be interviewed, so the interviews represented only a sample of the students who participated in the overall study.

2.2 Analytical approach

We conducted a two-step analytical approach. The first part of the analysis draws on the conceptual framework presented in section 1.2. Based on this framework, we coded activities in our material according to the following aspects:

- Knowledge task e.g., building a brick wall or recycling in a sustainable perspective.
- Knowledge processes e.g., verification, assessment, or recall.
- Social relations between actors e.g., collaborative work or getting supervision from teacher or peer.
- Rhythm e.g., shifts of activity.
- Physical social space e.g., movement in the room or position at desks.
- Material objects e.g., tools such as a pen, computer or hammer.

By coding our observations according to these aspects, patterns emerged, and these patterns constitute our descriptions of knowledge practices. The final analysis is inspired by Knorr Cetina's (1999) comparison of epistemic cultures. By comparing the practices in the workshop and in the classroom, we are able to interrogate the practices. The interviews calibrated our understanding of the knowledge practices. Findings based on preliminary analysis were presented to the teachers and students.

3 Results

Our research question was "What are the predominant knowledge practices in the school workshop and classroom?" In order to answer this question, we first discuss some examples of the knowledge activities that constitute the practices in the classroom and in the workshop. We then compare these practices to highlight what seems characteristic of the knowledge practices in each arena.

3.1 Knowledge activities in the classroom

Knowledge activities in the classroom varied between subjects and between lessons. We will present two activities that share some features and differ in others. The first example of an activity in the classroom is an online vocabulary quiz from an English lesson. The teacher divided students into teams. The team members in each team clustered around one desk. The computer provided vocabulary words in Norwegian and the students had to choose the correct English translation by picking from one of several alternatives. The key features of this activity were:

- Knowledge task: vocabulary quiz.
- Knowledge processes: recall and/or guessing.
- Social relations: teams constructed by the teacher, no formal division of labor among the team members.
- Rhythm: fast pace decided by the computer and teacher who started and ended the quiz activity.
- Physical space: students sat in groups around desks with computers.
- Material objects: personal computers.

To provide another example, we turn to a mathematics class. The activity was a task sheet about the topic "Bricklaying with Leca" and was contextualized in terms of what the students were doing in the workshop (see 3.2). The tasks on the sheet were short and structured, and they revolved around a wall made of Leca blocks that the students had been making in their Production class. For example, one of the questions was "what is the weight of a Leca block?" Some students tried to answer this question by anticipating the weight, lifting the block the teacher had brought with her. Others tried to solve the problem by googling it on their computers. Other tasks on the sheet were pure calculations, such as finding the area of a wall, and determining and how many Leca blocks would be needed to construct it. To complete the tasks, the students had to go into the bricklaying workshop and measure their own walls. The key features of this activity were:

- Knowledge task: context dependent mathematical tasks, short and structured with varying degree of difficulty.
- Knowledge processes: calculation, measuring, information finding, practical reasoning and assessing.
- Social relations: individual work but students talked among themselves in an informal way.
- Rhythm: the students chose their own pace and did not seem overly rushed. However, if they seemed to be losing focus, the teacher always came by to encourage them to work.
- Physical space: the students mostly sat at their desks, but the tasks also required them to walk to the workshop, and some also went to the teacher's desk to lift the Leca block.
- Material objects: the Leca block, task sheets, pens, yardsticks, computers.

These two examples show that there are differences, but also similarities between classroom knowledge practices: There is not one classroom knowledge practice. In some aspects, though, there are common features of classroom knowledge practices across subjects. Students were mostly working individually or in informal groups where they were not mutually dependent on one another (social relations). Students sat by their desks, often facing the center of the classroom rather than the front where the teacher's desk and the blackboard were located (physical space).

When it comes to tasks and knowledge processes, there was more variation. The tasks could be very structured such as in the vocabulary quiz, or they could be more open e.g., a role-play on recycling in science. In the classroom, lessons often consisted of many relatively short, thematically linked tasks. Each individual activity typically involved a limited range of knowledge processes, albeit over the course of a lesson, there could be several activities, and thus several types of processes. We rarely saw processes such as assessing, justifying or arguing for knowledge claims. Most often, the processes involved recall or finding and presenting information, as well as applying general principles to specific contexts. In terms of the classroom rhythm, with the exception of mathematics, there were clear transitions between activities. The pacing of each activity was decided by the teacher, and the teacher would always indicate the start and the end points of different segments. Many of the students did not seem to take good care of their school equipment. For instance, many did not bring a pen or paper to class and course material, such as work sheets and the like, would often be lost or crumpled up in the bottom of a backpack.

3.2 Knowledge activities in the workshop

We use tiling and bricklaying as an example of a knowledge activity in the workshop. This was an activity that took place over several weeks in a workshop designed for this purpose. The students worked in teams of 2 or 3. The teacher decided the teams, and the team members had various degrees of technical skills concerning bricklaying. Each team was to construct a corner wall with tiles on one side and plaster on the other side. The walls stood in a row, so that when the different teams worked, they did not see each other. However, the students frequently needed to move around the room to get tools and so on, so in passing they would stop at each other's walls to talk about both bricklaying or social activities. Because the teams paced their work differently, some acted as consultants for others, or, at times, some students would stop by to watch a team that was a bit further ahead in the process. The breaks followed the regular school schedule. The students took breaks when the clock said it was time for a break. After the breaks or at the start of the day, the students picked up where they had left off without being instructed to do so by the teacher. Students mostly took care of their gear and tools, and some of them tidied up the work area continuously, while other students tidied when they were finished. The teachers gave few instruction to the group as a whole, but supervised each team, and the teams also asked the teachers for advice.

It seemed to us that it was important that students "figured things out" and learned to observe appropriate techniques and procedures with few directives or explicit guidelines as to what to look for. For example, when a teacher supervised students while they were mixing tile adhesive, he declared "it [the adhesive] is not finished" without explaining how he reached this conclusion. However, he showed the students the mixing procedure, and they tried to copy him. Students applied much practical reasoning and assessment, and when the work was not good enough, they had to start over. They also stopped to plan the next step, for example, how to put down tiles. The key features of this activity were:

- Knowledge task: constructing large physical object with many different elements.
- Knowledge processes: embodied technical skills, measurement, assessment, problem solving and planning. problem solving by trial and error sometimes resulted in work that was not good enough and students had to start over.
- Social relations: the students worked in teams, no formal division of labor among team members. All members had tasks that needed to be done. The students engaged in conversations with peers about workshop activities or non-school topics.
- Rhythm: the pace was determined by how much time it took to complete a particular task. Time flowed according to the construction of the wall. Breaks were a pause in this rhythm, the activity continued after the breaks.
- Physical space: students were in constant movement. The movement was rarely organized or structured by the teacher.
- Material objects: students used many different tools. The appropriate use of some of them required instruction and practice. Students mostly took good care of the tools and tidied work areas regularly.

One characteristic feature of knowledge processes in the workshop was that students were making large physical objects, that involved different forms of knowledge, sometimes from different fields. For example, students interpreted drawings, and used the drawing to make constructions. They planned and assessed their work. The teacher often showed the students how to do a particular procedure, but there was little explicit clarification of how to observe (see, feel, hear) the embodied knowledge the teacher displayed. Thus, the question of what the students were supposed to look, touch or listen for in a particular demonstration was left to them. Another feature of knowledge processes in the workshop was that students quite often had to start a particular procedure over. In this sense, the quality of the work (such as applying the appropriate amount of tile adhesive) was more important than finishing quickly. In terms of social relations, students liked to socialize with each other and joked around, they collaborated in teams, and they often helped other teams. There was a flow between craft-talk and socializing. The most striking feature concerning the aspect of rhythm was the co-occurrence of activities at different speeds in the same room. In terms of material objects, the students used different gear, tools and machinery. Safety, keeping the workplace tidy and tools clean were important – and students mostly complied with this.

3.3 Comparing and discussing knowledge practices in the classroom and workshop

Given the richness of our material, several interesting points could be made when all the aspects of the activities are integrated and classroom and workshop practices are analyzed and compared. For the purpose of this paper, we will focus on one aspect only: knowledge processes.

The analysis of our material suggests that knowledge processes in the workshop were varied. They ranged from embodied action to verbalized problem solving and assessment. These kinds of knowledge processes were rarely seen in the classroom. Perhaps we can understand why this is so by looking at the other aspects of knowledge practices. For example, the knowledge tasks in the workshop gave a rich context for students to apply different knowledge processes. In the classroom, on the other hand, knowledge tasks were often more circumscribed, and thus required fewer types of knowledge processes. The classroom knowledge tasks also tended to center on factual information or on the application of general principles to specific instances. Moreover, problem solving and assessment in the workshop, frequently required students to start a particular process over. In our material, we did not see any instances of this in the classroom – even if the standards for "right and wrong" were no less clear. There seemed to be no time for do-overs in the classroom. Material objects, such as tools,

were a central part of knowledge processes in the workshop, while in the classroom they had a more marginal role. For example, students seldom took notes to make their knowledge processes visible in the classroom, but when the students moved around in the workshop, they observed other students and they talked and helped each other. In this way, they exchanged ways of working and thinking.

In both the workshop and the classroom, the students were often not supported in their observations or verbalizations of knowledge processes. In the workshop, the teacher often modeled knowledge processes, but seldom drew attention to what was worth noticing about the way he or she performed the task. Also in the classroom metalanguage about how knowledge processes (how do we do and think) was rare.

4 Conclusion

We have explored knowledge practices as a tool in order to identify, question, and compare VET across different subjects. Both our analytical approach and our analysis undoubtedly needs further development, yet it provides a possibility to address important questions in education, such as identifying the knowledge at stake and describing how it is worked with. Perhaps more importantly, the comparison between the practices can enable a comprehensive and empirically informed discussion of the interplay between academic and vocational subjects in VET.

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Transformative learning in correctional settings for diversity management[1]

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Abstract

Diversity management is a high priority in all settings. Specifically, in prison it requires personnel to be properly equipped to manage and guide change management processes.

Keywords

transformative learning; (de-)learning potential; learning needs and related problems

1 Introduction

The ongoing research (named *Forward*) in its first part that is presented in this paper (research-learning) aims at investigating and focusing on theory-in-use in the professional practices of penitentiary staff as well as producing institutional learning. The research is being funded by the Italian Ministry of Education, University and research (MIUR, 2018–2020, ID 85901), aiming at developing research and community based strategies to support diversity management in multiethincal environments. We hereby refer to the research activities that are being conducted with penitentiary professionals at different levels in order to investigate on problems, needs, demands and design the proper learning activities.

The theoretical framework we refer to is the *social* and *emancipatory* approach of *transformative learning*. Specifically transformative dimension is related the individual (Mezirow, 2000), the Public (Dewey, 1927) and the collective (Federighi, 2018) spheres of transformative learning conceived as learning enabling to „[…] perceive social, political, and economic contradictions, and to take action against the oppressive elements of reality" (Freire, 1970, p.17).

Reflexive capacity is combined to the power of the collective subject, the Public (Dewey, 1927) of managing learning actions to transform individuals, communities, organisations/institutions.

The object of our study is the learning "valencies" correctional settings can play in a positive and negative way towards foreign prisoners.

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[1] Title of poster in the ECER programme: The Pedagogical Dimension of the Re-Education Principle of Punishment in the Italian and Hungarian Legal System

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2 Methods

The research-learning has been conducted using the training needs analysis (TNA) methods (Boydell & Leary, 1996; Leigh, Watkins, Platt, & Kaufmann, 2000; McGehee & Thayer, 1961) carried out by semi-structured interviews and focus groups taken with high levels professionals (macro dimension of the TNA), manager of institutions (meso dimension of TNA) as well as professionals in prison (micro dimension of TNA). Active learning methodologies were adopted for the learning actions and transformative learning' design.

3 Results

Results achieved so far are in terms of:

- Identification of some of the problems connected to prisoners' diversity management in the penitentiary institutions involved.
- Analysis of the problems in the educational perspective.
- Expression of the learning demand at different levels in the penitentiary institutions (head of the executive education in prison, head of prisons, head of the police officers, head of the educational/treatment area, professionals)
- Definition of the learning pathway in response to the problems and needs' analysis including benchmarking with institution abroad (in our research we involved Hungary).

4 Conclusion

Prison system acts in a positive or negative way in the construction of behaviours, values, knowledge that are the basis for the "educational compensation" of prisoners (Torlone, 2018). Prison system contributes to the education to legal behaviours, to the respect of others (no matter where they come from, the colour of their skin, the religion they belong to, the way they dress), to being together. Every penitentiary staff is involved in this challenge. They can act as change agents should they be supported by methodological devices aimed at peer exchange, mutual learning devoted to reflexive practices by which transformation processes, professional development, institutional learning can start.

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Development of Teaching Competences of VET Teachers and Trainers in Germany, Italy and Lithuania

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Abstract

The goal of this comparative study is to reveal common and diverging trends in the development of teaching competences of VET teachers and trainers in Germany, Italy and Lithuania as part of the Erasmus+ project TEACHVET. The study focuses on the following research questions: 1. To what extent and how are issues of VET teachers and trainers training and competence development regulated by national laws and legal acts? 2. What are the responsibilities of different stakeholders in the design of VET teachers and trainers training curricula, organization of training, assessment of acquired competences and qualifications? 3. What are the instruments and mechanisms of the legal regulation of the competences and qualifications of VET teachers and trainers? 4. What are the main similarities and differences of the competences of VET teachers and trainers in the countries indicated above? Applied research methods include comparative content analysis as well as qualitative research methods as interviews.

Keywords

teaching competence; VET teachers and trainers; competence profiles; competence assessment.

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1 Introduction

Competences of VET teachers and trainers and their development increasingly attract the attention of researchers and policy makers as highly important factors of the quality and accessibility of VET and it's acceptance in society. Day (2017) reminds us that in addition to benefits, such as criteria for teaching quality assurance via a minimal/threshold standard for teacher education, competence-based approach in teacher training also brings significant drawbacks, such as favouring of atomistic and reductionist learning outcomes, and difficulties in ensuring acquisition of holistic capabilities required by increasingly complex tasks of the teaching profession. Application of the competence-based approach in teacher education is strongly influenced by the spread of corporate management values and parameters in the identification and assessment of the teacher performance and competences leading to the development of an "entrepreneurial" identity of teachers (Day, 2017). Wuttke and Seifried (2017) note that competence-based teacher education approaches are heavily influenced by behaviourism and characterised by over-specification and fragmentation of learning. In order to overcome this drawback, current approaches of modelling of teaching competence draw on a more holistic teacher competence model, which consists of professional knowledge and beliefs, motivation and self-regulation (Wuttke & Seifried, 2017). The study of Tacconi and Gomez (2013) on the factors of success of the Salesian VET centres in Italy revealed that professional expertise and competence of those VET teachers who really made an impact on successful training and further employment/career of their students were strongly integrated and linked with a wide range of personal skills and values. The ability of teachers to apply their professional competences and personal capabilities and values in the training process is what makes a real difference to students (Tacconi & Gomez, 2013). The presented study will seek to provide comparative perspective of the development of teaching competences of VET teachers and trainers in the context of the changing content of their work and institutional context of teacher training.

2 Institutional aspects of development of competences of VET teachers and trainers in Germany, Italy and Lithuania

This section covers comparative overview of the recent trends in the field of legal regulation of VET teachers and trainers training and competence development, as well as institutional settings of the governance of this field in terms of involvement of state, social partners and stakeholders.

2.1 Legal regulation

Comparing the legal regulations of the competence development of VET teachers and trainers in Lithuania, Germany and Italy offers to outline the following similarities and differences in this field:

1) Activities and competences of VET teachers and trainers are objects of national legislation in all three countries, although at different level.

The activities of VET teachers and trainers and their competence development in ***Lithuania*** are legally regulated in a centralised way with significant role played by the key national laws and legal acts and the functions of regulation in this field delegated to the Governmental institutions. The activity of a vocational teacher is characterized by the content of the activity defined by the Law on VET, other normative documents and requirements of curricula. According to the Law on Vocational Education, the work of a vocational teacher is regulated by the venue (professional theoretical training usually takes place on the premises of the institution; practical training may also take place in the field, for example in a training farm, in a greenhouse, on roads, in the forest, etc.). The Education Law establishes the obligation of

a teacher to participate in professional development events for at least 5 days a year. Obligatory participation in the training is paid by the VET institution at the expense of the student basket. Law on Amendment of the VET Law (2017) states, that VET teachers must comply with the qualification and competence requirements set out in VET programs and the Education Act, qualified personnel must be suitable for the planned VET and quality assurance of VET.

In ***Germany*** and ***Italy*** the national legislation on the VET teachers work and competence development delegates many functions in this field to the regions.

The training of VET teachers in ***Germany*** is based on the German Basic Law (Grundgesetz), Art. 12 and in the field of training competence and development of VET teachers the federal system confers so-called cultural sovereignty on the federal states and accords them the right to pass legislation in school-related matters. This produces a complex and rich body of ordinances and federal state laws such as federally standards for the educational contents regarding the training of (VET) teachers, federally framework agreement for the training and examination of the teaching profession, training act regarding teachers in public schools including VET-teachers, etc.

The Ordinance on Trainers Aptitude (*Ausbildereignungsverordnung, AEVO*) stipulates approval of the vocational and occupational pedagogical qualifications of trainers by taking a trainer aptitude test (*Ausbildereignungsprüfung*) needed by all trainers.

In ***Italy***, national legislation on VET also does not provide a mandatory teacher training course as regards vocational training (in particular with regard to VET centres), because the Italian VET system is not managed (for the most part) directly by the central government. At regional level, within the framework of the State-regions Agreement of 22 January 2015, each region and autonomous province is responsible for setting its own standards for teacher training to ensure high quality VET services financed by public funds.

2.2 Institutional setting of the governance of the VET teachers' and trainers' training and competence development: involvement of state, social partners and VET providers

What regards the initial training of the VET teachers, there can be noticed a trend of national standardisation and at least minimal legal regulation of this issue in the all analysed countries, although with some differences and specificities.

The most centralised governance of VET teachers initial training is typical for ***Lithuania***. Here the Ministry of Education, Science and Sport is responsible for planning of VET teachers training and their competence development. Another state institution – the Centre for Development of Qualifications and Vocational Education and Training is responsible for the development of the curricula for the training of VET teachers. Currently there is being designed occupational standard for the qualifications of the education sector which will also include descriptors of qualifications of VET teachers, trainers and the assistants of VET teachers. These descriptors will serve as a basis for the development of unified curricula for training of VET teachers and trainers. Currently there is no institutional framework of the provision and awarding of the qualifications for VET teachers. Existing national legislation foresees only minimal educational requirements for VET teachers' qualification. All vocational teachers must have vocational (professional) qualifications. Pedagogical qualifications are not necessary: they can have it or have a course in pedagogical-psychological knowledge. Subject qualification is obtained after graduation from higher education (college, university) or after completion of a vocational training program.

Due to the absence of institutionalized provision of training of VET teachers and trainers, the VET providers now overtake this responsibility. VET centres themselves organize the training of VET teachers, provision of necessary pedagogical and professional competences. One of the widespread practices in this field is recruitment of the graduates or former VET

students in the teaching positions. One of the key challenges is lack of attractiveness of the VET teachers career due to low salaries, what pushes the qualification requirements for VET teachers down. VET centres tend to resist the introduction of higher level qualifications of VET teachers (for example, LTQF/EQF level 6 qualification with higher education), because a big part of VET teachers and trainers currently have qualifications referenced to level 4 and attracting people with higher education to work as teachers and trainers in the VET system is highly challenging.

In the federalised VET policy of ***Germany*** some features of centralised coordination of the VET teachers training curricula can be noticed in the fact, that the ministers of education and cultural affairs of the German States participate in a standing committee (KMK). This committee ensures a certain degree of uniformity and comparability in school and higher education policies, including resolutions on education standards. The KMK defines educational contents as nationwide standards to make the quality of degrees in Germany comparable. Universities implement nationwide standards of the KMK and state regulations in the university education. These standards are divided into 4 areas of competence: teaching, educating, judging, and innovating. Eleven competences are assigned to these spheres of competences, which are acquired via theoretical training sections and practical training sections. Becoming a VET teacher requires absolving the Bachelor's degree program, 6 semesters, 180 CP, standard period of study 3 years, then completing of the master degree studies in the educations science: 4 semesters for all types of school, 120 CP, standard period of study 2 years. The "Referendariat" (practical training in VET schools, duration in Bremen: 18 months) and Second State Examination follow these academic courses.

German VET teacher education regulations do not foresee any active/mandatory role of social partners or chambers. However, such cooperation takes place on the voluntary basis. For example, delegates from industry and handicraft are invited to comment on study modules whilst re-accrediting of VET-teacher study programmes. Social partners also play important role in the VET trainers teaching at the companies. Employer organizations and trade unions are also the drivers when it comes to updating and creating new training regulations and occupational profiles or modernizing further training regulations.

In ***Italy***, VET centres play a very important role in the training of teachers. Each VET centre and / or each VET federation is free to manage teacher training. Consequently, the training of VET teachers depends either on the will of the management of VET centres or on their free personal initiative. Governance of continuing training of VET teachers is more delegated to VET providers and social partners, although recently it is made compulsory and regulated by law (Law 107/2015). There is no national regulation and standardisation of the qualifications of VET teachers, nor nationally recognised register of trainers or formal recruitment procedures. Similar like in Lithuania, there are established rather minimal requirements to the training profession by the National Collective Work: a degree or an upper secondary school diploma and work experience in the relevant sector. The training of trainers is decentralised and delegated to the different training providers and social partners. Each Region and autonomous province can provide their standards for trainers' training with a view to ensuring high-quality VET services financed by public funds (at the moment, only the autonomous provinces of Trento and Bolzano have institutional VET-teachers training). Inside the Italian VET system, the training and employment of VET teachers in State vocational schools and in centres for adult education (Centri per l'Istruzione degli Adulti - CPIA) is regulated by the Ministry of Education and Work – but they represent only a small part of the VET system.

In concluding this section there can be noticed, that mainly school-based VET systems of Italy and Lithuania, differently from the institutionally diverse and mature VET system of Germany, often lack maturity and sufficiency of the institutional settings and infrastructure of

the VET teachers training and competence development. It has rather diverse implications for the initial and continuing training of VET teachers and trainers – from the stronger state regulation and intervention to compensate the lack of involvement of social partners and stakeholders, to the delegation of many functions and responsibilities for VET teachers training and competence development to the VET providers by the recently implemented reforms.

3 Competences of VET teachers and trainers in Germany, Italy and Lithuania.

Research of competences of VET teachers and trainers in Lithuania, Germany and Italy involved content analysis of the existing standards, profiles or other descriptors of qualifications, as well as focus groups with VET teachers and trainers. The findings of this research provide information for the development of the competence matrices of VET teachers and trainers. These competence matrices refer to the activities and competences typical for VET teachers and trainers working in school-based or dual models of VET provision.

Competence matrix of VET teachers describe the core work processes and competences of VET teachers in supervising the students when they are learning in the companies during the traineeship or apprenticeship schemes typical for school-based provision of VET (also recognizing, that such activities and competences are not typical for VET teachers working in the 'traditional' or well established dual VET provision in German speaking countries).

Comparing the findings of this research there can be noticed, that VET teacher competence profile from ***Germany*** is more strongly focused on the different didactical and methodological competences in the field of curriculum design, application of teaching and learning strategies and methods.

The competence profile of ***Lithuania*** stronger focus on the field of management and organisation of the education and training processes. This difference, at least partially can be explained by the influence of recent methodological approaches in the field of VET curriculum design. Strong and fast implementation of the modular competence-based curricula in the VET system of Lithuania leads to a re-focusing of the functions and competences of VET teachers from the didactics of the subject-based training that prioritise provision and practical application of vocational knowledge and basic skills to the approaches of integrated training in the real work processes. This requires to pay more attention to the different organisational aspects of training and learning.

As training and standards in ***Italy*** are organised resp. set by the regional VET centres, it is impossible to figure out a common focus or level.

This also explains striking difference of attention to the different socio-pedagogical and socio-psychological competences of the VET teachers in the compared competence profiles. Whereas in the profiles from Germany there can be noticed rather strong focus on these competences, in the profile of Lithuania they are very marginal and strongly integrated with the pragmatic and managerial functions of the organisation of training and learning aimed to facilitate employability and employment.

Notwithstanding of these differences, there have been identified common core work processes and phases of competence development of the VET teachers. Due to limited space, only the respective core work processes are indicated:

- Planning of vocational education and training, which covers preparation of training and learning materials, planning and teaching of lessons (micro-planning) and piloting of training and learning materials and other activities.
- Implementation of vocational training and learning processes in VET school covers assisting more experienced VET teachers in preparing and adjustment the physical environment of vocational training and learning (workshops of practical training),

organisation of vocational training and learning processes in schools, independent provision of individualised learning and training and other activities.
- Implementation of vocational training and learning processes in the enterprises covers organisation and provision of infrastructure of practical training and organisation of processes of learning and training.
- Teaching students having special needs covers different activities related to identification of the special needs and requirements and provision of specialised training.
- Assessment and monitoring of learning outcomes of students covers activities related to executing diagnostic, formative and summative assessment, preparation of assessment tasks, etc.
- Advising students and parents on the issues of vocational education, employment and career.
- Project work and involvement in the development of VET provision like participation in national and international projects, organising skills competitions, etc.
- Own professional development.
- Management of students' conflicts and emotions.
- Development of digital competences.

There have been identified the following core work processes and steps of competence development of VET trainers:

- Analysis of the training pre-requirements in the companies, which covers assisting more experienced trainers and other representatives of enterprise in promotion of in-company training and it's benefits, identification of students' training needs and the potential of company to provide work-based training.
- Preparation of practical training at the workplace, which covers organisation of the time and space for practical training, preparation of groups of trainees / apprentices and other activities.
- Implementation /execution of practical training, which covers autonomous facilitation of learning and work tasks, selecting materials, measures and tasks for practical training, executing practical training in a stable and standard, as well as in the dynamically changing, emerging and highly specific work processes and other activities.
- Assessment and monitoring of the achieved competences of learners, which covers assessment and monitoring of advancement of apprentices, execution of diagnostic assessment of the achieved competencies, preparation of trainees/apprentices for the final assessment of competencies, accompanying assessed apprentices and learners to employment and other activities.
- Own professional development.

These competence matrices will serve as a basis for the design of an online tool for self-assessment and competence development. By using these online instruments VET teachers and trainers will have the opportunity to identify the level of attainment of these competences, as well as to plan and manage their competence development activities. The platform will also provide access to information and guidance materials needed for the development of different identified competences.

4 Conclusions

Training and competence development of VET teachers and trainers is an object of national legal regulation in the all analysed countries, although to a different extent and intensiveness.

In ***Lithuania*** legal regulation and institutional governance of initial and continuing training of VET teachers and trainers was changed by the recent educational reforms. It can be noticed rather strong influence of neoliberal competence-based reforms of VET curricula and VET provision by focusing of teacher competences and responsibilities to the satisfaction of the needs of labour market, organisation of flexible, outcome oriented training and learning processes.

In ***Italy*** the initial training of VET teachers is strongly influenced by the holistic reforms of the all education system (e.g., good school reform), what enhances more holistic and education-oriented change of the functions, responsibility, competences and qualifications of VET teachers, like importance of the competences related to cultural education and the requirements of higher education and pedagogical competences.

Germany in this regard presents the case of well-established, mature and complex legal and institutional setting of training of VET teachers and trainers with well balanced requirements of holistic education (attention to the didactic competences of subject based education, requirements of higher education degree for VET teachers) and skills needs of the world of work (significant element of professional experience and internship in VET schools).

Ministries responsible for education and training play significant role in the governance of the processes of VET teachers‘ and trainers‘ initial training, although at different levels of governance: in Lithuania this governance is more centralised (Ministry of Education, Science and Sport and it‘s agency Centre for Development of Qualifications and Vocational Training govern and coordinate initial training of VET teachers), whereas in Germany and Italy this function is delegated to the regional authorities. Social partners play rather different roles in VET teachers training and competence development: whereas in Germany they are sustainably involved in the activities of teachers‘ training curriculum design and development, assessment of their competences and other activities on the voluntary basis, in Italy, and especially in Lithuania the involvement of social partners is much more fragmented, what often requires stronger involvement of state to compensate it. Social partners are more engaged and have more influence in the training of trainers in Germany and Italy.

What regards instruments and mechanisms related to standardisation of competences and qualifications of VET teachers and trainers, there can be outlined absence of coherent and systemic standardisation in Lithuania and Italy. Introduction of national occupational standards in the education sector with the included qualifications of VET teachers and trainers should help to solve this problem in Lithuania.

Despite of different orientation of the analysed competence profiles of VET teachers and trainers to the didactic and cultural competences (bigger attention to these competences in Germany and Italy, less attention in Lithuania), comparison of these profiles permits to develop common competence profile in the format of competence matrices – instrument for the assessment / self-estimation and development of pedagogical and professional competences.

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Implications of Competence/Learning Outcomes-Based VET Curriculum Reforms for the Vocational Teachers and Trainers in Italy and Lithuania

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Abstract

Competence-based education (CBE) has become a world-wide leading principle for curriculum development. Looking from European policy level perspective, despite conceptual criticism, the notion of competencies and learning outcomes in EU policy documents has safeguarded CBE positions for upcoming years. This paper aims to explore how the practices of vocational teachers and trainers change due to introduction of competence-based qualifications and learning outcomes-based curricula. It does so by discussing how current international developments in VET curriculum reform are represented in Italian and Lithuanian contexts, summarises the fresh perspectives towards CBE and discusses implications of CBE for every-day vocational teachers' and trainers' practices.

Keywords

vocational education and training; competence-based education; learning outcomes; curriculum reform; curriculum implementation.

1 Introduction

School-based Vocational Education and Training (VET) systems in Italy and in Lithuania currently face important VET curriculum reforms that change existing methodological approaches and institutional settings of vocational training provision. Shift to Competence-Based Education (CBE) is one of the most evident reforms of modern education systems, including VET, inside and beyond Europe (Cedefop, 2018a; Mulder, 2017). This change, first of all, is related to the introduction of national qualifications frameworks and the standardisation of VET qualifications and is seen as a way to align VET to labor market needs. In recent years competence/learning outcomes-based approaches have been promoted by the European Union and European countries are applying different strategies of designing and implementing competence/learning outcomes-based curriculum. It is interesting to note that

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with political support to CBE approach, the criticism to it has also grown (Allais, 2012; Bagnall & Hodge, 2017; Cedefop, 2018a).

In Lithuania CBE approach was introduced to VET in 1995 (VET provider level) - 1998 (national level) and is considered as 'the core concept and background for the curriculum reforms' (Tutlys & Arna, 2017, p. 403). From then on, there were several stages of developments, the most recent one can be linked to: 1) adoption of national qualification framework in 2010, 2) introduction of sectoral qualification standards (2015), 3) modularisation of VET programmes (2015), that should match competencies defined in sectoral qualifications standards and clearly specify learning outcomes. VET programmes are designed nationally with VET institutions having the flexibility to adjust 20% of the programme according to their needs and to decide about the interpretation of learning outcomes. Another important new development is the promotion of apprenticeship-type schemes as an alternative to traditional school-based learning also combining certain periods of practice at work-place.

CBE is also a characteristic of Italian VET system (Ronchetti, 2017). The guidelines for VET (Linee Guida per il passaggio al Nuovo Ordinamento per Istituti Professionali 2010), national repository of professional qualifications and regional qualification profiles should support VET providers in implementing CBE. Since responsibility for VET issues is delegated to 20 regions, the situation is different from region to region. VET institutions may adapt their programmes to local needs within the national and regional qualifications profiles (Cedefop, 2018b). Further development of CBE is foreseen as well as an expansion of apprenticeship and work-based learning (Cedefop, 2018b).

In both countries CBE has a political support, but then its enactment rests on VET institutions. CBE and learning outcomes approach in training programmes implies important changes in the contents of work of the VET teachers and trainers, as well as the changing competence requirements (Allais, 2012; Brockmann, Clarke, & Winch, 2008; Mulder, 2017). It is important to understand what are the requirements and implications of curriculum reforms for teachers and trainers' work and their competence. There is an evidence that teachers' unpreparedness and lack of proper guidance materials may lead to the failure of CBE approach (Allais, 2012). Enactment of CBE, especially in the context of recent changes (modularisation, dual learning, strengthening of key competencies in VET), is under-researched (Perini & Pentassuglia, 2018; Ronchetti, 2017). On this basis, this contribution addresses the following research questions:

1. Which are the main current common developments in VET curricula reform on international level and how are they represented in Italian and Lithuanian contexts?
2. How these changes influence every-day vocational teachers' and trainers' practices?

2 Method

Research is based on the critical review of literature and semi-structured interviews with 'information rich' stakeholders involved in implementing curriculum reforms in Lithuania and in Italy. The academic papers for literature review were collected by searching both in academic literature databases (i.e. ERIC, Taylor and Francis Online, Emerald Insight and Springer) and in institutional databases of public agencies and organisations involved in education and VET i.e. European Centre for the Development of Vocational Training (Cedefop), Istituto Nazionale per l'Analisi delle Politiche Pubbliche (INAPP) and Centro Nazionale Opere Salesiane –Formazione e Aggiornamento Profesionalle (CNOS-FAP). Interviews in Italy and in Lithuania were carried out as an initial stage of validation of the CBE enactment research instrument.

3 Results

3.1 VET curricula reforms and the notion of competence-based education in them

Academic papers and reports by European Centre for Development of Vocational Training (Cedefop) on VET reforms in EU member countries point to a tight relationship between national VET policies and initiatives that are born due to European cooperation of EU member states in VET (Brockmann et al., 2008; Loogma, 2016; Vaitkute, 2019). The European cooperation is guided by European tools for VET agreed in European Council and Parliament recommendations (European Qualifications Framework - EQF, European Quality Assurance Reference Framework for VET - EQAVET, European Credit System for VET – ECVET). One of the underlying principles of these tools is the notion of competencies and learning outcomes in qualifications and VET programmes and a call for shift from input to outcomes in learning. Thus, implementation of these tools strengthens the position of CBE in VET systems.

According to Cedefop (2012), during the past 5-10 years, all European countries have implemented some kind of outcome-based reform of the curriculum in VET due to economical reasons, i.e. the need to better match VET and the labor market. Cedefop also refers to the following dominating 'operational' reasons for a shift to outcome-based curriculum: introduction of qualifications frameworks and systems for the validation of non-formal and informal learning, need for modularisation of training and rationalisation of VET offer. Interestingly, according to views of policy makers' and existing academic papers this rationale is still found in VET curriculum reforms actions today. The following strands of VET curriculum reforms can be identified: expanding apprenticeship/work-based learning, increasing flexibility of VET through national qualification frameworks, modularisation of VET programmes and individualisation of learning, increasing labor market relevance of VET curriculum, revising curriculum to incorporate development of key competencies (Cedefop, 2018c; Pilz, Li, Canning, & Minty, 2018). They are followed by decentralisation of responsibilities for curriculum making and implementation to schools level (Cedefop, 2012; Ermenc and Mažgon, 2015; Rekkor, Ümarik, & Loogma, 2013).

All these developments are evident in Lithuania and Italy: in both systems VET programmes are oriented towards concrete competencies, both countries have introduced national qualifications frameworks, are striving to introduce apprenticeships and key competencies represent an important part of VET curriculum, although countries have different approaches to their development. In Italy 'Assi Culturali', defined as 'cultural dimensions' have a strong focus in VET programmes and in Lithuania their development is underlined but only general guidance on their content and training exists. Another distinction between countries is that Lithuania has radically moved to modularised curricula from 2015 whereas in Italy (Veneto region) training still follows discipline/subject-based scheme. This questions the flexibility of VET for learners in Italy, but on the other hand, raises concern about its' integrativeness in Lithuania (Pilz et al., 2018).

3.2 Fresh perspectives on competence-based education approach

CBE as a concept is applied from 1960-1970 (Mulder, 2017). From the beginning CBE was associated with detailed analysis of behavioural aspects of job tasks and transferring these behavioural elements into curriculum. The limitations of such reductionalist approach were criticised in Anglo-Saxon educational research, however, this did not imply the rejection of CBE ideas in education systems, but led to transformation of CBE (Edwards, 2016).

In this section we will focus on recent views of opponents and proponents of CBE. Edwards (2016) summarises that critical positions to CBE stem into three directions: the notion of competence, CBE quality and credibility and CBE as way to increase skilled labor. Conceptual differences among countries in CBE terminology (competence, competencies, learning

outcomes, etc.) have been widely discussed (Brockmann et al., 2008; Mulder, Weigel, & Collins, 2007). Critics refer to CBE as being too narrow/behaviouristic approach, atomising skills and knowledge, with narrow focus on technical proficiency, unable to accommodate theoretical knowledge, failing to develop critical thinking of learners and undermining teachers' autonomy (Bagnall & Hodge, 2017; Cedefop, 2017; Day, 2017). A number of authors look at CBE from the perspective of Foucalt's theory of power and connect it to the ideas of surveillance, discipline and power in terms of external authority and control over educationalist's work, learners and workforce (Edwards, 2017; Hodge, 2016). According to them, instrumentalist policy objectives, non-educational and economical interests shaped CBE policy and further impact its exportation, CBE concept was selectively borrowed from progressivism, humanism, constructivism and was shaped by neo-liberalism (Hyland, 2006; Wheelahan, 2009).

The criticism to CBE has been strengthened by numerous analysis of CBE-type curriculum reforms, mainly in Anglo-Saxon countries. According to Wheelahan (2016), CBE in Australia has led to 'expensive and inefficient', 'low trust, highly regulated' system (p. 181), fragmentation of qualifications and failure to control the quality of VET. Hyland (2006, p. 12) notes that expectations towards CBE were unrealistic since it was designed from a perspective of work-place assessment. It is acknowledged that the problem of CBE lies in interrelation of various CBE related elements – the quality of assessment, (un-balanced) industry engagement and shift of control over curriculum from educationalists to employers. The most problematic area of CBE according to researchers is knowledge construction (Hyland, 2006; Wheelahan, 2009, 2016). According to Wheelahan (2016, pp. 186–187) students in CBE are denied access to disciplinary theoretical knowledge. As a result, learners do not develop a full base of knowledge needed for their future, experience problems in controlling and in applying knowledge, as well as in connecting theoretical knowledge with everyday knowledge.

On the European policy level, European Commission acknowledges the potential of CBE and learning outcomes approach in better linking education and employment policies. Taking into account a non-decreasing enthusiasm and support from European Union towards using competence/learning outcomes based approach for constructing qualifications within national qualifications systems, CBE approach, despite conceptual criticism, will be further applied, especially for qualifications awarded in VET system (European Union, 2017). CBE supporters acknowledge that application of CBE leads to more appropriate training programmes, increasing learning motivation of students, better transition and employability of graduates, involvement of employers into definition of competencies expected from learners (together with VET providers' certain degree of freedom), more authentic and attractive education (Biemans et al., 2009; Mulder, 2017).

A great deal of positive and negative insights and conclusions from research into CBE is provided in the volume entitled 'Competence-based Vocational and Professional Education: Bridging the Worlds of Work and Education' (2017) edited by Martin Mulder. This collection of papers reflects various opinions of researchers about potential and limitations of CBE. However, in a search for modern approach to CBE and its enactment it is worthwhile to stress the opinion of Mulder (2012): CBE should avoid fragmentation of learning outcomes, components of training should be seen 'from a holistic point of view', where professional development and personal identity receives attention and all the processes of education (planning, organisation of learning, assessment) are coherent and 'no component is forgotten'.

3.3 Implications of competence-based education for every-day vocational teachers' and trainers'

The literature review suggests the importance of changing pedagogical practices by vocational teachers and trainers in planning, designing and implementing CBE (Barabasch, 2017; Boldrini,

Sappa, & Aprea, 2019; Cedefop, 2017; De Bruijn, 2012; Mulder, 2017; Runhaar, 2017; Wesselink, Biemans, Mulder, & Vand Den Elsesn, 2007). Implementation of CBE is supported by learner-centered pedagogies (Barabasch, 2017; Cedefop, 2015). Taking into account a comprehensive CBE model of Dutch researchers (Sturing, Biemans, Mulder, & de Bruijn, 2011; Wesselink et al., 2007) and studies of De Bruijn (2012) and De Bruijn and Leeman (2011), CBE enactment implies successful integration of learners' knowledge, skills, and attitudes, organisation and coordination of learning in different meaningful and authentic (powerful) environments, development of learners self-responsibility, self-initiative and self-reflection as well as their attitude to lifelong learning, career and citizenship. Need for appropriate proven and experimental methods and learning situations to form students' professional identity and build their judgement/problem solving is stressed (De Bruijn & Leeman, 2011). Even though, according to Mulder et al. (2007) in CBE enactment the emphasis should not be put on evaluation, balanced and authentic evaluation in terms of representation of professional practices and professional dilemmas, implemented throughout all learning process, is among the core CBE design principles (Biemans et al., 2009). Also, the guiding activities of teacher and, particularly, a coaching role in addition to the one of expert, are underlined. One of the areas of concern is how teachers may help students to construct knowledge, what knowledge (theoretical against everyday) is being constructed (Wheelahan, 2009, 2016) and how theory and practice are linked in learning (De Bruijn & Leeman 2011).
Finally, the solutions to overcome the limitations of CBE in terms of atomistic approach to competence definition and development largely rely on vocational teachers and trainers' interpretative capacities. According to Barabasch (2017), Cedefop (2017) and Hodge (2018), they should be able to professionally judge and creatively interpret specifications of competencies and learning outcomes. They should also exercise high independence in designing training content (Baumeler, 2017; Boldrini et al., 2019).

The said above refers to the impact of individual factors of VET teachers for curriculum enactment. Organisational factors (Edwards, Miller, & Pristley, 2009; Nissilä, Karialainen, & Kepanen, 2015; Runhaar, 2017) that would motivate teachers and trainers' cooperation in integrating their teaching practices (theory and practice, integration of disciplines), team learning activities, engagement into professional networks and communities (Rekkor et al., 2013; Wijnia, Kunst, van Woerkom, & Poell, 2016) also need consideration.

Interviews performed at the initial stage of validation of CBE enactment research instrument in Italy and in Lithuania have reconfirmed that CBE requires changing of teachers practice. Integration of learners' knowledge, skills and attitudes (including key competencies), coordination and integration of theory and practice, creation of diverse authentic learning environments, strengthening of learners' motivation, application of new interactive didactic methods (especially for senior teachers) and teachers' cooperation appear to be the most problematic areas.

4 Conclusion and expected outcomes

In the beginning of the article we outlined that due to political support from European and national levels, CBE will continue to be a dominating approach to VET curricula. Researchers point to the fact, that curriculum reforms promoted by politicians may evoke resilience of teachers and not necessarily will succeed in change and innovation at school level (Boldrini et al., 2019; Edwards et al., 2009; Rekkor et al., 2013). The article examined pedagogical dilemmas of VET teachers in reaching students' competencies, such as, rethinking and changing pedagogical practices in knowledge construction, integration of learners' knowledge, skills and attitudes, theory and practice-based training. Nevertheless, to change teachers' attitudes their conceptual, cultural and political dilemmas (Sturing et al., 2011) need

consideration too and guidance/continuing professional development opportunities should be made available.

The present in-progress study represents a first part of a wider research project. The characteristics of comprehensive CBE model (Suring et al., 2011; Wesselink et al., 2007) and findings of literature review were used for designing a research instrument to explore changing work practices and implications of VET teachers in enacting CBE. The next steps will include interviews, focus groups and observations of VET teachers' practices. Moreover, a comparison between Italian and Lithuanian situation will be elaborated and provided.

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Sub-National Variation of Skill Formation Regimes: A Comparative Analysis of Skill Mismatch Across 18 European Regions

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Abstract

This article adopts the skill ecosystem approach to the comparative analysis of skill mismatch across European regions within different skill formation regimes. Institutional arrangements of skill formation regimes are designed at national level. However, they are enacted in regions with very different labour market and socioeconomic conditions, which mediate the relationship between the institutional setting and its effects on the mismatch between the supply and demand of skills in a given region. Our analysis draws on quantitative and qualitative data from a Horizon 2020 project on lifelong learning policies for young adults that compares 18 regions in nine European countries. The data shows the importance of regional demand side factors in explaining skill shortages and skill surplus, and the coexistence of low-skill and high-skill equilibria in urban regions with highly segmented labour markets.

Keywords

skill ecosystem; skill mismatch; skill formation; youth unemployment; functional region

1 Introduction

Most lifelong learning policies targeting young people's education to work transitions are aimed at improving youth's employability and ability to fit labour market needs. These policies have traditionally adopted a Human Capital Theory perspective, assuming that an individual's good foundation of knowledge and skills will translate into a full utilisation of these skills in the labour market. Contrary to this assumption, workers' skills are not always fully utilised in the labour market. Skill mismatch such as skills shortages – which materialise in hard to fill vacancies - and skills surpluses – producing over-qualification and unemployment – serve as vivid examples of skills underutilisation (Lauder, Young, Daniels, Balarin, & Lowe, 2012). In turn, these skill mismatch affect largely socially disadvantaged groups (e.g. young people, women, ethnic minorities).

The article combines the skill ecosystem (Buchanan, Anderson, & Power, 2017; Dalziel, 2015) with the skill formation regimes approach (Busemeyer & Trampusch, 2012) in the

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comparative analysis of skill mismatch across 18 regions in nine European countries. The skill ecosystem approach has two fundamental advantages over previous approaches to the study of skill mismatch. Firstly, by considering the interaction between supply (education) and demand (labour markets) explanatory factors, it overcomes the 'supply side fundamentalism' that has prevailed in Human Capital Theory research. Secondly, by focusing on sub-national levels of analysis, it avoids the 'methodological nationalism' of comparative research on skill formation regimes.

Skill formation regimes and skill ecosystems are both relatively novel analytical contributions to the study of skill mismatch. In the case of the skill formation regimes literature, most of the comparative studies still take the nation-state as primary unit of analysis. While education and training systems tend to be designed and monitored at the national level, these are usually enacted and implemented across socioeconomically diverse regions with very different employment opportunities. Therefore, the relationship between skill formation and utilisation, as well as the resulting skill mismatch, are likely to vary largely between regions within countries. In the case of the skill ecosystem approach, the idea has received more attention among policy circles and applied research than from critical scholars. In terms of empirical studies, this approach has been used for the analysis of regions or sectors in Australia (Buchanan et al., 2000, 2017), New Zealand (Dalziel, 2015), the United Kingdom (Hodgson & Spours, 2013, 2015; Payne, 2008, 2009) and the United States (Finegold, 1999), but there is a clear gap at comparing regions across countries. Our article aims to address these gaps by combining skill formation and skill ecosystems approaches to the comparative analysis of skill mismatch across European regions.

2 Methodology

In our empirical analysis, we draw on quantitative and qualitative data from a comparative H2020 European Commission funded project on lifelong learning policies for young adults in nine European countries[1]. Due to space constrains, in the conference proceedings paper we only refer to the qualitative data, although the quantitative part of the findings will be available in the longer version of the paper, in the conference presentation and at request.

We adopt an analytical qualitative perspective to identify the main regional skill mismatch and challenges affecting young adults across skill ecosystems. We use three methods to address this objective: desk research, semi-structured interviews with key regional actors (i.e. policymakers, employers' representatives, trade unions, skills agencies) involved in the regional skill ecosystem, and a review of the relevant grey literature (i.e. reports, articles) in the selected regions. In total, we base our analysis in 81 semi-structured interviews – four to five on average per region – and 129 documents – seven on average per region. Semi-structured interviews aimed at identifying the main regional challenges concerning LLL policies for youth in vulnerable situations. The main areas covered in the interviews were: 1) the main regional challenges in terms of skill formation; 2) the policy orientations of LLL policies; 3) the governance arrangements between policy actors; 4) and the implications of skill mismatches for young people living conditions in the region.

A qualitative content analysis of the texts (i.e. interview transcriptions and documents) has been applied using thematic coding to identify the main topics related to the regional enactment of the skill formation regimes and their effects on skill mismatch. Thirteen research teams across the nine countries under study replicated this exercise following the same analytical framework, data collection and analysis tools, and reporting guidelines. The interviews were conducted between March and July 2017.

[1] Austria, Bulgaria, Croatia, Finland, Italy, Germany, Portugal, Spain and the United Kingdom.

3 Findings

In the following paragraphs we present and discuss the main findings of the study in line with our two main objectives. Firstly, we compare the situation of skill mismatch across the FRs under study and its implications for social inequalities. Secondly, we explain how the relationship between the institutional characteristics of national skill formation regimes and skill mismatch among young people are mediated by regional labour markets and socioeconomic conditions.

3.1 Regional skill mismatch and social inequalities

Based on the analysis of interviews with key regional stakeholders and the available grey literature, we classified the participating FRs according to four types of skill mismatch: low-skill equilibrium, skill shortage, high-skill equilibrium, and skill surplus. These categories are not mutually exclusive, as FRs can display more than one skill (mis)match situation at the same time.

The most prevalent skill mismatch in policy discourses and reports is a **shortage of skills** (i.e. unsatisfied demand of skills). In some cases, skill shortages relate to the educational level (e.g. shortage of highly-skilled workers in Vienna, Austria) or to a specific period of the year (e.g. seasonal workers in Litoral Alentejano, Portugal). However, most commonly skill shortages are associated with specific industry sectors (e.g. oil and gas in Aberdeen, Scotland; ICT[2] in Plovdiv, Bulgaria; ICT in Glasgow, UK; textile and agriculture in Vale do Ave, Portugal; metal and wood in Kainuu, Finland; marine and automobile in South West Finland; tourism and shipbuilding in Istria, Croatia). While in urban settings these skill shortages refer to specific sectors of the economy that have demonstrated great dynamism and innovation (e.g. ICT in Plovdiv, Bulgaria and in Glasgow, UK), in non-urban settings they refer to one dominant industry in the region that is not attractive to the local young population (e.g. textile and agriculture in Vale do Ave, Portugal; metal and wood in Kainuu, Finland; marine and automobile in South West Finland; tourism and shipbuilding in Istria, Croatia) or that requires very specific skills that can only be recruited from abroad (e.g. oil and gas in Aberdeen, UK).

The other main type of skill mismatch experienced across several FRs is **skill surplus** (i.e. supply of skills that is not utilised or underutilised). Most commonly, skill surplus relates to a large number of highly educated graduates that cannot be absorbed by the local economy (e.g. Blagoevgrad, Bulgaria; Genoa, Italy; Istria and Osijek-Baranja, Croatia; Girona and Málaga, Spain). This over-supply of high skills in relation to employment opportunities usually translates into over-qualification (i.e. being employed in a job for which the worker's qualifications exceed those required for the job) among higher educated graduates (e.g. Blagoevgrad, Bulgaria; Genoa, Italy; Girona and Málaga, Spain) or into unemployment (e.g. Istria and Osijek-Baranja, Croatia). Interestingly, the FR of Bremen (Germany) is the only case that identifies a skill surplus of low-skill workers, as this region is increasingly attracting highly-skilled people. From a skill ecosystem perspective, the explanations for these skill mismatches are twofold: FRs lack employment opportunities for skilled workers because of the shortage of market opportunities (demand) or because young people are not investing in a type of education and skills that are valued by the local labour market (supply). Among the cases under study, the economic characteristics of the FRs reporting skill surplus clearly indicate that the demand side factors prevail in the explanation.

Some of the FRs experiencing skill surplus of highly educated people also experience a **low-skill equilibrium** (e.g. Girona and Málaga, Spain), suggesting that the significant market share of a low-skill sector (e.g. tourism) attracts low-skilled people as well as high-skilled

[2] Information and Communication Technology (ICT).

people who are overqualified for the job. From a skill ecosystem perspective, the lack of employment opportunities (demand) offers a more relevant explanation of skill surplus than the alternative explanation related to young people's educational choices (supply). Conversely, in the FRs of Milan (Italy) and Rhein-Main (Germany) the low-skill equilibrium does not seem particularly related to specific industries within the economy, but generally to the service sector. The FR of Upper Austria used to be in a low-skill equilibrium and now seems to be upgrading to a middle/high-skill equilibrium thanks to investment in education and training.

Across the regions under study, high-skill equilibria occur mainly in specific sectors (e.g. ICT) in urban FRs (e.g. Bremen, Germany; Glasgow, UK; Milan, Italy; Vienna, Austria), but also coexist with low-skill equilibria, leading to a situation of **skill polarisation** in these FRs. Cities are poles of attraction for high-skill demand - especially in the business and ICT sectors - but these also inevitably coexist with a contrasting share of low-skill demand, especially in the service sector. To what extent it is desirable from a public perspective to meet the regional labour demands of low-skill jobs remains debatable: from a short-term perspective it might raise youth employment figures, although in the long-run it might trap young people in low-skill jobs. Moreover, it reveals the hidden consequences of the initial concept of a high-skill ecosystem (Finegold, 1999), questioning to what extent a high-skill ecosystem necessarily coexists with a regional low-skill demand and, consequently, with job and skill polarisation (Autor, Katz, & Kearney, 2006).

Beyond economic and employment consequences, the (mis)match between the supply and demand of skills also has implications for social inequalities among young people in the regions. For instance, the skill polarisation experienced in urban poles poses greater challenges for low-skilled youth. While the number of young people with low–skill levels might remain quite stable in these FRs, the difficulties they face are increasing due to skill polarisation and the barriers to education and employment faced by the most disadvantaged. An illustrative example of this is the difficulty experienced by young people attempting to find an apprenticeship position in the FR of Bremen (Germany) and the risk of social exclusion associated with leaving education without a formal vocational qualification. Similarly, social background also seems to be a relevant indicator of limited chances of educational attainment in both Austrian FRs, as the early tracking of the education system generates social stratification between educational routes.

Following the 2008 financial crisis, an increasingly relevant factor in many European regions is the lack of public investment in VET due to austerity measures. In the FRs of Istria-County (Croatia) young people from disadvantaged backgrounds face significant financial difficulties in accessing the current offer of VET courses, limiting their opportunities to escape poor employment prospects and social exclusion. Another social group significantly affected by low skill equilibrium, unemployment or over-qualification are youth from immigrant backgrounds, ethnic minorities and refugees. In the FRs of Plovdiv (Bulgaria) and Osijek-Baranja (Croatia), youth from the Roma community are more likely to be employed in low-skill sectors, while in the FRs of Bremen and Rhein-Main (Germany), Girona (Spain), Kainuu (Finland) and Vienna (Austria), non-EU migrants and refugees are more prone to being employed in low-skill jobs. In a similar vein, the intersection between skills and gender inequalities hits low-skilled young women particularly hard in the FR of Girona (Spain).

3.2 Regional variation within skill formation regimes

Although the institutional architecture of skill formation regimes is established at the national level, its effects on skill mismatch are significantly mediated by the labour markets and the socioeconomic characteristics of the regions where it operates. Based on the analysis of interviews with key regional stakeholders, in this section we discuss how the relationship between national skill formation regimes and skill mismatch vary across FRs.

The Austrian case clearly illustrates how the collective regime of skill formation has divergent effects on skill mismatch across regions with different socioeconomic conditions and employment opportunities. The early division between vocational and academic tracks within the Austrian education and training system promotes a larger enrolment in vocational tracks and limits the possibility of later moving to an academic track. This institutional feature of the Austrian education and training system poses some restrictions for the FR of Vienna, where there is a shortage of youth with high-level qualifications and skills. Both public authorities and employers struggle to fill high-skill vacancies in this urban area and they report that employers try to fill these vacancies by attracting high-skilled immigrants. Conversely, in the FR of Upper Austria, the strong vocational orientation of the education and training system serves the technical and vocational skills demanded by the regional labour market. Therefore, the same skill formation arrangement provides different employment opportunities to youth in contrasting socioeconomic regions.

Similarly, Germany also presents a collective regime of skill formation with a strong vocational focus and early tracking. In the urban FR of Bremen, the trend towards the *'academisation'* of education to meet the increasing demand of highly-skilled workers is posing challenges to those young adults without an academic background. Conversely, in the German FRs of Rhein-Main, youth with vocational education and training have labour market opportunities that meet their skills. Thus, these findings suggest that the Austrian and German skill formation regimes struggle to provide 'second chance' opportunities for skills upgrading in dynamic urban regions with a large demand for highly-skilled workers.

The level of employers' involvement in skill formation through apprenticeships is one of the distinctive characteristics of the collective regime when compared to the statist and liberal regimes. In FRs with a comparatively underdeveloped apprenticeship system (e.g. Blagoevgrad, Bulgaria, Genoa and Milan, Italy, Osijek-Baranja, Croatia) key interviewees recognise this absence as the main cause of young people's struggle to transition from education to work. Policy actors in these regions seem to assume that a more developed apprenticeship system — including dual apprenticeships — would improve youths' work-related skills, while also serving as a screening mechanism for employers when identifying potential employees.

However, interviewees in FRs with more developed and longstanding apprenticeship schemes highlighted their limitations. In the FRs of Bremen (Germany) and Vienna (Austria), there are not enough vacancies available to place all students. In the FR of Aberdeen (UK), one of the consequences of the 2014 oil and gas crisis has been a scarcity of apprenticeship vacancies. In the FR of Vienna (Austria), concerns have also been raised regarding quality assurance of the VET system: while the Austrian Government is willing to introduce more quality controls, employers are reluctant, especially small and medium enterprises (SMEs). In contexts where the apprenticeship system is the norm, employers consider its successful completion as a basic job requirement. Therefore, contrary to what is assumed by policy actors in some FRs, the existence of institutional frameworks that facilitate the involvement of employers in the funding of apprenticeships does not guarantee the availability of sufficient quality training opportunities for young people.

Employability training plays a central role in facilitating the transition of young people to the world of work in skill formation regimes with low involvement from employers. A crosscutting topic mentioned to different extents by interviewees across all FRs is the perceived relevance employers place on youths' communication, work-discipline and generally 'soft' skills. Beyond technical knowledge and skills, employers appreciate and require youths who can effectively communicate, behave and follow orders, as well as commit and have positive attitudes towards work. However, in several FRs, training policies focused on employability skills show limited effectiveness due to the poor labour market opportunities available to young people in the region (e.g. Girona, Spain; Genoa, Italy; Istria–County, Croatia). Upgrading the

demand of skills in this type of region will require public policies to go beyond the funding of these training opportunities and to invest in wider regional development plans with a focus on the creation of quality jobs.

Interestingly, employers' involvement in skill formation seems to be higher in FRs where one single industry has a dominant position in the labour market, even in the statist and liberal regimes. Tailoring the supply of skills to meet the needs of this specific industry seems to facilitate the match of skills and access to employment for young people. Nevertheless, employment dependence on specific industries also brings a set of negative implications to consider, such as the seasonality of agriculture (e.g. Litoral Alentejano and Vale do Ave, Portugal), the low-skill equilibrium of tourism (e.g. Girona and Málaga, Spain) or the hard working conditions of the metal and wood industries (e.g. Kainuu, Finland). Moreover, the dependence on a single regional industry makes youth more vulnerable to exogenous changes (e.g. oil and gas crisis in Aberdeen, UK) and might generate unbalanced demographic structures in terms of gender and age that translate into social inequalities, such as male dominated regions (e.g. oil and gas in Aberdeen, UK; metal and wood industry in Kainuu, Finland). Policymakers and experts interviewed in FRs experiencing skill shortages associated with a specific industry or season argue that young people do not find these jobs attractive from a career perspective, mainly because of the poor working conditions (i.e. temporary contracts, hard work, low-skill) and/or the low salaries offered in these occupations. Hence, even if there are market and employment opportunities in the region, young people do not consider or value educational investment in the sector because of the limited individual economic returns and undesired lifestyle.

The public commitment to the funding of VET is another characteristic that separates the liberal regime from the statist and collective regimes in the theoretical models. In the European context of post-recession and austerity measures, public funding restrictions do not only affect skill mismatch in the regions under the liberal model: insufficient funding of the VET system has been highlighted in several FRs for a variety of reasons and with several implications for social inequalities. For example, in the FR of Vienna (Austria), the access of non-EU migrants and refugees to publicly-funded training opportunities is generating tensions among social groups. Local actors reported that this competition for limited public resources is undermining the ability of most disadvantaged youth to acquire better skills. Another example can be found in the Croatian FR of Istria-County, where the very limited public funding of VET makes youth dependent on private funding. This represents a barrier to youth in financially vulnerable situations, which prevents them from undertaking this type of programme. In the Spanish FR of Málaga, the funding of some VET programmes has been discontinued since 2011 due to alleged corruption practices in the management of European Social Funding (ESF) finances. A number of FRs have also mentioned the relevance of ESF for the regional VET system (e.g. Blagoevgrad FR, Bulgaria), without which training opportunities for disadvantaged youth in the region would have been scarce or non-existent. Therefore, the limited public funding for training is an important challenge under the liberal regime, but their impact on social inequalities seems more significant in the regions with weaker economic development.

4 Conclusions

In this article we adopted the skill ecosystem approach to the comparative analysis of skill mismatch across European regions with different skill formation regimes. Regional stakeholders and documental data analyses reported skill shortages in sectors that demand high-skill levels (e.g. ICT), but also in low-skill sectors with high seasonal demand (e.g. tourism, agriculture). Skill surplus is a concern mainly for regions where the job opportunities available to higher education graduates are very limited, while skill polarisation between segmented labour markets is the norm in urban settings, resulting in large inequality of opportunity among

young people, particularly in highly-stratified education systems. Across the study regions, young people from immigrant backgrounds, ethnic minorities and refugees are the most affected by unemployment and over-qualification in low-skill jobs.

The interviews with regional stakeholders also showed that the institutional effects of skill formation regimes on skill mismatch vary largely according to the labour market and socioeconomic characteristics of regions. While the collective skill regime is associated with an adequate match of skills in regions with high demand for intermediate skills, it suffers from shortages of high skills in the most dynamic urban concentrations. The low involvement of employers in the statist and liberal regimes is seen by key actors as a major institutional obstacle to matching the demand and supply of skills in many regions, but this is not the case in regions with a predominant position of one single industry in the local economy. In these regions, the predominant industry creates its own mechanisms to coordinate the supply and demand of skills, although the limited career choices available are not always attractive to local young people. Finally, the impact of the recession has negative effects on the capacity of national policies to be effective in the most deprived regions. Austerity measures in the public sector widened inequality of opportunity and triggered social tensions regarding access to post-compulsory education and training. Likewise, the downturn in economic activity reduced the offer of apprenticeships and jobs available to those participating in employability training courses.

By adopting the skill ecosystem approach to the analysis of skill mismatch, the article makes a twofold contribution to the literature. Firstly, and in contrast to Human Capital Theory, our approach shows the importance of demand side factors (i.e. local labour market) in explaining skill shortage and skill surplus across European regions. It also shows that low and high-skill equilibria coexist in highly segmented labour markets, indicating the need for local skill strategies to go beyond the policy aim of raising skill levels and primarily focus on tackling social inequalities among young people. Secondly, our approach shows its potential for comparative research when combined with the analytical framework of skill formation regimes. National institutional arrangements certainly explain skill supply trends between countries, but they need to incorporate analysis of regional labour markets and socioeconomic conditions to explain the divergent effects of these institutional structures on skill mismatch across regions. Combining both approaches will also facilitate a fruitful interdisciplinary dialogue over an issue that remains under-researched in comparative education scholarship.

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Coordination Between Secondary Educational Center and Company in Dual Vocational Training. Opinions of Students and Academic and Business Tutors

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Abstract

The tutors of the company in Dual Vocational Training play a decisive role in the proper development of this training modality. This modality is developed in two centers: school and company. The company tutors are responsible for monitoring the learning process and coordinating with the educational centers. The aim of the study is to identify the training needs of the company tutor and the opinion of the students. A qualitative methodology based on the case study has been proposed. The collection of information has been done through discussion groups and the content has been analyzed with the MAXQDA program. The results indicate the importance of the training of students in professional skills, the importance of tutoring, the need for coordination between the educational center and the company, the lack of follow-up by the tutors of the educational centers and the need for training of company tutors.

Keywords

dual vocational training; company tutors; academic tutors; workplace learning

1 Theoretical framework

There seems to be almost complete agreement in considering that Vocational Training is one of the most appropriate training models to give answer to the competences that must be acquired and developed by the people who are preparing in this educational stage, which are asked from the productive system (Echeverría & Martínez Clarés, 2019). This approach, which has shown to achieve very positive results in several European countries, such as Germany and France among others (Brunet & Moral, 2016: Marín Rivera, 2016), is also an interesting training model

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in countries like Spain with a high unemployment rate juvenile, close to 50% of the young population in working age according to a study by the Bertelsmann Foundation (2019).

In a historic moment in which the European Union places emphasis on overcoming the economic crisis and becoming a reference in the world economy, a basic element to achieve these challenges is to adapt training processes to the companies needs taking into account the surrounding contexts and those circumstances that derive from a world in continuous change.

Dual Vocational Training (Dual VT) is an educational modality that combines students training in two differentiated institutions. In the educational centers (in our case, the secondary education institutes or high schools) the formative activity is mainly theoretical-practical, while in the companies a training oriented to productive-didactic aspects is carried out. In this training model, students acquire a set of skills, both personal and professional, that allow them to reach a level of development in a job that will be useful in the process of professional development and incorporation into active life (Araya, 2008; Graf, Powell, Fortwengel, & Bernhard, 2014; Hoeckel & Schwartz, 2010; Vega, 2005).

These aspects make that the Dual VT is understood as a model that allows the improvement of the quality of the educational and labor systems. Thus, to ensure that the Dual VT works there must be collaboration mechanisms that allow a level of fit that makes it possible to achieve common objectives. Therefore it is necessary to develop joint strategies between both formative and productive instances that determine a common path leading to the professional success for people who choose to train in this modality.

The development of Dual Vocational Training programs has, among its purposes (Tolino, 2015):

- Increase the linkage and co-responsibility of companies with the education system in terms of training future workers.
- Facilitate the transition between the educational stage and the labor stage.
- Promote the labor insertion of students.
- Strengthen the relationship of the teaching staff of the secondary school with the companies in which the students stay.
- Promote the exchange of knowledge between both systems.

From this approach, the acquisition, putting into action and development of professional skills takes place in a real context, in which productive work is related to the learning acquired in the educational center (Delautre, 2014; Schmidt & Foster, 1997). The organization of the practices in Dual VT presents significant nuances in relation to traditional practices. Traditional internships usually took place during periods of stay in companies and institutions once the theoretical contents of a course, or even a degree, have been completed. Thus, on the one hand, companies can adapt the academic curriculum to their specific training needs and, on the other hand, they become institutions that impart training contents with value and curricular recognition. Although it is a relatively new training modality in Spain, Dual Vocational Training has a long tradition in countries in our immediate environment such as Germany, Austria, Denmark, Holland and Switzerland, where between 40% and 70 % of young people choose this training path (Euler, 2013). In addition, it contributes to the increase of youth employment levels that become, in those countries, the highest in Europe (Wolter & Mühlemann, 2015).

This theoretical-practical knowledge is framed in a flexible and open curriculum, a characteristic feature of Dual Vocational Training, which is reflected in the express academic recognition of the contents and competences that the company develops with the trainee students (Molina, 2016). In addition, another of the fundamental characteristics of this training modality is focused on the fact that students are the protagonists of their learning process and

work in cooperation with the different agents involved. This means that they must take an active role in solving problems or situations that arise in the workplace on a daily basis, in short, in the labor market. Also, through the practices in the work centers, it is intended to integrate, apart from the theoretical knowledge, a set of basic competences for the integral development of the student. These competences are: learning to be, developing personal skills such as self-confidence, self-esteem, individual responsibility, autonomy in decision making, reflection, sociability and a sense of purpose.

On the other hand, one of the relevant aspects in this kind of educational modality is to provide students with interpersonal and social skills, values, group work, interpersonal relationship, negotiation skills, listening and communication skills, and diversity management, in a real context. All this coincides with the aspects pointed out by Molina (2016), which indicates that from the company is essential the transmission, not only of professional knowledge, but also of the values and culture existing in the different organizations and companies to which the students go. Dual Vocational Training has its foundations in the learning based on the job, conceived as a process in which, from the workplace, you want to provide people with the necessary professional skills that allow them to develop work tasks successfully. This means that the situation becomes a didactic environment in which teaching and learning elements converge that allow the person to acquire the knowledge and skills necessary to develop professionally (Onstenk, 1995; Siebert, Mills, & Tuff, 2009).

In the design and development of the training programmes which develop the structure established in Dual Vocational Training, several agents are involved: those responsible for the coordination of work experience in secondary schools and training coordinators in companies, institutions and organisations where work experience placements are carried out in alternation; company tutors, academic tutors in schools and students.

The path of Dual Vocational Training in Spain, so far, has been short but intense. The first pilot projects were carried out in 2011, some aspects of dual vocational training were regulated in 2012 (Real Decreto 1529/2012), and between 2013 and 2014 the number of young people enrolled in this type of vocational training is doubled (Wolter & Mühlemann, 2015).

In Spain, there is a significant separation and disconnection between the Educational System and the labour market, which makes the transitions between one to the other very difficult for people who want to join the world of work. To minimize this gap, greater coordination between the education system and the labor market is necessary, promoting from school, high school and university the acquisition and development of skills that facilitate insertion into the labor market. In short, a decided bet must be made for an education that combines training periods in educational centers and in companies (Echeverría, 2016). In this sense, Dual VT should play a decisive role in achieving the stated objectives.

Dual VT in Asturias (Spain), Autonomous Region in which this study focuses, has been incorporated into the training system in 2012, so that the experiences are still at an early stage of development. This means that there are not many companies and institutions incorporated into this training modality, and, in addition, those that have been integrated into it, welcome a very small number of students. Thus, it is essential to understand their development and their future prospects, to know how the Dual VT projects are being developed. In this context, this work presents the results obtained, through a case study, on the degree of development of Dual VT in a high school in Asturias (Spain) in collaboration with a multinational company of the agri-food sector that welcomes students in alternating internships. The main objective has been to know the degree of development of the Dual VT modality from the point of view of the Company, the company tutors and the students.

2 Method

To carry out this research a qualitative methodology was used, due is an ideal research strategy to face the analysis of dual vocational training from the contextual description of the object of study (Denzin & Lincoln, 2012; McMillan & Schumacher, 2007; Taylor & Bogdan, 1992).

To reach this aim, a single case study has been carried out (Stake, 2005), in which the company where the students complement their training has been considered as the unit of work analysis, and the agents involved in this process as informants.

After a theoretical review of the basic topics on Dual Vocational Training and taking into account it current development in the community of the Principality of Asturias (Spain), a study has been carried out by focus group (Finch & Lewis, 2003) in order to know the real development of Dual Vocational Training within the company through the vision that the agents involved have about it.

The sample was made up of students from a public secondary school who participated in a Dual Vocational Training project in a food processing company and the professionals responsible for monitoring it in the company.

In order to collect the information, discussion-groups were held, one with the students and the other with the company tutors. A protocol and a template "ad hoc" have been designed for recording information that has been reviewed and validated by experts in order to ensure the reliability and validity of the investigation. The experts validated the proposed categories (profile of the informant, development of Dual Vocational Training, satisfaction and needs), obtaining a concordance index of 89.06% in the proposed categories. In this case, the analysis is focused on the first two categories.

From a methodological point of view, the information analysis phase has been developed in two fundamental stages: the processing and organization of information, and the interpretation of the information obtained (Krueger & Casey, 2000; Suárez, 2005; Verd & Lozares, 2016). This process has been concretized in the transcription of the audio recordings of the discussion groups, categorization and data analysis through the MAXQDA program (v. 10) and the results achieved interpretation, following the mandatory steps of qualitative data analysis (Flick, 2014; Miles & Huberman, 1994; Rodríguez, Gil, & García, 1996; Silverman, 2013; Tójar, 2006).

5 Results

The results clearly show the most important issues of the elements on which it is necessary to reflect in order to improve the quality of this training modality. Specifically in relation to coordination mechanisms between secondary education centers and companies and institutions. The results, considered in terms of the objectives set, are presented by the dimensions analyzed: profile of the agents and development of the Dual VT.

In relation to the profile of the informants, the results indicate that:

The students choose this training modality because of their interest in the professional sector of the company (35%), the high valuation of this modality in the Curriculum Vitae (29%), the increase in training that involves integrating into Work Centers (Workplace Learning) (24%) and for completing and increasing their training level (12%).

The company tutors only have one year of experience, and they emphasize as primary functions of the tutor: the management of the people, the training of the students in their stay in the company, being able to provide feedback and provide professional guidance to the students.

The competences to be a good tutor must focus on: exercising as a guide for students (40%), training to have the capacity to train people who are making internships stay (40%) and to have ability to motivate students (20%).

On the Development of Dual VT in the company, and depending on the different elements submitted to assessment and analysis, the informants highlight:

About the reception of the student in the company: the students and the company tutors indicate that in the welcome in the company they present and then work on aspects related to the initial training related to job security, continuous improvement and human resources (45% of answers) as well as the knowledge of the company (55%).

About Learning: both students and tutors argue that learning is based on acquiring technical knowledge (37%), on working professional competences (21%), and highlighting the responsibility that they instill, the ability to initiative and work team up.

In relation to the Monitoring in the company: the students say that they meet with the tutor only at the beginning and end of the stay (41%). The tutors, for their part, point out that they do not perform daily tutelage, but biweekly or monthly. Students and tutors agree that the tutorial sessions address issues about the resolution of problems caused during the internships.

Based on the results achieved, the following improvement proposals are proposed, which arise from the comments issued by the students and tutors of the centers and companies in which they are staying:

It is necessary to increase the coordination level between the educational center and the company, both in frequency of contacts and in intensity.

Formative strategies should be proposed to increase specific training, especially for company tutors, so that they can exercise their training function with students.

It is compulsory to increase the planning level of the students' training processes. In this planning process, both the tutors of the secondary education centers and the companies tutors must work together.

Mentoring must be established both in the educational center and in the company to make student follow-up more operational.

6 Conclusions

Dual VT, as indicated above, combines teaching and learning processes in two institutions, the school and the Company. These two institutions must be in constant coordination in order to improve the quality of the training of students who choose this type of educational modality.This synergy should make possible the exchange of information between both institutions and the adaptation of the training offer to the labor market and vice versa, and that the labor market should propose to the educational field proposals aimed at improving the training plans. The collaboration between the two institutions, high schools and companies, should help make it possible for students to acquire and develop a set of knowledge and professional skills that will allow them to successfully develop in the labor market and thus improve their employability.

This kind of training favors that students achieve more significant learning than in other training modalities, due that they occur in real contexts (Euler, 2013). This type of educational contexts allows a close link between theoretical and practical didactic elements, which benefits that the student lives in his o her own skin what is done, why it is done and how the tasks and professional functions are carried out in a company or work center. The alternating practices promoted by the Dual VT favor the adjustment and coordination between two fundamental elements for the sustenance of our society such as: the educational system and the labor market.

In this way, this experience highlights the need for training that meets the demands and demands of a changing environment in order to face the challenges posed by an increasingly globalized world.

Dual Vocational Training, with its flexible and open nature, ensures the exchange of training and information between the secondary school and the company, and thus guarantees

the professional growth of the students and the improvement in the educational structure of the Vocational Training and in the structure of the labor market (Tolino, 2015).

The stakeholders involved in the development of the Dual Vocational Traning programs, the students, the academic tutors and the company tutors, must establish continuous communication processes. Only in this way will they be able to contribute in a decisive and significant way to developing this training modality so that it reaches maximum quality levels.

In order to know the needs of the agents involved and be able to design strategies to avoid or reduce their training gaps, we believe it is very important to give voice to the protagonists of this training modality, vital for the improvement of actions aimed at professionals who join to the labor market in the current social context.

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Political Parties, Organized Interests and Collective Skill Formation: Lessons from Liberal Market Economies

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Abstract

Recently, dual apprenticeship has gained renewed attention among the public and among policy-makers. This paper discusses to what extent reforms promoting dual training are successful in countries, which lack well-established traditions of social partnership in industrial relations, namely Ireland and the United Kingdom. On the basis of two condensed comparative case studies, I show that government partisanship is an important factor for shaping apprenticeship reform outcomes in terms of VET governance: Left and centrist Irish governments promoted cooperative approaches that brought together unions and employers in apprenticeship reforms, whereas the neoliberal, Conservative Thatcher government curtailed union influence in training and pursued a course of marketization.

Keywords

collective skill formation; apprenticeship; comparative political economy; Ireland; Britain

1 Introduction

A pressing question in the field of vocational training and education (VET) research is how far models of (dual) training are transferable from one national institutional context to another. Although institutional legacies are important in shaping policy choices, this paper demonstrates that significant reforms and institutional transformations towards collective skill formation are even possible in the "least-likely case" of Liberal Market Economies (LMEs). [1] For LMEs, we should theoretically expect that collective skill formation should not emerge, because the market-oriented character of the political economy prevents collective approaches to human capital investment. Studying the two cases of VET governance in Ireland and Britain from the 1980s to the mid-2000s, however, I show that Ireland has moved towards collective skill formation, whereas Britain has stayed on the liberal path, transforming VET from a collective skill formation institution towards an employment policy program, complemented by a training market.

[1] This article presents some of the central findings of a monograph (Vossiek, 2018) and parts of it have been published in Portuguese (Vossiek, 2017).

This development is at odds with the conventional wisdom about where collective skill formation can occur: In Coordinated Market Economies (CMEs), VET plays a large role in national skill formation with the delivery of firm- and industry-specific skills, and while the state strongly sponsors VET, only in systems of *collective skill formation* employers are strongly involved in the governance, financing and delivery of VET, which is typically organized on a dual apprenticeship basis (Busemeyer & Trampusch 2012). Conversely, LMEs put little emphasis on VET for which state or employer support are largely absent, and are strongly focused on general skills that are primarily developed via academic higher education.

In the following, I challenge this assumption by showing that despite similar policy legacies, since the 1980s governments of different partisan compositions in Ireland and Britain have followed different pathways of including organized interests in VET reforms, which in turn led to different outcomes: Centrist Irish governments adopted a "social partnership" approach, which facilitated compromise between employers and unions and paved the way towards a more collective VET system. Conversely, the Conservative Thatcher governments deliberately reduced the involvement of unions in training reform thereby underpinning the liberal, voluntarist character of VET in Britain.

2 Theoretical background and methodology

In the 1990s and early 2000s, skill formation was prominently discussed in the "Varieties of Capitalism" (VoC)-literature (Estévez-Abe, Iversen, & Soskice, 2001; Hall & Soskice, 2001; see also Crouch & Streeck, 1997;). Following these contributions, VET is comparatively underdeveloped in LMEs, because investment in specific skills is stifled by the absence of strong coordinating in the political economy and weak safeguards of workers' skill investments in terms of employment protection and unemployment insurance. For example, the firms' willingness to invest in VET is reduced by poaching problems between employers who do and who do not train young workers beyond their immediate production needs. Also, institutions such as the statutory regulation of training content are weakly developed (Finegold & Soskice, 1988; Thelen, 2004). Finally, from a historical perspective, collective approaches to training were beset by strong class conflicts between skilled workers' unions and employers (Thelen, 2004).

In contrast, in CMEs such as Germany or Denmark skill formation is characterized by multiple institutions of cross-class cooperation between employers and unions that shores up collective approaches in training policies and politics (ibid.). Following a recent typology by Busemeyer and Trampusch (2012) they belong to the *collective skill formation regime,* which is characterized by high *firm involvement* in the financing and provision of initial VET as well as high *public commitment,* which essentially captures the role that the state and organized interests (such as chambers of commerce, employer associations and unions) have in the provision and regulation of vocational training. Besides high firm involvement, collective skill formation systems typically show three additional characteristics (cf. ibid., p. 14-15). First, intermediary associations that aggregate business and workers interests are strongly involved in the governance and reform of initial VET. Second, the content of VET is based on sectoral or national standards and VET leads to certificates, which are usually broadly recognized on national (occupational) labour markets. Third, VET typically is organized in the form of a dual apprenticeship, which combines practical on-the-job instruction with more theoretical and general education in vocational schools.

Following the conventional wisdom, countries belonging to the *Liberal Skill Formation*-regime are characterized by low firm involvement *and* low public commitment and should be least likely cases for the emergence of collective skill formation and its four central characteristics. And indeed, it has been frequently shown in – explicit and implicit – comparisons of VET in Germany and Britain (Crouch, 1995; Finegold & Soskice, 1988; Ryan

& Unwin, 2001) that reforms towards collective skill formation and more coordination in training were most often futile and short-lived in this particular LME.

Yet, a focus on Britain (and the US) unduly neglects that even among LMEs, we can identify cases such as Ireland, where training reforms have more strongly approached firm involvement, the inclusion of intermediary associations, comparatively regulated training standards and certification mechanisms as well as the creation of regulated, dual apprenticeships as one primary channel of VET (Busemeyer & Vossiek, 2016; Vossiek, 2018). But as I show in the remainder of this article, a comparative perspective helps us to identify varieties of training coordination among these LMEs, which can be traced back to the influence of different partisan governments.

Methodologically, my findings are based on two in-depth case studies of Ireland and England since the 1980s. This case selection follows the logic of a most similar systems design (Gerring, 2007; Lijphart, 1971), where the independent variables show similar characteristics at the beginning of the research period except for our main explanatory variable of government partisanship, which is used to explain the different outcomes of reforms towards collective skill formation in both cases.

Empirically, the paper is based on a broad collection of primary and secondary sources. Additionally, between September and November 2012, I conducted interviews with 34 policy experts in Ireland and in the UK, which have been triangulated with the other sources in order to analyze the actors' positions and their development in the trajectory of the reform processes in both cases. In the analysis that follows below, I refrain from citing the interviews, which are included in a longer monograph that includes Australia in the analysis (Vossiek, 2018).

3 Results: Different patterns of training reform in Britain and Ireland

Britain and Ireland are united by history, the latter being a former colony of the British Empire from which it inherited its training institutions. When taking a bird's eye view on the institutional and political foundations of apprenticeship in the two cases in the late 1970s, several similarities stand out (Vossiek, 2018). First, training arrangements were still mostly structured as craft-based apprenticeships, with weakly developed mechanisms for training standardization and certification across occupations. This usually meant that "time served as an apprentice" was the central benchmark for acquiring skilled worker status – instead of a successful final examination leading to a vocational certificate. Second, while employer associations and trade unions were to a certain degree involved in the governance and regulation of training, this usually took the form of voluntarist sectoral agreements instead of statutory regulation. Third and finally, even though firms provided training, its provision, content and regulation was quite heavily contested between employers and skilled workers organized in craft unions. A typical pattern of this conflict was that craft unions used restrictive workplace practises and their control over training to control the supply of skills in order to drive up wage levels. In turn, employers attempted either to limit their training costs by focusing on skills they required for the immediate production or by replacing skilled workers with machinery.

These three aspects remained basic features that were similar across the countries under study until the late 1970s in spite of training reforms in each country after the Second World War (ibid.). In the following, I now present how the countries started to diverge from the late 1970s to the early 1990s, which in part was a reaction to economic crises in each case. Where relevant, I introduce additional contextual factors, but the main focus of the following case studies is on the interplay between organized interests and different partisan governments in shaping training reform.

3.1 Britain: Thatcherism, anti-union politics and the marketization of training

During the 1960s and 1970s, reforms to put apprenticeships on a statutory basis and to create more cooperation had failed despite the introduction of a training levy and the creation of tripartite *Industrial Training Boards* (ITBs) and the *Manpower Service Commission* (MSC).[2] But beginning in 1979, when the first conservative Thatcher administration took office, it embarked on a course of radical change based on the belief that the deregulation of markets in combination with monetarist, low-inflation policies were key tools to securing the competitiveness and economic stability of the country (Finegold & Soskice, 1988; Hall, 1992). As relations between organized business and trade unions had deteriorated and no agreements on wage coordination could be reached, the government curtailed union rights, introduced in-work benefits and employment programs with a strong workfare element in order to break union power (cf. Howell, 2005; Rhodes, 2000). The logic of freeing the market by weakening the unions can also be detected in training reforms.

As a first step, most ITBs were abolished in 1982. This not only implied the weakening of unions, which had firm representation in the ITBs, but also abolished training levies as one central mechanism to induce employer participation in training and freed firms from the training regulations issued by individual ITBs (Rainbird, 2010). Only one year later, the government introduced the *Youth Training Scheme* (YTS) as a new training program for unemployed youths and alternative to traditional craft apprenticeship. This reform in 1983 had two profound effects on the training system. On the one hand, the budget of the tripartite MSC was increasingly directed to the YTS and other employment programs, thus effectively limiting the amount of resources that MSC union members could co-decide upon. Yet, on the other hand, the introduction of YTS had direct effects on the logic of training provision in Britain, effectively transforming a large part of the VET system into a training market.

What was the difference between YTS and traditional apprenticeships? First, YTS-trainees were no longer covered by voluntarist agreements between employers and unions where these were still in place after the dissolution of the ITBs, effectively giving firms much greater leeway in training provision (Gospel, 1995; King, 1993). Second, the financial logic underpinning VET was changed fundamentally, because trainees no longer received wages from employers, but were instead financed by state allowances transferred via firms, thus breaking "the historical nexus between apprenticeship and employment as a "trainee" [now became…] the responsibility of a training intermediary in receipt of a government allowance" (Toner, 2008, p. 427). As some employers opted to replace traditional apprentices with government-sponsored YTS-trainees, the traditional model of training declined rapidly. For supporters of more ambitious and regulated training models this was an unwelcome development, as research has frequently pointed out that YTS is best understood as a labor market program, given that it had low quality and variable standards of training delivery, and would not qualify as dual apprenticeship in Germanic countries (Finegold & Soskice, 1988; Marsden & Ryan, 1990).

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[2] In the UK, 27 *Industrial Training Boards* (ITBs) were created in 1964. Composed of employers and unions, they could raise training levies from its sector's firms and redistribute them for training purposes. In 1973, they were complemented by the *Manpower Service Commission* (MSC), which was intended to develop coherent training and manpower policies, and gave employers and the *Trade Union Congress* (TUC) a role in training politics. However, the training levy, which had shored up employer involvement in training (Senker, 1992), was changed to exempt small and medium-sized firms from payments and lost its effectiveness to a large degree. Although these institutions were quite similar to arrangements in collective skill formation regimes, they did not lead to more cooperation between employers and unions (Finegold & Soskice, 1988; Senker, 1992), apart from some sectoral exceptions such as construction or engineering.

As a final step in the transformation of training towards a free-market approach, the MSC was abolished in 1989 after a conflict between unions and government over the latter's plans to make the participation in training courses compulsory for unemployed adults (King, 1993). In place of old-tripartite institutions for training governance, *Training and Enterprise-Councils* (TECs) were devised as new institutions for the delivery of government-sponsored training program. Yet, the inclusion of union representatives in TECs now depended on an invitation from the central government, bringing an end to formal and statutory union representation in training governance. Further underpinning the logic of a market-driven system, TECs competed with each other for public funds, which were allocated in line with their training achievements (certifications, trainee placements) (Wood, 1999).

To sum up the legacy for British training that emerged from the critical juncture under Conservative governments, the main reform significantly curtailed union influence and transformed English VET towards a market-driven, but partly government subsidized system of training delivery. Although the phase from the 1990s onwards witnessed frequent attempts to establish more ambitious apprenticeship schemes, these did not fundamentally change the logic behind training in Britain instituted under Thatcher (Fuller & Unwin, 2011; Keep, 2006).

Compared with the central characteristics of collective skill formation, Britain has moved from fragmented, but tripartite training arrangements even further away from collective solutions. In the absence of overarching coordination mechanisms and intertwining of government-sponsored employment policy with training components as exemplified by YTS, *firm involvement* is comparatively weak. The *involvement of intermediary associations* was significantly weakened via the dismantling of tripartite institutions and the creation of semi-public bodies as the TECs. Finally, mechanisms of *skill certification* are not well-developed, partly resulting from the absence of intersectoral coordination and prevalence of employment programs.

3.2 Ireland: From crisis to coordination and social partnership

The Irish critical juncture in training reforms can be dated back to the late 1980s and early 1990s. Moreover, it differed from Britain in terms of reform content and the political processes, both leading to greater cooperation within the training system and reform politics. As a result, training has evolved towards the collective model, because it was underpinned by a social partnership model of reform politics between non-right governments, trade unions and employer associations, which formed the basis for agreements in training and industrial relations reforms between 1987 and 2009 (Teague & Donaghey, 2009). The Irish case shows that training and industrial relations reforms can become deeply interlinked, as the first agreements on training reform were initiated before the official beginning of social partnership in 1987 (Boyle, 2005; O'Connor & Harvey, 2001), but changes were only implemented after industrial relations had moved towards bargaining centralization and wage moderation from the side of the unions. The two main training reforms were the creation of *Foras Áiseanna Saothair* (FÁS/Training and Employment Authority) as a tripartite body for the regulation of apprenticeships under a coalition between the centrist *Fine Gael* (FG) and the *Irish Labour Party* (ILP) in 1987 and the introduction of *Standards-based Apprenticeships* (SBA) in 1993 under the subsequent *Fianna Fail* (FF)-led government.

When the FG-ILP coalition came to power in 1983 it faced conditions, which made immediate reforms of the training system difficult, as dealing with an economic crisis took priority. High unemployment, mounting levels of public debt, pervasive industrial conflict and pay drift due to decentralized bargaining (O'Donnell, Adshead, & Thomas, 2011; Roche, 2007, pp. 395-398; Teague & Donaghey, 2009: p. 62) dominated the political agenda. Yet, these problems were addressed quite differently from the liberalization and free market approach that the British Conservatives had taken, resulting in social partnership as the politics driving reform

played out differently resulting in concertated reforms in a broad range of policy areas: Industrial relations, wage bargaining, taxation, welfare and training reforms were mutually agreed upon by governments, trade unions and employer associations. These developments occurred after many failed attempts to negotiate a turn towards centralized wage bargaining, when in 1986 two reports became central for the emergence of a new political compromise.

First, the report "A Strategy for Development, 1986-1990" of the tripartite *National Economic and Social Council* (NESC) published in 1986 became a focal turning point for Irish industrial relations (Culpepper, 2008; O'Donnell et al., 2011), as it switched the attention away from immediate financial and economic problems towards the argument that low Irish growth rates were the key problem causing sluggish economy recovery and performance. After the reports publication, the social partners and the incoming Fianna Fáil minority government signaled their commitment to make their contribution towards fiscal stabilization and growth-enhancing macro-economic management by the turn to centralized wage-bargaining: Unions agreed to embark on a course of wage-moderation, while the government tried to assure employers and unions that economic recovery would result in lower taxes. As this offered potential gains to unions in the form of a higher net wage and to employers in the form of reduced corporate taxes and moderate wage claims by the unions, negotiations finally resulted in the signing of the first of eight subsequent tripartite social partnership areements, the *Program for National Recovery* (PNR) in 1987 (O'Donnell et al., 2011). From the perspective of the government, this strategy had the advantage of sharing political responsibility with the social partners, as it was yet unclear, if the new compromise would lead out of the economic crisis.

Second, a discussion paper on "Manpower Policy in Ireland" by the NESC, which directly addressed the need for training reform, became endorsed in a government White paper (Department of Labour, 1986). This document made three recommendations for policy reform: a new apprenticeship system should be based on standards achieved rather than on time-served, ensure a satisfactory balance between supply and demand for apprentices and reduce the financial cost to the state whilst maintaining quality. Its main proposition for the governance of the training system was that a new agency should include the main stakeholders of the apprenticeship system and bundle training and employment functions, which were formerly spread among different institutions. The decision to create FÀS as this new institution was already reached before the official start of social partnership in 1987, although FÁS only took up work in 1988. Within FÁS, the *National Apprenticeship Advisory Committee* (NAAC) became strongly driven by the social partners and became the main venue to discuss how exactly a reformed apprenticeship system should be structured.[3]

The creation of FÀS together with tripartite social partnership arrangements provided the background for an agreement on the introduction of a new apprenticeship system. In 1991 the Social Partners (*Irish Business and Employers Confederation* (IBEC), the *Irish Congress of Trade Unions* (ICTU)) and the FF-led coalition government agreed on the introduction of a new standards-based system of apprentice education and training as a part of the *Programme for Economic and Social Progress (PESP),* that was intended to solve the long-standing problems of the uneven quality of the occupationally uneven and fragmented apprenticeships. The problem concerning the negotiation of a new standards-based system was that employers were reluctant to pay for the implementation of a new scheme (Boyle, 2005, p. 48). The solution was found by FÀS leadership and the Department of Enterprise and Employment in the strategy to couple the renegotiations of the new, standards-based system to negotiations in the preparation of the tripartite agreement of 1991, which convinced employers to partake in the new system.

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[3] Personal communication with five interviewees that were close to the political process of training reform. Conducted in Ireland in November 2012.

The willingness of employers to change their position on the financing aspects of the new system can be seen in the light of the beneficial macro-economic results that social partnership had yielded so far.

Following the negotiations of the PESP, in 1993 the old time-served system of apprenticeships was reformed towards SBA, which are statutorily regulated and combine seven structural phases of workplace learning and off-the-job vocational education and covered 26 designated trades by 2012 (FÀS, 2012). Under the provisions of the SBA, apprentices enjoy full employee status and have a statutory entitlement to off-the-job education. Regarding the funding of apprenticeships employers fund the on-the-job phases, while the state funds the off-the-job phases. Regarding the latter, employers also contribute a special levy of 0,25% of the payroll and apprentices are paid a training allowance to the rate of pay appropriate to the year of apprenticeship whilst on the off-the-job phases. Under the governance framework of the SBA, standards are set collectively by FÀS in co-operation with the *Department of Education and Science* (DES), employers and trade unions, which jointly constitute the *National Apprenticeship Advisory Committee* (NAAC) that adises on apprenticeship.

Compared with the characteristics of a collective training system, the Irish apprenticeship system has moved towards a collective solution in three respects: *Firm involvement* is relatively strong via the training levy and for the on-the-job phases of apprenticeship, the *involvement of intermediary organizations* of capital *and* labor extends to their involvement in FÁS and corresponding institutions, and *skill certification* follows statutory definitions which specify training requirements for each of the on-the-job and off-the-job components.

4 Conclusion

As the condensed case studies of training reform in Britain and Ireland have shown, the politics between governments of different partisan compositions and organized interests have shaped training outcomes into different directions despite broadly similar policy legacies across the two countries. The distinction between right- and non-right partisan governments crucially shaped the policy reactions to economic crises. The Conservative Thatcher governments used training as a tool to curtail union power and to make training more market driven, quite paradoxically by the infusion of public expenditures into youth labour market programs. In contrast, Irish politics were built upon more concerted efforts to reform industrial relations in tandem with training arrangements and focused on the inclusion of organized interests in new training institutions and the process of political reform. One potential take-away from this article is that countries without a cooperative tradition in training need well-balanced approaches of political inclusion in the attempt to move towards a collective skill formation system. Another – political and analytical implication – of the two countries' trajectories is that the design of reforms has a distinct impact in changing the politics of institutional change (cf. Busemeyer, 2015; Busemeyer & Vossiek, 2016): In the case of Britain, the exclusion of unions from training institutions and the displacement of apprenticeship with labour market programs in turn weakened their capacity to influence training reform politics, while the inclusion of Irish unions paved the road to negotiations and compromises of training content and delivery.

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Developing a Culture for Change in VET

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Abstract

The article presents the preliminary results from a development project on improvement of the quality of training programmes at vocational schools in Poland, Hungary, Slovakia, and The Check Republic. As part of the process, the schools must draft a plan for the development process. The plan must include considerations about the relation between the intervention activities and the goal pursued. It must include considerations about the interplay between the technical and the pedagogical parts of the training. The preliminary result show that the schools are not used to make such considerations and that they find it difficult. It seem to be an overlooked obstacle in the models of organizational change. Consequently, training of these competences must be a part of the development. The project is conducted as action research.

Keywords

organisational culture; evaluation; development program; sustainability; goal setting

1 Introduction

The article describes the preliminary results from a project, 'culture for change'. The aim of the project is to contribute to developing a sustainable improvement of the quality of the training programmes at the educational institutions that participate in the program *European VET Development Initiative* under *The Velux Foundation*. More specifically, the aim is to support the changes that will be launched in order to enhance the quality of VET in Europe, particularly in the four countries Poland, Hungary, Slovakia, and the Check Republic. As a part of the development initiative a number of VET schools – in June 2019, eight schools - will receive financial support from The Velux Foundation to initiate local activities. The financial support is given to purchasing technical devices and to pedagogical development.

Alongside with this development programme, a research program is conducted. The aim of the research programme is to clarify factors that improve the implementation of the experiences gained from the development projects at the participating schools. The programme investigates conditions for organisational change and for the change of organisational culture (Van de Ven & Poole, 2015). The research programme focuses on three factors: teacher training, systematic evaluation, and leadership (Kenney, Jordan, & Curnow, 2019). It is based

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on three assumptions. First: The improvement of the quality of VET training programmes depends on the quality of the training programme for the teachers at the vocational schools (Ellström, 2010). Second: A systematic evaluation of the implementation of the new training programmes enhances quality as well as the probability of implementing the results from the development program at the institution (Gillon, 2018; Palmer, Dunford, & Buchanan, 2017). Third: The involvement of the school leaders in the development process is pivotal for implementation and sustainability of the changes in the vocational training programmes at the schools (Alvesson, 2015; Schein, 2010).

I order to secure a qualified evaluation of the developmental processes, each school will draw up a plan for their work on quality development (see below). The plan must be made right at the beginning of the development work at the schools. In the article, we describe the experiences from drafting the these plans at the schools. Based on these experiences we formulate assumptions for the next step in the research process.

2 The research-informed base of the development project

Practical experiences as well as research-based knowledge show that there is often a gap between on the one hand development and acquisition of knowledge and on the other hand, the ability to apply this knowledge in practice. Likewise, many examples tell us that results from development work have a limited impact on practice, not least the long-term impact after the development program has terminated and when the financial support has ceased (Elkjær, 2001; Palmer et al., 2017, p. 358–359). To respond to these obstacles a systematic and integrated evaluation programme is imbedded in the development initiative.

As a fundament for the quality development, the project makes use of a theory-driven evaluation (Chen, 2013). A theory-driven evaluation focuses on the mechanisms that relate initiatives and results aiming at clarifying the extent of the impact and the contents of the impact of the initiatives (Dahler-Larsen, 2013; Stufflebeam & Coryn, 2014).

The focal point of theory-driven evaluation is a program theory, the development of which is based on established knowledge about relevant factors that influence the degree of implementation. The program theory includes the processes (variables) that are part of the change, which should be realised. The data collection focuses on these variables and runs parallel to the project enabling feedback and ongoing adjustments of the project. Thus, the implementation and quality development rests on a solid foundation. The research approach shares similarities with action-based research, including interaction between the practitioners and the researchers throughout the research process (Cohen, Manion, & Morrisson, 2011, chapter 18; James & Augustin, 2018; Saunders & Somekh, 2009).

3 The aim and contents of the development part of the project

The overall purpose of the development project is, at the involved institutions, to develop an organisational change that contributes to an ongoing quality development of the educational programme during and after the implementation of the initiatives. Based on models for organisational change the activities at each VET institution must fulfil some requirements (By, 2005; Jabri, 2017; Seo, Putnam, & Bartunek, 2015). The development process must include the following steps.

To be able to develop quality, it must be clarified what is meant by quality. It must be clarified up to a standard, which make you able to assess whether quality has been improved or not. Likewise it must be specified which new training activities are implemented to train the students in order to obtain the aimed quality. In what way must the VET training programmes be developed to improve the aimed quality. It must be clarified which teacher competences are needed to teach according to the quality improvements. Consequently, a teacher training programme must be developed and implemented. When the student training programmes are

accomplished, it must be assessed whether the new activities actually improve the quality. As a part of the development process, the training activities must be adjusted based on the gathered experiences. Finally, an organisationally embedded strategy should be established for an ongoing development of quality improvement at the institution.

4 Making a plan for quality development

As soon as possible after the beginning of the developmental projects at each institution, the institution will draw up a plan for their work for quality development. The plan must include the following topics:

- A clarification of t the concept of quality
- How the institution will assess the improvement of quality
- How the documentation and data collection will take place
- Considerations about competence development of teachers and managers
- Considerations about implementation of the experiences in the organization.

The plan should specify where the responsibility for the quality development is in the hierarchy of decisions at the institution. The plan should be in writing: the quality of the implementation and evaluation will be enhanced if the grant to the individual institution is based on their written considerations (Brinkerhoff & Montesino, 1995; Massenberg, Schulte, & Kauffeld, 2017).

Based on the individual institutions' written considerations about quality and development, a final and agreed-upon plan will be drawn up about the accomplishment of the development. The plan should include the contents and form of competence development of the students, and how the results of the evaluation should be applied in developing quality, and how the results are imbedded in the organization to establishing a culture for change. The culture for change must be developed in considerations of the VET system of the individual country (Doh & Luthans, 2018).

The plan is drafted in cooperation between the researchers and practitioners at the school. The activities in this cooperation includes:

- A meeting with the managers and representatives of the employees. At this meeting, the strategy will be established, including clarifying and agreeing upon the plan for quality development. Principles for quality and methods for assessment of the improvement of quality will be established.
- A second meeting between researchers and practitioners at the schools. At this meeting the content of the concept of quality and the documentation process are agreed-upon.
- Competence development of the employees who participate in the evaluation and the data collection. The competence development should ensure the best possible long-lasting effect, emphasizing follow-up activities including supervision.
- Collection of data for elucidating the improvement of quality as well as factors that foster or impede the development of quality.
- Summary and presentation of data for the researchers at each institution twice during the project period. The first presentation should focus on what has been achieved concerning the quality development and what still needs to be improved. The second presentation should focus on the development of a culture for change based on the gathering of experiences and the results of the evaluation.

The institutions are responsible for accomplishing the activities aimed at improving the quality, for collecting data for the evaluation, and for the implementation of the results from

the evaluation in accordance with the final plan described above. The researchers are responsible for supporting and supervising these processes, and for the training program of the employees.

5 The aim and contents of the research part of the project

The research part of the project is focusing on the implementation process. The overall research questions are related to factors that have significant influence on this process: teacher training, systematic evaluation, and leadership. The research focuses on the three assumptions mentioned above. Which obstacles do we find in the implementation of the new activities?

To accomplish an excellent development process it is necessary to know what is going to be obtained and be aware of what is the aim with the development. It is necessary to have a plan and to have a 'good beginning'. Consequently, in the first part of the research program, we focus on factors, which seems important in the first phase of the development process. We focus on three questions related to the process of 'drafting a plan' for the sustainable development:

- How does the goal setting process influence the development process?
- How does the institutions' ability to conduct internal evaluation influence the development process?
- How is the relation between on the one hand the implementation of new technical devices and new machines and on the other hand the implementation of new teaching methods according to new pedagogical principles?

6 Data

As a part of the total project, in June 2019, development projects have been initiated at eight schools. Two meetings have been accomplished between each of the schools and the research team. The schools' management and the persons responsible for the development work participated in the meetings. The research team includes four researcher. At each meeting between researchers and practitioners four to eight practitioners (directors, managers, and teacher) and two to three researcher participated.

The agenda for these meetings was to develop the schools' plans for implementation and evaluation of the activities as described above.

After each meeting, the research team has gathered and systematized experiences about the progress of the elaboration of the action plan. The data material includes the written material from the schools drafting their plans and the impressions and experiences gathered by the research group after each meeting. The impressions and experiences should be perceived as the researchers' perceptions of the process. However, an intergroup reliability has been carried out by comparing each researchers' individual notes. The research team has analyzed this material in relation to the three research questions.

The progress in the development work is evaluated in relation to the likelihood that the activities at the institution will lead to the desired results.

This part of the research project is conducted as an action research project, where the researchers summarize the preliminary experiences and inform the practitioners about these experiences. Based on these experiences, the actual development work at each school has been adjusted.

7 Preliminary results

The purpose of a development work is to develop practice, which means to improve practice in order to achieve a goal. A prerequisite for being able to evaluate the progression in the development work is that the goal of the work has been operationalized.

In the development projects at the schools, the goals are described as an improved quality in the vocational training programs. Consequently, the concept of quality must be defined. A necessary condition for being able to improve quality is that the school has defined what they mean by quality and that they have stated the criteria for measuring quality.

The preliminary experience is that the schools have difficulties in describing their perception of quality. The schools find it difficult to pinpoint what they want to develop, and what they understand about quality. They can describe what they want to do, and what activities they will initiate. However, they have difficulty in explaining what must to be achieved through the various activities. They find it difficult to describe the impact of the activities on quality; mostly because the goal, the concept of 'quality' is unclear.

Based on that, we can formulate the following assumption: the progress in the development process depends on whether there is a clear description of the interrelation between the initiated activities and the goals that should be reached in the development work.

It is a general assumption that the quality of a development work is improved if there is an ongoing evaluation of the activities, the aim being to assess whether the activities lead to the desired goals. In a development work, there is a dilemma between acting and reflecting on this acting. A dilemma between – on the one hand – implementing what has been planned and financially supported and on the other hand evaluate the activities. The schools seem to prioritize the activities highly and tend to consider the evaluation as an unnecessary barrier. An explanation may be that the evaluation is not perceived as functional and rewarding at an early stage of the development work. Another explanation may be a more or less conscious whish not to be evaluated in order to avoid a negative result. A third explanation could be that the schools are not used to making internal evaluations, and do not have the capability to do it.

Based on these observations, we can formulate the following preliminary assumption: The progress in the development process will be weekened if evaluation is perceived as an obstacle rather than an option at the schools.

All vocational training takes place in a workable localities and use some kind of technical devices and tools to conduct the training, e.g. of carpenters, it-specialist, cooks, or roofers. Training the students, there is an interaction between on the one hand the physical facilities and the technical devices on the other hand the training methods and teaching principles. As an example, one has to learn to operate a particular machine. What is the best way to learn to operate exactly this machine? The grants to the schools are aimed at both parts of the development work: the technical and the pedagogical, i.e. for purchasing machines and for pedagogical development that reflect the best way to learn operating the machines in current work processes.

The preliminary experiences indicate that the schools' focus more on buying and using hardware than on how to learn to use this hardware.

Based on these observations, we formulate this preliminary assumption: The quality of the pedagogical experiences depends on the extent to which the institutions are able to co-ordinate the technical and educational development.

In the next phase of the project, we will examine the validity of the assumptions in six new projects. We will also examine the importance of the employees' competence development for the quality of the development work. As the third research topic, we will focus on the managers' role in ensuring sustainability of the project results.

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Theorising the Role of Public Vocational Education Institutions Using the Capabilities Approach

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Abstract

This paper observes several limitations of human capital theory, both as a description of the way qualifications are used in the labour market, and in severely limiting the potential roles vocational education. It proposes as an alternative the human capabilities approach which posits that the goal should be for everyone to have the capability to be and do what they have reason to value. The paper reports the application of human capabilities as productive capabilities which are located in and concentrate on an intermediate specialised level, the vocational stream which links occupations that share common practices, knowledge, skills and personal attributes. The paper reports an application of the concept of productive capabilities to seven countries: Argentina, Australia, Côte d'Ivoire, England, Ethiopia, Germany, South Africa and Taiwan. From this the report finds that productive capabilities rest upon broader social, economic, cultural, and physical resources.

Keywords

capabilities; vocational education; anchor institutions

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1 Dominance and limitations of human capital theory

Policy on vocational education and indeed higher education in many countries is dominated by augmented human capital theory. Human capital theory is mainly a descriptive theory that postulates that education increases graduates' skills which makes them more productive which in turn increases economic value (Figure 1). From this many derive a normative position, that the aim of education should be to increase economic value.

Figure 1 Education's contribution to economic value posited by human capital theory

Human capital theory is understood to apply at the level of the individual, group, and whole economy. Individual graduates' higher employment outcomes are ascribed to their increased human capital; more educated workers are thought to increase their productivity and hence the organisation's profitability; increasing the qualifications of members of an occupation such as technicians or financial advisers is expected to increase their effectiveness; and increasing the proportion of an economy's workers with higher qualifications is understood to increase economic growth, at least in specified circumstances.

Equity policy may also be based on human capital. The under representation of women in engineering, for example, and in senior positions is said to lose the economy valuable potential talent as well as disadvantaging women; and the lower proportions of qualified people from disadvantaged groups is thought to 'waste' human capital as well as disadvantaging individuals. Of course, equity policy may be based on other grounds, such as social inclusion (Vinson, 2009), or broad notions of justice, but a policy maker seeking a parsimonious description of policy could include most equity aims within human capital theory.

But human capital theory does not explain the roles of qualifications adequately: some employers use qualifications not to signal relevant knowledge and skills but to screen for employment potential (Hungerford & Solon, 1987; Spence, 1973; Stiglitz & Weiss, 1990); qualifications prepare high proportions of graduates for skilled work outside their educational field (Montt, 2015, p. 11; Moodie & Wheelahan, 2018, pp. 3–4; Sutherland, 2012, p. 622); qualifications have intrinsic educational value as well as generating cultural and social benefits capital (Walker & Unterhalter, 2007); and education institutions contribute to their communities' educational, social, cultural and economic development beyond educating skilled workers.

2 Alternative: Human capabilities

An alternative is the human capabilities approach developed by the economics Nobel laureate Amartya Sen (2000, pp. 18, 285) and the philosopher Martha Nussbaum (2000, pp. 71, 78–80) who argue that the goal should be for everyone to have the capability to be and do what they have reason to value. We argue that vocational education's role in developing human capability is to develop each student as a person, as a citizen, and as a worker. By developing each student as a person, we refer to tertiary education's role in developing students' capacity to understand and manage themselves, to understand and manage their environment, and to appreciate and contribute to human culture. By 'developing each student as a citizen', we refer to vocational education's role in developing students' capacity to contribute to their community and to participate in the governance of their society. By developing each student as a worker, we refer to vocational education's role in developing students' capacity to be and do in work what they have reason to value.

We apply the human capabilities approach to vocational education by considering what people are able to 'be and do' at work and through work to realise themselves and their goals. We understand productive capabilities to refer to the resources and arrangements of work and the broad knowledge, skills and attributes that individuals need to be productive at work, to progress in their careers, and to participate in decision-making about work. Vocational education students need to understand how their field of practice fits within their communities and societies, and they require the capacity to be 'citizens' within their field, so they can help shape its future.

Productive capabilities are located in and concentrate on an intermediate specialised level, the vocational stream. A vocational stream links occupations that share common practices, knowledge, skills and personal attributes. Vocational streams increase horizontal flexibility and transferability at work by linking occupations in a broad field of practice and increase vertical flexibility and progression by supporting education and occupational progression in a broad field of practice.

3 Case Studies

We tested the capabilities approach by applying it to case studies of seven countries of different intensities using different methods, which are set out in Table 1.

Table 1 Methods used for each national case study

Country	Literature review	Statistics secondary analysis	On line survey	Interviews	Country visit
Argentina	✓	✓			
Australia	✓	✓	✓	✓	✓
Côte d'Ivoire	✓	✓	✓	✓	✓
England	✓	✓	✓	✓	✓
Ethiopia	✓	✓			
Germany	✓	✓			
Taiwan	✓	✓	✓	✓	✓

We added a case from South Africa described by Powell and McGrath (2019) because it is such a rich application of the capabilities approach to vocational education. We identified one issue from each case which has wider implications. The identification of an issue from a case does not imply that the issue did not arise from other cases, nor even that the issue arose most starkly in the case we identify.

3.1 Argentina: Capacity for collective action

In several reviews of Argentina in the late 2000s the OECD (2017, p. 35) argued for Argentina to improve its governance generally, including its governance of vocational education. Low trust in governance led to low public and private investment in infrastructure, the low quality of infrastructure and to high costs (OECD, 2017, pp. 44–45).

Other countries also suffer from lack of confidence in governance. Transparency International (2018) collects the perceptions of 'experts and business people' on the 'levels of public sector corruption'. It ranks 180 countries and territories on 'a scale of 0 to 100, where 0 is highly corrupt and 100 is very clean. More than two-thirds of countries score below 50 on this year's CPI, with an average score of just 43' (Transparency International, 2018). While

Argentina had a transparency score of only 40, Côte d'Ivoire and Ethiopia have lower transparency scores (Table 2).

Table 2 Transparency International's transparency score, selected countries, 2018

Country	Score
Germany	80
United Kingdom	80
Australia	77
Taiwan	63
South Africa	43
Argentina	40
Côte d'Ivoire	35
Ethiopia	34

Source: Transparency International (2018)

3.2 False Bay College, Cape Town: Physical integrity

Powell and McGrath (2019, p. 66) identify capabilities from their deep interviews of 20 students and graduates of False Bay College in Cape Town, South Africa. Not all capabilities are equally within the college's ability to expand. Powell and McGrath (2019, p. 153) report the outcome of the college's attempt to expand its students' bodily integrity:

> To reduce the dangers involved in using public transport, the college tried to arrange buses to collect students at local stations and transport them to their campus. However, the taxi companies threatened to burn the buses and the students in them, forcing the scheme to be abandoned. (p. 153)

This is an issue not just for South Africa as an upper middle-income country with extremely high income inequality (Beaubien, 2018), but some USA institutions also have difficulty ensuring the safety of their students travelling in their campus neighborhoods. Some elite USA universities have established community partnerships to invest in the renewal of their neighborhoods (Melhuish, 2016; Paul, 2004; Romano, 2006). Physical integrity includes being adequately nourished and having adequate shelter which Nussbaum (2000, p. 78) includes as part of 'bodily health' and the security of one's property.

3.3 Côte d'Ivoire: Minimal infrastructure requirements

One of the challenges the Ivorian government has identified for its vocational education system is the obsolescence and decay of its equipment and buildings (METFP, 2016) which is a legacy of the civil war, lack of funding, and the instability of vocational organisation and governance. Vocational education lacks computer equipment. Classrooms are without windows when they are not just outdoor courts. In one college visited by a member of our research team, the mechanics workshop had only one engine, more than thirty years old, and which does not work. As a result, mechanics students receive a mainly theoretical training and try to learn from Internet clips of current engines.

Vocational education and, indeed, most activities depend on physical infrastructure: utilities such as water, power, and telecommunications; transport such as roads; waste disposal; buildings; and equipment. Activities also depend on 'soft infrastructure' (Gu, 2017), institutions which enable societies to operate such as the legal system, the finance system, and emergency services (Hamutuk, n. d.).

3.4 Ethiopia: Strengthening the informal economy

Around half of Ethiopia's workers are employed in the informal economy outside agriculture, about the same rate as Argentina (Table 3). Some countries have even a bigger informal economy. A very high 88% of non-agricultural workers in Côte d'Ivoire work in the informal economy. The International Labour Organization (2013) estimates that most OECD countries have much smaller levels of informal employment. Even so, the levels of informal employment are sizeable even in wealthy countries, and they are increasing in some countries (International Labour Office, 2018, p. 15). And in both developed and in developing countries workers in the informal economy are more likely to be poor (International Labour Organization, 2018, p. 6).

Table 3 Informal employment as % of non-agricultural employment

Country	Informal employment, %
Côte d'Ivoire	88
China	54
Ethiopia	c 53
Argentina	50
South Africa	35
Australia	c 14
United Kingdom	13
Germany	10

Source: International Labour Organization (1996–2019; 2018, pp. 85–90; 2013)

Most vocational education funded by government is in formal institutions which are not well established to serve the informal economy, and this is a challenge in many countries.

3.5 Australia: Developing institutions, systems and teachers

Australian private providers increased their share of publicly funded vocational education and training equivalent full time students from 12% in 2008 to 43% in 2017 (Wheelahan, Moodie, Lavigne, & Samji, 2018, p. 44). This huge increase is the direct outcome of policies of Australian federal and state governments, first to marketise and then to privatise vocational education and training. By marketise we mean governments' allocation of resources by a competition, typically for students. In this context privatisation refers to the extension of public subsidies to for-profit private training providers.

This resulted in public funds subsidising private profits, a considerable waste of public funds on programs private providers found most profitable, widespread exploitation of students, numerous scandalous market abuses and rorts (Wheelahan et al., 2018, p. 19), and legal prosecutions (Taylor & Branley, 2015).

Marketisation and privatisation have seriously weakened vocational education as providers have competed by cutting provision and lowering standards. Public colleges have been seriously weakened, thousands of teachers and education support workers have been sacked, and campuses have been closed throughout Australia.

3.6 England: Adequate resourcing

The number of adults aged 19 and above in various English vocational education programs other than apprenticeships and community education fell by 36% from 2012/13 to 2017/18 due to substantial increases in fees, substantial cuts in funding and competition from higher education, most of whose enrolments are not capped. The recent major review of post-education

and funding in England chaired by Philip Augar (2019, p. 119) found that total spending on adult skills fell by approximately 45% in real terms between 2009/10 and 2017/18.

3.7 Germany: Trust and Coordination between social partners

Many analysts outside continental Europe do not appreciate how much Germany's very strong vocational education and particularly its dual apprenticeship system is based on strong coordination and mutual trust between the social partners: employers, trade unions and government, at several levels from national to local. This coordination extends deeply not only into vocational senior secondary and postsecondary education, but also into employment and the organisation of work. Dual apprenticeships prepare graduates for 327 recognised training occupations regulated by the state (Bundesinstitut für Berufsbildung, 2016). Cooperation between the social partners of employers, trade unions and federal and state governments is based on consensus which builds trust in the dual system.

3.8 Taiwan: Educating the whole person

Taiwanese vocational education is strongly shaped by Confucianism in two ways. Confucianism accords highest value to scholars and scholarship, and accordingly lower value to manual work and thus vocational education. Respondents to our team's survey identified this as a challenge for vocational education's development in Taiwan (Mou, Lavigne, Rostamian, Moodie, & Wheelahan, 2018, p. 33), although it is not clear that this is more of a problem for vocational education in Taiwan than in many other countries.

Vocational education in Taiwan is also strongly shaped by Confucianism's emphasis on whole-person education, the view that the ultimate aim of education is to cultivate a full person who knows how to appreciate life and pursue happiness, and who understands that professional skills are but one part of a whole person. So in addition to attaching much importance to practice and internships, vocational education in common with academic education includes humanities and the arts as indispensable components of individuals' competencies. Accordingly, technical and vocational institutions include studies in the humanities, arts, languages, and education in their curriculum. Campus's physical and cultural environments are designed to promote virtue, and virtue and moral action are key parts of the evaluation of students (Mou et al., p. 14).

4 Implications for Technical and Vocational Education and Training

Our case studies illustrate that peoples' capabilities depend on their context and on the conditions of their society such as public health, the quality and level of education of fellow citizens, means for transport and communication, means of collective decision making, means of collective action, means of exchange of goods and services, and the sharing of facilities and resources. In particular, social capacity includes a society's capacity to support and foster the capabilities of people who are disadvantaged by, for example, having fewer resources, knowledge, skills or abilities, access to capacities, or suffering discrimination.

This has implications for vocational education's development of its students, communities, and of occupations and industries. All post-secondary qualifications should have these three roles, although the emphasis on each role may differ with each qualification:

1. *Labour market*. Qualifications should provide entry to and progression in the workforce.
2. *Education*. Qualifications should provide students with the knowledge and skills they need to study at a higher level in their field or a closely related field.
3. *Society*. Qualifications should contribute to society by developing students' appreciation of and contribution to culture and society.

Vocational education to develop productive capabilities would develop individuals in three domains:

1. *The knowledge base of practice*. This includes the theoretical knowledge needed for the field of practice, but also for higher-level study within the occupation. It also includes knowledge about the history and trajectory of their field of practice, ethical dilemmas and debates, and knowledge about sustainable practices.
2. *The technical base of practice*. This includes industry knowledge and skills, or the ability to perform particular roles and tasks, that transcend particular workplaces.
3. *The attributes the person needs for that occupation*. This includes attributes such as ethical practice, but also effective communication skills, the capacity to work autonomously and in teams, creativity, information management and so forth. While these are sometimes described as general or generic, they are understood differently in different fields of practice and need to be developed in specific disciplines and occupations. Since capabilities are embedded in their context, productive capabilities require an understanding of the nature of work, the relationship between education and work, and the kind of qualified person we want to produce.

Vocational education have an important role anchoring their communities by:

1. proactively working with other key social partners in the region and nationally (where appropriate) to support sustainable social and economic development;
2. anticipating, elaborating, codifying and institutionalising the knowledge base of practice for the future as well as the present and in considering the way work is changing and the implications that this has for a curriculum for the future. This is a crucial role that would support innovation, and requires appropriately qualified and supported teachers who engage in the scholarship of teaching and learning and in research on the way their field is changing;
3. offering students a sufficiently comprehensive range of programs that enable them to realise their aspirations and providing students with the broad range of services and supports that are needed to successfully achieve their goals; and,
4. developing qualifications that meet the needs of students, communities, local industries and regions.

Vocational education also has important roles developing occupations and industries. It:

1. Is a reservoir of accumulated expertise and resources;
2. Is expert in organising knowledge, restructuring knowledge for new purposes, and presenting it for new audiences (teaching);
3. Transfers new ideas from outside the occupation and local industry; and
4. Has a potentially valuable role in codifying, restructuring, and systematising rules and procedures of practice, not only to construct curriculum, but to establish assessment standards which can be important industry standards.

To fulfill these roles vocational education needs to have strong institutions with expert and well supported staff. Vocational education also needs to become institutionalised in the sociological sense of being generally understood by the public with established norms and organisational forms which are reinforced by the expectations and behaviour of other institutions, organisations and actors.

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