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TEACHER EDUCATION & DEVELOPMENT | RESEARCH ARTICLE

Towards a typology of improvisation as a professional teaching skill: Implications for pre-service teacher education programmes

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Abstract: In this article we discuss the concept of improvisation as a professional teaching skill. Our professional context is teacher education and our discussion is aimed at developing a categorized understanding, or rather a tentative typology, of what professional improvisation in teaching and teacher education might be. Undertaking such a bold endeavour has included literature reviews and in-depth interviews with practicing physical education teachers. We argue that improvisation in teaching needs to be professionalized. We suggest that a tentative typology of professional improvisation should include sequential, dialogic and exemplary improvisation, and that a description and introduction of such a typology could be a first step towards making improvisational skills accessible to student teachers as part of their pre-service teacher education. We conclude by arguing that further research is needed within classroom teaching and teacher education contexts in order to explore how improvisational practices in teaching could enhance education, as well as student learning.

Subjects: Teacher Education & Training; Physical Education; Teachers & Teacher Education

Keywords: improvisation; teacher education; physical education; typology

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PUBLIC INTEREST STATEMENT

Many argue that improvisation is crucial in the formation of new ideas in all aspects of human experience. In this article, we discuss the concept of improvisation as a professional teaching skill in teacher education and we argue that improvisation in teaching needs to be professionalized. We suggest that a tentative typology of professional improvisation should be categorized and include sequential, dialogic and exemplary improvisation. However, such a description is only a small first step towards making improvisational skills accessible to student teachers as part of their pre-service teacher education. Further research is needed within classroom teaching and teacher education contexts in order to explore how improvisational practices in teaching could enhance education in a wider context, as well as student learning.

1. Introduction

... pupils need to be motivated, be engaged, be seen, but they also want variation and something exciting, and they are curious, and if you have something in your toolbox, you can pull out there and then; it might be enough. Then, what you improvise becomes professional, and even better than something scripted you cling to, simply because it is adapted to the situation. And things will always happen and scripts exist to be changed. (“Tom”—primary school teacher)

The practice of being able to “pull out something there and then” is often described as “improvisation”. Practices of “improvisation” are considered to be most prevalent in areas and activities like jazz and the performing arts (Barker, 2010; Berliner, 1994; Rudlin, 1994). Reflecting on what this concept means in terms of how we act, how we talk and relate to others, how we plan and how we enact what we have planned, most of us will probably agree that it is something we all do in our everyday lives. As such, we can engage in a theoretical discussion about improvisation from a colloquial and everyday point of view, as well as from a *professional* point of view, here meaning with a focus on improvisational practices in professions that enhance the activity in question.

This article is based on comprehensive literature reviews (Holdhus et al., 2016) and an instrumental case study, both of which were important parts of a larger study on *improvisation in teacher education* (IMTE), funded by the Norwegian Research Council, involving researchers with diverse curriculum backgrounds and conducted in teacher education programmes in Western Norway (IMTE, 2012–2016). The IMTE study serves as the immediate background and research context for our understanding of improvisation as a *professional* concept in *education*. In this article we focus on what improvisation might *mean* in theory and practice in the teaching profession, and hence teacher education.

Many argue that improvisation is crucial in the formation of new ideas in all aspects of human experience (Alterhaug, 2004; Eisner, 1979; Sawyer, 2004, 2006). We support the view that its scientific and professional significance is connected to its creative role in knowledge production. However, in this article, our main focus is on the significance of professional improvisation in education as a concept mirroring individual skills in communicative situations and settings, e.g. as described in the introductory vignette and in literature from different performance-related fields (e.g. Berliner, 1994; Steinsholt & Sommerro, 2006).

When researching improvisation in education, one of the challenges we as researchers continuously face are questions from teacher students and colleagues such as: What do you mean? What is it really? How can we describe it, and what will I be doing when I improvise in teaching? Are there different types of improvisation in teaching, and if so, what are they?

Inspired and encouraged by these and similar questions, the need for breaking down the concept into more concrete categories resembling a “typology” of professional improvisation in education became obvious to us. Undertaking such a bold endeavour has included literature reviews on the concept of improvisation in education, repeated discussions about and reflection on our own teaching experience, as well as in-depth interviews with practicing teachers. Our inquiry and discussion focused on the following research questions:

- (1) What could be the main constituents or categories of a typology of professional improvisation in teaching, and how could such a typology be described?
- (2) How could such a tentative typology be made accessible to student teachers as part of their pre-service teacher education?

2. Theory

2.1. *Improvisation as a professional teaching skill in educational theory*

Keith Sawyer has written significantly on the role of improvisation in *recent* educational theory (2004, 2006, 2011). He builds on the writings of other influential American educational theorists such as Eisner (1979, 1983) and Sarason (1999) who had strong connections to the performing arts. Although building on their comparisons of teachers and artistic performers, Sawyer also offers a constructive critique of this tradition, arguing that these writers to some extent marginalized the importance of “structure” and the domain specificities in educational practices. Sawyer (2011) therefore introduces the term “disciplined improvisation” as a key concept for education and creative teaching, and argues that what is needed in education is a shift in focus from *scripted* instruction and learning to the teacher’s skilful improvisation.

... skilful improvisation always resides at the tension between structure and freedom.

Of course, expert teachers have deep intuition and are talented performers, but their performance is rooted in structures and skills. The improvisation metaphor emphasizes that teachers and students together are collectively generating the classroom performance. (Sawyer, 2011, p. 5)

Disciplined improvisation as a generic teaching skill can, according to Sawyer, be described as a *learnable* skill for responding to, inventing and controlling sequences of expressions and situations in educational contexts. In their article “Teaching for creativity with disciplined improvisation”, Beghetto and Kaufman (2011) develop Sawyer’s concept of *disciplined improvisation* further and argue that this “involves reworking the curriculum-as-planned in relation to unanticipated ideas conceived, shaped, and transformed under the special conditions of the curriculum-as-lived, thereby adding unique or fluid features to the learning of academic subject matter” (p. 96). As such, improvisation gives the improviser the freedom to choose adequate responses and to use and orchestrate their own repertoire in an informed and balanced way. In education, as in other life situations, the development of a teacher’s *repertoire* is a key to the professional use of this skill (Boss, 2001; Feiman-Nemser, 2001), be it in dynamic dialogues with students, in choosing teaching examples, in the midst of dynamic teaching activities or in reflective discussions with peers.

An early tradition in educational theory stems from the German philosopher Herbart who introduced the concept “pedagogical tact” in 1802 (van Manen, 1991a). This concept has been elaborated upon by a number of writers (Birmingham, 2004; Gadamer, 1975; Vagle, 2011) but most significantly by Max van Manen (1986, 1991a, 1991b, 2008) and Stake (1995). van Manen uses the notions of “pedagogical thoughtfulness”, “pedagogical sensitivity” and “pedagogical tact” to describe the improvisational pedagogical-didactical skill of “instantly knowing, from moment to moment, how to deal with students in interactive teaching-learning situations” (van Manen, 1995, p. 41). In his discussion of “pedagogical tact” van Manen refers to other important educational writers and concepts such as John Dewey’s description of the nature and process of “reflection” (Dewey, 1910/1991) and Donald Schön’s influential concepts of reflection on and in action (Schön, 1983, 1987). Dewey, with his emphasis on “the situation”, educational “sequencing”, the importance of giving students “an experience” and the holistic nature of learning, described educational reflection as an *immediate* process (Dewey, 1916/1944, 1934; Dewey & Small, 1897).

The work of Herbart, Dewey, Schön and van Manen provide an early theoretical basis for our understanding of the concept of professional improvisation in teaching. They all refer to the immediate and spontaneous reflection of the situational moments, dialogues and responses, leading to professional educational actions *there and then* as the essence of professional teaching. Similar conclusions can be drawn when reading more recent writers specifically focused on general education, e.g. Black and Wiliam’s (2009) concept of “moments of contingency” in assessment theory and Gert Biesta’s (2004, 2006, 2011) contributions in educational philosophy, relational pedagogy and education as performative communication. Therefore, we agree with Dezutter (2011) who argues that

teaching is “inherently improvisational” and that improvisation therefore should be an important focus in every teacher education programme.

The IMTE project review study on professional improvisation by Holdhus et al. (2016) indicates that improvisation as a teaching skill *can* be meaningfully described and discussed with reference to arts-inspired literature in the field of education (Eisner, 1983; Greene, 1995; Rubin, 1985; Sarason, 1999). However, their review findings also suggest that useful insights could be gained from an investigation of the wider use of improvisation as a theoretical and practical working concept in other academic traditions; rhetoric theory, theories and practice in drama and theatre, organizational theory and both theory and practice in music, notably connected to the genre of jazz (e.g. Berliner, 1994; Dehlin, 2008; Holcomb, 2001; Steinsholt & Sommerro, 2006; Toivanen, Komulainen, & Ruismäki, 2011). Within these traditions, Holdhus et al. (2016) found four *common* characteristics for the use of improvisation: (1) professional improvisation involves communication and dialogue in all domains and practices; (2) structure and design are important in professional improvisational practices; (3) professional improvisation relies on learnable repertoires and the spontaneous use of ideas and examples these repertoires; and (4) professional improvisational practices are to a great extent context dependent and domain specific. These review findings made it clear to us that *professional* improvisation contains a number of common characteristics across widely different fields.

2.2. A tentative typology of professional improvisation in education

Our study of literature indicates that the concept of professional improvisation is present in academic theory in many different ways, in several disciplines and in varied knowledge areas on many levels. Reviews suggest that there is quite a large degree of overlap in a broad range of scholarly work on improvisation. As such, the concept of professional improvisation should lend itself quite easily to implementation and actual usage in different fields. The question remained, however, to what extent the review findings could build a platform for different categories of professional improvisation and whether or not such categorization could lead us to a tentative typology of professional improvisation in teaching and teacher education that could be meaningful to practicing teachers. Based on our review findings and our discussions in the early phase of the IMTE (2012–2016) project, we introduce below three aspects of improvisation that seem particularly relevant as a basis for a tentative categorization of professional improvisation in teaching: dialogue, sequences and the use of examples.

2.2.1. Professional improvisation as responsive dialogue

Holdhus et al. (2016) found that a number of writers from antiquity to modern times have used concepts, viewpoints and descriptions that seem to be close to our immediate conceptions of what characterizes professional improvisation as a teaching skill. Central to many writers seems to be a focus on the *direct and immediate* connections between the person who teaches and the person being taught. Quintilian and Aristotle suggested that the building of immediate and friendly *relations* with students, as well as the use of dialogues in the construction of knowledge and understanding, need to occupy a central position in any teacher’s educational undertaking (Haas, 2015; Quintilianus & Russell, 2001). Herbart describes pedagogical *tact* as a special quality in *human interaction*, which is usually practiced “in the spur of the moment where one is required to act in an instant or immediate fashion” (van Manen, 1991b, p. 131). Several other authors have discussed the importance of concepts and foci for education such as immediate interaction (Dewey, 1934), relational education (Sidorkin, 1999) and student–teacher relationships through dialogue (Renshaw, 2004), reflection in action (Schön, 1983), moments of contingency (Black & Wiliam, 2009) and performative communication (Biesta, 2004, 2006). Biesta underlines that communication is a crucial aspect of education, but only if communication is regarded as a performative practice concerned with transformation, and not only transmission. This aligns with our review findings suggesting that in all domains and practices, professional improvisation involves *communication and dialogue*. Therefore, it seemed clear to us that communication and dialogue must be included as one of the categories of a typology of professional improvisation. We chose to label this category *dialogic*

improvisation, referring to the use of professional improvisation in a teacher's spontaneous learning-oriented dialogues with students.

2.2.2. *Professional improvisation in the use of sequences in teaching*

As teacher educators with specialities in curriculum subjects, we are used to dealing with different methods in teaching school subjects and different aspects of pedagogic content knowledge (Shulman, 1986). Teachers are used to methods, educational recipes, and scripted educational procedures evolving in time, whether as part of the structure and construction of a single unit of teaching (e.g. a school hour) or for larger or smaller educational units. What comes first, what comes next and what concludes the unit matters. Therefore, any educational undertaking is *sequential* by nature. There is a certain framework, and the actions within this framework unfold over time in sequences. These are the formal and design dimensions of teaching units or programmes, often reflected in theory and teacher guidelines as educational or instructional *design* (Bird, Morgan, & O'Reilly, 2007; Gagne, Briggs, & Wager, 1974).

We suggested therefore that a second category in our typology of professional improvisation in teaching could be *sequential improvisation, or improvisation in the use of sequences in teaching*. In our view, this category would draw the attention of teachers, and student teachers, towards their professional ability to *change* sequences while implementing their planning based on what takes place there and then, e.g. new ideas raised by pupils or the emergence of potential situations to support specific learning outcomes.

2.2.3. *Exemplary improvisation: Improvisation in the choice of examples and forms of activation*

One of the most convincing ideas behind professional improvisation in teaching appears to us to be the strengthening of teachers' professional confidence and the necessity of building rich repertoires for teaching. We believe that teachers' repertoires *can be* associated with superficial scripts and recipes, but repertoires can also be an important and constructive element of vertical knowledge structures being used professionally and improvisatory in order to create a framework for maximum and deep learning (Bernstein, 2000). The use of examples or demonstrations for learning has been central to education since antiquity (Holdhus et al., 2016). When discussing the use of examples in teaching, an important and necessary conditional understanding is its domain specificity. Examples are as close as one can get to the "contents" of a subject, and all examples refer to something, some kind of particularity, which can lead to more general conclusions but which are meaningless if not contextualized. In schooling, therefore, examples will often be different in nature from subject to subject; some will be more theoretical, e.g. in social science or mathematics, and others will be more practical, e.g. in arts and crafts, music or physical education. In the latter cases, it seems to be meaningful to talk about "forms of activation" rather than "examples", e.g. demonstrations of how to work creatively in clay or how to perform a certain movement in physical education.

Consequently, we have labelled the third category of our typology of professional improvisation *exemplary improvisation, meaning professional improvisation in selecting examples and forms of activation*. This category represents an attempt to describe how teachers can make situational and learning-oriented immediate decisions about the use of examples and forms of activation based on their knowledge and professional repertoire.

3. Method

This study on improvisation in education is theoretical and conceptual as well as empirical. Our theory and literature studies were designed to give us a map of the terrain of improvisation in education rather than a comprehensive interpretation of different educational theories and curriculum methods regarding improvisational elements (Montuori, 2005, p. 376). We soon engaged in closer investigations of established educational theories in which we hoped to find descriptions of educational processes close to our initial understanding of professional improvisation in teaching. However, the need to base our thinking in a context wider than our own experience and review studies soon

became evident. Yin (2003) argues that one rationale for using a single case study design is to test a well-formulated theory with a clear set of propositions. A single case study, he writes, “can then be used to determine whether a theory’s propositions are correct or whether some alternative set of explanations might be more relevant” (Yin, 2003, p. 38).

Believing that improvisational skills are important in all kinds of teaching, and are context as well as domain specific, we chose to discuss our initial typology with novice practicing teachers. We wanted to know if and to what extent they had been trained in or been made aware of improvisational teaching skills in their pre-service programmes (Kvale & Brinkmann, 2009; Stake, 1995). We chose to conduct an instrumental case study by conducting in-depth interviews with four teachers selected through purposive sampling (Stake, 1995).

An instrumental case study is defined by Yin as “an empirical inquiry that investigates a contemporary phenomenon within its real life context” (Yin, 2003, pp. 13–14). An instrumental case is just one type of case study (Baxter & Jack, 2008; Stake, 1995), which can be used as follows:

... one case to gain insights into a particular phenomenon, where there is also an explicit expectation that learning can be used to generalize or to develop theory. In this case, there is likely to be a question or a set of predetermined criteria or a theory, which is being explored and tested through the case study. (Greenaway, 2014)

We used semi-structured in-depth interviews to gain insight into to what novice teachers think about professional improvisation as a concept in teaching with empirical reference to their daily teaching in physical education and their pre-service teacher education programmes. In this way, we wanted to explore and test our conceptual thinking in the shape of a typology of professional improvisation in teaching that emerged from our literature review (Stake, 1995) and also discuss implications for teacher education.

When discussing whom to interview, we soon came to the conclusion that we should use purposive sampling of informants selected according to certain criteria (Kvale & Brinkmann, 2009; Stake, 1995). Our teachers needed to remember their pre-service teacher education well. We needed to know what their pre-service programme, or at least what their curriculum subject specialism, consisted of, and our participants needed to have some experience teaching in schools. Given our research interest and background in physical education, we concluded that previous student teachers, now working as teachers, who specialized in physical education as part of their primary or secondary teacher education programmes, would be good candidates for our sampling criteria. We considered all graduated physical education students from the last two years with one or two years of teacher practice in primary (age 6–13) or secondary schools (age 13–16). We found few informants satisfying our selection criteria, but ended up with four interviewees, two of them working in primary and two in secondary schools.

Before the interviews were conducted, the teachers received an interview guide and a description of the intention of the thematic content of the interview. The interviews revolved around the following three core questions: When do you improvise in your teaching? To what extent do you find our typology of professional improvisation meaningful for what goes on in your own teaching? Did you get any training in improvisation in physical education in your pre-service teacher education programme? All interviews were conducted by one researcher over four weeks in the spring of 2014 and were recorded in Norwegian, transcribed and translated into English. Additionally, field notes and a research log were used during interview collection.

The transcribed interviews were sent to the teachers so that they could provide comments, additions or deletions. Transcripts were analysed using thematic analysis as a categorizing strategy, where data were interpreted within the context of the particular background of each informant (Maxwell & Miller, 2008). Three researchers read and discussed the interviews, the field notes and

the research log. One of the researchers had no previous knowledge about the interviewees nor the contents of their pre-service physical education curriculum.

Before conducting the interviews, we recognized that our position as the informants' previous pre-service education teachers could influence their answers significantly. However, given our search for informants with whom we could meaningfully discuss issues that both parties had considerable knowledge about—pertaining to both pre-service education and practical teaching experience—we tried to balance bias when analysing the data by adopting a critical stance to their responses. A recurrent issue in our discussion was connected to our interpretation of the data with regard to its exemplification of different aspects of improvisational practices in teaching. The discussion also shed light on what parts of our pre-service programme which could be seen or not seen as rehearsal or preparation in improvisational practices.

4. Findings from interviews

Below, we describe our findings narratively in order to contextualize each informant's general views on several aspects of using professional improvisation in their teaching as well as their specific responses to our interview questions.

4.1. Teachers' views on professional improvisation as a teaching skill

4.1.1. Teacher 1: "Tom"

Tom finished his teacher education two years ago with a 60 credits (a full year of study) specialization in physical education. He is a classroom teacher at a local primary school, but he also teaches physical education (PE) to grades 2, 5 and 7. He thinks his specialization is very relevant for what he is doing in the classroom, especially in providing what he calls a "good toolbox", which includes activities, exercises and ideas he adapts to his current teaching. However, he also mentions that he uses this toolbox as a basis for constructing new activities. When asked about the relevance of professional improvisation in teaching, he is eager to reveal that this is important in his work:

One never knows what will happen in a school ... for example, when someone is being hurt ... then you cannot rely on your script ... you have to find something else from your toolbox ... you have to improvise.

Tom relates his improvisational practice to his PE toolbox. When presented with our model with categories of different types of professional improvisation, he immediately refers to *sequential improvisation* as the most important for him in his current job. He also recognizes dialogical improvisation, understood as his dialogic response to input from his pupils, e.g. about the rules of an activity or game:

... then you have to improvise somehow, in such a way that the students feel more at home in the activity, maybe change the rules a little bit, or maybe answer by referring to their experience in other contexts ... solve things they feel uncertain about, this is important in dialogic improvisation.

Tom no longer plans his teaching in the way he did when he was a student teacher. However, he recognizes the value of learning how to plan in detail and thoroughly, which gives "... a better foundation for professional improvisation in a good way". Tom is very clear about the importance of his appropriation of professional improvisation: "... a good teacher is good at improvising, no doubt! Unexpected things happen all the time, and plans and scripts are there to be changed!" He also underlines that improvisation must be rooted in the pedagogical content knowledge of the curriculum subject and the corresponding educational toolbox.

4.1.2. Teacher 2: “Lisa”

Lisa finished her pre-service programme in 2013. She is a new classroom teacher of the 4th grade. The fact that she is in charge of a “class” means that she teaches less PE than she would as a specialist teacher. She immediately recognizes our suggested typology and exclaims that she is improvising “all the time”, sequentially and dialogically, as well as with examples. With regard to sequential improvisation, she continually reflects on how many activities to plan and what come first, second, etc.:

... when changing the sequence of activities, I often find I have planned far too many things ... and then I have to decide whether to follow my initial planning or move activities ... so changing the sequence of activities is something I do often

She gets both useful and “useless” (to use her own word) suggestions from her pupils about what to do and then needs to engage in dialogue with them:

... after all, they know what PE is, and they know what works well so I listen to them quite often to get good ideas, and, if I listen to them, teaching often proceeds more smoothly

Lisa does not plan her dialogic activities, but is prepared to respond when these occur. She underlines that there needs to be a good balance. If there is too much dialogue, then the goals of the teaching and learning might diverge. Also, when it comes to the use of examples, she refers to a balance between what is prepared and intended as a script and what must be improvised there and then:

... of course there are things I have planned to demonstrate, but often I believe that they will understand, and then they don’t, and then you have to demonstrate in a new way...

Lisa recognizes how relevant professional improvisation is for teaching in her classroom: “... if you can’t improvise you will end up feeling quite helpless ...”.

4.1.3. Teacher 3: “Nina”

Nina is also a new teacher who teaches PE, as well as electives in health and physical activity, in a lower secondary school. She underlines that her pre-service PE programme courses in didactics and curriculum planning have been very useful in her professional practice as a teacher. These courses gave her a repertoire and tools for planning, which have made it possible to make longitudinal plans for teaching and lessons over the three years of lower secondary education. In response to our questions on the use of improvisation, she immediately recognizes exemplary improvisation in her teaching because pupils sometimes have very sensible suggestions, and she was taught to have an open and inclusive attitude to pupil initiatives. She also allows pupils who excel in different activities to share and demonstrate their skills to their peers as examples to imitate. She sometimes adds or leaves out activities there and then, especially when making decisions about what exercises pupils will or will not be able to do. She underlines the importance of good planning and a good repertoire:

... you think you are there for them to learn, that they can do it ... and that they understand the methodological aspect of exercising, and that it is not only because I want them to. They have to learn little by little ... if I understand and know why, then I feel safe to improvise in order to vary your way of teaching them, right

She refers to language teaching (Norwegian), in which she has had less teaching experience:

... and when teaching here I am a little shocked because there is such a great difference between teaching a subject I feel safe in and in something you don’t know that well. And here I can’t improvise, I don’t have the big picture, and I can be stressed and feeling helpless because I don’t have the necessary repertoire ...

4.1.4. Teacher 4: “Maria”

Maria started her pre-service programme with a full year of educational theory before studying PE and two other subjects. She is in her second year as a professional teacher and teaches PE across primary and lower secondary grades. She also underlines the importance of knowing how to plan her lessons: “... to plan fully, using a schema and similar things, it’s in my blood so to speak—the intention of it all—even if I don’t write it down ...”. She also recognizes the necessity and usefulness of improvisation but connects it to good planning:

... improvisation happens every day simply because things happen. You can never follow a script fully. That happens very seldom. You make good plans, and then you change it when met with illness, timetable changes, equipment that does not work. There is always something

Maria uses what we have labelled sequential improvisation in her teaching, but still states:

... to sit down in advance and plan what you want to do and your schedule, this I have to improvise on as things develop because pupils are so different. For me, everything seldom goes as planned. You can’t plan your lesson minute by minute as we did during pre-service, but it is still possible to plan approximately.

She uses dialogues with pupils when planning the lessons:

... they can express and argue what they want to do, but I am the one who decides what we have to get through ...

Maria uses exemplary improvisation more than the other three informants. She explains:

I use video, I show and demonstrate, and I use other pupils to show exercises. I even invite a pupil over from a different class sometimes. I think they like it and that they learn from it, and then a younger pupil might learn better from an older peer. Teachers are not experts on everything.

In summary, all informants think professional improvisation is important in the teaching profession, and they all do it every day. They recognize the three different categories, sequential, dialogic and exemplary improvisation, in our suggested typology model as meaningful descriptions with regard to their own teaching, but the typology is not exhaustive. There is more to be included, especially with regard to what needs to be in place for *quality* professional improvisation to take place. The informants particularly underline the need to feel safe and comfortable, the importance of knowledge about planning and the need for control over and sufficient practice in the repertoire of the specific pedagogical content knowledge (Shulman, 1986). According to our teacher informants, there is no contradiction between the use of scripts and professional improvisation when teaching in primary and secondary school classrooms. What is planned must often change because the unexpected always happens.

Even if our teacher informants confirms that improvisational practices is an important part of teacher practices (Dezutter, 2011), and that our suggested typology model describes different forms of improvisation in physical education teaching, they also underline the importance of planning, structure and scripting. Their narratives strengthen Sawyer’s (2011) views of improvisational practices as being disciplined and context and domain specific. They also agree that teaching is a risky endeavour (Knight et al., 2015) and that the unanticipated is bound to occur in lived teaching practices (Beghetto & Kaufman, 2011).

4.2. Teachers' perceptions of professional improvisation in their own pre-service programme

None of the informants could remember being trained in improvisation in their pre-service programme. It did not exist as a conscious theoretical, practical and described element. However, in hindsight, they all remember having to improvise in practicum situations where they met “real” pupils in authentic settings. This was very different from the workshops on campus where peer students played the role of pupils. Lisa states:

They were exemplary peer students doing exactly as told ... and then there was a completely different reality when you start as a professional teacher. Then, equipment is moved, and the pupils might run around and not listen

Tom agrees: “... what we did was very planned and scripted, so in our sessions, there was no room for improvisation”. Nina has a modified view, pointing out that she was given the basics of planning but also to be prepared for the unexpected:

“... feeling safe is basic, so for every lesson you pick up the equipment need, you know how to start a lesson, and you need to be prepared for the unexpected ... and even use pupils to demonstrate exercises.

In hindsight, our informants seem very aware that they used improvisation quite extensively in pre-service situations where they were given full responsibility as a teacher. Lisa recalls:

If you, for example, had responsibility for a full week or a whole day and not only a lesson in PE then you had to improvise. You could only rely on yourself. This was when I really learned what it meant to be a teacher.

Nina states, “Yes! Gosh! There was a lot of improvisation then ... we had planned the activities, but when the pupils arrived”

Our informants differ in their opinions when asked if they ever observed their pre-service instructors using improvisation when teaching PE. Two of the teachers could not remember having observed this. Tom states, “... well, I think our teachers presented us with well-structured lessons. I don't think I saw anyone improvise”. Maria agrees: “... there was always a plan”. Lisa doubts this, saying to us (her pre-service instructors), “... maybe you did not think about it, but I bet you did it. Maybe you invented a story or something there ...”. Nina believes that the pre-service teachers improvised “... all the time. If we had questions, for example, you stopped to discuss and change what was going on”.

These findings confirm our belief that improvisation exists as tacit knowledge, even in pre-service programmes. Former students were not aware of learning it but believe that it was an element, even though it was not explicitly discussed or experienced as part of the curriculum other than through general educational recommendations such as paying attention to responses from pupils and including them in what was going on.

4.3. Teacher views on the implementation of professional improvisation in pre-service programmes

Our informants do not voice many ideas about how to foster knowledge and skills in professional improvisation in pre-service teacher education programmes. Tom takes a structural view on the question of what can be done in pre-service programmes to develop professional improvisation. He believes that the inclusion of many subjects being studied at the same time in the newly reformed Norwegian pre-service programme makes it very difficult to build a rich enough repertoire to allow for professional improvisation:

... I strongly believe that to study one subject for a whole year gives a rich toolbox; it gives safety, it gives in-depth knowledge and competence, and it creates a space for professional improvisation in my teaching.

Lisa asserts that because the pre-service programme has access to "... a rich collection of equipment", it is ideal for pre-service teacher students to plan for the unexpected and rehearse professional improvisation. For example, "instructors could remove balls and ask the students how they would deal with this challenge when confronted with a full group of 30 pupils and not just 15 ...". However, Lisa is very uncertain as to whether it is possible to teach improvisation in pre-service programmes: "... to learn to improvise in pre-service? I really don't know ... But to be a creative person, being born with it, I think can be an advantage, but that can't be easy to learn ...". Even so, she suggests ways of rehearsing improvisation:

Maybe someone could argue or create a crisis, and the student teacher has to sort it out, or someone could fake a serious injury and you could see how could it be dealt with when the pupils have to be on their own, and how would you solve this.

In summary, our informants voiced limited ideas for implementing professional improvisation practice in pre-service programmes, even though they think it is important and that they need to do in their work as teachers. However, they underline that the best opportunity to practice improvisation in their pre-service programme was when they worked in authentic settings with pupils, preferably with full responsibility for what was going on in the class.

5. Discussion

Our preliminary empirical findings suggest that the concept of "professional improvisation" and improvisational practices in teaching physical education are legitimate and much needed elements in teaching. Even if our novice teacher informants had never reflected on "improvisation" as a teaching skill, they immediately recognized their own practices in our typology of professional improvisation. In many ways this is a surprising finding given that our teachers had never reflected on improvisation in their work and had not been given any form of pre-service education in improvisation theory or practice. Even after just one or two years in their current work, they are able to recognize the importance of improvisational practice as a necessary teaching skill.

Sawyer (2011) points out that experienced teachers seem to be more improvisatory in their daily work than novice teachers. His observation suggests that professional improvisation as a teaching skill grows with experience after pre-service education through exposure to the everyday challenges of the classroom. Sawyer's observation made us ask to what extent professional improvisation in teaching is a form of *tacit* professional knowledge (Polanyi, 1958/1998, 1966/2009; Sternberg & Horvath, 1999). In an article published in the *Journal of Teacher Education*, Knight et al. (2015) describe current trends in research on practice-based teacher education, pointing out that "novices must learn to deal with uncertainty as teaching in this manner is partially improvisational" (p. 106).

This suggests that teacher education still has a way to go with regard to implementing professional improvisation in pre-service programmes, both theoretically and in practice. Even if we are pleased with the fact that our small empirical and instrumental case study seems to support our theoretical thinking in terms of specific categories of professional improvisation—sequential, dialogic and exemplary—the need to discuss what measures and recommendations to give to teacher educators remains. At this stage, it seems that the following educational issues must be addressed in further research:

- Developing consciousness about what is professional improvisation and what is not.
- Developing awareness and knowledge about different types of professional improvisation.
- Developing rich and specific repertoires in pedagogical content knowledge in different curriculum subjects, as well as in classroom management.

- Offering special contexts with rich potential for enacting professional improvisation in a safe environment.
- Preparing teacher students for the unexpected.
- Assessing lessons for alternative solutions and potential for professional improvisation (curriculum as planned versus curriculum as lived).

We do not claim to have full solutions for solving these research and educational challenges. However, we are convinced that a greater focus on professional IMTE, both as a theoretical concept and as research-oriented enactments of pre-service practices, will contribute to the enhanced quality of pedagogic and curricular classroom teacher practices. One major first step might be to introduce a research-based description in the form of a tentative typology of professional improvisation in education and adapt it to the present descriptive curriculum framework in our teacher education programmes.

6. Concluding remarks

The prime empirical field of our study and discussion is teaching and pre-service teacher education. For our pre-service physical education curriculum, our findings would mean that students would be introduced to a typology of professional improvisation, both theoretically and in different forms of curriculum practices. PE courses need to include more practicum situations where students teach on their own. When evaluating their own teaching practices with peer students or pupils, student teachers will have to reflect on their use of dialogic, sequential and exemplary improvisation and whether or not they had planned for it. They should also reflect on why they have or have not used professional improvisation and what the effects could be in terms of learning outcomes for pupils. Teacher trainers need to be more conscious of when they themselves improvise in teaching and talk about this with student teachers, for example, by asking themselves the following: Why did I improvise, what kind of improvisation was it and how did it affect the teaching situation? Through the introduction of different simulated pedagogical situations, student teachers can rehearse professional improvisation in a safe environment and afterwards receive constructive feedback in order to build a repertoire for responding to the unexpected. The need for developing such a repertoire, where professional improvisation is part of an educational toolbox, is very clearly reflected in our interviews with practicing teachers.

... pupils need to be motivated, be engaged, be seen, but they also want variation and something exciting, and they are curious, and if you have something in your toolbox you can pull out there and then, it might be enough. Then, what you improvise becomes professional, and even better than something scripted you cling to simply because it is adapted to the situation. And things will always happen, and scripts exist to be changed. (Teacher 1: "Tom")

This research-based tentative suggestion for a typology of what professional improvisation in teaching might be, could be a constructive contribution towards researching to what extent practices can be changed and improved in our pre-service programmes. Even if our theoretical thinking seems to be supported by practicing teachers referring to their PE teaching, we are well aware that in the complicated web that constitutes teaching and teacher education, a tentative typology of professional improvisation is only a small first step towards understanding what professional improvisation in teaching is, how it can be prepared for in teacher education and how it can be enacted in high-quality ways. More research is needed with regard to how professional improvisation can enhance quality teaching and student learning in different domains and contexts (Biesta, 2015; Cochran-Smith et al., 2015); this is a topic not discussed in this article but one that must be dealt with continuously and extensively.

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