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# Problem based learning in Higher Education and new approaches to assessment as a consequence of new formal regulations

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## Introduction

Aalborg University has more than 30 years of experiences in educating students through the use of problem based learning strategies. The pedagogical model is described in keywords as problem-oriented, project-organised cooperative learning in groups. Within a curricular fra­mework based on scientific or professional fields (often with a considerable degree of interdisciplinarity) the members in the study groups choose and formulate pro­blems and questions, which are investigated and analysed by the students and they take steps towards resol­ving, making use of existing sources, methods and theo­ries. This work is documented in a project report drawn up by the group and it becomes the basis for oral exami­nation at the end of each term and semester. In general this work process has similarities to research work, but it is also related to work processes such as development projects, project management and in relation to organisational learning. It is therefore considered a useful preparation for the candidate’s working life, both as regards the knowledge dimension and the development of collaborative competences.

Until recently examinations of the project work were held in groups on the basis of the project report in order to ensure alignment between goals, learning activities and assessment form. However, in 2006 the government announced that group examinations would no longer be permitted. As a result students are now allowed to do study work and write reports in groups, but they are to be examined and assessed individually, i.e. without the presence of other students from the group.

In this paper, we will investigate some of the consequences of these new regulations for assessment. The research questions will address the question of alignment between group study and individual examination; the pros and cons of the individual examinations including the aspect of validity; the influence on student behaviour, if any; and finally the academic results of the new regulations. The results of a qualitative survey among study leaders will be compared to previous investigations made since the ban of group exams. Based on selected theoretical approaches to teaching, learning and assessment we wish to discuss the result of our research, the consequences of the changes in assessment forms, as well as the measures taken at the university in order to obtain new valid assessment forms. Finally, suggestions will be made to some alternative assessment forms.

## The principles for problem-oriented, project-organised cooperative project work in Denmark

We will start with a short description of the context for the problem of this article. The didactics of Aalborg University ha**ve** been developed from the original principles formulated around principles such as: problem orientation and inter-disciplinarity, exemplarity, open curriculum and experience-based learning, peer learning, and cooperative learning in groups (Enemark and Kjærsdam, 1994), (Kolmos, Fink, Krogh, 2004).

Problem based learning, PBL, project work etc. are concepts used widely and with very different meanings, integrated in varying educational designs and with different instructional goals. The original idea and theoretical foundation of the problem oriented project work in a Danish context was formulated by Knud Illeris in 1974 in his seminal book “Problem orientation and participant direction. An introduction to alternative didactics.”[[1]](#footnote-2)

### *The founding principles of problem oriented project work*

Based on an analysis of society’s need for education Illeris lists three categories of qualifications which appear to be necessary for the development of society: 1) Skills which can be defined in direct relation to a given task or work process, 2) Adaptive qualifications of a general character and comprising attitudinal characteristics (e.g. diligence, perseverance, vigilance etc.) – combined with a willingness to apply these characteristics in relation to work, to accept and subject to the existing work processes, 3) Creative / innovative qualifications which may be divided into qualifications for scientific, innovative work and qualifications for continuous renewal and being able to cooperate. (Illeris: 32-35). Referring to Piaget’s theory of learning Illeris understands accommodative learning processes as the prerequisite for creativity. With this point of departure Illeris describes an expedient learning process which allows for the development of skills, adaptive ability and creativity as a process which alternates between accommodative processes (the creation of new cognitive structures) and assimilative processes (the incorporation of new material in the individual’s existing structures). Such alternating processes are a precondition for student’s ability to acquire a holistic competence which comprises the skills, the adaptive ability and the creative qualifications which according to Illeris’ analysis was needed by society (Illeris: 76-77).

The alternative didactic concept – the problem oriented project work – was and is characterised by:

* *Problem orientation*, which means that the point of departure is the subject related knowledge, methods and theories relevant to the specific problem. This means that interdisciplinarity becomes a leading principle.
* *Participant direction*, which means that both the definition of the problem and the choice of work methods must lie with the students as this is the only way to create the possibilities for accommodative learning processes necessary to develop creativity and flexibility.

*“Because if you determine beforehand politically which problems should be the point of departure of problem oriented education and how you are supposed to work with the problems, you may well have transgressed the traditional borders between disciplines, but have at the same time established new limitations which in the same way as the old ones will hinder the accommodative learning which is the prerequisite for developing the desired creativity and flexibility.”* (Illeris: 82)

Furthermore, the problem in question has to be and be experienced as relevant for the individual student in order to ensure the appropriate learning process,

*“Accomodative learning is a demanding process which depends on commitment. You only accommodate in situations which have significance for you to manage. Why else ‘take the trouble’? In less significant situations you dismiss the problem or assimilate it, i.e. integrate it into already established cognitive structures.”* (Illeris: 82-83)

As a consequence of this the principle of participation in decision making becomes important.

* *The principle of exemplarity* which means that working with the important and representative aspects exemplify the area of the discipline in question.
* *Group work.* The students collaborate in groups about problem solving. In that way they learn the difficult art of collaboration and leaderships of projects.
* *The communicative didactic*, with primary focus on the forms of work and cooperation within the group and the considerations regarding the choice of content.

*“The communication in the group, the group’s reaching an understanding of an experienced problem, is the second main factor. It is a democratic process and therefore significant partly as a subject for negotiation, and partly as a source of insight.”* (Illeris: 177)

### *The work process in practice*

Ideally a problem oriented project work would go through the following phases,

* Selection of subject and the first problem raising
* Formulation of project (corresponds to ‘problem formulation’ often used in the PBL terminology)
* Methodological reflections and decisions on how to solve the raised questions in the problem formulation
* Project work (i.e. theoretical and empirical work, perhaps involving experiments)
* Production (of project report) (sometimes involving descriptions of work processes)
* Product evaluation and if necessary – product adjustment

As mentioned above problem oriented or problem based project work may be interpreted and implemented in a number of different ways according to educational institutions, disciplines, subjects, and learning goals. There may be varying degrees of free choice regarding the specific problem, subject area, and method, and the project work may differ in size, i.e. the students’ workload per semester. Furthermore, there may be vast differences in resources allocated to the project work in terms of hours of supervision as well as study rooms for the groups. Even though the facilities and resources for project work may vary, the following model illustrates the elements which generally forms part of the problem oriented project work at Aalborg University,



Fig. 1. Example of project-organised problem solving processes (inspired by Kjærsdam and Enemark, 1994)

The project work is closely combined with lectures, seminars or laboratory work on relevant subject matters. The actual organisation of the study programme depends on the didactic analyses, performed by the study board and the teachers. The intentions are that all sources and methods aim at supporting the students in their working processes. The students’ work is facilitated by university teachers supervising their project work. It is generally expected that students work in groups of 6 - 8 persons during the first year of study, which later in their studies often shrinks into 3 or 2. Individual project study is accepted, but the students are told that this minimizes the peer-learning.

The organisation of the studies can be illustrated as in this model:



Fig. 2. General organisation of the Aalborg PBL model

As mentioned above there are many different kinds of project work, mirroring differences in fields, subjects and study environments. Students in philosophy or anthropology may find it difficult to recognise the kind of project study undertaken by for instance engineering students. Therefore the model varies considerably in practice.

### *The teacher as supervisor*

Each group is assigned a supervisor[[2]](#footnote-3), who through the process helps, challenges, supervises, teaches and discusses with the students and assesses them. The supervisor’s assistance is, however, important at several occasions, for instance in both the selection and formulation of problems, methodological reflections and decisions, facilitation during the working process and in explaining how exams will take place.

### *Group examination*

In accordance with the founding principles behind the PBL-approach examinations have been carried out in groups, in the form of a combination of oral presentations from each study member, questions from examiner and external examiner and discussions on the basis of the project report, thus forming an alignment (Biggs and Tang, 2007) between goals, learning activities and examination form (i.e. evaluation of students learning outcome), where the study form and activities correspond closely with the form of examination and objectives to be met.

As we have discussed earlier in this paper the intentions of the problem-based, project organised group work are that the students learn together and from each other.

During the group exams the group and its members were tested in their abilities of presenting and showing the problem definition analysis in the project, as well as their abilities in both performing individually and cooperating with others during the exam situation. The examiner (who has also acted as supervisor/facilitator for the group) and the co-examiner or external[[3]](#footnote-4) examiner challenged and tested the students’ knowledge and experiences, making sure that all students in the group got the opportunity to demonstrate the knowledge and the understanding of essential relevant topics in the curriculum. Effects of synergy were often displayed during group examinations when the students, prompted by the questioning of the examiner and the co-examiner or external examiner, were mutually inspired to respond in very qualified ways.

The students were assessed individually in the groups. Exams might often last several hours dependent on group size[[4]](#footnote-5). This meant that the exams often became qualitatively very valid exams.

Aalborg University has accumulated much experience in group examinations. A crucial part of this is the awareness of the necessity of assessing the performance of both the group and the individual students in the group. The obligation to assess the individuals has always been emphasized in the official regulations for examinations in Denmark. There are different ways of doing this. If the examiners were in doubt about the skills of an individual student they might pose supplementary questions exclusively for him/her, and in the Humanities at Aalborg University students have always been required to indicate which parts and chapters etc. they have contributed to the project report in order to ensure individual assessment regarding the written report. It has not been uncommon for students in a group to be graded differently.

## Ban on the group examination

In 2006, however, the liberal-conservative government announced that group examinations would no longer be permitted at any educational institution in Denmark. Students were welcome to do study work and write their reports in groups, but they were to be examined and assessed individually, *without* the presence of the other students in their group[[5]](#footnote-6).

The announcement provoked resistance from many quarters, especially from students, their organisations, and many educational institutions, but, perhaps more importantly, also from industry and business, thus underlining that the skills, knowledge, and competencies claimed to be an outcome of the problem-based, group-organised project work are highly sought after and valued by the employers.

Before continuing to present the results from the survey and discuss some of the consequences from the ban on group examinations we will briefly illustrate some of the previously documented learning outcome from the Aalborg PBL model.

## Potentials and added bonus from the Aalborg PBL model

As mentioned cooperative study aims at strengthening certain aspects of the learn­ing process in higher education. It demands that students learn to cooperate on tasks and develop a plan for the division of labour without losing sight of the basic questions they are inves­tigating. It means that much learning takes place through discussions and knowledge sharing where the ideas and perspectives of each individual student are presented, confronted, discussed, and perhaps integrated in a common understanding. Furthermore, cooperative study means that students are trained to formulate and present the results of their studies and learning, most often in the form of written reports. Study tasks like this establish a collec­tive responsibi­lity.

The work processes, which are going on during project work bear some resemblance to research processes, and they are also related to types of work processes as they may be seen in business, in particular in project management and in combination with organisational learning. In this context there are similarities to the principles of Modus Two research (Gibbons, 1994, Wenneberg, 2000). Especially in the last terms of a master programme it gives students the possibility of transcending the barrier between the cognitive and the affective learning when they experience the relevance of research in relation to society and needs from the working places. This is achieved by asking the students to investigate problems in theory and practice. This type of work can also be seen as types of/or pre-forms to research-processes. However, the intention is not to turn all students into researchers but to make it possible for them to develop skills that are useful within their future professional and academic working life whether it takes place at universities or in other workplaces nationally or internationally.

A comprehensive survey which was carried out among 10,000 former students at Aalborg University and Roskilde University Centre, which is also working with a PBL-approach, indicated that the pedagogic form and the cooperative studies seem to have supported the Masters (Candidates) in developing skills and abilities of for instance communication, problem solving, creativity, innovation and cooperation in solving workplace related tasks, i.e. competencies, which have proven useful in job situations. This is documented both in earlier studies (for instance Rasmussen 1991) and as mentioned in two surveys (October 2002 and April 2003) among Masters graduated from Aalborg University and Roskilde University and among 150 employers from public and private firms (Kandidat- og aftagerundersøgelsen, 2003); (see also Krogh and Rasmussen 2004). A new survey among Masters graduated from Aalborg University during the period 2001 to 2007 has just been ended ([www.Karrierecentret.aau.dk](http://www.Karrierecentret.aau.dk)). This survey confirms the results from the surveys in 2002/2003 in relation to the development of the above mentioned skills.

It is seen from these surveys that some of the intentions behind using this particular pedagogic model seem to have been met according to the Candidates/Masters and their employers. This can be said about the development of theoretical knowledge and methodological knowledge and to some degree the ability to cross the traditional disciplinary boarders. In this respect the pedagogical principles in the pedagogic model seem to meet some of the demands rising from the development of society for knowledge transcending the boundaries of the strict disciplinary knowledge, without loosing the traditional disciplinary knowledge – still according to the employers and their employees. These demands thus seem to be fulfilled at least in the problem based didactic as it has been performed at Aalborg University and Roskilde University Centre.

## Educational arguments for discussing exam forms

There may be many good reasons for discussing the forms and the functions of examinations in education. In international educational research there are continuing critiques about whether established methods of examination actually test the aspects of the students’ learning which are intended and relevant (see for instance the overview in Lauvås and Jakobsen, 2002) and Sadler (2005). It is also well known that assessment methods and requirements probably have a much greater influence on how and what students learn than any other single factor – see for instance Boud (1988), Gibbs (1999) Lauvås og Jacobsen (2002), Cowan (2003). Boud argues that if you get the assessment right, then you are likely to direct students’ activities appropriately. He states,

“*If we want to encourage them (the students) to take a deep rather than a surface approach to the development of practical skills, we need to design practical assignments intelligently. We need to think not just about the assessment criteria but also about weighting, timing, agency and ‘fitness for purpose’, with imaginative consideration of methods and approaches that can challenge students, be inclusive and suit the topic, context, cohort and level*” (Boud in Pickford and Brown, 2006)

Actually it is this kind of research, which lead to much concern from many Danish educational researchers, developers and practitioners because there potentially seemed to be so much alignment between learning goals, the teaching and learning model and the assessment form in group examination related to PBL, so valid exams were a possibility and at the same time motivated the students to work collaboratively in groups.

***Some consequences from the shift in exam forms – students’, teachers’ and examiners’’ perspective***

In the press release quoted above as well as in the ensuing debate the two ministers[[6]](#footnote-7) offered little in the way of arguments for the ban. They mainly insisted that “we want to know which skills the individual has”, implicitly claiming that this can only be assessed through individual examinations (without the presence of the other group members). The fact that there at that time were not much systematic evidence about how group examinations actually had been working (although there were much practical experience in some educational institutions) probably made it easier for the ministers to avoid serious debate and arguments about their claims. Some of the existing evidence can be read for instance in a survey made by the Danish Evaluation Institute (2005) – see Krogh and Rasmussen (2007).

An ongoing research project at Aalborg University, established in connection with the ban on group examination, aims at comparing the impact of group examination and individual examination on different aspects of the teaching and learning process. As mentioned above teaching and study at this university has generally followed the principles of problem-based project learning and group organisation, and the shift from group examinations to individual examinations gave the opportunity to investigate the consequences for study work and learning. The decision about individual examination was implemented by the Ministry of Science, Technology and Innovation (which has the responsibility for universities) by fall of 2007. However, a limited number of diploma level students in engineering did in fact make the shift already in 2006, and for these students it was possible to compare the experiences of individual and group examinations. Some results from this first analysis (Kolmos and Holgaard 2007, p 10) were that,

* Compared to students taking group exams, *students* taking individual exams found that their academic skills were questioned and examined to a much lesser degree
* *Examiners* find that individual exams give much reduced possibilities for asking questions related to deeper academic understanding, and they find that the basis for assessing individual performance is better in group exams.
* Both *students and examiners* find that a number of skills are less likely to be assessed in individual exams than in group exams. These include arguing for choices of theories and methods, discussing different solutions to problems, transferring knowledge from the study project to other contexts, engaging in dialogue and teamwork.

This research project has been followed up by investigations among students, supervisors/internal examiners and external examiners in 2008 (Kolmos and Holgaard, 2009). It concludes that it to a certain degree is not possible to test students’ skills concerning project competences such as analytical, methodological and communicative skills in solving technological problems. It is to a larger degree easier to test the individual students’ basic knowledge. In that way there seems to be only a minimum of alignment between goals, learning method and assessment form and consequently there is probably problems concerning the validity of many exams.

Furthermore, the majority of examiners (internal as well as external) and students claim that they prefer group based exams to individual exams. It should, however, also be mentioned that the investigation shows that still more students seem to be positive towards the individual exam in 2008 than they were in 2006. An explanation to this might be that some of the students who participated in the survey have never tried group exam and thus have no basis for comparison.

One argument brought forward a few times from Government to support the ban on group exams was that students taking group exams tend to obtain grades resembling those of the other students in the group, whereas grades obtained in individual exams were more dispersed. This was presumably seen as an indication that no individual assessment had taken place. There is, however, another more plausible and learning oriented interpretation of this fact. When students cooperate intensively on a common project in much of their daily study work they will learn from each other and the levels of skills and knowledge among the students in the group may approach each other. If the grades of the group members approach each other there is no need to assume that this is due to a lack of validity in group examination. However, in another respect the argument about levelling takes on a different meaning. Experience with project work points to the fact that in a given student population, students will tend to form groups that are fairly homogeneous in skill, motivation and knowledge levels. This means that the differences in ability and achievement will manifest themselves not in, but between groups, which again would account for the seemingly homogenous character of the individual group. It might also indicate that there may not be any levelling effect for the student population after the first years of study and selection of group members.

***Results from recent research – the study leaders’ perspective***

Since the ban of group exams in 2006 many efforts have been made in the educational system and among study leaders and teachers in order to minimize the more negative consequences of the government decision. To supplement the above mentioned surveys an investigation among study leaders within the Humanities and the Social Sciences was undertaken in May/June 2009.

In the Danish university system study leaders are responsible for implementing the decisions made by the local study board[[7]](#footnote-8) regarding the study programmes for which it is responsible, and are in charge of the day-to-day management of the studies. Study leaders thus are in a unique position to form an overall opinion/impression/picture of the situation both as regards positive and negative consequences, if any. A questionnaire was sent to 22 study leaders and they were given the option to either respond to the questionnaire in writing or to participate in an interview based on the questionnaire. 15 study leaders participated. The overall research questions in the questionnaire was related to the following overall themes 1) Individual project exams (description of the actual exam situations; advantages and disadvantages of the new form); 2) Group work and study strategy (ratio of group work compared to before; group size; measures taken to ensure group work, if any; 3) Results of the individual examinations (quality of the projects; validity and reliability of the examination)

The results of the investigation show that there is both complexity, conflicting experiences and diversity in the understandings of the consequences of changing exam forms and the function of individual exams. Some of these consequences and concerns are presented below. However, it is important to be aware of the fact that in Denmark there are various opinions among university teachers and leaders about the importance of the pedagogy compared to research and more narrow subject related issues and the role of exams, - and of course these different opinions and understandings influence on the statements, which may be seen in the data-material.

In the following the results from the investigation will be presented and statements from the informants, the study leaders, will be cited to illustrate the points made.

### *The question about Alignment*

Generally from the answers, study leaders express concern regarding the question of alignment in terms of coherence between what has to be learned, the working and study forms and the validation of students’ learning outcome. As one study leader points out the lack of alignment is evident to the students,

*“It is difficult to argue for the students, that we have an assessment form which do not correspond with the working form”*

Another study leader is in addition to this concerned with what you might call the ‘alignment’ which reaches beyond the educational framework and into the future work situation of the students. Referring to the original ideas behind the PBL approach one of the intentions was to prepare the students for their future working life. Whereas the group exam was a continuation of the group work processes of the project period and as such in many ways is thought to mirror the work processes of the work life in companies, organisations, institutions etc. the individual exam represents both a discontinuation of these processes and a decontextualisation,

“*Assessment of the individual student happens without any kind of relation to the collaborative process which has been the basis for the project. And it is quite unnatural in relation to the kind of future in which the students will have to act. It makes the exam situation unnatural instead of natural. You also spend too much time on exams*.”

The latter comment refers to the general outline of the individual examination[[8]](#footnote-9) compared to the group examination. In the group exam examination time was a function of the number of students in the group supplemented with time for group discussion. This would give the examiner and the co-examiner/external examiner ample time to probe in depth into the knowledge of each student, and get at good overall impression of the competencies of the individual as well as of the group as a whole. Compared to this the individual examinations have a limited amount of time, on an average approximately between 20 and 30 minutes. As each student has to start from scratch so to speak regarding the presentation of the project, the problem, the method, the choice of theory/ies, etc. there is not much time to discuss in depth the project, the implications and consequences of the choices made, possible alternatives etc. Furthermore, the examiners must take care not to make a difference between the examinations of each member of the group, which is also the concern expressed by this study leader,

*“You do not gain any insight into the group’s interaction and you have to repeat the same questions time after time when there are many students in a group”*

Some of the issues addressed here regarding the group’s interaction refer to the group’s collaborative competencies in terms of professional dialogue, critical thinking, project management and division of labour within the group.

As previously mentioned the group examination had the potential of being a learning encouraging situation due to the generous time frame of the exam, as is also advocated by some assessment researchers. Lauvås and Jakobsen (2004) for instance advocate a form of summative evaluation that is conducive to the students’ learning rather than merely a control of the knowledge acquired. With the shift to individual examinations the control aspect will outweigh any intentions of creating a learning scenario.

### *Validity*

From the surveys undertaken up till now it can be concluded, that the exams risk becoming primarily about ‘checking’ the students’ rote learning and abilities to reproduce theories, used in the project. This also means that the enormous amount of work undertaken by the students during the project work does not seem to have a platform for assessment in the individual exam. You might say that it is only the tip of the iceberg of what has been learned that is actually assessed, which has consequences for both alignment and the validity of the exam, as is expressed in the following statements,

*“I also estimate that the validity has deteriorated as the result of the exam today is more dependent on the 20 minutes’ questions and answers and do not involve the result of the thousands of working hours in the assessment of the total performance and of the individual’s contribution to it.”*

Most of the study leaders find that the basis for assessment has become poor because of less time for the examinations (each individual student about 20 minutes). They value it as very unsatisfactory professional situations, where the students’ project is only discussed and treated on the surface compared to the ‘old’ group exams, where you could discuss the projects in depth and obtain a much better impression of the individual student’s competences and the scope of their knowledge based potentials.

*“It is not easy to guarantee validity because of the time span”*

*“Less validity! The new individual exam forms do not quite catch the talent”*

The last statement here addresses yet another aspect of the assessment, namely that the short time span interferes with the student’s possibility to ‘shine’ and show it if he/she is particularly talented.

*“It is a less challenging exam form. If the wish was to develop talents then you have shot yourself in the foot. Now you get standard articles!”*

On the other hand this scenario entails another risk, namely, that students, who may not have participated whole-heartedly in the project work, may be able to pass the examination solely based on having read the report prepared by the other group members, but without having been a part of the learning process. Since the examination will be checking the ‘surface’ of the student’s knowledge and he/she is not challenged in a discussion with the rest of the group as well as the examiners, this new examination form might aggravate the very thing, that the ministry feared and wanted to avoid, namely that an individual is granted a grade that is not a true reflection of his/her actual skills, knowledge and competencies.

“*The new exam form represents poor quality. There are no possibilities for assessing the students’ abilities (in relation to time, depth and the possibilities of confronting/challenging the students to each other (positively meant*).”

Other study leaders, however, express a more positive attitude towards the individual project exam even if it does mean that there is no alignment,

*“The individual student has the possibility to defend the product without taking into consideration that others are present and without influences from others. It makes it easier to assess the individual student correctly” … The more negative aspect is, that the work process is not consistent with the assessment of the product*”

“*It has become easier now to focus on the individual student*” or

“*I cannot see any negative consequences in individual exams*” and

*“It has become easier too to evaluate the individual student – who is expected to be able to give answers to everything”*

The last statement emphasises the question and answer procedure of the individual exam as opposed to dialogue and discussion which was generally the ideal for the group exam.

### *Academic results*

During the last years a new qualification framework system and a new grading system have been implemented in Higher Education in Denmark. An essential aspect of these new systems has been the focus on the importance of the formulation of skills and abilities in terms of competences as well. As a consequence of this there has been a process at the university where learning goals have been re-formulated in terms of abilities, skills and competences in the curriculum and in course/programme regulations.

In addition to this several study leaders claim, that clarification of learning goals to a certain degree has ‘saved’ the group exams, because learning goals have become more explicit than before the ban of group exams. It means that the teachers/supervisors as well as students are more conscious about the intended learning outcome, which in a way can clarify the exam situation. But it does not necessarily mean that the validity of exam is present.

Afew study leaders say that they have no problems with the validity of exams and, some even find that a raise in professionalism/subject related knowledge can be seen.

*“The students seem generally to be better prepared”*

In general the results in terms of grades show that no changes can be seen compared to the situation before.

### *Group work and student behaviour*

The university generally still believes very strongly in the group organised problem oriented project work, and one concern following the lack of consistency between the ideal of group work and the individual exam is that the students will to a larger extent wish to work alone. Students do not always find it easy to have to work in groups, and several of the study leaders also claim that more and more students actually want to work individually.

“*We talk about a thoroughly collective product and the quality of this product depends on the team work in the group. The exams form partly block the way for motivation as well as collective commitment in relation to the group work*”

Consequently, some study leaders (not all) report that their study board and the teachers have to make special efforts to convince the students that group work is important for the learning processes and the learning outcome. Some of the measures reported by the study leaders were for instance, during the process of establishing the project groups teachers and supervisors may point out the problems related to data gathering, analysis and knowledge sharing if students wish to work and write individually. Some study leaders in fact report that in some semesters students are told that it will be impossible for them to complete the project, if they do not work in groups. In one particular case this has resulted in a situation where 80-90% of the students therefore work in groups of often 5 students (which are actually larger groups than before). Another incentive to promote group work is allocating relatively more supervision hours to large groups.

Furthermore, some study leaders have noticed changes in students’ behaviour in terms of on the one hand a less social and collectivist attitude in the students,

“*Solidarity has been replaced by elbows*”

“*Students keep their cards closer to their chest. You may see students accusing each other for plagiarism”*

And on the other hand a marked lack of independence in the students is beginning to show,

“*Tendency of lack of independence among students is seen, but the students have also become younger”[[9]](#footnote-10)*

According to the Danish qualification framework professional independence is a competence which must be developed during the study at both bachelor and master level; it is therefore a potential problem that students now seem to be less independent.

Finally, some study leaders report that another negative side effect is that among especially first year students study leaders and teachers have experienced that many students are much more nervous in the exam situation than earlier, and generally that they are not being able to argue as reflectively and open-mindedly on questions from examiners as earlier (unless they are a very trained and self-assured students).

This last statement would appear to be in opposition to what some students expressed during an interview in summer 2007[[10]](#footnote-11) regarding the transition from group examination to individual examination, where one of the sentiments involved seemed to be relief,

*“It is far easier to go to exam alone than being roasted by the intern and extern examiner for several hours.”* (Information, 28th June, 2007)

In this case the wider time frame of the group examinations was perceived as a negative factor by the students.

In conclusion, it appears from the investigation that there is still a considerable amount of group work taking place, in some cases even a larger number of students work in groups and sometimes even bigger groups than before. It would thus appear that in spite of the ban on group exam the teaching system has to a certain degree succeeded in convincing the students about the importance of working in groups in relation to learning outcome even when they find it difficult to work in groups.

***Conclusion and suggestions for new /additional exam forms***

Group work as a study form is under pressure in Denmark and although the shift in student behaviour towards a more individualistic orientation may not be directly linked to the problems of alignment regarding the group work, the tendency requires special attention among the study leader, teachers, supervisors etc. in order to maintain the learning potentials of the group work (cf. Illeris). A number of the basic principles in the Aalborg PBL, model such as problem orientation, participant direction and the principle of exemplarity, may still be applicable when the student works alone, but apart from the obvious fact that a one man project may only cover a limited subject area compared to a group project due to the resources (man hours) which are at the student’s disposal. Working alone also means that the student is not challenged in his/her understanding of the problem, is not trained in the democratic process involved in group work, does not train and practice his/her verbal negotiation skills and so on. The possibility of learning through dialogue, discussion, challenge of point of view etc. is reduced. It is therefore necessary continuously to be very articulate about the pedagogic/learning theoretical rationale behind the study form, and to give the students positive experiences with group work so that they experience first-hand how much more they can achieve and learn when they cooperate with their fellow students. It is necessary to continue creating a learning culture that does not question the ‘wisdom’ of the group work processes as an effective and motivating form of study.

However, solving the problem with group work does not solve the problem with the exam form. Based on the above results it is difficult to argue that the solution for the problem with alignment between the group work dimension of the PBL-model and the individual exam has been found so far. The individual oral examination has the traits and characteristics of the ‘traditional’ subject exam, as regards both the limited time frame and the control aspect of the examination. The scope of what it is possible to control or test for during this type of examination is consequently reduced accordingly. Thus the complexity of competencies gained through group work, for instance the ability to work together as a team also during a stressful examination, can not be assessed. Neither can the depth and the complexity of knowledge and skills acquired by the students during the project work. The question of the validity of the exam form must consequently be of high priority – and new/other exam forms must be created to capture this.

One consequence of the alteration of the exam forms could be a reduction in the demands for knowledge, skills and competencies to be assessed through the examination. However, due to the impact of the Bologna-process on the Danish educational system all the learning goals are described in terms of knowledge, skills and competencies, and generally this detailed description has resulted in an increase of the demands. Consequently, other measures have to be taken to ensure validity of the assessment of the problem oriented group based project work. One suggestion could be that part of the examination takes place as formative assessment during the semester:

* Written tests regarding selected subject-related issues central to the project work in question. The tests are prepared by the group’s supervisor. Answers may be worked out collaboratively among the students, but presented individually.

It appears to be difficult to assess group processes without observing the individual student within the group. However, some suggestions could be:

* A video recording of a group session – and a meeting where the individual student describes and reflects upon his/her role in the group, his/her actions and reactions, perceptions of group dynamics etc. It could be supplemented with a recording of a group session with the supervisor, as it is sometimes a very different situation regarding interaction and distribution of responsibility and time.
* Log books or portfolios where the individual student describes the group processes and reflect on his/her role in the group as well as what the learning outcome has been regarding group work, project management etc.

To introduce such assessment initiatives regarding for instance group dynamics it would be necessary that this dimension was explicitly stated as a learning outcome with very clear assessment criteria in the study regulation, and that resources for the assessment processes were allocated accordingly.

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1. The PBL model, implemented in Denmark was a result of needs for developing new more critical approaches to teaching systems.

   Theoretically the Danish PBL approach originally was based on ideas from the two German authors Negt and Kluge (1975) and with references to C. Wright Mill (1959), Dewey (1933) and Freire (1970). [↑](#footnote-ref-2)
2. At the Natural – and Health sciences groups are assigned 2 supervisors at the first year. One supervisor represents the subjects and one is primarily acting as process- supervisor. [↑](#footnote-ref-3)
3. In the Danish educational system it is possible to operate with either internal or external censorship. The ratio between internally and externally censored examinations is laid down by the Ministry of Science, Technology and Innovation, and the study order for each education determines the rules regarding the specific examination. [↑](#footnote-ref-4)
4. For instance, 30 minutes per student would mean a 3 hour examination of a group of 6 students. [↑](#footnote-ref-5)
5. This in itself is a breach of the general principle in Denmark that all examinations are public. [↑](#footnote-ref-6)
6. The Minister of Education and the Minister of Science, Technology and Innovation [↑](#footnote-ref-7)
7. A study board has representatives from the academic staff as well as from the students. [↑](#footnote-ref-8)
8. See also Kolmos and Holgaard (2009) for a presentation of the group examination of project work versus the individual examination of project work. [↑](#footnote-ref-9)
9. Students in Denmark have for many years been older than students at other universities in the world. Now new regulations have been decided by the Minister in order to encourage them to start their studies sooner after finishing the Gymnasium. [↑](#footnote-ref-10)
10. In an article in the Danish newspaper ‘Information’ [↑](#footnote-ref-11)