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## TEACHER EDUCATION & DEVELOPMENT | RESEARCH ARTICLE

# Towards a professionalization of pedagogical improvisation in teacher education

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**Abstract:** The aim of this study is to provide theoretical and practical knowledge about strategies and techniques for training primary school education pre-service teachers (PSTs) for Pedagogical Improvisation (PI). Data was collected during two iterations of cross-disciplinary art/science school interventions in Norwegian 3rd-grade classes, which provided a framework for a process based on Educational Design Research theory. Data included interviews with PSTs ( $n = 11$ ), and their reflection notes, following their participation as practicum educators in the interventions as well as in separate PI rehearsal sessions in a controlled classroom environment. PSTs' experiences and perceptions were coded and analysed, leading to the development of a theoretical model on which future trainings for classroom improvisation may be based. Implications for improvisation as an integral part of teacher education, its professionalization, and areas for further research are described as conclusions.

**Subjects:** Education; Music in Primary Education; Primary/Elementary Education

**Keywords:** improvisation; jazz; teacher education

### 1. Introduction

As part of their practicum training in a 3rd-grade class, two pre-service teachers (PSTs) are readying themselves to teach a science lesson during which a discussion of the concept “temperature” will take place. The PSTs know the lesson’s content, but nothing more. The specific plan and, consequently, much of how they will interact with pupils, will only be made known to them during the actual lesson. They are Rehearsing Pedagogical Improvisation (RPI) in the classroom.

### ABOUT THE AUTHOR

Oded Ben-Horin is Associate Professor of Music at Stord/Haugesund University College, Norway. He leads the European Commission’s project “Implementing Creative Strategies into Science Teaching (CREAT-IT)” which proposed and implemented interdisciplinary art and science interventions and teacher training in 6 countries. He is the coordinator of the “Global Science Opera” initiative. He is a composer/vocalist in the European Economic Area project “Write a Science Opera (WASO)”. His focus of musical activity is the meeting points of inquiry within science and art. He teaches vocal improvisation, ear training, and music theory at the University of Bergen. Oded is a PhD candidate within the “Improvisation in Teacher Education” project.

### PUBLIC INTEREST STATEMENT

The aim of this study is to provide a framework aimed at training future teachers as improvisers in the classroom. Data was collected during pre-service teachers’ training (practicum) periods in Norwegian 3rd-grade classes. Data included interviews with 11 pre-service teachers, and their written notes about their training periods which included improvisational elements. Their experiences and perceptions were analysed, leading to the development of a theoretical model on which future trainings for classroom improvisation may be based. Implications for improvisation’s future potential as an integrated phenomenon in teacher training, and areas for further research, are described as conclusions.

Pedagogical improvisation (Donmoyer, 1983) exists at the crossroads of an educator's teaching methods, content knowledge, and didactical approach. Its character is defined by several factors, such as his communication skills (Donmoyer, 1983, p. 40), emotions (Berliner, 1994, p. 255) and timing (Berliner, 1994, pp. 245–246). Teaching has been recognized as inherently improvisational (Dezutter, 2011, p. 27). Yet a potential *professionalization* of Pedagogical Improvisation (PI) would require methods of training educators to identify, experience, and, finally, consciously employ it (Dezutter, 2011, pp. 28–30). Though drama and jazz music educators command a large repertory aimed at training improvisation in those fields and evaluating its quality, there is no existing body of knowledge dedicated to training improvisation in general teacher education. This study offers a step in that direction by providing an empirically validated theoretical framework aimed at furthering teacher training institutions' understanding of how to prepare for, structure and evaluate PI. As such, it set out to understand the needs, perceptions, and potentially enhanced capacities of PSTs who actively trained PI in the classroom. The study's methodological approach draws inspiration from existing pedagogical practices in the field of jazz music (Berliner, 1994; Levine, 1995) as models for improvisational practices in the classroom: PSTs trained improvisation in three contexts designed to correspond to procedures which the developing jazz musician undergoes during her training. These included preparatory sessions (basic drama and music improvisation exercises and a theoretical discussion of improvisation); Rehearsing Pedagogical Improvisation sessions (PSTs rehearsed improvisation in a controlled environment with pupils); Authentic Pedagogical Improvisation sessions (PSTs took the responsibility of educators in a complex, interdisciplinary educational environment). The interventions were conducted during two iterations of the interdisciplinary art/science "Write a Science Opera (WASO)" intervention, implemented with Norwegian 3rd graders.

Following the introduction of the research question, this article first provides a theoretical framework and a description of the study's methodology based on Educational Design Research (McKenney & Reeves, 2012). Emerging themes are then described, followed by a discussion. Finally, conclusions describe future-related research possibilities.

The research question:

In what ways can knowledge gained through improvised teaching experiences impact educational settings with regard to PSTs' levels of risk-taking, interaction and self-regulation during teaching?

- Analysis & Exploration: How do PSTs perceive improvisation within the framework of their teaching?
- Design & Construction: Which improvisational practices are currently in use by PSTs? What are their needs in order to realize improvisation's potential in the classroom?
- Evaluation & Reflection: How and why are PSTs' risk-taking, interaction and self-regulation in teaching contexts supported by systematic rehearsing and implementing of improvisational skills; which tools are needed to support that type of practice?

## 2. Theoretical framework

The roots of the word "improvisation" lie in the Latin language. The word "improvisas" refers to something which cannot be foreseen in advance (Montuori, 2003). A dictionary definition refers to "the act of improvising", or "Something that is improvised, in particular a piece of music, drama, etc. created spontaneously or without preparation" (Oxford Dictionaries, 2016). A look at various industries' definitions of improvisation has been provided by Moorman and Miner (1998) and Pina e Cunha, Vieira da Cunha, and Kamoche (1999), and summarized by Leone (2010). Table 1 introduces these, and others, regrouped according to common themes:

Though far from a complete list, these definitions exemplify the large variety of perspectives on improvisation. In addition, the idea of *planning* for improvisation has been advocated in fields such

**Table 1. Common themes of improvisation’s definition**

Theme	Definition	Industry
Simultaneous planning/design and action	“Improvisation occurs when the design and execution of novel activities converge” (Baker, Miner, & Eesley, 2003)	Entrepreneurship
	“Composition converging with execution” (Moorman & Miner, 1998)	Organizational memory and innovation
	“Thinking and doing unfold simultaneously” (Weick, 1996)	Firefighting
	“The art of spontaneously creating music while playing or singing” (Toiviainen, 1995)	Neural network theory applied to music
No (or minimal) planning/unforeseeable	“Fabricating and inventing novel responses without a prescribed plan and without certainty of outcomes” (Barrett, 1998)	Management
	“To substitute ... staid and preconceived notions for the unforeseen, the improvised, the unknown, the world of imponderables” (Knapp, 1989)	Theatre
	“Imagination guiding action in an unplanned way, allowing for multitude of split second adjustments” (Chase, 1988)	Music
Creation and creativity	“Immediate and spontaneous ... process of creation” (Sharron, 1983)	Sociology
	“Play within and with structural constraints minimally defined to provide a range of creative interpretation” (Ross, 2011)	Sports

as crisis management (Webb & Chevreau, 2006) and music (Wiklund & Erik Lundström, 2012). For the purpose of the current study, the following definition is provided by the author: “Improvisation is an activity which includes both pre-planned and spontaneous action, and thus a risk factor in dialogue with a pre-defined structure”. This definition limits the unknown to only part of the improviser’s activity, enabling improvisation, while regulating how much improvisation is being planned for.

### 2.1. Pedagogical improvisation

The amount of scholarly work about training PSTs for pedagogical improvisation (PI) by means of rehearsed improvisation with pupils is limited. No available framework lent itself in its entirety to this study, which therefore leans upon existing theoretical perspectives of improvisation and the improvising educator. Donmoyer’s discussion of PI based on an arts-education framework (1983) provided a starting point.

PI refers to *simultaneous decision and action within a pedagogical setting*. It can be applied to one or more of several factors such as learned content, choice of teaching method, the examples invoked, and body language. PI may or may not be intentional, and may or may not be recognized, or valued, by the educator. Temporally, it may take place on the micro-level (within a single lesson) or macro-level (improvising the daily or weekly teaching schedule by changing the order of the lessons themselves). Full or partial departure from a pre-planned teaching sequence will, in both cases, however, introduce a component of uncertainty and risk into the pedagogical setting due largely to the lack of available planning time when simultaneous decision and action occur. Full or partial departure from a pre-planned teaching sequence will, however, introduce a component of uncertainty and risk into the pedagogical setting due largely to the lack of available planning time when simultaneous decision and action occur.

Improvisation as a generic phenomenon in teaching has been described as inherently risky (Biesta, 2014, 2015; Dezutter, 2011). One way of understanding this would be to consider the common impulses of improvisation and creativity (Dezutter, 2011; Sawyer, 2011), and the consequences thereof: Biesta approaches creativity from the angle of *creation* (Biesta, 2014, p. 11, italics added). This approach, he explains, leads to the question of whether education should be thought of in terms of creation in the strong sense, “as the *production* of something” (ibid, p. 11), or in terms of something weak, in which risk is taken through the act of relinquishing full control over the educational process and its results. In the latter, the educator calls into being something which exists in potential before it was produced, making weakness a desirable trait. Furthermore, education is risky inasmuch as it is an encounter between subjects who may not be easily “fixed” by attempting to eliminate risk from the educational system (ibid, p. 2), as these subjects will, in the future, need to make their own way in the world. Education thus “*necessarily* needs to have an orientation toward the freedom and independence of those being educated” (ibid, p. 2, italics in original). This creates a need for a space in which subjectivity may be allowed to emerge (ibid, p. 12). Yet subjectivity is “not something we can have or possess, but something that can be realized, from time to time, in always new, open, and *unpredictable* situations of encounter” (ibid, p. 12, italics added). Teacher and pupils thus create something together, *as it emerges*. Unpredictability-as-process and subjectivity-as-goal necessitate improvisation. Creativity seen from the perspective of creation is therefore, according to Caputo, “risky business” (as cited in Biesta, ibid, p. 13). It is thus possible to appreciate Biesta’s perspective on why risk is *desirable* in education, and why a risk-free education would miss the point of education to begin with (ibid, p. 3).

Donmoyer (1983) analysed classroom activities in which teachers and pupils constantly negotiated emerging questions and ideas, employing drama and jazz music improvisation theory to evaluate what he observed. Sawyer (2011) strengthened this perspective by describing tendencies common to the teacher-as-improviser and the improvising jazz musician. This bridge between jazz and classroom improvisation provides fertile ground for modelling improvisational practices in teaching (Dezutter, 2011). In order to work within this framework, though, both similarities and differences between improvisation in jazz and teaching must be considered. Jazz music pedagogy is based on a repertory of written and oral practices which specifically train improvisation (e.g. Levine, 1995). Several knowledge fields must be mastered before the learner can be considered an improvising musician (Berliner, 1994): instrument-specific technical exercises; the training of an improvisational state of mind; acquiring repertory; becoming acquainted with existing improvised repertory; learning relevant music theory; embodiment of improvisation; practising improvisation on the instrument alone and with an ensemble of musicians; acquiring performance experience. Both jazz and PI have audiences, require in-the-moment communication amongst practitioners, and exhibit various levels of interaction. Both use scripts and rules: Improvisation, in both cases, does not imply total freedom of action, but rather the need to choose from a range of available options in a given situation or moment. In any situation, only some of these will prove successful in the context. Yet some differences between improvisation in jazz and in teaching do exist. Firstly, PI is not an art form. Secondly, while several underlying parameters (such as interaction, timing, and risk-taking), are fundamental to both musical and pedagogical improvisation, the disciplinary material is different.

Finally, in order to consider systematic training of PI in real-life classrooms, precedents must be considered as references. Previous research which focused on training PSTs to improvise by employing a drama technique (role-play) provides ample inspiration: Maheux and Lajoie (2010) showed the importance of PSTs’ role-playing in preparation for classroom improvisation. The authors provided “know-how” aimed at allowing future teachers of mathematics to “make the best” of unexpected situations and surprises. They thus exemplified improvisation as a central element in teacher education, and showed that training for it is possible.

### 2.1.1. Professional pedagogical improvisation

“Great teaching” (Sawyer, 2011, p. 1) depends on rules and structures which teachers have developed over decades of experience, including improvisational practices. Experienced teachers are

better at improvising: they use less time planning for teaching, and are more likely to employ teaching structures which they themselves created. The current study was concerned with how teacher training institutions may support that ripening process on the road to a professionalization of PI, necessitating an approach to its systematic training and evaluation. Indeed, Dezutter (2011) argued that improvisation's central role in teaching necessitates "taking improvisation seriously" (p. 33) and described our need to "strategize about how to improvise *better*" (ibid, p. 33, italics added). We need to "think of ourselves as professional, rather than incidental, improvisers" (ibid, p. 33). This, she wrote, will "lead to the development of a body of professional knowledge", with "shared notions of what constitutes successful improvisation", and with "techniques for helping learners accomplish these goals" (ibid, pp. 33–34). Sawyer (2011) refers to "professional" in this context as "the ability to improvise effectively within structures" (p. 7). Aadland, Espeland and Arnesen (2016) described what they call a categorized understanding, or rather, a tentative typology, of what professional improvisation in teaching and teacher education might be. They argued that a tentative typology of professional improvisation should include sequential, dialogic and exemplary improvisation, and that such a categorization can be understood, practiced by novice teachers as well as pre-service teacher students. While the provision of a comprehensive framework for the evaluation of PI is not feasible within this study, preliminary steps are taken here by turning to arts education improvisational training pedagogies, and criteria for evaluation of their results (Dezutter, 2011). The specific frameworks referred to in this context are that of Berliner (1994, pp. 243–285) regarding improvisational content, and Alterhaug (2004) for a discussion of the improviser's *intentionality*. Berliner (1994) provided the following parameters by which artists evaluate their own and others' improvisations:

- An improvisation's rhythmical substance (including "timing")
- Melodic substance
- Harmonic content
- Originality and taste
- Emotional substance
- Instrumental virtuosity and technical features of ideas
- Storytelling ability
- Spontaneity and uniqueness of invention
- The unique voice within the tradition
- Accommodating musical change
- Critical judgement

It is tempting to try and imagine corresponding evaluation parameters for Pedagogical Improvisation. Yet while some of Berliner's parameters, such as timing and spontaneity, easily lend themselves to pedagogical settings, others, such as improvisation's emotional content, would require extensive rethinking.

The second part of the framework for PI's potential evaluation relates to the improviser's intentions. Alterhaug (2004) differentiated between improvisation happening strictly as a reaction to unplanned occurrences, and improvisation intentionally implemented as a goal in its own right. Steps towards the professionalization of PI will need to rely on improvisers' initiative and intentionality. In this context, it is helpful to turn to the "Four C Model of Creativity" (Kaufman & Beghetto, 2009) as a reference through which to explore improvisation based on their distinctions of various levels of creativity. Creativity levels include little-c, mini-c, pro-c, and Big-C. Little-c is defined as "everyday creativity" (Craft, 2001), while Big-C is defined as consisting of "eminent creative contributions" (ibid, p. 2). Kaufman and Beghetto (2009) argued that previous distinctions of "little" and "Big" lack nuance regarding creativity levels of the person in question. They therefore proposed adding mini-c and pro-c levels to their model. Practitioners of mini-c exhibit creativity inherent in the learning process, while practitioners of pro-c are "professional creators but have not yet reached imminent

status” (ibid, p. 4). Pro-c represents a “developmental and effortful progression” (ibid, p. 5), implying intentionality. Similarly, I would like to propose definitions for “little-i”, “mini-i” and “pro-i” within PI. An educator spontaneously providing an example to pupils while not considering the improvised aspect of it to be of significance, exhibits “little-i”. An educator consciously engaging in improvisation as an inherent part of her training process, exhibits “mini-i”. Lastly, an experienced educator, improvising *for the sake* of improvisation as a fundamental element of her profession, exhibits pro-i. A consideration of Big-I lies beyond this study’s scope.

### 3. Methodology

#### 3.1. Research design

The study relied on qualitative research methods (Creswell, 2007), as these were deemed appropriate for in-depth exploration of PSTs’ experiences and meaning-making. The methodological framework was Educational Design Research (EDR), a genre of research in which iterative development of practical solutions to complex educational problems also provides the context for empirical investigations that yield theoretical understanding and which can inform the work of others (McKenney & Reeves, 2012; Van den Akker, Gravemeijer, McKenney, & Nieveen, 2006). Plomp and Nieveen (2013) defined EDR as “a research approach (design) appropriate to address complex problems in educational practice for which no how-to-do guidelines are available, or to develop or validate theories (e.g.) about learning processes, learning environments and the like” (ibid, p. 6). There are various approaches to the presentation of the resulting design principles following design studies. One of these may be the summary of principles in the form of a heuristic (van den Akker, 1999). Furthermore, EDR provides grounds for conducting research *on* an educational intervention, while conducting research *through* that same intervention. The current study of PI was conceptualized as research through two interventions of the WASO teaching approach (Craft et al., 2016), while research on those same interventions produced new knowledge about the design of the interdisciplinary art/science WASO teaching approach in Norwegian schools. With regard to PI, the iterative intervention implemented in the current study consisted of a preparatory session realized several weeks before data collection began, and included PSTs, school teachers, college personnel, and the author engaging in improvisational exercises and related theoretical discussions. These were followed by a 2-week school project during which two overlapping training and data collection sub-interventions dedicated to PI were implemented with PSTs and pupils: Rehearsing Pedagogical Improvisation (RPI) and Authentic Pedagogical Improvisation (API). Together, these sub-interventions were designed to enable two main distinctions: 1. “laboratory” rehearsing opportunities as opposed to “real” rehearsing opportunities, and 2. Data collection regarding authentic improvisation on both the micro (PI within a single lesson) and macro (adaptable teaching hour or day schedule) levels. The two sub-interventions’ characteristics are summarized in Table 2 and detailed in greater length.

##### 3.1.1. Rehearsing Pedagogical Improvisation

RPI was a predefined pedagogical model, generally conceptualized with the idea of a rehearsing jazz ensemble, in which one of the musicians is a soloist, in mind. It was developed to respond to two aims: Allowing PSTs to consciously rehearse real-time classroom improvisation in a controlled environment which was limited in time, and enabling the collection of empirical data about those improvisations. Several aspects of improvisation needed to be satisfied: The session needed to include elements of teaching which were unknown to the PSTs, but which PSTs could realistically be assumed to be able to react to authoritatively; real-time situations; agreement of PSTs to participate in the exercises. In practice, RPI sessions included the communication of a task which the PST did not

**Table 2. Sub-interventions**

	Typical length	Main goal	Discipline
RPI	15–30 min	Controlled rehearsal of PI on micro level	Single discipline (e.g. music)
API	2–3 weeks	Authentic PI on micro and macro levels	Focus on one or more disciplines within an interdisciplinary context

know the exact content of in advance on a sheet of paper which was handed to her shortly before that task was realized with pupils, often while the PST was teaching, and then documenting the ensuing improvisation. RPI sessions were designed to include a variety of disciplines, settings, and class sizes. These have produced a broad scope of results, presented below. In all cases, PSTs could rely solely on their previous knowledge. Unless otherwise specified, they were instructing a class of approximately 20 pupils.

### 3.1.2. *Authentic Pedagogical Improvisation*

API took place within the interdisciplinary WASO project, on both micro and macro levels of improvisation. The project was chosen as an arena for PSTs' improvisational experiences and corresponding data collection due to its complexity as an educational environment which necessitates some level of reinvention each time it is implemented, and for its extensive reliance on group work.

## 4. Participants and data collection

The study was conducted in two primary schools in a small Norwegian city. Pupils were 3rd graders (ages 8–9). Both iterations, each of which lasted for 2–3 weeks, were realized during PSTs' practicum phases. PSTs were assigned to various in-service teachers who functioned as their tutors, as well as to art and science education experts. All of the study's informants were female PSTs in their second year of teacher training at the time of the study. PSTs received 10–12 h of preparatory training regarding both the WASO teaching approach as well as Pedagogical Improvisation. During research, PSTs provided data including videos of interviews following RPI sessions, and reflection notes following the complete interventions.

The first iteration took place at the "Sage View"<sup>1</sup> school, and included four PSTs, with the following areas of responsibility: drama, music, visual arts, math, lighting and public relations. The second iteration took place at the "Room White" school and included 7 PST informants, with the following areas of responsibility: drama, science, visual arts, music and public relations.

Two minor changes were implemented during the second iteration's RPI sessions, based on PSTs' recommendations following the first iteration. The first of these was an increase in the number of PSTs taking part in the project, so as to divide the workload. Also, prior to the second iteration, PSTs requested to have a clear idea about RPI sessions' thematic content, something which was implemented during the second iteration.

## 5. Data analysis

Data analysis was based on two main data sources, in a process repeated during each of the study's two iterations. Interviews with the informants, conducted on the same day as the RPI sessions, were transcribed verbatim<sup>2</sup>. Informants' written reflection notes were written during the weeks after their respective iteration was completed. In addition, the author observed all RPI sessions, and most API sessions, in person. One of the PSTs who participated in the first iteration, Laura, conducted an additional interview following the preliminary data analysis, in order to provide for ongoing and interwoven data collection and analysis (Miles, Huberman, & Saldaña, 2014, p. 70), and to triangulate findings. Preliminary analysis (ibid, p. 93) was undergone by coding<sup>3</sup> the resulting data using codes which addressed issues related to RPI, API, to the interdisciplinary WASO intervention itself, and to Pedagogical Improvisation in general. Codes were changed and developed, especially during the second iteration's data analysis, and finally grouped into five overarching themes of relevance for the study. Tendencies and patterns were thereafter searched for during an iterative process of data analysis (Creswell, 2007). A model of Educational Design Research (McKenney & Reeves, 2012) was employed in order to study the data and make conclusions regarding the further development of the improvisation approach's design.

## 6. Findings

Informants perceived improvisation as being ever-present and of importance in teaching. Prior to systematic training for improvisation, their perception of it was generally limited to its being a

reactionary, “problem-solving” measure. PSTs were loath to be seen as “lacking control” in the eyes of pupils, or of not being in command of relevant content knowledge. These tendencies often limited improvisational teaching. Systematic improvisational training based on preparatory sessions, rehearsing, authentic experiences and reflection, stimulated a new perception of Pedagogical Improvisation’s implications in several respects: It provided greater awareness of improvisation’s roles and potentials, and an understanding of improvisation as a phenomenon which can be improved and refined over time. This was enabled through PSTs’ increased willingness to engage with, and at times embrace, risk-taking in teaching, following training. Furthermore, PSTs were more likely to self-regulate actions following improvisational training. Kaia summarized this by explaining that “I have gone from being nervous from having to say good morning, to being able to lead a half-hour long improvisation with what I would call an ‘outstretched hand’”. PSTs’ increased openness to pursue unforeseen outcomes during which learning occurred through real-time interaction allowed pupils to “be seen” and co-create emergent knowledge, providing pupils with a heightened sense of ownership of that knowledge. Laura explained that PSTs “get a better relationship (to the pupils) ... they (the pupils) really ‘get it’ ... ‘now I am being seen’”.

PSTs expressed specific needs which required fulfillment in order to rehearse and implement Pedagogical Improvisation. Data analysis yielded several emerging themes with regard to these needs. They depend on the kind of training implemented in RPI and API sessions. While the descriptions presented above are valid for both micro and macro levels of improvisation, the macro-level, in which teaching *schedules* are adapted to pupils’ needs, pace and opportunities, implies further considerations. Namely, shifting schedules may require interaction with other educators such as a school’s head teacher, or teachers of other classes following the same curriculum, due to logistical or other issues. These considerations may increase or decrease the teacher’s risk-taking and self-regulation on the macro level, thereby impacting the educational setting with regard to its level of relevance for pupils. A detailed description of emerging themes regarding PSTs’ needs is summarized in the corresponding RPI and API sections below.

## **6.1. Rehearsing Pedagogical Improvisation sessions**

### **6.1.1. PSTs’ perceptions**

PSTs perceived rehearsing for Pedagogical Improvisation as important, and the RPI sessions as an effective approach towards becoming better improvisers. An emerging theme was a new qualitative perception of improvisation. Sofie reflected that “I have learned that things don’t need to be perfect in order to be good enough. Perhaps it is not only the final result which is relevant, but also the way towards that result”. The perceived experience of heightened interaction with pupils was also a recurring theme, nowhere more so than in the non-verbal improvisation led by Crystal and Miriam, during which the two PSTs joined pupils as participants in the drama exercises. Finally, PSTs’ evaluation of their own RPI session usually was, to a large extent, based on whether or not they’d “succeeded” to teach the content requested in the written task they were required to implement. Rachel and Crystal described their session as having been “successful”, while Anita and Kaia did not perceive their own session as “successful”, as they did not feel they had accomplished the requested task. Anita stated the following: “... we got a result, but we didn’t get the result we wanted, right?”

### **6.1.2. PSTs’ needs as prerequisites for improvisation**

Several themes relevant to PSTs’ needs in order to enable what they considered successful participation in RPI sessions emerged. Possessing necessary content knowledge seems to be crucial in RPI sessions. The time before the sessions, regardless of the amount available, was invariably related to acquiring content knowledge or refining existing knowledge: PSTs succeeded in realizing RPI sessions even when available preparation time was very short (often less than one minute), provided they had the necessary content knowledge. Following their RPI session which they perceived as exceeding their content knowledge in music composition, Anita and Kaia expressed the necessity of possessing relevant content knowledge during their interview. Anita explained that “if you have an open moment, you just have to find a task, but then you can choose something you’re secure with,

something you've done before, and then you can use it in the moment there and then". Kaia added that "as a teacher you don't choose to improvise with something you have no idea about". A second need which emerged as a theme was effectiveness and importance of pre-intervention preparation sessions as a way of preparing for RPI sessions. Thirdly, accurately informing pupils regarding each session's goals and scope, and ensuring that the specific task realized during the session was realistic with regard to pupils' levels, available time, and PSTs' content knowledge, were perceived as crucial in order for PSTs to realize satisfactory improvisations: Anita explained this by stating that improvisation does not imply that "anything goes".

#### *6.1.3. Enhanced capacities*

A recurring theme was PSTs' enhanced capacity to take risks and intentionally plan to improvise following the sessions. Anita expressed this in terms of following emerging ideas, and explained that one can "get impulses from pupils which you haven't planned yourself (when improvising). Playing off of these is worth gold, because you can thus 'take' the pupils with you during teaching". Secondly, an enhanced capacity to interact with pupils in real-time emerged as a theme. A third theme was PSTs' enhanced capacity for self-regulation during PI, often related to choices of teaching sequences, examples chosen, adaptation of tasks to pupils of various levels, and structural elements of teaching.

#### *6.1.4. RPI design*

PSTs described RPI as a relevant setting within which to rehearse improvisation. Though the sessions' planning was redesigned following the first iteration's preliminary data analysis, resulting in what PSTs referred to as "more realistic tasks" (tasks simulating actual pupils' questions rather than researcher-induced questions), a final analysis of data following the second iteration yielded still further room for improvement in future iterations which should be implemented in three areas. The first of these is sessions' timings which were recommended to be earlier in the two-week project so as to avoid occurring during the final, "stressful" days prior to the performance. The second area for improvement is aiming for seamless blending of the RPI sessions with what pupils were doing immediately before the sessions so as to not "disturb" their attention and "confuse" them. The third area is ensuring tasks better tailor to capacities of the improvising PSTs as well as those of pupils, thus increasing chances of them experiencing a feeling of having mastered the task. Kaia described this as aiming for a task "which the pupils have a good chance of mastering". Finally, the shift towards RPI sessions in which pairs of PSTs improvised together during the second iteration, as opposed to "solo" RPI sessions as were realized in the first, was only partially beneficial, and depended largely on the type of improvisation realized.

#### *6.1.5. RPI sessions' observations*

Table 3 presents a summary of the author's observations of the sessions:

The summary provided above exemplifies the variety of disciplinary fields in which RPI sessions were implemented during the study, while still adhering to the common structure of improvising written tasks in real-time with pupils. Improvisation was rehearsed and reflected upon in every case, providing PSTs with improvisational experiences.

## **6.2. API sessions in the interdisciplinary teaching environment**

#### *6.2.1. PSTs' perceptions*

PSTs perceived the interdisciplinary WASO intervention as inherently improvisational, and thus a fitting setting for API. This was due to its including extensive group work which necessitated continuous task synchronization, to the fact that project leaders did not specify all details in advance, and to the fact that PSTs were participating in this kind of project for the first time. Another emerging theme was a perception of the intervention's necessitating improvisational interaction with and amongst pupils. Gina described that "for the most part, everything was realized according to how the pupils worked together, and what they considered important". PSTs perceived API experiences

**Table 3. RPI sessions and corresponding improvisational categorization**

Iteration	PST	Improvisation task	Observation of RPI session
"Sage view" school	Agnette (music)	To instruct pupils on how to create "sound atmospheres" based on situations she could choose from a list	Agnette used an "assisting tool", which she defined as "film music", to explain the concept of creating atmospheric music
	Torill (math)	To teach pupils about multiplications of "2" and the concept of "double" by asking them to describe how these would be explained to 2nd graders	Torill provided several different examples before she was convinced pupils had understood her instructions
	Erica (Arts & crafts)	To instruct two pupils as to how to write a Public Relations (PR) statement for the opera	Erica relied on details she thought were logical to include, as well as on details which the participating pupils wished to include
	Laura (Drama)	To lead the class during the writing of a Haiku	Laura tried to complete the task, but then decided she wasn't able to see it through due to her lack of knowledge of Haikus. She then opted for an alternative teaching sequence, in which pupils wrote a rhyme-poem
"Room White" school	Crystal and Rachel (science)	To explain the concept of "temperature" to a group of six pupils	The PSTs relied on what they observed a college science educator teaching the pupils several days prior. This knowledge provided them with a fundament for the session
	Crystal and Miriam (drama/ non-verbal activity)	To lead a group of five pupils in a pantomime exercise, without using words to explain the activity	The PSTs were unsure about the definition of the word "pantomime". Their solution for this was to hurriedly ask a colleague. They needed to, without words, decide which of them would lead the pantomime. Miriam spontaneously began exploring pantomime movements, and the others followed
	Kaia and Anita (music)	To lead the opera's orchestra during the composition of a song	PSTs led the session despite their belief that the timing and level of difficulty were not optimal
	Gina and Sofie (Arts & Crafts)	The last RPI session was not realized as planned due to time constraints. Empirical evidence was therefore provided during an unplanned improvised session the following day	

as relevant for their future educational work. Laura reflected that "taking pupils out of all routines, and together creating an opera in just three weeks, was a good experience to take with me further". Finally, though PSTs perceived the process as having been very energy-demanding, it had also been a new and enjoyable experience which led to a more positive mindset towards improvisation.

#### 6.2.2. PSTs' needs as prerequisites in improvisation

PSTs need to possess several areas of knowledge as prerequisites for API: Overwhelmingly, they referred to their commanding necessary content knowledge as a "make or break" factor. Secondly,

they acknowledged the need for pre-intervention preparation for improvisation, yet that preparation must provide a very clear understanding of what and how much they are expected to improvise during the actual intervention. Thirdly, the necessity of reflection following the process also emerged as a recurring theme: Rachel expressed this point as “completely necessary for the process”. Finally, specifically on the macro-level of improvisation, in which lesson scheduling was continuously adapted to pupils’ progress, a main structural need was to be granted permission to schedule lessons’ flexibility, although this only emerged as a theme implicitly.

### 6.2.3. Enhanced capacities

A recurring theme was that API participants achieved a greater capacity to engage in risk-taking and improvisation. A second emerging theme was PSTs’ awareness of, and capacity to plan for, improvisation on both micro and macro levels: Agnette “filled out a planning form for each session, but noticed quickly that planning for these lessons and days was a big challenge, since this was a «floating» project with lots of improvisation”. The capacity of being able to handle emergent knowledge, implying enhanced interaction, was another emerging theme.

### 6.2.4. API design

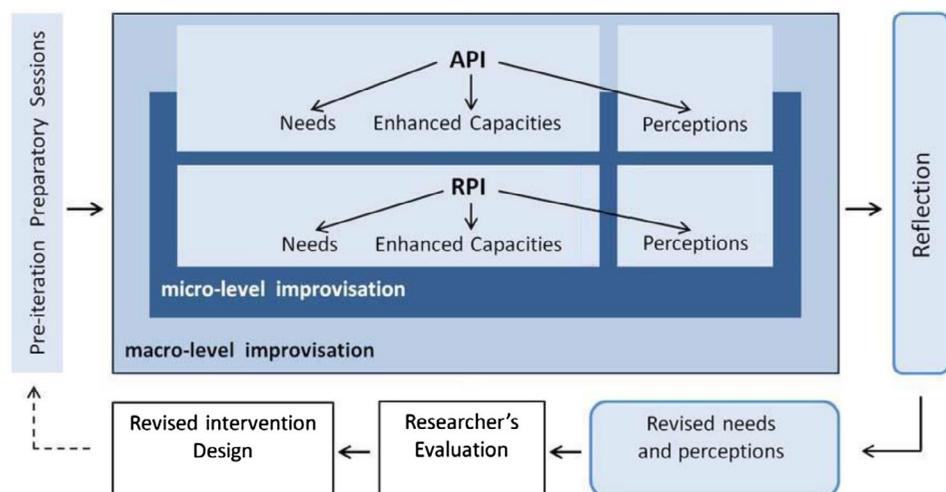
Informants provided design recommendations following their API experiences. Regarding their own preparedness, some pointed out that more extensive pre-intervention preparation would have been beneficial. Secondly, regarding the pupils’ functioning within an improvised setting containing extensive group work, Gina explained the importance of a common start to the day, during which all pupils were present: “Their days started off as normal days. This was essential, because the whole project was different than the normal school day, so it was good to have a set program for the mornings”. Indeed, the interventions’ character necessitates some time during the day which is very structured and foreseeable, as opposed to sessions which PSTs sometimes referred to as “chaotic”, at the same time that they were “creative”. Thirdly, while the extensive amount of improvisation was useful for their training, PSTs often described the interventions as overwhelming, at the same time as they were enjoyable.

## 6.3. Model

Following analysis of the collected data, design propositions for an educational intervention during which PSTs are trained for Pedagogical Improvisation have been reached. The findings’ results regarding RPI and API are summarized in Figure 1 (part a) and Table 4 (part b), which together represent an integrated model of training Pedagogical Improvisation in Teacher Education.

In Figure 1, the process begins with pre-iteration preparatory sessions. Following this, a school intervention is implemented, during which macro (API) and micro (API and RPI) improvisation is

**Figure 1. Training pedagogical improvisation in teacher education.**



**Table 4. Part (b) of model**

	<b>PSTs' needs<sup>a</sup></b>	<b>Enhanced capacities</b>	<b>Perceptions</b>
API	<ul style="list-style-type: none"> <li>• Content knowledge</li> <li>• Reflection</li> <li>• Scheduling flexibility (macro only)</li> </ul>	<ul style="list-style-type: none"> <li>• Risk-taking</li> <li>• Planning to improvise (intentionality)</li> <li>• Handling emergent knowledge</li> <li>• Interaction with pupils in real-time</li> <li>• Envisioning integration of experiences in future work</li> </ul>	<ul style="list-style-type: none"> <li>• API as relevant rehearsing arena</li> <li>• API necessitates interaction</li> <li>• Positive mindset towards improvisation</li> </ul>
RPI	<ul style="list-style-type: none"> <li>• Content knowledge</li> <li>• Pre-intervention preparation</li> <li>• Accurately informing pupils</li> <li>• Synchronizing tasks with pupils' knowledge levels</li> </ul>	<ul style="list-style-type: none"> <li>• Risk-taking</li> <li>• Planning to improvise (intentionality)</li> <li>• Interaction with pupils in real-time</li> <li>• Self-regulation</li> </ul>	<ul style="list-style-type: none"> <li>• Heightened interaction with pupils (learning occurring through interaction)</li> <li>• Importance of rehearsing improvisation</li> <li>• RPI as relevant rehearsing arena</li> <li>• New qualitative perception of improvisation</li> <li>• Perception of "success" based on sessions' outcome</li> </ul>

<sup>a</sup>Findings revealed that in some cases, equipment and infrastructure may also be necessary for improvisation to occur, yet this did not emerge as a main theme.

implemented, subject to formative evaluation by PSTs and their instructors. Following the intervention, reflection takes place, leading to a revised set of needs and perceptions. The complete process is subject to evaluation by the researcher(s). Finally, the process leads to a revised design of the intervention, which is thereafter implemented in future iterations. Part (b) of the model summarizes PSTs' specific needs and enhanced capacities following implementation, as well as their perceptions of the sessions.

Data analysis thus led to design principles which can be formulated as the following heuristic (van den Akker, 1999): "In order to design an educational intervention for the purpose of training Pedagogical Improvisation in a teacher training context, it is recommended to include four distinct activity phases. These are pre-intervention preparation (theoretical and practical); opportunities to rehearse improvisation in short, controlled sessions with pupils; opportunities to experience extensive sessions during which authentic improvisation may occur; post-intervention reflection. The reasoning for this procedure is improvisation's necessitating a variety of elements and skills which need to be acquired in different settings, and during various types of training".

#### **6.4. Suggestions for evaluation of quality**

The enhanced capacities of PSTs to improve as improvisers, develop new points of view and understandings about improvisation, and even, in some cases, plan for improvisation as a result of systematic training, have all emerged as relevant findings. The question of a professionalization of PI in teacher training, though, necessitates a clear view regarding what to strive for in improvisation, and how to evaluate its quality (Aadland, Espeland & Arnesen, 2016).

While a complete description of PI's evaluation lies beyond this study's scope, findings supported two perspectives as a means of suggesting approaches to evaluation in future research. These are the potential learning outcomes of improvisation (Espeland, 2015), and the differentiation between little-i, mini-i and pro-i, based on improvisation's intentionality (Alterhaug, 2004).

Espeland (2015) proposed possible learning outcomes as a result of improvisational learning environments. He conceptualized those outcomes within the context of the research of Aadland, Espeland & Arnesen (2016), conducted during the Improvisation in Teacher Education (IMTE)<sup>4</sup> project (Stord Haugesund University College, 2014), and in which categories of improvisation in the educational context were proposed:

Category 1, Professional improvisation as responsive dialogue.

PSTs:

- know how to develop and implement learning-oriented dialogues with pupils with spaces for improvisation
- can reflect on and plan improvisational and open-ended dialogues with pupils

Category 2, Professional improvisation on the use of sequences in teaching.

PSTs:

- know how to handle, change, and implement teaching sequences based on spontaneous input from pupils or contexts
- can reflect on and plan teaching with spaces for sequential improvisation

Category 3, Exemplary improvisation: Improvisation on the choice of examples and forms of activation.

PSTs:

- know how to make situational and learning-oriented decisions about the use of examples and forms of activation in teaching based on their knowledge and professional repertoire
- can reflect on and plan teaching with spaces for situational and learning-oriented use of examples and forms of activation

In order to contextualize these outcomes as potential evaluation references the first category, Professional improvisation as responsive dialogue, and its corresponding outcomes are taken as an example. Responsive dialogue occurred in several cases during data collection. Anita's explanation of the ability to "get unplanned impulses from pupils" is representative of dialogic improvisation. Findings within both RPI and API sessions, presented above, pointed at PSTs' knowledge of what is necessary in order to develop and implement dialogue-based improvisation with spaces (opportunities) for improvisation. Furthermore, much of the collected data included PSTs' reflections on improvisation, including on the issue of open-ended dialogues with pupils: During Rachel and Miriam's RPI session, they experienced this type of dialogue following their entering the science classroom with no specific plan for how to interact with, and engage in, dialogue with the pupils.

Improvisation's intentionality is also relevant with regard to an analysis of that improvisation's quality. Data showed that much conscious engagement with improvisation during practicum training occurred, and thus that mini-i has taken place during the intervention. PSTs also exhibited an enhanced capacity to take risks and intentionally plan to improvise during and following improvisational training, provided they commanded the necessary content knowledge. They exhibited enhanced abilities to self-regulate and improvise their choices of teaching sequences. They often felt comfortable with, and saw the value in, entering the teaching situation without a plan. Though these tendencies may only be seen to represent first signs of pro-i, inasmuch as pro-i describes the experienced educator improvising *for the sake* of improvisation as a fundamental element of her profession, they do exemplify a potential for the development of pro-i as part of teacher education in the future.

Findings were presented based on PSTs' reflections and interviews following improvisational training. The extent to which it is possible to evaluate their improvisational quality necessitates further research with regard to the pupils' own experiences of the improvised learning situations, yet preliminary steps have been provided within which it would be possible to contextualize that evaluation.

## 7. Discussion

PSTs considered improvisation to be ever-present in teaching, and perceived training for that improvisation as useful. They exhibited potential to improve as improvisers over time, given a framework within which to train Pedagogical Improvisation. That framework included preparatory sessions, rehearsing improvisation, implementation experience and reflection. Following improvisational training, most PSTs agreed that training for improvisation should have a more structured place in teacher education. Should that be realized, it would provide grounds for systematic exploration of professionalization of PI in teacher education.

Improvisers in both education and the arts rely on a dynamic method through which they realize improvisation: The jazz musician finds a system which enables him freedom to interact with audiences through music. The instinct of the improvising PST is to find a system which she can relate to herself, yet which also leads her pupils towards a chosen pedagogical goal. As with the case of the developing jazz musician, the pedagogical improviser's development requires bringing together many elements. These include techniques, experience, rehearsal, and a mindset which is open to one's own progress as an improviser. That mindset must be based on the PST's viewing herself as a long-term pedagogical improviser: Jazz musicians' training may span the duration of many years, even if only to play that music on a novice level (Berliner, 1994; in Sawyer, 2011). Similarly, learning to respond to in-the-moment impulses in the classroom with authority may take years, as it necessitates a command of improvising techniques as well as rich content knowledge. This study's analysis of data, collected during two-week-long interventions, can only point at potential steps towards professionalization of PI, as the informants cannot yet be considered to be professionals in that area even though they did exhibit pro-i intentionality in several cases. In similar fashion to the case of professionally improvised jazz music, systematic training aiming towards professional PI in teacher education would require improvisation to be seen as a goal in itself with which improvisers would be required to engage intentionally (pro-i) over time. This would imply that educators' improvisations be subject to evaluation based on their quality. Training for professional improvisation thus necessitates approaches for implementing and evaluating it based on a conceptual understanding of what makes one improvisation more effective than another within the unique setting in which they are enacted. Potential steps towards a framework for evaluation of improvisation's quality are therefore proposed in this article as "building blocks of theory" (McKenney, 2013), yet additional research is needed in order to deepen and validate it. Taking improvisation "seriously" (Dezutter, 2011, p. 33) by means of improvisational training with professionalism as a goal will, with time, as with jazz improvisers, lead to *personal* interpretations of what improvisation implies in the classroom. This is true because elements of improvisation such as interaction with others, speed of reaction, or attention to certain details are, to a large extent, derivatives of one's individual personality. This process will introduce the question of improvisational styles into the educator's work. New research will be necessary in order to establish evaluation parameters for PI styles, and how to describe them, possibly based on the above-mentioned artistic parameters provided by Berliner (1994) as sources of inspiration.

This study thus provided knowledge regarding the design of a practical intervention aimed at training future teachers for PI. That design is presented as a model in Figure 1 (part a) and Table 4 (part b), and detailed in the findings section, above. The study also provided theoretical knowledge which may be used by future researchers as a result of that exploration: PSTs were capable of planning for, implementing, and even embracing, improvisation on both micro and macro levels. Although a move towards professional PI in teacher education will require structural flexibilities within the unique organization which enable, and even encourage, the educator to take risks and

improvise, this is especially true in the case of macro-level improvisation. This is due to the fact that macro-level PI depends on logistical interaction with other stakeholders regarding school schedules, materials and equipment which need advance preparation, as well as with schools' evaluation procedures of pupils.

Professional PI would also necessitate granting PSTs more extensive tools, in the form of improvisational techniques, in addition to the content knowledge which they are already being trained to acquire. In order to implement that framework, RPI interventions' design will need more accurately devised training sessions, during which improvisational tasks will be tailor-made to needs of each PST. These sessions' goals must be very clearly defined and accurately communicated to PSTs, and should not interfere with pupils' learning processes before and after the sessions. Regarding API, an improved design will include even more preparation of content knowledge relevant to the complexities of each unique intervention, space for reflection, better communication of PSTs' roles and tasks within the intervention, and ensuring that school authorities are open to scheduling flexibility.

## 8. Conclusions

This Educational Design Research study was implemented in order to reduce the gap between current PSTs' improvisational practices, and a professionalization of those practices in teacher education. It was conducted as research through an educational intervention. Data analysis regarding research on that same intervention concerns design principles of the interdisciplinary WASO intervention thus lying beyond the scope of this article, and will be described in other settings.

Findings showed that training Pedagogical Improvisation in a sequence of preparatory sessions, rehearsing improvisation with pupils, experiencing improvisation in authentic settings, and reflection, may impact PSTs' approach to, and implementation of, improvisation.

It has been the aim of this study to propose both practical improvements for an educational intervention's design and theoretical knowledge relevant to other studies in the field of educational research. Though it remains to be seen what a systematic professionalization of PI in teacher education would imply, data has shown that it may have potential to contribute to the "freedom and independence of those being educated" (Biesta, 2014, p. 2) by providing for a subjectivity and individual diversity enabled largely by what Laura described as pupils' sensation of "being seen". In other words, professional PI may be expected to lead to an educational initiative which happens *by means* of interaction as opposed to one in which interaction is merely existing. That subjectivity, though, will rely on continuously new, unpredictable encounters (ibid, p. 12), inviting educator and pupils to create something as it emerges, and on the teacher training institution which prepares those educators being willing to accommodate that risk. This development, however, may not be an easy process for teacher training institutions as its implementation would come at the cost of other valuable resources in teacher education, most notably training time in "regular" teaching situations.

The study was limited to a teacher training programme at one college, with practicum training activities taking place at two elementary schools. More research is needed in order to explore needs, perceptions and potentially enhanced capacities of PSTs in additional settings and countries before making more general conclusions regarding the professionalization of Pedagogical Improvisation on a larger scale. Also, while this study focused on analyzing the improvisations of PSTs, it would be beneficial to research the impact of improvisational classroom teaching on the pupils' learning processes as part of a future study.

## Abbreviations

PST	Pre-Service Teacher
PI	Pedagogical Improvisation
RPI	Rehearsing Pedagogical Improvisation
API	Authentic Pedagogical Improvisation

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### Notes

1. The names of the schools, as well as the PSTs', are pseudonyms.
2. Transcriptions were made using Hyper Transcribe software (version 1.6.1).
3. Data were coded in the original language in which it was recorded or written, Norwegian, using Hyper Research software (version 3.7.3).
4. Funded by the Norwegian Research Council (2013–2016).

### References

- Aadland, H., Espeland, M., & Arnesen, T. (2016). Towards a typology of improvisation as a professional teaching skill: Implications for pre-service teacher education programmes. Manuscript submitted for publication.
- Alterhaug, B. (2004). Improvisation on a triple theme: Creativity, jazz Improvisation and Communication. *Studia Musicologica Norwegica*, 30, 97–118.
- Baker, T., Miner, A. S., & Eesley, D. T. (2003). Improvising firms: Bricolage, account giving and improvisational competencies in the founding process. *Research Policy*, 32, 255–276.  
[http://dx.doi.org/10.1016/S0048-7333\(02\)00099-9](http://dx.doi.org/10.1016/S0048-7333(02)00099-9)
- Barrett, F. (1998). Creativity and improvisation in jazz and organizations: Implications for organizational learning. *Organization Science*, 9, 543–555.
- Berliner, P. (1994). *Thinking in jazz*. Chicago, IL: The University of Chicago Press.  
<http://dx.doi.org/10.7208/chicago/9780226044521.001.0001>
- Biesta, G. J. J. (2014). *The beautiful risk of education*. Boulder: Paradigm.
- Biesta, G. J. J. (2015, June 11). Virtuosity in teaching: On improvisation and embodied judgement. *Lecture presented at the Art and Science of Improvisation conference*, Stord.
- Chase, M. P. (1988). *Improvisation: Music from the inside out*. Berkeley, CA: Creative Arts Book Company.
- Craft, A. (2001). Little c creativity. In A. Craft, B. Jeffrey, & M. Leibling (Eds.), *Creativity in education* (pp. 45–61). London: Continuum.
- Craft, A., Horin, O., Sotiriou, M., Stergiopoulos, P., Sotiriou, S., Hennessy, S., ... Conforto, G. (2016). CREAT-IT: Implementing creative strategies into science teaching. In M. Riopel & Z. Smyrniou (Eds.), *New developments in science and technology education* (pp. 163–179). Weston: Springer.  
<http://dx.doi.org/10.1007/978-3-319-22933-1>
- Creswell, J. W. (2007). *Qualitative inquiry and research design. Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.
- Dezutter, S. (2011). Professional improvisation and teacher education: Opening the conversation. In R. K. Sawyer (Ed.), *Structure and improvisation in creative teaching* (pp. 27–50). Cambridge: Cambridge University Press.  
<http://dx.doi.org/10.1017/CBO9780511997105>
- Donmoyer, R. (1983). Pedagogical improvisation. *Educational Leadership*, 40, 39–43.
- Espeland. (2015, May 14). *Improvisation in Teacher Education (IMTE) Project Meeting*, Stord.
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four c model of creativity. *Review of General Psychology*, 13, 1–12.  
<http://dx.doi.org/10.1037/a0013688>
- Knapp, B. (1989). *Machine, metaphor and the writer*. University Park, PA: Pennsylvania State University Press.
- Leone, L. (2010). A critical review of improvisation in organizations: Open issues and future research directions. *Paper presented at the Summer Conference 2010 on Opening up Innovation: Strategy, Organization and Technology at Imperial College, Imperial College London Business School*, London. Retrieved from <http://www2.druid.dk/conferences/viewabstract.php?id=501578&cf=43>
- Levine, M. (1995). *The jazz theory book*. Petaluma: Sher Music.
- Maheux, J.-F. & Lajoie, C. (2010). On improvisation in teaching and teacher education. *Complicity: An International Journal of Complexity and Education*, 8, 86–92.
- McKenney, S. (2013, November 29). Practitioners conducting educational design research: Tales of tension and triumph. *Key-Note speech at EAPRIL conference, Where Practice and Research on Learning and Development Meet*, Biel. Retrieved May 14, 2016, from <https://www.youtube.com/watch?v=g95RpxHwe0>
- McKenney, S., & Reeves, T. (2012). *Conducting educational design research*. London: Routledge.
- Miles, M., Huberman, A., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Thousand Oaks, CA: Sage.
- Montuori, A. (2003). The complexity of improvisation and the improvisation of complexity: Social science, art and creativity. *Human Relations*, 56, 237–255.  
<http://dx.doi.org/10.1177/0018726703056002893>
- Moorman, C., & Miner, A. S. (1998). Organizational improvisation and organizational memory. *Academy of Management Review*, 23, 698–724.
- Oxford Dictionaries. (2016). *Oxford University Press*. Retrieved January 15, 2016, from <http://www.oxforddictionaries.com/definition/english/improvisation>
- Pina e Cunha, M. P., Vieira da Cunha, J. V., & Kamoche, K. (1999). Organizational improvisation: What, when, how and why. *International Journal of Management Reviews*, 1, 299–341.  
<http://dx.doi.org/10.1111/ijmr.1999.1.issue-3>
- Plomp, T., & Nieveen, N. (2013). Introduction to the collection of illustrative cases of educational design research. In T. Plomp & N. Nieveen (Eds.), *Educational design research—Part B: Illustrative cases* (pp. V–XX). Enschede: SLO.
- Ross, D. (2011). Activating bodies of knowledge: Improvisation, cognition, and sports education. *Critical Studies in Improvisation*, 7(2). Retrieved March 5, 2016, from <http://www.criticalimprov.com/article/view/1314/2234>
- Sawyer, R. K. (2011). What makes good teachers great? The artful balance of structure and improvisation. In R. K. Sawyer (Ed.), *Structure and improvisation in creative*

- teaching (pp. 1–24). Cambridge: Cambridge University Press.  
<http://dx.doi.org/10.1017/CBO9780511997105>
- Sharron, A. (1983). Time and space bias in group solidarity: Action and process in musical improvisation. *International Social Science Review*, 58, 222–230.
- Stord Haugesund University College. (2014). *Improvisation in teacher education (IMTE)*. Retrieved March 30, 2015, from <http://prosjektsider.hsh.no/imte/project-information/projectinformation-scope-and-relevance-of-the-imte-project/>
- Toiviainen, P. (1995). Modeling the target-note technique of bebop-style jazz improvisation: An artificial neural network approach. *Music Perception: An Interdisciplinary Journal*, 12, 399–413.  
<http://dx.doi.org/10.2307/40285674>
- van den Akker, J. (1999). Principles and methods of development research. In J. van den Akker, R. Branch, K. Gustafson, N. Nieveen, & T. Plomp (Eds.), *Design approaches and tools in education and training* (pp. 1–14). Dordrecht: Kluwer Academic.  
<http://dx.doi.org/10.1007/978-94-011-4255-7>
- Van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (2006). Introducing educational design research. *Educational design research* (pp. 3–7). London: Routledge.
- Webb, G. R., & Chevreau, F. (2006). Planning to improvise: The importance of creativity and flexibility in crisis response. *International Journal of Emergency Management*, 3, 66–72.  
<http://dx.doi.org/10.1504/IJEM.2006.010282>
- Weick, K. E. (1996). Drop your tools: An allegory for organizational studies. *Administrative Science Quarterly*, 41, 301–313.  
<http://dx.doi.org/10.2307/2393722>
- Wiklund, C., & Erik Lundström, E. (2012). Developing distance music education in Arctic Scandinavia: Electric guitar teaching and master classes. *Music Education Research*, 14, 448–456.



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