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Expanding and orchestrating the problem identification phase of design-based research

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Abstract
Design-based research (DBR) employs the identification of a problem as the key to designing solutions and generating new knowledge. Based on three empirical examples that highlight the potentials of three methods for elaborating on a problem, this paper argues that expanding, deepening and orchestrating this phase may provide crucial insights into subsequent attempts at problem-solving design. The authors discuss how the identification phase can be orchestrated in a way that facilitates a nuanced and explicit exploration of a problem. The matter of a problem is addressed by drawing on Schön's (1983) distinction between problem-setting and problem-solving, focusing on the problem-setting process and addressing the implications of a collaborative practitioner–researcher perspective (e.g. Amiel & Reeves, 2008). When discussing paradigmatic issues in different scientific domains, as well as the issue of bridging practical and theoretical problems, the authors draw on epistemological insights to define what constitutes a problem (Adolphson, 2006). Three methods practised by the authors in three DBR projects—future-workshop, dialogic-space, and co-creation methods—suggest potential approaches for enhancing practitioner–researcher collaboration when identifying a problem. From here, it is argued that the dynamic interplay between practical and theoretical problem-setting holds the potential to transcend a fixed set of problems. Furthermore, it is argued that multifaceted and diverse stakeholder collaboration creates productive tension between perspectives that can revitalize well-known ideas on the matters of a problem. The problem-setting issue in DBR is therefore not solved, but more tools are proposed for use in the phase during which a problem is identified.

Keywords
design-based research, problem-setting methods, practitioner involvement

Introduction
When design-based research (DBR) is conducted, practitioners in the field are rarely engaged in identifying problems on the same level as researchers. DBR studies are iterative but not divergent in terms of problem identification; in the vast majority of cases, they converge around the refinement of a pre-defined solution (Gundersen, 2021). This is a serious issue that undermines scientific arguments for using DBR as the key to sustainable solutions and generating new knowledge (Dede, 2004). DBR was derived from the educational sciences, which faced the pedagogical challenge of integrating digital technology into schools,

and was an attempt to reframe experimental laboratory studies (Dede, 2004). Amiel and Reeves (2008) argued that the implementation of digital technology is not handled sufficiently by the humanities' interpretative research approach, which offers comprehension of real-world issues but no action points for changing them, while the natural sciences research approach offers experimental and controlled empirical research approaches, albeit without real-world contextualisation. Initially, the pioneers of DBR took their point of departure from examples in science education and mathematics (Brown, 1992; Cobb et al., 2011); their approaches to problems were connected to digital learning in these domains. Cobb et al. (2011) described their design research methodology as a way of addressing the concrete problems that researchers encounter when experimenting in classrooms. However, influential design-based researchers within mathematics, such as Cobb, have primarily focused on validating their suggested learning trajectories (Gundersen, 2021). Nieveen et al. (2006) distinguished between such *validation studies* and what they call *development studies,* which is a more problem-driven type of research with a high degree of practitioner involvement. Amiel and Reeves (2008) stated that the ultimate goal of DBR is to build a stronger connection between educational research and real-world problems. They further emphasised the importance of establishing research questions and identifying problems as a collaborative process between researchers and practitioners. They stated that problems undergo cycles of refinement and redefinement that serve the purpose of developing guidelines or design principles for the phases that follow, especially in DBR processes aimed at theory generation and problem-solving, which were already promoted by Reeves (2006), Brown (1992), and Collins (1992). The latter is not without difficulty, since practitioners and researchers may have different views of what is a problem. Questions arise, such as: What constitutes a problem for a practitioner and a researcher? In what ways do practitioners and researchers collaborate to enrich the setting of a problem? How can the diverse involvement of stakeholders contribute to problem identification? What are the methodological implications of DBR? This article argues that approaching a problem through real-life problems in the problem identification phase, with a focus on the inclusion of the practitioner's perspective, has the potential to enhance DBR's theory building and endeavour for sustainable solutions. However, practitioner and researcher collaboration in problem identification is challenging. The purpose of this paper is to provide arguments for engaging in a situated and reflective problem-setting encounter between researchers and practitioners, and to discover how this process can be orchestrated through future workshops, dialogue space and co-creation workshops as examples of various problem-setting methods.

The setting of a problem as a situated reflective encounter between researcher and practitioner

The discussion of practitioner perspective in research is known outside DBR and provides insights from which DBR may learn. In design research, it is criticised as a matter of traditional bias in scientific philosophy (Schön, 1983). Schön criticised professional practices for drawing on technical rationality – meaning the epistemological inheritance from positivism, where science and technology were considered the driver for the well-being of mankind and institutionalised in modern universities since the enlightenment in the eighteenth century, to attain a one-sided focus on problem-solving at the expense of problem-setting. He problematised the assumption that problems are solved without considering what real-world issues the problems represent, and argued that, in real-world practice, problems do not present themselves to the practitioner (Schön, 1983, p. 40). He suggested a focus on the process of situations that are puzzling, troubling and uncertain. He considered the

practitioner an important 'actor' in figuring out what constitutes a complex and ill-defined situation, and how to make sense of it. The practitioner possesses valuable insights into a real-world situation that may be both contradictory and multifaceted. Furthermore, Schön argued that even though a problem-setting process may serve as a technical solution, it is not in itself epistemological and based in technical rationality. However, it is important to treat the problem-setting phase with attention to how it is *named* and *framed*. By that, he meant that problem-setting phases consist of interactive naming of the things attended to, and framing of the context in which they will be attended to.

Writing from a DBR perspective, Holmberg (2014) took up Schön's (1983) concept of design as a reflective conversation, with the context as a way of preventing a dichotomy between research on the use of digital educational technologies and teachers' situated use of such technologies (Holmberg, 2014, p. 294). Holmberg considered that the situatedness of teaching and learning makes it impossible to create digital educational 'blueprint solutions'. DBR could therefore improve by paying more attention to the social contexts in which a teacher designs for learning, how teachers' conceptual frames are constructed and negotiated in situations of perceiving technology affordance, or to the methodical and theoretical framing of a teacher's reasoning on whether a design is working or not (Holmberg, 2014, p. 306). Additionally, Amiel and Reeves (2008) addressed the analysis of practical problems through collaboration between researchers and practitioners as a fundamental principle of DBR. They suggest that DBR research 'begin with the negotiation of research goals between practitioners and researchers' (p. 34). Further, they underline the necessary humbleness of the DBR researcher by recognising the complexity that occurs in real-world environments.

The collaborative construction of a problem as a research problem

Drawing on insights from the approaches of Schön (1983), Holmberg (2014) and Amiel and Reeves (2008) to understand the conditions for setting a problem, our discussion draws on epistemological insights (Adolphsen, 2006) into bridging the nature of real-world practical and theoretical problems and the related paradigmatic issues (Kjersdam & Enemark, 1994). Kjersdam and Enemark present a dynamic model for the interplay between practical, theoretical, and paradigmatic problems. Their contribution is the recognition of professional practice (e.g. teaching or social work) as a specific field, with a conscious perception of assumptions and theories built into the language, culture, way of life and professional functions that are carried out by academically trained people (Kjersdam & Enemark, 1994, p. 14). These impressions and professional practices guide professional lives. Going back to Schön (1983), these are the practices that researchers and professionals working in collaboration should consider by naming and framing. In this process, the participants may encounter several practical problems as a breakdown in a professional's actions and activities. As Adolphsen (2006) explains, 'A *practical problem* is related to human practice: Something around you behaves in another way than one expected or wanted. A practical problem can be settled by chance or disappear as a problem without knowing why it happened' (p. 30). However, a practical problem can also 'be a symptom that something is wrong with our theories and assumptions, and thus the practical problem produces a theoretical problem as to why there is a practical problem' (Adolphsen, 1985, as cited in Kjersdam & Enemark, 1994, p. 14).

Therefore, through the process of naming and framing, researchers and professionals working in collaboration may get closer to identifying the practical problems that our theories cannot explain—what might be termed the 'theoretical problem'. A *theoretical problem* 'is an anomaly in relation to our former experience or understanding of the world, a

problem in relation to our former comprehension, understanding or explanations of the world' (Adolphsen, 2006, p. 30, our translation). Established theoretical knowledge and scientific disciplines cannot always explain practical problems, and the dynamic interplay between a practical and theoretical problem can therefore lead to anomalies in theoretical frameworks, paving the way for new paradigms (new ontologies and epistemologies). A practical problem can imply different theoretical enquiries, domains and explanations, and may point at the need for alternative paradigmatic approaches, which again will result in different practical solutions to the problem.

Applying this perspective to DBR, we argue that problem-setting must address the dynamic interplay between practical and theoretical problems, and open itself to new paradigmatic positions. The researchers' and practitioners' collaborative naming and framing of real-world puzzling, troubling and uncertain experiences is a bridge to identifying important problems from the practitioners' point of view. Importantly, this naming and framing serves as a bridge to (new) theoretical concepts and paradigms that unfold in the problem-setting process. Before entering the DBR design and intervention phases, the problem analysis needs to engage the stakeholders (researchers and practitioners) in a collaborative and mutual construct of the problem as a research problem (e.g. an anomaly or paradox). This has the potential to lead to the development of a kind of problem identification that interlinks practical and theoretical problems.

Methodology

In this paper, we drew on the assumption that the possibility of designing for problem-solving improves by elaborating on problem-setting (Schön, 1983) as a complex endeavour of understanding the process of exploring a problem (Amiel & Reeves, 2008; Holmberg, 2014). Understanding these processes as a reflective situated encounter between stakeholders (Holmberg 2014), together with epistemological insights into 'what is a problem' (Adolphson 2006), provides a theoretical framework within DBR for addressing research assumptions about what constitutes a perceived problem and how it may be approached.

We discuss three suggested methods for orchestrating this process, and draw on empirical examples from problem-setting in three different DBR projects conducted by the authors. Through these examples, we aim to elaborate on how the impact of problem-setting methods in DBR is 'not only solving the practice-oriented problems addressed by action research, but also identifying reusable design principles' (Amiel & Reeves, 2008, p. 36). The latter refers to how design principles from other learning contexts may inform the problem and context in question.

Flyvbjerg (1995), who defended the scientific validity of case studies as a methodology, helped us define our examples for this article as paradigmatic examples: they 'establish a metaphor or a school for the domain that the case concerns' (1995, p. 230). In this article, we regard the three examples as paradigmatic cases of collaboration between researchers, professionals and stakeholders to understand how a problem-setting process reveals and creates a bridge between practical and theoretical problem-setting.

The examples were chosen for their paradigmatic similarities regarding meeting challenges in problem-setting processes, and for adopting a particular practitioner-involving method for setting a problem (Flyvbjerg, 1995). They were chosen for their diverse domains, as we argue that the use of a methodical approach to elaborate on problem-setting concerns in different educational contexts, learning situations and technological settings. In this way, we draw on Amiel and Reeves (2008), who describe technology as a process. Further-

more, we draw on Amiel and Reeves' employment of a collaborative knowledge construction method in DBR facilitates the more thorough treatment of a problem as a mutual learning process between stakeholders. Together, our examples form the basis for a discussion of how researchers and practitioners elaborate on naming and framing, by engaging in collaboration wherever practical and theoretical problems are encountered.

The three different methods may constitute the first steps towards building a toolbox that can be used for problem-setting processes. Furthermore, by increasing attention to the importance of engaging in what a problem is, before moving on to a design for solving it, these methods offer a methodological contribution to DBR development.

The three examples stem from national and Nordic DBR projects, conducted by the authors in schools and adult learning environments. The first method was a *future workshop* (FW) to bridge the distinction between a practical and theoretical problem in a diverse group of schoolteachers as part of a large-scale DBR project on implementing digital learning platforms initiated by the Danish Ministry of Education and the Agency for IT and Learning. The second method was a *dialogical space* for advancing the attention of the implications in the positionings of the practitioner and researcher in a Danish PhD project targeting 21st – century skills through design thinking and game-based learning. The third method was a *co-creation workshop* intended to activate the diversity potential of stakeholder voices within a heterogeneous group of Nordic citizens and professionals. In this last method, the workshop bridged civil society and institutions representing 'hard-to-reach' learners involved in the Nordic Council of Ministers' project on digital transformation and digital exclusion (Buhl, et al., 2022).

Example 1: Applying future workshops to enable reflective conversation on practice

In Example 1, the future workshop (FW) method was used to support the project participants in a reflective process of conversation about their practice using learning platforms in schools in a large-scale DBR project (Misfeldt, 2016). The method was originally developed by Jungk and Müllert (1987) to practice democracy and create desirable futures. It has since been applied in action research, with a focus on developing emancipatory practices. In the DBR project, the application of FW was pragmatic: Its aim was first and foremost to establish a collaborative workspace between researchers and practitioners, to encourage participants to explore together their thoughts, values, experiences and ideas, contradictions and tensions pertaining to change.

The FW is based on systematic brainstorming techniques organised in at least three phases: critique, fantasy and realisation, creating a convivial and safe space integrating rational-analytical and intuitive-emotive modes of knowing (Jungk & Müllert, 1987). Seven teachers from one school participated in the FW. They were purposefully selected to represent a variation of disciplines (e.g. Danish, the arts, math and science) at pre-preparatory, intermediate and lower secondary education levels.

Even though the DBR project could be characterised as a validation study at the outset (Nieeven et al., 2006), by engaging teachers in identifying and setting practical and theoretical problems, the use of the FW provided interesting insights regarding problem-setting in DBR. The critique phase revealed that technical breakdowns and a lack of training were what the teachers criticised the most. However, during the FW, critical statements changed to focus on the values built into the learning platform, which participating teachers described as dehumanising and simplifying teaching and learning, especially the assessment process. In the vision phase, building on the teachers' value statement of 'the child as someone and

not a robot or thing', participants outlined ideas for the development of an inclusive learning community mediated by a learning platform that supports the collaborative principles of learning: For example, outdoor learning, play and project-based learning and team-teaching (Dirckinck-Holmfeld & Ræbild, 2017).

The FW made it possible for teachers to express concerns about the platform, based on examples from their teaching practice. The teachers also became more conscious of their tacit values regarding platforms, pedagogy and learning. Thus, the FW highlighted a polyphony of voices, broadened the researchers' and teachers' insights into practices, and enabled participants to identify the main issues (practical and theoretical problems) related to the pedagogical use of digital learning platforms. Furthermore, the FW's persistence on elaborating the critique enabled repertoire-building, and facilitated the incipient naming and framing of the problem situation.

To further elaborate on the function of bridging from a practical problem to a theoretical problem, the researchers conducted an interaction analysis of the video recordings from the workshops, and applied Engeström's (2001) second-generation activity theory to identify tensions within the activity system of the teaching and learning situation. The aim was to connect the experiences of the FW to systematic and theoretical framing. These analyses were subsequently used as a point of departure for formulating the problem (Dirckinck-Holmfeld & Ræbild, 2017). The Activity-System-Analysis (ASA) process expanded the framework of the FW, offered suggestions for problem-setting and served as a common object to support the dialogue between researchers and professionals. The FW method provided insights into the practitioners' ability to exceed the limits of what they thought was possible using a learning platform, and laid the ground for a process and relational understanding of digital technologies and for detailed insights in the professional context. As such, the naming and framing of the problem went beyond merely technical challenges in using the platform, and created a complex basis for the following interventions.

Example 2: Applying dialogue spaces as a method for levelling the asymmetric positioning of professional practitioners and researchers in problem-setting

Example 2 explored how researchers and professional practitioners were positioned in the processes of practical problem-setting in the context of teaching game-based mathematical reasoning. It approaches reflective conversations about situations (Holmberg, 2014), by drawing on insights from dialogue learning (Wegerif et al., 2020). This approach was used in the context of a larger game-based learning research project (GBL21), which investigated how students' (5.-8. graders) design-thinking competencies are developed through the process of redesigning games using design thinking in Danish, science, and mathematics (Hanghøj et al., 2020).

In mathematics, one issue was that some participating teachers did not engage in collaborative problem-setting practices. Instead, they focused on what the researchers wanted them to do in the classroom. They participated in the DBR project's problem-setting as if it were a researcher-led implementation of course units, instead of a collaborative developmental practice. Teachers simply did not feel that they had adequate knowledge to identify problems. To address this, a dialogical workshop was planned, to formally frame the dialogic space, and facilitate problem identification, through explorative dialogues with the aim of engaging the breadth and depth of the teacher's perspectives. The workshop was structured by the researcher to create a dialogic space, to revisit the problem-setting in accordance with what the teachers experienced as problematic in teaching mathematical reasoning. The workshop was held two weeks into the course unit. The workshop started with an interview

in which a small team of teachers presented their experiences teaching the unit thus far. Second, the researcher introduced a theory about the learning content to be explored: In this case, a conceptualisation of mathematical reasoning competency (Burke et al., 2008). The teachers and the researchers then used this theory to name and discuss their experience of the unit, identifying problems, and finding new opportunities to address the problems. Third, based on this discussion, the teachers and researchers agreed on one primary principle of how the rest of the unit should be changed. In this case, the problem was identified as the fact that the students did not have enough opportunities to explain their mathematical reasoning. Participants decided that, as a change, the teachers would actively seek out opportunities to ask the students, 'Why?'

The teaching concepts presented in the DBR project were complex, and required a lot of practical organising and planning at the beginning of the course unit. Revisiting the problem-setting in the middle of the course unit meant that the teachers were now familiar with both the game and the lesson plan for the unit, and that the initial organisational problems were solved. Thus, the teachers were then able to use their valuable insights from the problems that occurred in practice during the unit, to focus on their role in the teaching process.

Example 2 illustrates how the dialogic approach contributes to the extension of problem identification. First, the extension meant that the teachers engaged in the identification and consideration of theoretical problems in the course unit, instead of focusing entirely on practical and logistical issues. Second, and closely connected, the delayed problem-setting allowed the teachers to be involved in the identification of the problem using their own experiences within the actual specific course unit. In this way, they could rely less on the researcher's input, and instead make professional judgements from their place in a situated practice. This provided a better balance between the involvement of teachers and researchers in problem-setting.

Placing the teachers in both practical and theoretical problem-setting situations revealed the importance of timing when dealing with the perceived imbalance in knowledge and experience between the two groups of participants. Because the researcher knows the project's scientific scope prior to the teachers, the teachers assume that the researcher has the upper hand. However, an encounter in a dialogic space creates an opportunity for participants to engage in mutual learning during the process of naming and framing both new practical and theoretical knowledge about a problem.

Example 3: Co-creation workshops as a method for leveraging diverse stakeholders' voices in problem identification

Example 3 is that of a DBR project intended to contribute to a solution for the fact that an estimated 20–30% of the whole Nordic population is considered digitally excluded, despite years-long educational initiatives (Buhl et al., 2022). The co-creation method was used to name and frame a problem, by leveraging practical insights from different stakeholders, who represented both average citizens and professional practitioners in five Nordic countries. The DBR approach was used not to solve a problem related to the implementation of an educational technology, but to reframe and rename the digital skill problems that were connected to, and emerged from, the use of existing educational technology.

The research team designed a series of workshops, based on the principles and ideas of co-creation, where the main view was that a citizen user of public services is regarded as a resource, instead of one who drains resources (Agger & Tortzen, 2015). The problem-setting process was divided into four phases. Phase 1 involved deciding how to proceed with the invitation of possible workshop participants, representing different positions, uses

and experiences (citizens, public organisations, NGOs, ministries, and local governments), while attempting to avoid biased categories. Phase 2 comprised two workshops with the invited participants, who met in online groups to frame their conversation, ideation, and prioritisation of digital problems. Between and after the two workshops, minutes were sent to the participants for comments. Phase 3 comprised the researchers' thematic analysis of the practical problems emerging from the workshops in dialogue with theory. The themes identified as key problems relating to citizens' use of digital technology were: lack of meaning, institutional scepticism, and lack of collaboration (Buhl et al., 2022). Phase 4 comprised a third workshop that presented the identified problems to a new group of professional practitioners, this time including people with management responsibility, which served as the starting point for conversation, ideation and prioritisation. Again, this was followed by sending out minutes for comments. This phase advanced the researchers' analyses, and made it possible to theorise the practical problem, in order to qualify the renaming and reframing of the problem of 'how' and 'why' digital exclusion was taking place.

The co-creative problem-setting, and subsequent problem identification process, created productive contradictions and tensions that helped the researchers reveal the complexity in digital exclusion, and thereby also the complexity of endeavours to design for digital inclusion. Even though the Nordic countries, to some extent, go along on the same digital agenda, they also differ by national focus area. Similarities also occurred on an overall level, referring to intersectional relations and citizen, organisational and governmental relations, which exposed cracks between institutionalised and personal perceptions of when, how and why digital exclusion becomes a problem.

The co-creation method provided the research team with insights from stakeholders that crossed boundaries between citizens, professionals and managers. Moreover, it created the opportunity to work together, comment across positions, and draw on inter-Nordic experiences. This method provided the research team with the possibility to dig deeper into their understanding of the practical experience with using digital technology, and of the theoretical problem of digital exclusion. This example showcases the extent to which the involvement of diverse and multifaceted stakeholders can support a reflective conversation about practice in the context of lagging digital skills (Buhl et al., 2022), thus moving the problem-setting forward by pursuing the 'why' of the practical problem (Adolphsen, 2006). This method enabled the researchers to rename and reframe the digital exclusion problem to be 'situations' organised by factors in surroundings, rather than by the citizens' individual problems (Buhl et al., 2022).

Discussion of 'naming and framing' methods for problem-setting in the DBR methodology for problem identification

Amiel and Reeves, (2008), Cobb et al., (2003), Nieveen et al., (2006) and Gundersen (2021) argued that educational technology is a process, and not a tool to be implemented. Furthermore, they assert that collaboration between researchers and practitioners at an early stage of research is crucial for improving both the value of educational technology research, and its potential to direct technological development in schools. This article expands upon their arguments at the operational level, by suggesting a methodical way to frame these crucial problem-setting processes during the problem identification phase of DBR. By borrowing appropriate methods from other traditions, such as action research (the FW and dialogic space) and design (co-creation), the act of naming and framing during the problem-setting process increases a DBR project's probability of generating new theoretical insights.

These new insights may, in turn, increase the success of the next phase of solution design, in the context of implementing educational technology (Examples 1 and 2), or may reveal how educational technologies can be considered a co-organising factor of digital exclusion (Example 3). The actual constitution of a problem in DBR occurs through this collaborative knowledge construction process. Both practitioners and researchers enrich the problem-setting process, by contributing two qualitatively different modes of knowledge: practical and theoretical. We argue that bridging these forms of knowledge is enhanced by methodically framing the problem-setting process.

The three empirical examples highlight different formal and informal learning contexts that involve a variety of stakeholders in the naming and framing processes. The DBR approach emerged in the context of research in the formal K–12 education system in the US, but was challenged by the lack of appropriate research approaches to implement educational technology in schools. As Amiel and Reeves (2008) explained, this necessitated the reconceptualisation of educational technology as a process, rather than as an apparatus. However, educational technology as a process is also a condition for all learning situations outside of formal educational contexts and schooling. According to Holmberg (2014), learning practices are situated, and educational technology is ubiquitous, in both formal and informal situations. Practical experiences produced by both professionals and learners feed into the naming and framing of a problem. Thus, the DBR researcher must decide which methods are fruitful, and in what context to facilitate a shared problem-formulation process.

In suggesting these methods, we argue that an expanded method for framing problem identification may afford methodological strength to the problem identification stage of DBR. By deepening our understanding of Schön's (1983) 'setting', the focus on 'how a problem constitutes a problem' can be processed through methodical framing. We argue that this approach methodologically expands the first phase of DBR, thus deepening insights into situated experiences. Still, this expansion does not replace other research aspects of problem identification, such as desk research, theory and field studies. Often, the researcher must choose a focus due to the constraints of limited resources. This article proposes that the collaborative problem-setting process should be prioritised; however, employing the methods described above is not without challenges for researchers, and may not ensure success. Facilitating these methods effectively requires professional and ethical competence to prevent some voices dominating others, to prevent bias due to ignorance of systemic power relations, and to prevent any difficulties in the accurate interpretation of contributions from participants.

Conclusion

The impetus for this paper originated in a concern over the insufficient inclusion of practitioners' perspectives in the problem identification phase, as prescribed by prominent DBR scholars, such as Amiel and Reeves (2008), which undermines the scientific arguments that separate it from other scientific paradigms and from consultancy work.

Questions were posed about what constitutes a problem for a practitioner and for a researcher, the interaction between these groups, and how this triangulation contributes to the practice of problem-setting. The background is derived from practising a methodology that promises to enhance the problem-solving design process as it relates to integrating digital technology into educational systems and learning practices. Moreover, it offers ways to approach the problem by elaborating on more aspects of professional practices, without losing sight of the target groups' experiences and resources. The theoretical framework

draws on insights that acknowledge the complexity of the professional practitioners' level of knowledge, and that acknowledge that, since every pedagogical situation involving people is new and unrepeatable, digital educational design can never be based alone on ideas of matrices. Additionally, it was acknowledged that when a problem is experienced practically, it must be theoretically framed to be sustainably solved beyond common sense and situated needs. We suggest that attention to the problem identification phase in DBR counteracts unsustainable technology-determined solutions that become obsolete when new educational challenges emerge in digital transformation.

The three examples (the FW, dialogue spaces and Nordic co-creation) suggest methods for orchestration of problem identification that hold the potential for deepening and unfolding the problem-setting process, by which it is argued that: a scaffolding for a dynamic interplay between the practical and theoretical problems, a focus on the time and timing aspect in overcoming the asymmetry positioning, and a creation of a productive tension from diversity between stakeholders, can renew well-known approaches to problem identification. The article contributes to the framing of problem identification, and proposes more tools to be used in problem-setting.

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