

# Presentation in teacher education

A study of student teachers' transformation and representation of  
subject content using semiotic technology

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*Bergen, May 2019*

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## Introduction

The current study is part of a larger research project that was first initiated at the Stord/Haugesund University College, which has integrated into the Western Norway University of Applied Science. The overarching research project is called *Improvisation in Teacher Education: Curricula and Practice in Dynamic Interplay (IMTE)*, a project established to develop an understanding of what improvisation might mean as a teaching skill. The research team was led by Prof. Knut Steinar Engelsen and Prof. Magne Espeland. Other members of the team were subject teachers across various disciplines and a group of four PhD candidates who contributed subject-specific approaches from the areas of music, mathematics and pedagogy to the research effort. An international advisory board offered additional cross-disciplinary competence and contributed to defining the project and commenting on the research in seminars where the entire project group was present.

The current study is one of the four PhD research designs that was funded by the IMTE project. At the time of being accepted as a member, the distribution of the research focus among the research members was on the agenda. This particular project was assigned to directing its focus on learning activities in teacher education.

As discussed in more detail below, approaching a field with a preconceived understanding of the prevalence of a phenomenon, such as with improvisation, represents certain challenges regarding the research bias of the interpretative work. However, through initial discussions among the members of the research team and through consulting a shared literature reading list, a preliminary set of constructs was established for the early navigation in the respective research fields. In particular, in the earliest stages, a common working definition of the term improvisation was influenced by the writings of Professor Keith Sawyer, who coined the phrase ‘disciplined improvisation’, a term that seemed to capture the essence of a concept that could be used to delimitate and define our research focus: ‘Creative teaching is disciplined improvisation because it always occurs within broad structures and frameworks’ (Sawyer, 2004, p. 13). When applied to educational research, this

citation spurred investigations into what might constitute the structures and frameworks in settings that could be candidates for further research. In this case, the term ‘disciplined improvisation’ indicates that the concept that we pursued also might be grounded in professional competence and hence might be described as an asset of the professional practice of teaching.

Here, we ask the following: What learning activities that are taking place in teacher education might be worth investigating in the pursuit of developing knowledge on improvisation as a professional teaching skill? To respond to this, the activities that occur within a structure or framework had to be identified. In the opening sequence of one particular research group session, first, a musical piece was shared, and this displayed a musical notation on the projection screen as the music progressed. The presenter did not comment during the playback but reasoned immediately afterwards why he wanted to show the group this particular video clip. He was not at that time sure, he reasoned, of why he had done so; however, he noted that the music might function as a smooth opening early on the day for the participants attending the session. The idea emerged, that a person who presents information to the rest of the group does so within a structure that is constituted by the set of PowerPoint slides he or she has prepared. This short sequence of a presenter’s meta-reasoning on the content of a single PowerPoint slide is one of the earliest encounters with what later became the research topic of the current PhD thesis, that of presentation in teacher education. As it were, the research topic opened up for research and reflection on many levels that are adjacent to the concept of presentation and that connects with existing discourses on teacher education research, some of which have prevailed for decades.

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## Abstract

Situated in the context of teacher education, the current study seeks to understand the practice of presenting – here supported by digital technology – as a student learning activity. The study considers Shulman's (1986) concepts on what constitutes teachers' professional skills, which he coined pedagogical content knowledge (PCK). He identified the transformation and representation of subject content as two key aspects of teaching; transformation entails didactic reasoning regarding how to make the subject content comprehensible, whereas representation captures how to give ideas a material shape. The present study regards preparing and conducting a presentation as a process where the transformation and representation of the subject content occurs; first, this occurs during the process of designing the PowerPoint slides, and second, it happens while performing the slides for a group of learners.

The current study comprises three substudies that each contribute to the following overall research question: How can student-led presentations that are supported by semiotic technology be understood as a learning activity in teacher education?

By approaching a presentation as a semiotic practice (Zhao et al., 2014), transformation and representation take on additional meaning; it is a sign-making activity motivated by pedagogical ends. By applying the learning design sequence (LDS; Selander, 2008; Selander, 2017; Selander & Kress, 2010a) as an analytical tool, the students' agentic process of sign making is modelled as two transformation cycles. The first cycle captures the students' preforming activity of giving shape to knowledge by designing a semiotic artefact: a set of PowerPoint slides. The second cycle captures the performance of the slides for an audience.

The first study proposes a revision of the LDS so that it can be used as a framework for the analysis of empirical data derived from the video observations of first-year student teachers. These participants were observed as they presented reports from their practicum placement to their peers. In contrast to the original model, the amended version of the LDS captures the dynamic, multimodal interplay that occurs between the constituent elements of the slides and the presenter during the

performance. The revised LDS conceptualises the presentation as a ‘live’ multimodal event encompassing the performance of preformed materials and designs. The model is utilised as an analytical framework supporting the three articles that are published and that represent the scientific output of the current PhD study.

Using theoretical concepts pertaining to jazz improvisation, the second article delves deeper into interpreting the phenomena of presentation as a performative activity. The motivation behind the second study is to test theoretical devices developed by the jazz community as tools for researching the practice of presenting. The aim of the study is to develop concepts and terminology that may help in understanding what mechanisms are at play during the performance of presentations in educational settings.

If musical lead sheets depict ‘the kind of skeletal model that typically provides players with a framework for improvising’ (Berliner, 1994), preformed slides may be studied in terms of their properties as an improvisational framework. The philosopher Stephen Davies claimed that works made for performance can be ‘thick’ or ‘thin’ in their constitutive properties (2001); these perspectives are applied to study the design of the student-made slides prior to being performed. The concepts of horizontal and vertical playing (Baker, 1989) are adopted to interpret the student teachers’ performance of the slides. A vertical approach involves elaborating and expanding on the constituent elements of the slides, whereas a horizontal approach involves connecting the elements into coherent linear phrases. The outcome of the study is a model that has a double matrix operationalising the concept of improvisation in the current context. One axis permits the researcher to position a slide on a continuum between ‘thick’ and ‘thin’ according to the slide’s constituent elements. The other axis, spanning between ‘horizontal’ and ‘vertical’, reflects the student’s approach to performing the slide. By interpreting presentation as an improvisational activity, the article contributes new perspectives to the epistemology of teaching as commonly practised in higher education. The empirical data are video recordings of music students’ presentations for their peers of music lessons planned for their practicum placement.



The focus of the third study shifts from describing and interpreting the processes that unfold during presentation and towards the very subject content that is being presented. The study attains a meta-perspective on professional teacher development by exploring student teachers' representations of what may be considered teachers' professional knowledge. The study is based on the ontological idea that what is represented by the student teachers during their presentations is not isomorphic with a fixed reality but rather is a version of a socially constructed reality, one that is shaped by the situated interest and agency of the student teachers.

The study maps the students' representations of professional knowledge by using a double dichotomy that spans between the universal and local and between the theoretical and procedural. The 'knowledge landscape' that appears calls into question what 'epistemologies of teaching' the students encounter in and outside of campus during their education. A discussion follows on how the traditional gap between theory and practice can be understood in light of the representations of professional knowledge made by student teachers themselves.

The overall outcome of the study supports a better understanding of presentation in teacher education, displaying it as an agentive act on the part of the student, who transforms and makes a representation of curricular issues, and who is influenced by the norms and contexts of campus-based practices in teacher education. The social semiotic perspective supports a perception of knowing and knowledge that is based on the ability to participate in the discourses of the society and interest-guided communities by using the available modes and means for expression. Situated in teacher education, the presentations contribute to bringing discourses of the profession into the classrooms on campus, hence offering the students an opportunity to reflect on subject matter that resides in the gap between campus and practicum. The improvisational features of performing the preformed remind us that knowledge representations in education are subject to the fluid logics of improvisational practices, where knowledge construction requires an awareness of the curricular framework and structures within which the teacher performs the knowledge.

## Terminology

Artefact (semiotic artefact) – A semiotic resource that has a material form and incorporates selections from different semiotic modes (e.g., layout, texture, colour, sound) and media (e.g., visual, aural, print, electronic; Zhao, Djonov, & van Leeuwen, 2014, p. 355).

Epistemology – The branch of philosophy that deals with questions concerning the nature, scope and sources of knowledge. The nature of knowledge centres on the following questions: How do we know what we know? What makes us believe that something is ‘true’? Questions like these are epistemological in nature. Hofer and Pintrich (1997) stated, ‘Epistemology is a branch of philosophy concerned with the nature and justification of knowledge’ (Bates, 2015, p. 50).

Meaning making – Multimodal meaning making refers to the processes by which people use semiotic resources to make meaning in social settings. Meaning making is inherently linked to the different practices that people – as social actors – engage in. From this perspective, Kress and van Leeuwen (2001) described how meaning is made in the four (interrelated) domains of practices: discourse, design, production and distribution (Poulsen, 2015)

Mode – This term refers to a set of socially and culturally shaped resources used for making meaning. Mode classifies a ‘channel’ of representation or communication for which previously no overarching name had been proposed (Kress & van Leeuwen, 2001). Examples of modes include writing and image on the page, moving image and sound on the screen and speech, gesture, gaze and posture in embodied interactions (MODE, 2012).

Multimodality – Multimodality is an interdisciplinary approach that understands communication and representation to be more than about language. Multimodal approaches have provided concepts, methods and a framework for the collection and analysis of visual, aural, embodied and spatial aspects of interaction and environments, along with the relationships among these (MODE, 2012).

Ontology – Social ontology is the study of the nature and properties of the social world. It is concerned with analysing the various entities in the world that arise from social interaction (Epstein, 2018).

Pedagogical content knowledge (PCK) – PCK represents the blending of content and pedagogy into an understanding of how particular aspects of subject matter are organised, adapted and represented for instruction. To characterise the complex ways in which teachers think about how particular content should be taught, Shulman (1986) argued for ‘pedagogical content knowledge’ as the content knowledge that deals with the teaching process, including ‘the ways of representing and formulating the subject that make it comprehensible to others’ (Shulman, 1986, p. 9, in Mishra & Koehler, 2006)

Social semiotics – Social semiotics is an approach to communication that seeks to understand how people communicate by a variety of means in particular social settings. Modes of communication are what they are not because of a fixed set of rules and structures, but because of what they can accomplish socially in everyday instantiation. With this emphasis, a key question is how people make signs in the context of interpersonal and institutional power relations to achieve specific aims. (MODE, 2012).

## List of Publications

Kvinge, Ø., Espeland, M., & Smith, K. (2018). Performing the preformed: Towards a conceptual framework for understanding teaching as curricular transformation.

Designs for Learning, 10(1), 29-39. Stockholm University.

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Kvinge, Ø. (2018). 'Playin' the changes — A jazz approach to researching student teachers' PowerPoint presentations. Cogent Education, 5(1).

<https://doi.org/10.1080/2331186X.2018.1461046>

Kvinge, Ø. (2018). Teaching represented: A study of student teachers' representations of the professional practice of teaching. In K. Smith (Ed.), Norsk og internasjonal lærerutdanningsforskning: hvor er vi? hvor vil vi gå? hva skal vi gjøre nå? (pp. 199-221). Bergen: Fagbokforlaget

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*In a classroom at a Norwegian university college, a group of music student teachers are presenting lesson plans that they have designed for their forthcoming practicum placement in primary school to each other. A student is about to explain the didactic 'what, how and whys' of a music class he has prepared with the aim of introducing a song to a group of primary school pupils.*

*'There are the lyrics'. As the student teacher is pressing the space bar on his laptop, he turns halfway towards the projection screen behind him. He points towards the visual slide that features the heading 'La ti do re'. The heading is separated from the main body of the slide by a borderline drawn in the shape of a wave. The design template he has applied provides a dark blue background against the heading and a contrasting brighter nuance as the background for the main text. The verse lines 'La ti do re, La ti do re, La ti do re do re mi' are aligned in the centre of the slide and are orderly listed as three bulleted lines.*

*Still facing the projection screen, the student teacher addresses his fellow students: 'Thought I might sing it. It goes like this'. Putting his palms together, he faces his audience and sings the tune in a soft voice. Although the text is still visible on the projection screen, the melody, which is reminiscent of a lullaby, can be heard as a solo vocal performance.*

*'Those are the three parts which are being repeated', he turns towards the projection screen and makes three movements with his left hand, imitating the indents for each of the three verse lines on the slide. 'Those are what you sing like a canon ... around and about each other, so it becomes quite cool'.*

## **1. Background**

Politicians and policy makers have been advocating for the implementation of digital technology and digital tools in education. Efforts have been made to equip teachers at all levels with the necessary competencies for utilising digital technologies that can enhance teaching and learning and for adequately preparing their students for life and work in a digital society (Redecker & Punie, 2017, p. 12). This tendency pervades the current discourses within the Norwegian educational system, where the equivalent of the K-12 curricula is undergoing a revision. Accordingly, what it means to be a digitally competent teacher is also being reconsidered. The newly developed concept of professional digital competence is a framework that captures both the aspect of professional development and the actual practice of the profession (Kelentrić, Helland, & Arstorp, 2017). The ambition of adapting digital technologies challenges teachers to develop their own digital competence to reach the aims of the profession.

The following section introduces some of the perspectives on digital practices that student teachers encounter during their studies. Student teachers participate in educational practices that are prevalent in higher education in general, not only in teacher education. Yet they study to become working professionals in compulsory school, which differs from higher education regarding how the aims and purposes of digital practices are formulated and enacted. The section that follows will position the subject matter of the current project – presentation as a learning activity in teacher education – within a framework that connects visions of the K-12 curricula with theory on representation and communication in a way that reflects the empirical observations made in the field.

### **1.1.1 Presentation as digital practice according to the framework for basic skills**

An important aspect of studying to become a teacher is familiarising oneself with the realities of the profession. Students encounter the profession during practicum placements, by being embedded in school, and through campus based activities, such as studying the curricular framework that governs the field of practice. Therefore, it is



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important that student teachers become acquainted with the fundamental ideas of the national curriculum.

The current Norwegian national curriculum of compulsory school – the Knowledge Promotion Reform (Ministry of Education and Research, 2006) – has been effective since 2006. At its core are five basic skills considered to be ‘fundamental to learning in all subjects as well as a prerequisite for the pupil to show his/her competence and qualifications’ (Norwegian Directorate for Education and Training [Udir], 2012, p. 5): oral skills, reading, writing, digital skills and numeracy. All basic skills are cultivated across all subjects, and how the skills can be developed in each subject is outlined in each subject curriculum.

The overall outline of the content of the construct, *digital skills*, saw a revision in 2012 and is likely to see further revisions when the new curriculum reform (The Norwegian Directorate for Education and Training, 2018) is put into effect in 2020. However, as a skill in the current school system, the term stresses both the ability to use digital artefacts, such as computer hardware and software, and it stresses the communicative work that one should be able to perform using the technology:

*Digital skills involve being able to use digital tools, media and resources efficiently and responsibly, to solve practical tasks, find and process information, design digital products and communicate content. (Norwegian Directorate for Education and Training [Udir], 2012, p. 12)*

Four subcategories, outlined in the framework for basic skills, offer a further specification regarding the central aspects of digital skills. Of particular relevance to the current study is the subcategory *to produce*, which reflects a particular stance towards meaning making:

*Produce means being able to use digital tools, media and resources to compose, reapply, convert and develop different digital elements into finished products, e.g. composite texts. (Norwegian Directorate for Education and Training [Udir], 2012, p. 12).*

This description of the ability to produce hints at a multimodal stance (Kress & Bezemer, 2015; Kress, 2010; Kress & van Leeuwen, 2001; Kress, 2003) towards meaning making in the digital domain; the term *composite texts* in the quote above refers to texts that consist of more meaning making resources than the written verbal language alone. Implicit is the view that other modes of language contribute to the overall meaning making through forming multimodal ensembles (Kress, 2003). Such modes, which are typically afforded by software, are images, moving images, graphics, pictures and sound. As a finished product, a composite text can be a document made in MS Word featuring text, graphics and images, or it can be a PowerPoint file made to comment and illustrate a topic using various modes where text is only one component of many. A multimodal take on meaning making will be dealt with more extensively below; however, it is important here to note that the framework, which the Norwegian National Curricula is based on, subscribes to a multimodal view on communication and production of meaning.

By referring to *produce* as a matter of reapplying and converting existing elements into composite texts, it is reasonable to draw a parallel to a distinct epistemological position that views knowledge and knowing as a matter of design, such as Designs for learning (Selander, 2008, 2010, 2017). Essential here is the view of *knowing* as being able to produce a representation of one's knowledge by using the available modes of media at hand. Expressing knowledge, then, becomes a matter of giving knowledge a shape by transforming existing knowledge expressions through design and redesign. Knowing becomes a matter of transforming knowledge expressions that already exist because in this sense, knowledge is considered as not existing independent of shape and form. In other words, modes and multimodal ensembles provide environments for remaking meaning in interpretation as learning (Kress & Bezemer, 2015, p. 51).

This view on knowledge and knowing can also be inferred from the subcategory *communicate*, which, in the framework for basic skills, is defined as another subcategory of digital skills. The communicative aspect of being digitally competent

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is tightly linked to the ability to present one's knowledge and competence within a certain topic:

*Communication means using digital tools, resources and media to collaborate in the learning processes and to present one's own knowledge and competence to different target groups. (Norwegian Directorate for Education and Training [Udir], 2012, p. 12)*

This view on successful communication as the ability to *present* one's knowledge goes hand in hand with the epistemological stance referred to above when discussing the concept of *produce*. Knowing, then, becomes the ability to *communicate* using the available modes of media to *produce* a representation of one's knowledge, a representation that is produced digitally and given shape through design and redesign.

The subcategories *to produce and communicate* are common across all five basic skills. This means that the subcategory of *produce* is present also in the specification of oral skills. *Produce*, as a subcategory of oral skills, is worth commenting upon because it may be considered as subscribing to the same multimodal perspective on language and communication as was identified for digital skills. However, whereas *produce* as an asset of digital skills focuses on the student's ability to make a standalone digital document, *produce* as related to oral skills is concerned with the ability to combine spoken language with other modes afforded by the media and technology at hand, whether analogue (paper) or digital (a presentation). This is evident in the formulation of the differentiated levels of achievement pertaining to the term *produce* as a category of oral skills:

*Level 1: Can combine verbal language and nonverbal resources to create meaning.*

(...)

*Level 3: Can use spoken forms of language and choose appropriate nonverbal resources to support speech.*

(...)

*Level 5: Can apply spoken language and nonverbal resources independently and critically.*

*(Norwegian Directorate for Education and Training [Udir], 2012, p. 7)*

The common denominator for all five levels of achievement of *produce as an oral skill* is that oral skills involve making meaning with more than just verbal language and in combination with other resources for making meaning than speech alone.

Hence, the guidelines for the Norwegian National Curriculum promote a multimodal view on meaning making, one that is grounded in the framework for digital skills and oral skills, their subcategories and the specification of what the levels of achievement involve. The curriculum motivates activities where communicative skills are practised by producing digital artefacts alone and through communicative events unfolding in time where the meaning is distributed between multiple resources, verbal and nonverbal. This observation may legitimise and explain the prevalence of *presentation* as a learning activity in compulsory school in a Norwegian context. Therefore, during their preservice years on campus, student teachers should be made aware of both the theoretical and practical implications of the curricular guidelines.

Twelve years after its implementation, one might expect that students under the knowledge promotion reform – who have by now entered higher education – are familiar with creating and disseminating information using digital presentation tools. However, findings have indicated that in a Norwegian context, lecturers consider their students as knowledgeable yet not sophisticated users of digital technology. The students know how to operate PowerPoint but are missing the communicative skills that are required to successfully use presentation software such as PowerPoint (Tømte & Olsen, 2013).

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### 1.1.2 Presentation in higher education

The digitalisation of higher education echoes that of compulsory school, and large investments have been made to digitalise campuses and to develop a digital infrastructure, hand in hand with enhancing the digital competencies of students and staff. The Norwegian Ministry of Education and Research has closely monitored the progress of the digitalisation of higher education and reported on the perceived outcomes among staff and students of its use and appliance (Norgesuniversitetet, 2015; Norgesuniversitetet, 2018; Ørnes, Wilhelmsen, Breivik, & Solstad, 2011; Wilhelmsen, Ørnes, Kristiansen, & Breivik, 2009). Studying the reports, the general tendency reflects a move over that has occurred the last decade from a focus on technology in itself towards a focus on how to use technology to solve pedagogical and didactic challenges. The most recent Norwegian national survey on implementation of digital technology in higher education concluded that ‘it is the pedagogical use of technology that has a positive effect on the learning experience and the learning outcome, not the technology in itself’ (Norgesuniversitetet, 2018, p. 88). However, they added that educational institutions have, in general, not come far in utilising the pedagogical potential in applying digital technology (Norgesuniversitetet, 2018, p. 88).

In the Norwegian context, the use of presentation software, such as PowerPoint, is regarded as one of many means when it comes to implementing digital technology to support teaching and learning. Lecturers have argued that students expect the technology to be applied and that it helps prepare the lectures, and many claim that it improves the teaching situation (Kjeldsen & Guribye, 2015, p. 205). Critical voices, however, have claimed ‘there are few pedagogical justifications for their use’ (Instefjord, 2015, p. 168).

### 1.1.3 ICT in Teacher education

To a lesser extent, the actual implementation of ICT in *teacher education* specifically has been surveyed (Hetland & Solum, 2008; Tømte, Kårstein, & Olsen, 2013). A decade ago, as a tool for teaching, the main focus was on ICT as presentation tools, both for teachers and students. The software is accessible, and the user level is

comparatively low. Reports also have stated that subject teachers should be able to use digital tools for planning, administration and *presentation* in their own work. This view on presentation software as an accessory to teaching is also reflected in the local plans within all teacher education institutional levels (Hetland & Solum, 2008).

The development of ICT in teacher education over the last decade has followed a move from focusing on technology itself to focusing on solving pedagogical and didactic challenges through the use of technology. This evolution is reflected in a reconceptualisation of teachers' digital competence. In 2017, the Professional Digital Competence Framework for Teachers was launched by a working group. The work group builds on the national curriculum (Ministry of Education and Research, 2006) and the conceptualisation of the basic skills framework (Norwegian Directorate for Education and Training (Udir), 2012), as referred to above. Fundamentally, the revised framework represents a step towards perceiving digital competence as tightly related to the nature of the individual subjects, both for teachers and students: a professional, digitally competent teacher understands how digital developments are changing and expanding the content of the subjects. The framework also stresses the need for fostering the pupil's digital skills in these subjects, not as an independent, auxiliary competence (Kelentrić et al., 2017).

How, then, does the recent development in the conceptualisation of digital skills in policy documents relate to the established pedagogical conceptions of teachers' professional competencies? In the following section, the concept of teacher's pedagogical content knowledge (PCK; Shulman, 1986, 1987) will be debated, and the essential skill of *transforming* and *representing* the subject content will be addressed as one area that characterises teachers' professional knowledge and that might be relevant regarding the skills to align with the use of digital presentation technology as a tool for teaching. The revised model of technological pedagogical content knowledge (T-PCK; Mishra & Koehler, 2006) will be introduced as a framework that builds on Shulman's ideas and that takes into consideration the knowledge of the pedagogical affordances of digital technology. The discussion will show that presentation is an activity involving the transformation and representation of subject

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content through the use of digital tools. Building on the notion of transformation and representation as essential skills for teaching, the discussion will proceed by introducing the learning design sequence (LDS; Selander, 2008; Selander & Kress, 2010b), a model that will be applied to operationalise the concepts of transformation and representation anchored in the perspective of designs for learning. The LDS is based on a multimodal approach towards language and meaning making, and the LDS model captures the processes of transformation and representation in a multimodal context and contextualises the ideas of T-PCK into the domain of social semiotics.

#### **1.1.4 Technological pedagogical content knowledge**

Shulman (1986) identified what characterises expert teachers' professional knowledge, the kind of knowing that separates a person who is knowledgeable of the subject content and one whom possesses the same understanding yet also can make the subject content comprehensible for learners. Central to Shulman's conceptualisation of PCK is the notion of the transformation of the subject matter for teaching. Specifically, according to Shulman (1986, 1987), this transformation occurs as the teacher interprets the subject matter, finds multiple ways to represent it, and adapts and tailors the instruction materials to alternative conceptions and students' prior knowledge. Representation, then, is the material manifestation of the transformation of the subject content that is committed to by the teacher through analogies, examples, demonstrations, simulations and the like using physical objects, speech or a digital artefact, such as PowerPoint slides.

The T-PCK theory (Mishra & Koehler, 2006) is an attempt to integrate technological artefacts into Shulman's theories on teachers' pedagogical content knowledge. At the heart of the T-PCK framework is the complex interplay of three primary forms of knowledge: content (CK), pedagogy (PK) and technology (TK).

The term technological content knowledge (TCK) is an understanding of the manner in which technology and content influence and constrain one another. Teachers need to master more than the subject matter they teach: they must also have a deep

understanding of the manner in which the representations that can be constructed can be changed by the application of technology (Herring, Koehler, & Mishra, 2016). Of relevance to the current study is the notion that by preparing and performing a presentation using digital technology, the subject content is transformed and represented by the student teacher.

The T-PCK concept supports the idea that knowledge of the affordances and constraints of the technology is essential for the teacher to appreciate the pedagogical and representational potential afforded by the technology. T-PCK underscores the idea that teachers should be aware of digital presentation tools as a possible means for transforming and representing subject content.

### **1.1.5 Designs for learning**

In what follows, the LDS will be introduced as a starting point for conceptualising a presentation as a multimodal semiotic practice in the context of a technology-enriched classroom in teacher education. The LDS will be modified as a result of the findings of the current project, and the revised model will be presented in the results chapter. However, the starting point will be explained below because as a model, it is based on assumptions of epistemological character that connect with what is stated in the national curriculum on digital and communicative skills. In the current project, the model in its original state is transferred to teacher education settings as a tool for analysis. The application of the model in the current setting is based on the notion that on campus, the student teachers *are learners of teaching* and hence take the learner's role in the model.

Before the model is introduced, some remarks will be made regarding what ontological and epistemological paradigm it adheres to. The perspective of designs for learning will be introduced along with the premises for this theory, which is grounded in social semiotics and the sociocultural perspective.

### **1.1.6 Social semiotics**

Social semiotics is an iteration of the semiotics field and investigates human's sign-making activities in social and cultural settings. The main task of social semiotics is



to develop analytical and theoretical frameworks that can explain meaning making in a social context (Thibault, 1990). Its basic assumption is that meanings are derived from social action and interaction through the use of semiotic resources as tools. It stresses the agency of sign makers, focusing on modes and their affordances, as well as the social uses and needs these modes serve (Jewitt, Bezemer, & O'Halloran, 2016). Within social semiotics, language is considered to be more than verbal language. Other systems for meaning making are referred to as semiotic modes; a mode can be defined as 'a socially shaped and culturally given semiotic resource for making meaning' that has distinct 'affordances' (Kress, 2010, p. 79). Semiotic modes can be visual, verbal, written, gestural or musical resources that are used for communication.

Social semiotics integrates the social aspect in meaning making processes and is concerned with how social processes influence the codes of language: how did the sign makers use the modes available to them to represent the world? In the current case, the social contexts are classroom settings in teacher education, where meaning making is influenced by the social and institutional framing. The student teachers are sign makers who present the subject content for their peers and thereby make representations of an aspect of the 'world of education' by drawing on the modes available in the setting. The social environment shapes – directly and indirectly and with differing dynamics – the semiotic resources through which the social can become material (Kress & Bezemer, 2015, p. 143).

Designs for learning is situated between social semiotics and sociocultural theory. Social semiotics is not first and foremost concerned with theories of learning but rather with the communicative process and how communication can be conceived of as making and interpreting meaning when using various semiotic resources. The sociocultural theory supplies the social semiotic perspective with dimensions such as the framing and contextualisation of communication situations and a view of the role cultural artefacts have in communication and learning. Designs for learning builds on and further develops the established approaches from within sociocultural theory and practices of sign making (Selander, 2008).

Designs for learning view knowing and learning as linked to the individual's production and expression of meaning through utilising semiotic resources. The concept of *understanding* is related to the ability to use the available signs and to make new combinations of signs. The learner's ability to make a representation of one's understanding is central here:

The concept of 'Designs for Learning' highlights the material and temporal conditions for learning as well as the learning activity itself. The use of modes and media in processes of interpretation and identity construction is here central for understanding learning activities. Learning is thus seen as an activity where signs in different media (information) are elaborated, and where the forming of new signs in new media (re-configuration and re-contextualization) takes place. (Selander, 2008, s.12)

From the perspective of designs for learning, being able to communicate through semiotic resources is a key point, and there is no understanding beyond symbols. To understand, then, is being able to express one's understanding through one or more established semiotic modes. *Knowledge (knowing)* is defined as the ability to use one or more established semiotic modes, i.e. the verbal language, to participate in the world in a meaningful way. *Learning* is viewed as the process of increasing one's ability to use signs and symbols to participate in various situations in a meaningful way (Selander & Kress, 2010).

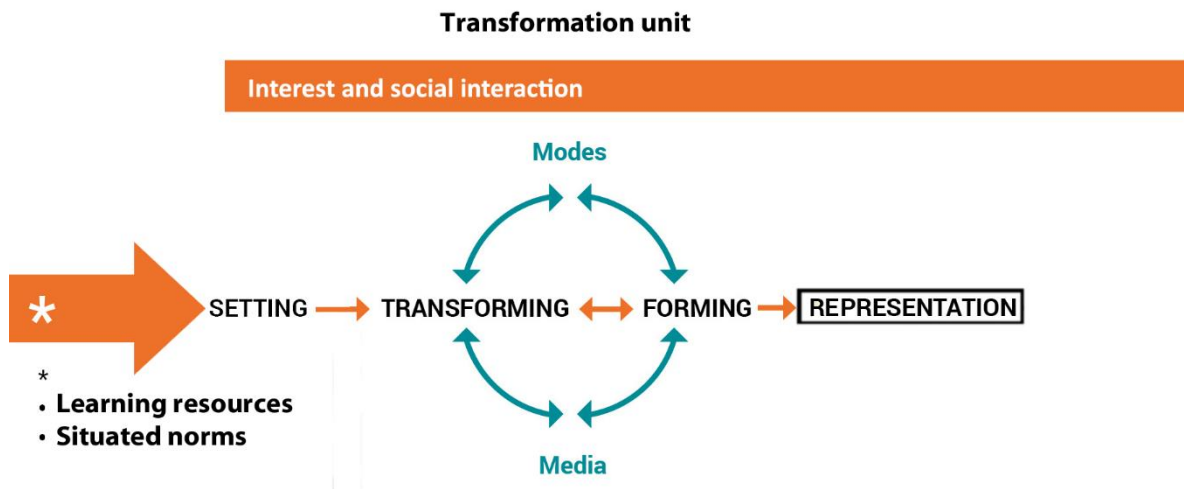
The term *knowledge representations* refers to symbolic systems, i.e. a picture or a model that represents certain aspects of a given phenomenon. Knowledge representations are never neutral and complete images of the topics they represent but are always reduced models of complex processes (Kempe & West, 2010). In school, the symbolic representation is in focus rather than what is being represented (Osberg & Biesta, 2003; Unsworth, 2011). Various knowledge representations emphasise and communicate different aspects of the subject matter, affecting the conditions for meaning making in learning situations (Kempe & West, 2010, p. 74). Likewise, in the

current research, the student teachers made PowerPoint presentations function as means for representing knowledge.

As will become clearer below, the LDS depicts learning activities as being centred around the previously mentioned conceptions of *learning, knowledge and knowing*. At the heart of the model is the representation, which emphasises the epistemological position that sees learners as makers of knowledge representations, which are their individual remaking of aspects of the world that are guided by their situational interest in the given learning context (Kress, 2010). These properties of the model will be transferred to and adapted to settings in teacher education where the presentation occurs.

### **1.1.7 Learning design sequences**

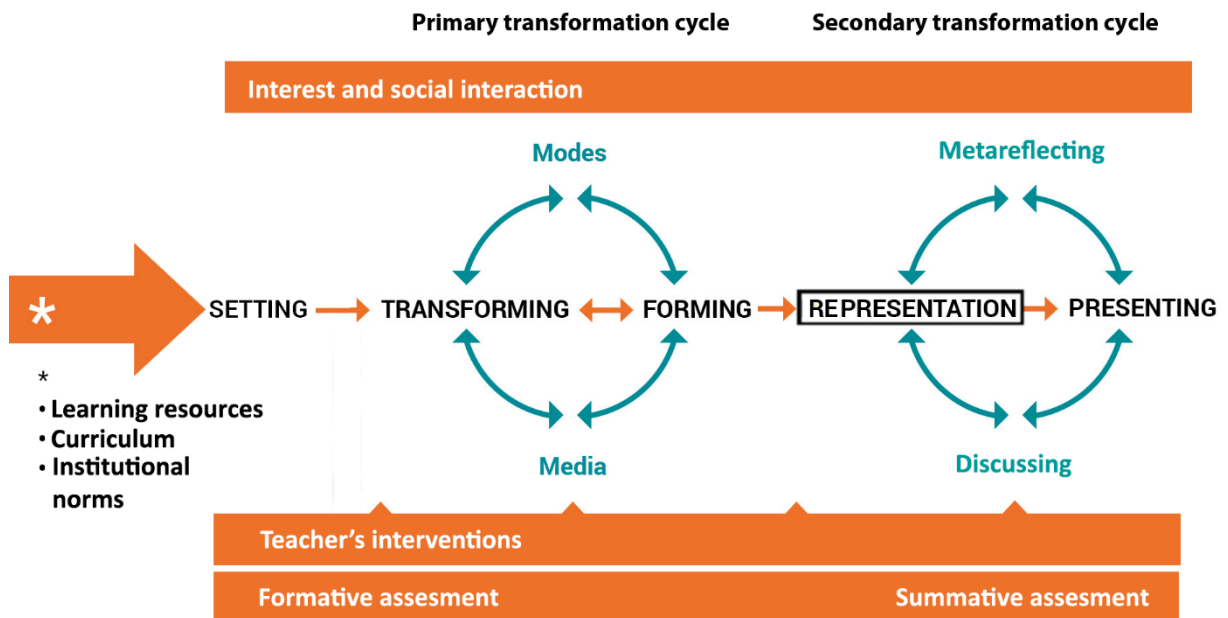
The model for learning sequences was originally made to identify the critical stages in a creative learning process where meaning making takes place. The models below illustrate learning processes manifested in an informal situation and thereafter as a scene in a formal learning process. In its simplest form, the main principles are present: the starting point is a situation grounded in a social context, and it is governed by social norms where a set of semiotic resources are available. Everyday situations, where the purpose of the action is not explicitly stated, can exemplify this model.



### *Ill. 1. Informal LDS (Selander, 2008)*

An informal situation can be exemplified by a person asking for directions to his or her destination. The modes available are the spoken language and gestural devices, that is, pointing. A response to a question can be articulated by language and gestures, a multimodal ensemble, which – when articulated together – represent the direction which may lead the person asking to his or her destination.

As expressed in a formal teaching setting, the formal LDS (below) is introduced and initiated by the teacher. The sequence is influenced by the formal goals for achievement, institutional norms and predesigned learning resources, i.e. PowerPoint. The learning process, which consists of transforming and forming the subject content by using semiotic resources, is enclosed in assessment and evaluation routines. The learning process is oriented towards making new forms of representation, such as graphic displays, essays, a presentation or a musical performance. In addition to letting the students express their understanding in terms of a *representation*, the model includes *presentation* as an activity that encompasses sharing the representation with peer students and the teacher and experiencing a meta-reflection on the learning outcome.



### Ill. 2. Formal LDS (Selander, 2008)

Data for the current PhD study were collected by video recording student teachers' *presentations* for their peers in classrooms on campus; this was scheduled based on the term plans. These settings correspond to the secondary transformation cycle in the model above. The presentations are the outcome of the assignments on various topics that were made by the subject teachers. *Representations*, in these cases, are the digital artefacts: PowerPoint slides, which the students have *produced* based on transforming the source material, such as experiences from practicum, chapters from a book on classroom management, a novel or their own lesson plans for instructing music in practicum. The semiotic software (Zhao et al., 2014), PowerPoint, affords users access to modes such as text and the possibility to place images and graphics spatially in the layout, embedding sound and video and other media forms.

The presenter *communicates* through speech, but also through gesture, such as pointing, thus highlighting certain elements of a densely populated visual

representation. The presentation event is reflected in the model above as the second transformation cycle, where the subject teachers observe and assess the student's performance. A dialogue among the presenter, subject teacher and peer students facilitates meta-reflection on the learning outcome of the assignment.

The LDS encompasses ideas of learning and teaching as ways to facilitate sign making processes, which are perspectives used to support the current research project. The concept of didactic design captures how social processes can be shaped and can then support the conditions for learning and for how individuals can redesign information through processes of meaning making. Students' sharing of information by presenting it is an example of a didactic design used by subject teachers in teacher education.

*Framing* is a concept linked to the idea of designs *for* learning and incorporates physical and psychological contextual resources, such as institutional norms, habits of mind, sanctions and patterns. The semiotic resources at hand in terms of sign systems and that are available for meaning making are also to be considered part of the framing of the situation. The organisation of the framing affects how one can work, what information is available and what kind of representation is possible for the student to make. In the current setting, the *framing* demarcates what is to be presented by the students in terms of a specific assignment formulated by the subject teachers. To some extent, the semiotic resources are limited by the habitual norms of presenting using PowerPoint, which often is reduced to text and images accompanied by speech. However, some informants of the current project challenged this functional fixedness (German & Barrett, 2005) and introduced their presentations with by performing a role play, which draws on spatial organisation, proximity and spoken language; yet others recorded their own video and embedded this as the mode of moving images in their PowerPoint slides.

An important aspect of this matter is the *staging* of an activity, which refers to how a particular situation is arranged, how activities are initiated and what norms and expectations are actualised in the situation. The aim and purpose of a learning

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sequence can be expressed explicitly through curricula, but it may also be implicitly expressed through conventions and culturally inherited expectations (Selander & Kress, 2010b). As will be shown below, the current PhD study further develops the idea of staging as an aspect of the very performance of a presentation, that is, the representation of the subject content in action.

Whereas the staging draws attention to how a teacher acts to realise the design of a learning sequence, the present study draws attention to how staging also may encompass the actions of the person who performs a presentation. Therefore, the current study has developed the conceptions of *performing* the *performed* (van Leeuwen, 2016) as theoretical devices that can address how a semiotic artefact (constructed in the first transformation cycle), that is PowerPoint slides, are being performed for an audience in the second transformation cycle. Whereas the original LDS depicts a presentation as a unidirectional process where a student's presentation is subject to being assessed and commented upon, the current study sees *staging* as a term that directs attention towards the actions that unfold during presentation and the multimodal interplay that occurs between the performer and the performed PowerPoint slide. This also acknowledges that no two persons would have articulated in the same way a common set of PowerPoint slides. *Staging*, therefore, invites the researcher to explore the concept of performance as a way of scrutinising the very action that unfolds in the LDS's second transformation cycle. The current PhD study looks to performance studies (Carlson, 2017; Schechner, 2017) to seek knowledge on the ongoing action that takes place during presentations as the presenter performs the performed slides. As will be outlined below, several key concepts of designs for learning, such as framing and staging, find their counterparts in performance studies. Therefore, the inclusion of perspectives offered by performance studies may broaden the value of the LDS as a model representing the artefacts, actions and activities that unfold in the classroom in teacher education.

### **1.1.8 Performativity**

The first article of the current project builds on the notion of presentation as a process that involves performing the slides prior to their performance. As it is used in the

article, the concept of performance does not go beyond a colloquial usage. There are, however, important aspects developed in the field of performance studies that can bring about a deeper understanding of presentation as a performative activity and thereby validate the use of the term, as follows:

A performance studies scholar examines texts, architecture, visual arts, or any other item or artefact of art or culture not in themselves, but as players in ongoing relationships, that is, ‘as’ performances. (...) Briefly put, whatever is being studied is regarded as practices, events, and behaviours, not as ‘objects’ or ‘things’. This quality of ‘liveness’ – even when dealing with media or archival materials – is at the heart of performance studies. (Schechner, 2017, p. 4)

In the first article of the current PhD study, the amended LDS is introduced to the reader. The LDS models learning activities that are situated in an educational environment, in this case, in teacher education. The lesson wherein the presentation takes place is referred to as the ‘setting’. In the first article, the settings observed are described in terms of what artefacts for teaching are present, such as the lectern, the projector and screen, and in terms of the seating arrangement that positions the peer audience close to the presenter, much in the same fashion an audience would be placed in a semicircle to interact with a performing artist. This type of setting can be described in terms of its objects and entities and its spatial arrangements; it can also be described in terms of its temporal qualities, that is, how events are organised in time. Clearly, a lesson can be identified by having a beginning whereby its participants – both presenters and their audience – are summoned to a class at a particular time. However, the performances that take place in educational settings are no elaborate theatre plays with detailed stage plots and written parts rehearsed by heart; rather, the metaphorical use of *performance* is done deliberately to capture its fluid and flexible properties.

Goffman (2002) pioneered research in ‘social drama’ to contrast the concept of ‘aesthetic drama’ and looked at how social mechanisms organised settings outside the



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theatre sphere. He defined performance as ‘all the activity of an individual which occurs during a period marked by his continuous presence before a particular set of observers and which has some influence on the observers’ (Goffman, 2002, p. 22). For a start, this definition may suffice in anchoring the educational practice of presenting within the domain of performance studies. The presenter has a continuous presence in front of the audience, and in terms of influence, this may refer to the learning outcome that is the implicit aim of any presentation.

Within performance studies, the concept of *framing* has attained a central focus. A framing arrangement, according to Goffman (2002), is what places a circumscribed sequence of activity before persons in an ‘audience’ role whose duty it is to observe at length the activities of the ‘performers’ without directly participating in those activities (Carson, 2017, p. 36). Transferred to the domain of education, framing arrangements are the layout of the classrooms which places the presenter up front before the audience. The teaching resources, such as the digital infrastructure, support in performing the activities. As mentioned above, by default, the seating arrangements are set to focus the learners’ attention towards the presenter.

The notion of framing also carries with it a notion of what is performed and its relationship to ‘normal life’. Here, a frame is an organising principle for setting apart social events from the ‘untransformed reality’, which is a similar event that would be outside the frame (Carson, 2017, p. 36). The framing arrangement thus serves to put an event that otherwise resembles real life into the realm of fiction, becoming ‘uplifted to the view’ or ostended (Carson, 2017, p. 37). Hence, performance resembles some pieces of normal life, but by means of framing the arrangements, the performer and audience agree that what takes place is not reality itself; rather, performance is a *representation* of reality or a version there of. This dichotomy between reality on the one hand and ‘reality represented’ on the other hand is dealt with thoroughly in the current research project, and it is explored in the third article, which departs from Biesta’s observation of how schooling relies on a representational epistemology (Osberg & Biesta, 2003), one where the ‘outside world’ is represented in the classroom. On an ontological level, performances and education share a

relationship with reality in that what is staged in front of the spectator is a *representation* of aspects of the world, not reality itself.

This reference to performance studies contributes to deepening the understanding of the concept of the performance of the preformed, which are the labels used to describe what takes place in the first and second transformation units of the revised model of the LDS. Performance studies have attributed meaning to the social setting and the contextual framework, which echoes how the social semiotic theory sees the act of meaning making in relation to circumstantial conditions. Here, performativity may contribute to understanding the notion of schooling based on a representative epistemology in that performance theories see performance as a representative form of expression. Hence, the performance theory offers some perspectives across all three research designs of the current research project.

## 2. Research questions (RQ)

The overarching main question of the PhD thesis is formulated to provide a meta-perspective on the entire research project. The main question is relevant to each individual article because it contextualises the findings as pertinent to investigating teachers' professional knowledge. Yet at the same time, the question functions as an overarching question, here viewing all three articles as an effort to illuminate one single issue: understanding presentation as a learning activity situated in teacher education. *How can student-led presentations that are supported by semiotic technology be understood as a learning activity in teacher education?*

Table 1 displays the research questions and the corresponding titles of the published materials, along with the overall research question and how the three articles – referring to their titles and research questions – are designed to respond to this.

<i>OVERALL RESEARCH QUESTION:</i>		
<i>How can student-led presentations that are supported by semiotic technology be understood as a learning activity in teacher education?</i>		
<i>STUDY 1 (TITLE &amp; RQ)</i>	<i>STUDY 2 (TITLE &amp; RQ)</i>	<i>STUDY 3 (TITLE &amp; RQ)</i>
<i>Performing the preformed: Towards a conceptual framework for understanding teaching as a curricular transformation</i>	<i>'Playin' the changes'— A jazz approach to researching student teachers' PowerPoint presentations</i>	<i>Teaching represented: A study of student teachers' representations of the professional practice of teaching</i>
How can the multimodal and dynamic interplay between the student teacher and the digital representation of the	How does improvisation materialise in the multimodal interplay between the preformed curricular items and the	What epistemological positions can be inferred from the student teachers' own representations

curricula be analysed, described and understood?	performer in student-led presentations in teacher education?	of professional teacher knowledge as experienced on campus and in practicum?
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Table 1. Research questions

The first study is designed to develop a framework that allows the researcher to capture the processes, entities and artefacts at the observed settings. The question is formulated to reflect the theoretical stance that of designs for learning, which is the theoretical foundation of the LDS. The output of the study is an amended version of the LDS that will be referred to as the analytical framework for the two subsequent articles. The research question of the first study reads as follows: *How can the multimodal and dynamic interplay between the student teacher and digital representation of curricula be analysed, described and understood?*

The second study evolves from the revision of the LDS model from the first study, which establishes that presentations feature the characteristics of performativity; a framework, which is represented by the *performed* slides, and the transformation of these by the student teacher during their *performance*. The exploration of the construct of improvisation in the settings under scrutiny can be justified as follows: *How does improvisation materialise in the multimodal interplay between the performed curricular items and the performer in student-led presentations in teacher education?*

The amended LDS from the first study features a table that suggests at what level inferences can be made; this is done by applying the LDS to learning activities such as presentation. The first level is that of *description* and supports – as exemplified in the first article – describing the presentation as a multimodal event featuring semiotic technology. The next level of making inferences is that of *interpretation*. This approach is applied in the second article, which interprets presentation as the *performance* of the *performed*; the data are analysed as an expression of an improvisational practice. The final level of making inferences is the *curricular* level.

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In the third substudy, the attention is hence directed at the very material that is subject to presentation. Departing from the discourse on the ‘gap’ that students perceive as existing between the knowledge disseminated on campus and that required in practicum, the third study analyses student teachers’ reflexive accounts from practicum and their presentations of the chapters from a handbook in classroom management. A ‘knowledge landscape’ (Burnett, 2006; Clandinin & Connelly, 1998) is drawn, here reflecting the epistemological positions that are implicit in the student-made representations of professional knowledge. Thus, the curricular level of the analytical framework is captured by the theme of ‘teacher’s professional knowledge’ as represented by student teachers in their reports. The research question of the third study reads as follows: *What epistemological positions can be inferred from the student teachers’ own representations of professional teacher knowledge as experienced on campus and in practicum?*

A common feature of the research questions is that they reflect the theoretical and methodological design of each substudy. This may support the coherence and integrity of the design and the actual research activities when they are conducted, and it may aid the researcher in seeing the overall structure, which connects the analysis with the theoretical foundation on which the research has been grounded. Each of the research questions reflects the particular field and settings subject to scrutiny (Agee, 2009). The theoretical framework is reflected in the formulation of each question to aid in defining the cases and what parameters to emphasise (Yin, 2003) within the methodological framework.

### **3. The epistemology of practice – a case for improvisation as a teaching skill that negotiates the space between the preformed and the performed**

The current research project approaches presentation as a phenomenon in which knowledge is instantiated in action because of the transformation of subject content that the presenter undertakes by preforming and performing it. Knowledge representations are instantiated in action as multimodal ensembles, here combining the semiotic resources afforded by the presentation software and the presenter's embodied resources, such as speech and gesture. These qualities align the presentation with that of performance, particularly because the semiotic artefacts are parts of ongoing relationships and thereby attain a sense of 'liveness' (Schechner, 2017). The following section will recapitulate seminal literature on the professional knowledge on which teachers draw, a knowledge that is embedded in their practice. The aim of recapitulating the literature is to investigate if the 'liveness' of a presentation has common features with aspects already described by scholars as characteristic of teachers' professional practical knowledge. If it does, the current PhD project may contribute to the existing understanding of teachers' particular professional knowledge, which here would be PCK exercised in action by transforming and representing the subject content.

This section begins by exploring the views on the relationship between domain-specific scientific theory and the corresponding *practice* within the profession. These discussions tend to depart from the epistemological assumption that the solution to good practice lies in conceptualising a reflective relation between theory and practice (van Manen, 2008); however, as the literature referred to below has indicated, not all aspects of practice can be related to the operationalisation of a core scientific theory.

Donald Schön critiqued the prevailing view of his time on technical rationality and its corresponding view on competent practice as 'application of knowledge to instrumental decisions' (1992). He claimed that in certain circumstances,

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competencies considered to be central to professional practice have no place in the underlying models of professional knowledge. The ‘indeterminate zones’ of practice prove to be resistant to readily accessible solutions derived from theory; hence, this calls for a rethinking of what might constitute professional knowledge. Schön presented the terms ‘knowing-in-action’ and ‘reflection-in-action’ to capture the tacit knowledge embedded in action and to provide a new focus regarding the on-the-spot decision making of professional practitioners. To contrast the rational application of scientific knowledge, Schön introduced ‘professional artistry’ as a metaphor to mirror the reflection-in-action embedded in practice. By nature, artistry cannot be reduced to the exercise of describable routines and is hence tied to acknowledgement of the indeterminacy of the world and the failure of a paradigm rooted in technical rationality (Kinsella, 2010).

The critique raised by Elliott Eisner somewhat echoed that of Donald Schön’s. Eisner wished to re-establish the legitimacy of the art and craft of teaching to respond to the scientific heritage that influences the educational policies of his time: that of the general methodologies of the social sciences applied to the specifics of education and the positivistic approach inherited from Thorndike’s stimulus-response school. Eisner’s view on teaching as an art stemmed from his presumptions that no science of teaching can reduce the practice of teaching to routines and that the classroom is a dynamic enterprise that requires the teacher to be able to read the dynamic structures of signification that occur in these settings (Eisner, 1983).

Max van Manen agreed with the view that the dynamics and challenges of the classroom call for a different understanding of the teacher’s practical knowledge. However, he claimed that the conception of the teacher as a reflective practitioner and the knowledge-in-action models ‘suffer from practical flaws’ in that it fails to capture the interactive reality of the classroom (van Manen, 1995; van Manen, 2008). He developed the ‘pedagogical tact’ notion 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, 1986). His conception of tact encompasses a critique of the notion of reflection-in-action in that

he claimed ‘what teachers do is not first of all reflectively reasoned thought translated into action. Rather, action itself already constitutes a type of knowledge that cannot always be translated back into propositional statements or cognitive theories’ (van Manen, 2008, p. 17). Tact is in *its very practice* a kind of knowing.

### 3.1 Improvisation as professional skill

Extending the discourse on the nature of teachers’ professional knowledge and expertise, educational researchers have explored the applicability of the concept of *improvisation* to educational settings. A fuller understanding of what this particular concept may mean can first be found by looking at common definitions of improvisation and, second, by looking at improvisation as a metaphor and on which properties of the metaphor scholars have attempted to transfer from the domains of jazz and theatre to understand the domain of education.

Improvisation is often associated with an unprepared response to a given situation. Dictionaries have promoted this understanding of the term. Merriam-Webster defined the verb to improvise as ‘to speak or perform without preparation’ (2004). The Oxford dictionary offered a similar definition: ‘to create and perform (music, drama, or verse) spontaneously or without preparation’ (Pearsall, 2003). The Latin root of improvisation is *improvisus*, or unforeseen or unprepared.

Improvisation carries its domain-specific interpretations and is an inherent feature of jazz music. However, contrary to the quotes from these dictionaries, in his landmark book *Thinking in Jazz*, ethnomusicologist Paul Berliner (1994) claimed that the popular conception of improvisation as ‘performance without previous preparation’ is fundamentally misleading. His study showed that there is ‘a lifetime of preparation and knowledge behind every idea that an improviser performs’. Berliner’s definition of improvisation in jazz music reads as follows: ‘Improvisation involves reworking precomposed material and designs in relation to unanticipated ideas conceived, shaped, and transformed under the special conditions of performance, thereby adding unique features to every creation’ (Berliner, 1994, p. 241).



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The Norwegian scholar and jazz musician Bjørn Alterhaug acknowledged that there is a common perception of improvisation as resorting to plan 'B' if everything else fails. However, in his own research on improvisational practices, he pursued a definition that considers Berliner's remark, and Alterhaug 'recognises that successful, creative improvisation is dependent on preparation and training as fundamental factors in spontaneous and intuitive action' (2004).

A close reading of educational researchers Beghetto and Kaufman's definition of improvisation can show that they have modified Berliner's definition to fit with the domain of education: 'Disciplined improvisation in teaching for creativity 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' (Beghetto & Kaufman, 2011, p. 96). Their use of the term *disciplined improvisation* (Sawyer, 2004; Sawyer, 2011) reflects that the improvisational activities occur within structures and frameworks represented by 'curriculum as planned'. The term *disciplined improvisation* also denotes an expert criterion: 'they have mastered the knowledge base of expertise identified by these scholars, and at the same time, they know how to apply this expertise in improvisational practice' (Sawyer, 2011, p. 9).

### 3.2 The jazz metaphor

Within the literature on improvisation in educational contexts, scholars have commonly drawn on the features of the improvisation metaphor as found in the arts, in particular jazz improvisation and improvised theatre. The use of a metaphor is a legitimate approach in exploring a field because 'a memorable metaphor has the power to bring two separate domains into cognitive and emotional relation by using language directly appropriate to the one as a lens for seeing the other' (Black, 1962, p. 236). Alfonso Montouri acknowledged the link between improvisation and the lived experiences of complexity and sought to challenge the norms of the social sciences in his use of the improvisation metaphor: 'As I use it here, it is a musical metaphor, and therefore brings in all the elements from the arts that were successfully

avoided by the social sciences' (Montuori, 2003). Montuori served as a pivotal figure in that he brought the theme of art and artistry – the opposite of technical rationality – into the discussion on the relationship between theory and practice, thus advocating for the inclusion of the term improvisation in the discourse on the epistemology of practice.

In his controversial 1958 article in which he debated the emerging styles of modern jazz, Gunther Schuller described modern jazz improvisation as a 'melodic-rhythmic extemporaneous composing process in which the sole organising determinant was the underlying chord pattern' (Schuller, 1958). Such notions of jazz improvisation as being derived from organising principles later inspired the metaphorical interpretation among scholars of improvisation, who began to see improvisation as taking place within structures and frameworks. This is also exemplified by Schön, who described the structure underlying improvisation as 'a shared schema of meter, melody, and harmony that gives the piece a predictable order' (Schön, 1992, p. 13). Berliner remarked that a quality of creative improvisation is the generation of the unpredictable, the unusual, the unforeseen, within preexisting structures of the song form, navigating the edge between innovation and tradition (Berliner, 1994). Likewise, Nicholas Sørensen noted that 'improvisations are determined by spontaneous and intuitive decisions arriving from the dynamic interplay between fixed and informal, generative structures' (Sørensen, 2015, p. 157). Hence, using the jazz metaphor to shed light on the nature of professional improvisation creates a foundation for understanding improvisation as an activity that occurs within preexisting structures.

### 3.3 Improvisation in education

However, the properties identified in jazz that are considered to be relevant for teaching seem to vary among scholars: the features that have been identified are the intuitive and improvisatory elements of performance and the relationships between rules, procedures, technique and performance (Humphreys & Hyland, 2002, p. 9). Others have emphasised creativity and interaction in group activities (Alterhaug,

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2004). Borko and Livingston (1989) underlined characteristics such as teachers' 'flexibility in their plans and their responsiveness to students during interactive teaching'.

From the established literature on teachers' professional knowledge, the PCK reflects the unique characteristics of the knowledge of the teaching profession, which consists of 'the blending of content and pedagogy into an understanding of how particular topics, problems or issues are organised, represented and adapted to the diverse interests and abilities of learners for instruction (Shulman, 1987, p. 8). As noted above, the improvisation metaphor is seen as pointing at the aspect of responsivity, being an asset that teachers should be in command of and that Sawyer outlined in his article on classroom discussion as a format that challenges the teachers' professional knowledge base. A high degree of PCK is required by the teacher to be able to respond to the unexpected student queries which occur during classroom interaction (Sawyer, 2004). The equivalent term of 'didaktik analysis' describes the preparatory work on the part of the teacher in analysing the fundamental principles and structures of the subject content and the way it can become comprehensible for the pupils of a given class. Klafki described the 'didaktik analysis' (Klafki, 1995) as draft in character because planning is the design of opportunities and possibilities for pupils and may give way to a wider interpretation of the improvisatory application of teacher expert knowledge. Loveless referred to how 'professional knowledge can express both the 'science' of careful design for learning and the 'art' of openness and improvisation in making connections within and between subject domains' (Loveless, 2007, p. 520).

A recent review article distinguished between literature concerned with the roots of improvisation and literature on the application of improvisation as a concept transferred to other contexts (Holdhus et al., 2016). By exploring improvisation as practised in the root traditions of rhetoric, music and theatre, common features were identified, such as how improvisation is inseparably linked to (a) communication and dialogues, (b) structure and design, (c) repertoire and (d) context (Holdhus et al., 2016).

Based on the findings of a pilot study, the investigators identified the typologies of improvisation in terms of how these typologies could be applied in educational settings: the typologies were derived from observations of the dialogical aspects of teaching, of the (re-)ordering of sequences of activities in response to circumstances and on the use of examples and activity forms in class (Mæland & Espeland, 2017). Others have assumed a different perspective, asking in-service teachers of their perceptions of improvisation as a teaching skill. Here, the respondents identified the same four base categories of the previously mentioned studies. However, there was a debate regarding the role of the improvising teacher regarding the structural demands in Norwegian school contexts, such as teachers' responsibility and accountability (Aadland, Espeland, & Arnesen, 2017). This latter study problematised the concept of improvisation in the context of teachers' space for agency in the age of accountability.

Compared with jazz and theatrical improvisation, improvisation in educational settings seems to be missing 'an explicitly held and deliberately taught body of knowledge about how to successfully improvise to accomplish the intended aims of the profession' (DeZutter, 2011, p. 29). Therefore, the current project borrows established concepts from the art of jazz improvisation to aid in researching the practice of presenting in teacher education. This is justified by acknowledging the analytical approach to jazz improvisation, which manifests in numerous method books and in accounts of jazz within musicology. Jazz improvisation resides within a framework of semicomposed materials and designs that are represented by lead sheets. Jazz musicians relate to the preformed elements and structures during their improvised musical performances. By sharing the fundamental property of *performing the preformed*, the concepts derived from the art of jazz improvisation may help in obtaining insights into the performative activity of presentation in education.

The second study in the current project conceptualises improvisation in educational settings by linking it to the transformation and reworking of subject content – as it occurs within the framework of the precomposed slides – which are called either

thick or thin according to their constituent properties. The notion of horizontal and vertical approaches differentiates the presenter's way of reworking the elements present on the projector screen. A vertical approach goes beyond these givens by elaborating, extending and augmenting what is already present, whereas a horizontal approach refers to how a presenter connects the givens, not by adding information, but rather by reading what is there and then making connections by linking together the elements present on the slide. In the current study, the concept of improvisation is thereby linked theoretically and empirically to the transformation and representation of the subject content and is as such an asset of the essential teaching skills as defined by Shulman (1986, 1987) in the PCK construct. Therefore, it is possible to argue that improvisation exists as a teaching skill that may enable the teacher to mediate the transformation and representation of subject content for the students in the classroom.

## **4. A rationale for adapting the LDS as an interpretative framework**

In the following section, the epistemic approach of the study will be clarified by using perspectives from the philosophy of science. A rationale will be provided for the use of the improvisation metaphor as a tool for illuminating the practice under scrutiny. Using the properties of improvisation within the arts as a root metaphor, aspects of the practice of presentation can be addressed for investigation. The limitations of the power of metaphors will be discussed, and an argument for establishing a theoretical construct in terms of the LDS model will be brought forward.

### **4.1 Of hermeneutics**

The current study bears the characteristics of hermeneutics in that it is concerned with interpretation and bringing clarity to a phenomenon that suffers from a lack of understanding (Taylor, 1998). However, contrary to the origin of hermeneutics, which dealt with the interpretation of text, the current project focuses on the interpretation of human behaviour in a specific context; the outcome of the study will be an interpretation that may yield a new understanding of a phenomenon thought to be prevalent in educational practice: that of the transformation and representation of the subject content through improvisation.

A challenge of modern hermeneutic science is preunderstanding and the way an interpretation may be biased by a preconceived perception of what meaning is embedded in the object of study, either it being in a text or set of actions. Therefore, it is necessary to problematise the concept of improvisation as a preconceived understanding of what is going on in the events that are subject to observation.

Gadamer (2004b) referred to how Heidegger acknowledged that ‘interpretation begins with fore-conceptions that are replaced by more suitable ones. This constant

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process of new projection constitutes the movement of understanding and interpretation' (p. 280). Any research project will have a starting point regarding the definition, and narrowing down, of its field of research. This starting point may in turn rest on presuppositions and a fore-understanding regarding how that field can be considered a researchable object in itself. To formulate research questions, the researcher may possess a minimum set of presuppositions to direct the focus of a study towards a particular set of entities of the world. *Improvisation* is a theme carried over from the aim and intentions of the overarching research project and should be addressed as a fore-conception of what is going on in the settings observed.

Gadamer, extending the tradition of Heidegger, spoke of the importance of being conscious of one's own prejudices and fore-meaning: 'The important thing is to be aware of one's own bias, so that the text can present itself in all its otherness and thus assert its own truth against one's own fore-meanings' (2004a, p. 282). In the context of the current study, Gadamer (2004a) can be read as suggesting that the researcher should strive to obtain an awareness of the meaning of the object in itself to balance the preconceived understanding that the researcher carries into the field. The researcher should hence foreground the appropriation of fore-meanings and prejudice and be open to an object's alterity. This meta-perspective may describe what Gadamer called the 'hermeneutically trained consciousness' (Gadamer, 2004a, p. 282).

So how can the current research project see beyond the concept of improvisation and allow for a nonbiased interpretation of the field subject to observation? Below, Charles Taylor's criteria for the science of man will be used as a lens for approaching the field of this study. Taylor's perspective will be used in an attempt to separate the conception of improvisation from the observable indicators that are manifested in the field:

*There are, to remind ourselves, three characteristics that the object of a science of interpretation has: it must have sense or coherence; this must be*

*distinguishable from its expression, and this sense must be for a subject.*

(Taylor, 1998, p. 13)

The first response to the quotation above is to establish to what extent there is coherence in the studied field. In principle, this has to do with perceiving the object of study as something that is only partially understood, unclear and cloudy and that requires a researcher's effort to bring to light 'the underlying coherence or sense' (Taylor, 1998, p. 3). In the current project, the language used for the initial description of the field should hence avoid using terms suggesting preunderstanding, such as *improvisation*. Rather, the field should be considered as an established set of activities that are common across institutions in teacher education, of which there are aspects that are unclear. An initial aim would be to question the fuzzy parts of the practice and problematise the relationship between the teacher student's articulation of topics and the co-present series of slides.

On the other hand, there are aspects of this practice that seem to be comprehensible when looking at them with common sense; the practice of peer teaching is prompted by compulsory assignments given by subject teachers in higher education. There are likely to be certain social conventions at play and expectations to be met that guide the practice of the students in action, as well as the practice of the peer students watching. There is likely to be a pedagogical purpose that justifies the events taking place in teacher education, that is, the aim of preparing the students of a practice that is relevant for their future profession. A researcher's initial approach to the field would hence be to acknowledge the recognisable properties of the practice, along with the less obvious ones, and thus claim a partial coherence of the object of study.

Taylor's second parameter is that the object of science must be separable from its expression; it must be possible to draw a distinction between the meaning and its expression (Taylor, 1998, p. 5). Taylor used the term 'signifiers', echoing the theories on semiotics formulated by Saussure, when referring to the indicators or observable aspects of a research object. It should be mentioned that according to Saussure, a sign carries two dimensions – signifier and the signified – a sign's expression and its



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meaning, and this relationship is arbitrary (Saussure, 1974). There are only conventions in culture that give a word its semantic meaning. The word ‘cat’ is given its meaning by its use, not by any properties of the sound or letters. There is no natural sign where meaning is given by the sign itself, according to Saussure. When transferred to the settings of this project, this dualism may shed light on the relationship between the perceivable expressions made by students in their context as ‘signifiers’: their actions, talk, gestures and gaze, and the external concept believed to take place, that of improvisation, which is an activity and a verb that may be regarded as ‘the signified’ indirectly through the observable actions.

## 4.2 Improvisation – a metaphor?

Having established that there is a distinction between the object of study and its expression, connecting the ideas of the two philosophers Charles Taylor and Max Black can make for a deeper understanding. Black (1962) described how metaphors may aid in understanding a field of research. The purpose of bringing in a metaphor to the science of interpretation is to derive meaning or to transfer properties of the metaphor to the field of exploration to ‘see a new subject matter in a new way’ (Black, 1962, p. 236). One condition for being able to speak of a phenomenon in terms of metaphor is that there must be a distinction between an object and its expression. Otherwise, a metaphor could not shed light on other domains than itself.

A consequence of the reasoning above is that the object of study for the current research project is not *improvisation* or *improvisational* practice; rather, the object of study is student teachers’ use of presentation technology when teaching their peers. The purpose of bringing in the concept of improvisation is then because of its quality as a metaphor. The *concept of improvisation becomes the metaphor*, and its properties may help the researcher describe the identifiable features of the field of study.

Black (1962) introduced Pepper’s concept of ‘root metaphors’ (Pepper, 1942), which helps in understanding one area in terms of another one. The original area, that of improvisation, becomes the basic analogy or root metaphor for understanding

students' approaches to the subject content using semiotic technology. To apply the concept of a root metaphor to this project, the next step would be to define a list of structural characteristics of improvisation that will serve the description and explanation of the target field under scrutiny. The list is the basis for a set of categories that serves in analysing the field of study by relating the facts or observable indicators to the compilation of categories. For the purpose of clarification and to push the ontological basis of the current study forward, it may be helpful to perform the exercise of looking at improvisation as a metaphor and what categories it may yield.

Whereas the idiom of the swing era from the 1930s focused on the melodic aspects of the composition underlying a jazz performance, the be-bop style that emerged in the 1940s and 1950s required the musicians to attend to the harmonic structure of the composition, often referred to as the chord changes or simply 'changes'. This new approach is referred to as vertical playing, as opposed to the horizontal, melodic playing of the swing era. Approaching improvisation vertically, the soloist derives the melodic material from the underlying harmonic structures of the composition. Several method books have approached jazz improvisation analytically from the vertical perspective (Bjørklund, 1983; Kruse, 1980; Levine, 1989). Jazz, when in the style of be-bop and subsequent contemporary styles, indicates how the improvisation may be guided by underlying structures, and the interpretation of the structures requires a certain body of domain-specific knowledge.

In other words, by using jazz improvisation as a metaphor, it is possible to transfer improvisation as an *informed, creative activity that takes place within structures and frameworks* to other domains. If education is the target field of the improvisation metaphor, the equivalent properties of the root metaphor must be possible to identify and interpret the target domain as improvisational.

Professor Keith Sawyer has been a leading voice in recent years' exploration of what improvisation may mean in educational settings. Of particular relevance to treating improvisation as a root metaphor are Sawyer's parallel observations that 'excellent

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teaching is disciplined improvisation, because it always occurs within broad structures and frameworks' (Sawyer, 2011). The property of improvisation as something that occurs in relation to structures and frameworks captures the essence of improvisational performance in educational settings, as well as in jazz performances, and may serve as one category of many describing improvisation as a metaphor.

Black did, however, stress the limitation of what inferences can be drawn from such a set of categories derived from a metaphor:

You need only proverbial knowledge, as it were, to have your metaphor understood; but the maker of a scientific model must have prior control of a well-knit scientific theory if he is to do more than hang an attractive picture on an algebraic formula. Systematic complexity of the source of the model and capacity for analogical development are of essence. (1962, p. 239)

This calls for a further exploration of the relationship between a concept external to the object of research and the indicators that may be observed in the field. A model is called for, and in the case of the current research project, the LDS and its amended version serve to contextualise the phenomena of improvisation beyond a metaphorical understanding. Given that the first study of the current project addresses the use and adaptation of an existing model, the first article of the thesis represents a disclosure of how, within the current research context, the adaptation of a model has proceeded. The amended LDS will be presented in the results section.

Departing from the discussion of some of the foundational issues pertaining to the epistemic base of the current research project, the next section will elaborate on the project's methodological approach. Although there are overall shared premises across all three substudies, such as the use of the revised LDS developed in the first study for an analytical framework, each substudy will be attended to separately to bring about clarity to their specific research methods. In particular, the collection and analysis of the data will be addressed across the three substudies.

## 5. Methodology

The research design is based on what will be studied. As outlined earlier in the text, the phenomena of interest are the transformation and representation of subject content as conducted by student teachers in the context of teacher education. Based on theoretical assumptions, the events where student-led presentations occur are considered as exhibiting various aspects of the skills and knowledge pertaining to the teaching profession; these are subject to exploration according to the research questions posed in each of the articles.

### 5.1 Case study design

The research project aligns itself with what characterises the case studies; it deals with investigating ‘processes, and to gain insight into and in-depth understanding of an individual, group, or situation’ (Lodico, Spaulding, & Voegtle, 2006, p. 269). The hallmark of a case study is the desire to study phenomena within their context ‘to provide an analysis of the context and processes which illuminate the theoretical issues being studied’ (Hartley, 2004, p. 323). Each session attended, where students perform their presentations for their peers, is considered as featuring the phenomena that are subject to research attention. The settings observed represent multiple instances of the case that is subject to exploration. The case itself is hence not a physical object; rather, the case is constituted by the action and events that unfolds within the delineations and confinements of the class, the classroom and the temporal beginning and end of the session within which the presentations performed by the student teachers take place.

A case study can be considered a strategy for collecting data, not a method in itself. According to Stake, a ‘case study is not a methodological choice but a choice of what is to be studied. By whatever methods, we chose to study the case’ (2000, p. 435). In the current research context, the events to be studied are the student-led communicative events taking place in higher education classrooms. Accordingly, the

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methods for collecting data have been appropriated from a multimodal methodology. These methods, which are rooted in a social semiotic multimodal approach towards meaning making, are the use of video for collecting multimodal data, the multimodal transcription of video data and the application and adaptation of an analytical framework grounded in a social semiotic approach to communication and meaning making.

Stake (1995) described a case as instrumental when ‘a case is examined mainly to provide insight into an issue or to redraw a generalisation’ (Denzin & Lincoln, 2005, p. 445). The case here is presumed to be of secondary interest and plays a supportive role by facilitating the understanding of something else. In other words, the case is used as a means or anchor for the purpose of elucidating the other interest strewn within or about it (Njie & Asimiran, 2014, p. 37). This relationship between the indicators observed and phenomena expected to be represented in the setting, is discussed in the chapter above which investigates the premises of the study through the lens the philosophy of science.

From a critical point of view, case studies are considered as providing little basis for scientific generalisation; however, Yin (2014) argued that case studies, much like experimental studies, strive for generalisable findings that go beyond the settings of the specific case or experiment studied. Of relevance to the current project is Yin’s observation that the theory that went into the initial design of the study, which will be empirically enhanced by the case study’s findings, will have formed the groundwork for *analytic generalisation*. Analytical generalisation may be based on either: ‘(a) Corroborating, modifying, rejecting or otherwise advancing theoretical concepts that you referenced in designing your case study, or (be) new concepts that arose upon the completion of your case study’ (Yin, 2014, p. 41). In the current research project, the implementation and modification of the LDS may serve as an illustration for how the case study design is adhered to in terms of amending a model that supports an analytical generalisation of the findings. The two double matrixes that illustrate the findings of the second and third substudies support the idea of analytical generalisation in terms of developing new concepts summarised as graphical models.

## 5.2 Pilot study – multimodal presentations of a factual prose text

Yin (2003) recommended conducting a pilot case study as a final preparation for data collection. This will help to refine the data collection plans regarding both the content of the data and the procedures to be followed (Yin, 2003). A pilot study was carried out to watch the observable processes that are common in educational settings in initial teacher education, where digital artefacts are utilised as tools for transforming and representing subject content for pedagogical ends. The LDS (Selander & Kress, 2010) in its original form served as a referential theoretical framework for the processes expected to unfold. Three students of Norwegian as school subject prepared the individual multimodal presentations of an open-ended humorous prose text that debated the essay genre. The assignment required the students to select five passages from the text and transform each passage into a representation by utilising the semiotic resources available, such as the modes afforded by the presentation software of their choice and speech and gestural expressions during its performance. The students were made aware that the context of the pilot session would be an educational setting, and they were asked to make a deliberate choice between a dialogic approach and a monologue style for their presentations. The students were introduced to theory on multimodality earlier during the term and were expected to be sufficiently familiar with the theory to deliberately apply the concepts to this practical setting.

The student presentations were followed by a 45-minute semistructured group interview (Lodico et al., 2006). The group conversation followed a semistructured interview guide that was oriented towards the research questions of this PhD study. Interview questions were formulated to address the participants' views on the multimodal ensembles they had prepared, on the distribution of the information load across modalities and on the cohesion mechanisms at play during their presentations. The interview questions addressed the widespread practice of presenting the use of digital artefacts as a mode of teaching, and attention was given to the participants' own perceptions of what improvisational performance in such settings might mean.

The conversation was allowed to evolve in its own direction as the participants brought up relevant perspectives that expanded and supplemented the interview guide.

### 5.3 Structure vs. flexibility

The findings that were relevant for the current PhD project were first and foremost the comments and observations that addressed the concept of improvisation in didactic settings. The students' choices of preparing a manuscript for their presentations served as a meaningful entrance to this discussion. The students explained their choice of relying on the manuscript by referring to their problems when comprehending the source text. Normally, they would avoid using a detailed manuscript. However, one of the students departed from her script and spoke freely at times during her presentation. She commented on how her departing from the manuscript created less fluency and less cohesion because her new and spontaneous associations were incompatible with the content of her preformed structure displayed on the screen.

The students shared their thoughts on the practices they had observed on campus, where the teacher educators applied digital presentation tools. Occasionally, the students' questions were not responded to directly in class because they would be addressed by a slide later in the presentation. Examples were given on presentations that had been read aloud by the lecturer, turning the slides into a shared manuscript for the presenter and audience to read. As an alternative, the interviewees would prefer the lecturer to provide additional information on what was being presented on the screen. The latter claim points towards the findings of the second study of the present project, where a distinction is made between a horizontal and vertical approach towards presentation. The participants of the pilot study appeared to prefer a vertical approach that required the presenter to go beyond and elaborate what was already projected on the screen.

During the group interviews, the presentations that had taken place were discussed as

examples of curricular enactment (Goodlad, 1979). The notion was shared that all the participants had transformed and made new representations of the source text, but to what extent the individual presentations represent the intentions of the author was challenged. The following snippet may serve as an early illustration on how a discourse on the curricular paradox (Sawyer, 2011) and the tension between curriculum as intended and curriculum as enacted may be addressed in the context of the current PhD study:

Student (1): We transmitted what the author had written and not our own opinions based on his writings or our understanding of the text.

Interviewer: Yes, did you do that? Is it what he wrote that you have communicated?

Student (2): No, we don't really know that; we have no clue, because we did not entirely understand the text (laughter).

The pilot study did stimulate further reflection on what became the crucial aspects of the main research effort. It allowed the participants to enact the stages of preforming and performing a representation of what may be considered a curricular item – a text from the syllabus. In that manner, the pilot study served as a tiny enactment of the process modelled in the original LDS. The pilot served as an important first step towards utilising the LDS and all its theoretical implications as a framework around which to structure the research project. The pilot created the foundation and premises for an analytic generalisation of the findings, as discussed above.

## 5.4 Field of research

To observe the phenomena of interest, permission was requested to attend four sessions that comprised a total of 30 presentations performed by student teachers. Apart from the pilot study, none of the observed presentations were initiated by this particular project because the student activities were compulsory assignments scheduled in the term plan by the various teacher educators. Therefore, the sampling may be considered to be purposeful (Yin, 2003) because the number and variation of



events observed were determined by each individual subject teacher's plan for the current term. The participating students were primarily first-year students in their initial teacher education at a teacher education college in Norway. They were sufficiently informed about the project's aim and focus and gave their informed consent to participating. Two students abstained from participating.

The sessions were distributed across various subjects and topics, as follows:

Case no.	Topic	Subject	No. Pres.	Tot. no. Slides	Duration
1	Pilot study – dissemination of an essay. A study on transformation from text to a multimodal presentation	Norwegian	3	18	0h 26
2	Dissemination of a book on classroom management	Pedagogy	6	36	1h 15m
3	Reflection on experiences from practicum placement	Pedagogy	6	56	1h 18m
4	Planning of instruction of musical material	Music pedagogy	12	71	1h 20m
5	Dissemination of chapters of a novel	Norwegian	6	27	0h 59m
	Total		33	208	5h 18 m

Table 2. Video data material

## 5.5 Video observation

The collection of data across the settings, as outlined in Table 2, took place during autumn 2015. Taking into consideration the time-consuming work of transcribing and analysing video, the decision was made to collect the data for the entire project at an early stage. Thus, the sampling that took place in 2015 across these six settings served as a pool of data for all three substudies. An alternative approach would be to work iteratively and sample data anew prior to each substudy; this would have allowed for diversifying data sources to a greater extent based on the insights obtained as the study evolved. However, at the time of making the decisions, the multimodal approaches to data collection were the focus because of their close

relation to the theoretical foundation of the project. Video recordings and the analysis thereof appeared to provide sufficiently rich data material to respond to the research questions.

Using video is motivated by the need to attend to the multimodal nature of instructional communication (Mishra, 2008, p. 363). A single HD camera was placed in a fixed position at the back of the classrooms to capture the student teachers' speech, actions and the projection screen. A wide fixed frame ensured that no zooming, panning or further selection was made as the events unfolded. To ensure that audio was captured at a sufficient volume, a studio quality microphone was discreetly positioned close to the presenter.

During and after the presentations, field notes were made using an observation schedule. These were used to capture the immediate reflections of what had been observed during the presentations. Apart from capturing the data for systemizing observations, such as time and date, title of presentation and four fields were used for the descriptive and reflective comments (Lodico et al., 2006). The field 'main characteristics of presentation' was used for a short summary of the content, design and typical features of the presenter's way of relating to the projected information on the screen. 'Elements for further exploration' captured questions regarding the event that took place, that is, concerning what constitutes structure and improvisation in the current performance. The area 'notes' was an open section. The schedules served as indexed memos for the video recordings as the sample collection evolved, which proved helpful during the analysis.

## 5.6 Data and transcription

The aim of analysing a situated social activity usually relates to how participants make meaning in naturally occurring interactions, where information about the setting, manipulation of objects, body language and so forth may need to be integral to transcription (Lancaster, Hauck, Hampel, & Flewitt, 2013, p. 45). A transcription template was developed to allow for a multilayered notation of the multimodal action

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that unfolded during the presentations, as captured by video. Each layer represents a separate mode, that is, speech, gesture, text (on screen) or image (on screen). The layers were further categorised, drawing on the methodology of a study on PowerPoint as semiotic technology and practice (Zhao et al., 2014). These categories were labelled, on the one hand, *resources for coordination*, such as embodied gestures and interaction with computer and, on the other hand, as *semantic integration*, which refers to the relationship between the presenter's speech and the visual content of the slides, whether text, images or graphics.

The video material was transcribed through two stages. First, all speech was transcribed using the HyperTranscribe software (Hesse-Biber, Kinder, & Dupuis, 2009). The transcribed speech would then serve as a reference that could be returned to for further in-depth transcriptions of other meaning making resources in use. Short sequences thought to be representative of the phenomena at stake in each of the three substudies were thereafter attended to for a more detailed transcription, including the other modes of significance to the overall constitution of meaning.

The content of the projected slides represents a crucial element of the overall communication. Attempts were made to embed captured video frames into the transcript to represent the students' PowerPoint slides. However, this proved to be futile because the visual content would be too small to read. The slides were instead represented in the transcript as descriptive *text* for further analysis related to other concurring modes. The purpose of transcribing the visuals was to analyse the intersemiotic relations that occur between the presenter's utterances and actions and the elements of the visual presentation. In instances of adding to the transcript *text* from the slides, no transduction occurred; that is, the properties of the original mode – text – would still be intact in the target mode, which is text. Fonts, colours and layout were missing, but annotations made in the transcript could work as reminders in the case of overly elaborate designs. Images would be replaced in the transcript with a written description. In these cases, the transduction from one mode to another brought about change, change of entities and changes in the structural organisation of those entities (Bezemer & Mavers, 2011).

In the following section, the methods applied will be explained in more detail regarding how the analysis of the data was conducted in each particular substudy. As mentioned above, the data supporting the entire research project was collected and prepared for analysis at an early stage. The diversification between the three substudies becomes more apparent when focusing on the process of analysing data in view of the research questions posed and the applied corresponding substantive theories.

### **5.6.1 Study (I)**

The first study asks how the interplay between the presenter and the digital representation of curricula can be analysed, described and understood. Based on the experiences of the pilot study, the LDS (Selander, 2008) provided a starting point for further exploration because the processual aspects of presentation match the cycles outlined in the model. Transferred to the context of teacher education, the transformative process which the model presents is conceived of as curricular transformation, which is an essential teaching skill as part of the PCK construct (Shulman, 1986; Shulman, 1987). Therefore, a conceptual preunderstanding exists, motivating and influencing the research design and methodological choices accordingly.

Having established the LDS as a preliminary interpretative framework, the first study adheres to the overall research design as an instrumental case study. In instrumental case study research, the focus is more likely to be known in advance and designed around established theory or methods. An instrumental case study may be considered ‘an empirical inquiry that investigates a contemporary phenomenon within its real-life context’ (Yin, 2003, p. 13). The specific case is important because it uncovers knowledge about the phenomena of interest, which may not be the case itself (Stake, 2012). In this first study, the cases comprise students’ presentations; however, the phenomena external to the situations are the processes of curricular transformation and representation.

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### 5.6.2 Setting, data and analysis

The first study is an observation of two sessions comprising 12 groups of first-year students in music pedagogy. Their presentations were their responses to a compulsory assignment that required them to plan for a lesson for practicum placement, where the aim of the lesson would be to teach their pupils a song of their choice. The settings that were observed featured 12 presentations made individually or in groups of two to three student teachers. To support their planning, the students drew on relevant literature from the syllabus. The presentations should have followed the logic of the didactic relation model (Bjørndal & Lieberg, 1978), which constitutes a framework and ‘checklist’ for the didactic planning and reflections. The students used PowerPoint and their own laptops to display the content of their presentations. Peer students were sitting in two semicircles facing the presenting students. Each presentation lasted 8–12 minutes and was followed by a Q&A section.

Derived from multimodal theory, the analytical work was done in two stages. First, the slides captured by video were analysed in terms of being *designs* that would be subject to becoming materialised in a stage of *production* (Kress & Van Leeuwen, 2001). Therefore, the slides were first discussed in terms of being multimodal compositions on their own. The analysis focused on the design principles and relationships detectable among the constituent parts of the slides. That is, how are the bullet points structured? What is the relationship between the image and the surrounding text? What is the relationship between many slides in succession? Analysing the stage of production, the focus was directed towards what intersemiotic relations are detectable between the presenter and the elements of the slides during the presentation. A set of concepts derived from theory on moving images, as set out by Theo van Leeuwen (2005), permits the analyst to describe such relations in terms of cohesion mechanisms and information linking, that is, by elaboration, extension, exemplification, illustration and so forth. Such semiotic relations are labelled as *intersemiotic relations* and *coordination of semiotic resources*. These labels are adopted a priori from theory and tested in the current study within the instrumental case study design.

The findings support an amendment of the original LDS by reworking what was originally referred to as ‘the second transformation cycle’. The original model depicts a learning sequence as a unidirectional process where the student made representation, whether an essay, drawing or set of slides, is incorporated in an event where it is presented. This view can be modified by the findings of the first substudy. Findings suggest that a presentation entails an interaction between the presenter and the artefact being presented. This interaction contradicts the unidirectional depiction of the original model which suggests that what is presented is a fixed and final entity. On the contrary, in the case of PowerPoint slides, a representation is required to enter into semiotic relations with the presenter to become fully articulated. Therefore, it is more accurate to describe the second cycle of the LDS model as a bidirectional process in terms of intersemiotic relations, and the coordination of semiotic resources conducted by the individual who is presenting the slides.

In descriptive terms, the revised model captures how the presenter commits semiotic actions in what may be described as a multimodal setting. Thereby, the transformation of curricula can be described as a semiotic activity where students make selections regarding what meaning making resources to draw upon for creating an apt representation of the issue at stake.

### **5.6.3 Study (II)**

Having established that presentation is a meaning making activity that encompasses a transformation process across the two stages of design and production, the second study seeks to understand the performative nature of the transformation process by adopting theoretical devices from the field of jazz. Improvisation is conceived of in theory as an action that takes place within the confines of a certain framework (Berliner, 1994; Sawyer, 2004; Sawyer, 2011). The research question reflects this by asking how improvisation materialises in the interplay between the *preformed* curricula, which constitute a framework, and the actions of the *performer*, who presents within the framework.

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#### 5.6.4 Setting, data and analysis

The data set is the same that is used for the first substudy: a set of 12 video recorded presentations performed by music student teachers. The analysis here was done by coding transcribed speech and the corresponding slides. The slides were transcribed to text; hence, the images and graphics were transduced by being represented as text. However, the meaning of the slides was considered preserved through the annotations embedded in the transcripts. Using software for qualitative data analysis – Hyper Research – a code book was established, and passages of the transcripts were coded based on similarities with the concepts and artefacts in jazz. The sources for such concepts are previous academic studies incorporating concepts from jazz (Sawyer, 2011; Sørensen, 2015), books on jazz theory (Baker, 1989; Bjørklund, 1983; Levine, 1989; Novello & Lamont, 1987) and ethnographic accounts from the jazz community (Berliner, 1994). A refinement of the initial code book was done by observing if the codes might be classified to either a *framework* or *performance* – two basic constituent parts of improvisational practice.

The review yielded one category that describes the slides as a framework; these appeared to vary in terms of their design and in their detail. The artefact from jazz that corresponds to slides is the ‘lead sheet’, which is a draft compositional score requiring input and interpretation by the performer to become a complete musical entity. An analysis of the presenters’ approach to the slides revealed differences in terms of contributing new information or by summarising and adding together what was already present on the slide. Jazz offers analogous concepts for performance in that vertical playing is based on analysing the givens of the score, and horizontal playing focuses on making cohesive lines across the constituent parts of the score. Thus, the coding process yielded two dichotomies applied for the analysis: the framework varied from ‘thick’ to ‘thin’ as determined by the quality of the constituent parts. The students’ performance of the slides can be described in the dichotomy between a horizontal and vertical approach. Combined, these two dichotomies constitute a double matrix, making it possible to identify where each performed slide belongs. Thus, the model constitutes a response to the research

question because it maps the dynamic materialisation of the concept of improvisation, in this case transferred to an educational setting.

### **5.6.5 Study (III)**

The amended LDS model developed through the first study, and the conceptualisation of improvisation as a semiotic practice, form the basis for a closer investigation of the epistemological stance of the third study. The aim of the third study is to apply the LDS model as an analytical framework to explore what epistemological positions are implicit in student teachers' representations of the profession as expressed in their reports from practicum and in their sharing with each other of chapters from a book on classroom management (Bergkastet, 2009). Ultimately, the third study generates new insights into the perceived gap between theory and practice and between practicum and practices on campus. The study assumes that the perceived gap may be owe to student teachers' multiple and diverse perceptions of what constitutes teachers' professional knowledge; hence, the purpose of this study is to draw a 'knowledge landscape' (Burnett, 2006; Clandinin & Connelly, 1998) that represents the diversity of epistemological positions as expressed by the student teachers themselves.

### **5.6.6 Setting, data and analysis**

The third study encompasses two sessions with a group of first-year students attending a pedagogy class. In the first session, the students share the chapters of a handbook on relational leadership and classroom management (Bergkastet, 2009). The compulsory assignment required the students to perform an analysis of the content and discuss the content during presentations. Following each group, a plenary discussion allowed for feedback and questions from their peers. A month later, the same group of students shared their experiences from their practicum placement. This time, the assignment required the students to present reflexive accounts from their placement in practicum.

By studying previous research literature on the perceived gap between theory and practice, the ideas of epistemological categories for analysis were defined a priori. It



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appears that there is a continuum in literature that reflects perspectives on ‘teachers’ professional knowledge’ as theoretically oriented on the one hand and as action guided and practical on the other hand. Another continuum moves between professional knowledge that is general and universal on the one hand and context bound and situated on the other. These epistemological positions were expected to be traceable in the students’ own performances of experiences from their practicum placement and in their dissemination of chapters from the handbook on classroom management.

A coding process was undertaken to operationalise the a priori categories by mapping those onto segments of the data considered to represent a variety of epistemological positions. Segments marked up in the first session on classroom management came from the idea that expressions of professional knowledge are traceable in the dichotomy between theoretical and practical. Therefore, the focus was directed towards students’ presentations of theoretical segments, such as their reports of rules for classroom communication, the didactic relation model and templates for students’ self- reflection. Based on the data from the second session, accounts of field experiences were highlighted if these accounts featured reflections on responsiveness to practical circumstances. Examples include how the students self-reported dealing with situations that occurred if they ran out of activities for the planned lessons. On a second review of the data, it became apparent that the students’ presentations matched the criteria of contextuality: Students’ accounts of theory could represent universal applicability in that their accounts were void of any dependence on context. The study maps students’ representations of knowledge in a double dichotomy that spans between the universal and local, on the one hand, and the theoretical and procedural on the other. The knowledge landscape that is mapped is used to question what epistemologies students encounter both in and outside of campus during their education.

Because of the processual aspects of all three substudies, the findings of each have been expressed in terms of models, which adhere to the principle of an analytic generalisation. The models reflect the dynamics of the relations between the entities

in focus. A detailed account of the models and the interpretations of these is presented in the results chapter.

## 5.7 Validity

On an overall level, validity as it is conceived of in qualitative research refers to the relationship between the account and something external to it – that is, the phenomena the account is *about*. In a broad sense, validity pertains to this relationship between an account and something outside of that account (Maxwell, 1992, p. 282).

The strategy of solving potential threats to validity in the current project can best be explained by referring to the philosophical stance on which the research design is based. At its base is the belief that a researchable object needs to be separable from its expression (Taylor, 1998). For example, the phenomena of improvisation being a research object can be used to illustrate how the term improvisation does not need to be uniform with the audible expression of a jazz concert. The musical performance may be improvised, or it may be a performance based off a score of a transcribed improvisation. Sound wise, it will be similar, yet only one of the performances represents the phenomena of improvisation as a property of the performer's actions. Thus, a phenomenon such as improvisation is separable from its expression. In the current research context, a presentation may be rehearsed in detail in a scripted manner yet appear spontaneous and thus improvised, or it may be presented spontaneously by improvisation within the framework present in the situation.

The term improvisation should be understood as a theoretically defined construct in that it takes its definitions from an already existing theoretical domain – that of jazz theory. Empirical research, whether quantitative or qualitative, must link constructs to indicators (Kleven, 2008, p. 6). Across three substudies, the current project has followed the procedure of first observing indicators by studying transcribed video data material; thereafter, constructs have been 'constructed' through the process of analysis. The constructs of a horizontal and vertical approach to improvisation are

examples of constructs that are operationalised in the current research context, as are the constructs of local and universal knowledge and theoretical and practical knowledge, which are based on indicators observed in the students' self-reports from practicum placements. Relevant for the current study is construct validity, which problematises how well the concept in question is represented by the indicators observed (Kleven, 2008).

A model in the current context is a construct based on observable indicators considered to represent the phenomena in question. The current study has produced three different models that are considered theoretical constructs: First is the amended LDS, which represents the output of the first published article and that is applied as an analytical framework of the two subsequent texts. The other two articles present the findings in terms of models that are formed as a double matrix and a double dichotomy. These depict improvisation as a skill that mediates the transformation of subject content, and in the final text, the model depicts a professional knowledge landscape.

It should be added that the validity of the constructs refers to the correspondence between a theoretically defined construct and the indicators representing the construct in empirical research. Hence, the issue of validity does not concern any 'isomorphism with reality' (Kleven, 2008)

## 5.8 Ethical considerations

The participating students may have been aware of the overarching IMTE project. As a consequence, they may have possessed prior knowledge of the overarching project's aim of developing an understanding of improvisation as a construct pertaining to teaching. On the one hand, this may have allowed for a more supportive attitude towards the project; however, it may have posed the risk that the students carried preconceptions in the process of planning, designing and enacting the activity in the classes that would be subject to observation.

However, from an ethical perspective, any inquiry should provide the participants with information about the purpose, methods and procedures of the project in which they are getting involved (Cohen, 2011). Information meetings were held for the participating student teachers before the field work commenced. The meetings served as a way to provide sufficient information to comply with the criteria of informed consent, which can be described as ‘the procedure in which individuals choose whether to participate in an investigation after being informed of facts that would be likely to influence their decisions’ (Diener, 1978, p. 53). The information meetings addressed the purpose of the inquiry in a balanced manner, not revealing too much of the underlying theoretical concepts and constructs yet not withholding information that may cause the participants to feel deceived and not sufficiently informed of the researcher’s true intentions.

A letter of agreement (see Appendix 1) was handed out at the information meetings for individuals to sign. All participants were informed about the right to withdraw from the project at any point without being obliged to explain the reason why. A challenge was posed when two students did not want to participate in the research: they were still obliged to be present in the lessons. These students were not video recorded during their presentations, nor were their partner group members.

Efforts were made to minimise the obtrusive effect of large digital recording equipment, which is ‘critical to capturing relaxed and authentic information’ (Banister, 2007, p. 3). The main video camera was positioned at the back of the classroom and directed towards the student teachers presenting and towards the projection screen. Its focal area avoided the recording of nonparticipants. An active microphone was either positioned on a stand or attached to the ceiling close to the presenters in the front of the classroom. This ensured high-quality audio captures; however, because of the presence of the equipment, it did so at the cost of making the students aware that the setting was being recorded.

Anonymity is the principle that the information provided by participants should not reveal their identity. One can argue whether anonymity can be granted in settings

where the researcher uses observation and video recording as methods for collecting data; in these settings, the researcher will inevitably be able to identify who are the sources for what data. In terms of protecting the participants' privacy in such settings, confidentiality might be a more appropriate term; although the researcher knows who has provided the information or can identify participants from the information given, the researcher will in no way make the connection known publicly (Cohen, 2011). The current PhD project ensured that the identities of the persons involved and the identity of the institution where the research was conducted are not recognisable in any publication. The overarching IMTE project registered the overall project, including the PhD subprojects, at the Norwegian Social Science Data Services (NSD).

## 6. Results

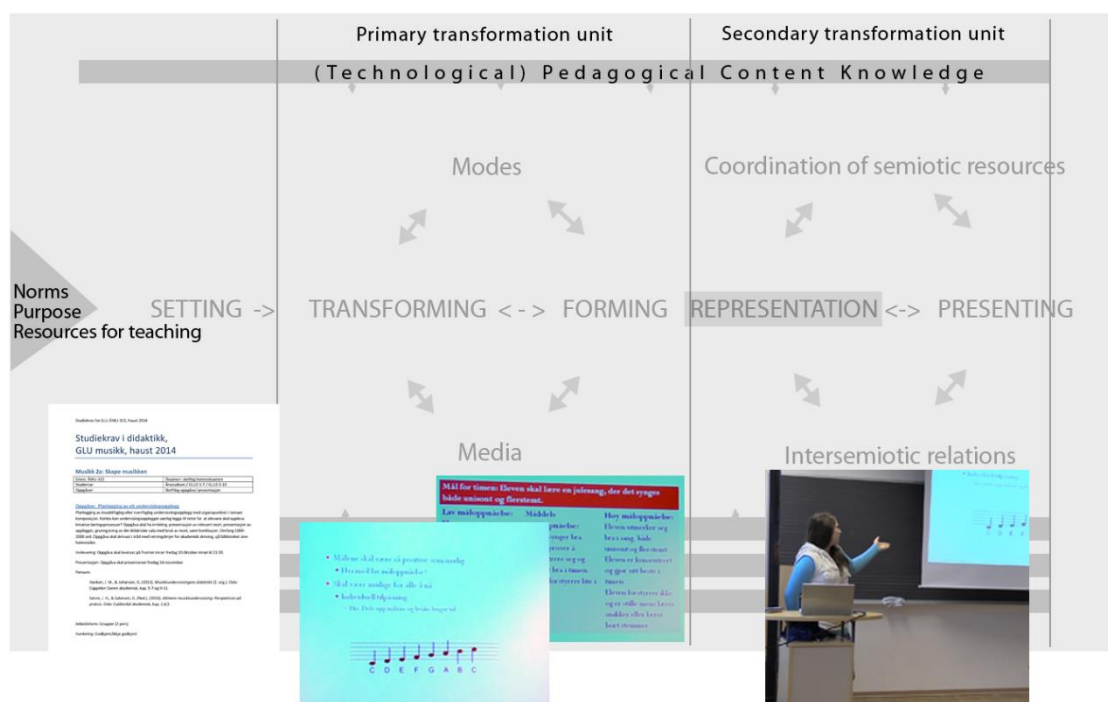
In the following chapter, the main findings will be presented, synthesising the individual three studies. The section begins with the LDS, which is the theoretical model that has guided the inquiry. The LDS has provided a map that has helped identify the processes that take place during a presentation, and it has supplied a theoretical framework that is grounded in the perspective of designs for learning, which includes the epistemological and ontological foundation for the study. Based on empirical data, the model has been revised, and the amended model should be considered the main finding of the current project. The revised model is the outcome of the first article. For the succeeding two research designs, the model has been used to guide the inquiry. The model has been tested against data from the field, and at the same time, the model has served as a tool for further research.

The original LDS model (Selander & Kress, 2010; Selander, 2008) captured the design activity in learning sequences and the formation and transformation of knowledge when pupils deal with their tasks, such as problem-solving, information-seeking and sign-producing activities. The LDS model captures the learner's perspective. Applied to the context of teacher education, the model is adapted with the purpose of identifying critical stages in the process that the *student teacher-as-learner* goes through in learning sequences where the use of presentation technology is a crucial part. A learning sequence here is the compulsory assignments given by subject teachers to students who respond by designing a semiotic artefact in terms of a series of PPT slides that they present for their peers. The model helps direct the focus towards the contextual norms and the multimodal semiotic work that takes place both at the stage of design and during the act of the presentation.

The revision of the model is influenced by and has incorporated findings of a large Australian research effort that approaches PowerPoint as semiotic technology and semiotic practice, that is, as technologies and practices where meaning making is at the heart of the matter (Zhao et al., 2014). Accordingly, the second transformation cycle of the LDS has been redefined to capture the dynamic relationships that occur

between the elements on the slides and the actions of the presenter during a presentation. The first article of the current project tests the revised model against data collected by video recording students' presentations in teacher education.

The revised model is illustrated by an example (below) that shows what constitutes a learning sequence in the current project. The setting (far left) is framed by the assignment given by a teacher educator in music didactics; the students who are taking a yearlong course in music pedagogy were prompted to plan a music lesson, to carry out the plan in practicum and to write a reflexive report in view of a key text from the syllabus. The report would later be presented to fellow students in a plenary session staged in a classroom furnished with semiotic technology.



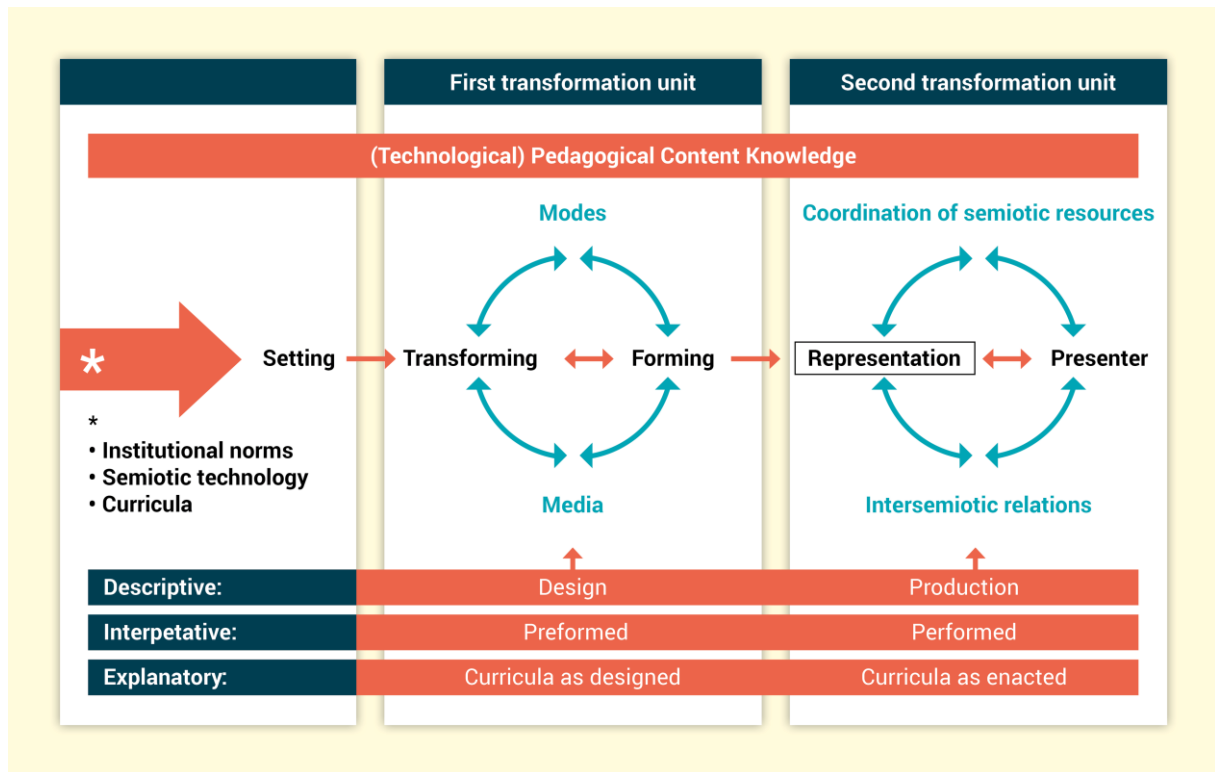
### III. 3. Amended LDS – illustrated

The reflexive report was first written by the student as a text document and later reconfigured into a new representation, that is, a slideshow. The outcome of the first transformation unit is the student's response to the assignment, which is materialised in terms of a series of PowerPoint slides. Here, the term representation subscribes to

the epistemological belief that the representation of an aspect of the world is not isomorph with an objective reality; rather, it is the student's own version of an issue, designed according to the student's situated interest and influenced by the social context and norms of the institutional setting where the assignment is situated.

The second transformation unit refers to how the set of slides is incorporated by a teacher student into a multimodal event. During the presentation, the teacher student is facing the task of combining semiotic resources embedded in the slides with speech and gestures to make a meaningful and coherent account of the issue at stake. As the student is presenting, she or he may be considered as authoring the presentation, in theoretical terms, by combining the semiotic resources embedded in the slides with embodied resources such as speech and gestures, thus creating intersemiotic relations. The coordination of semiotic resources occurs as the presenter interacts with the software to switch between slides and selects – by pointing – what items on the preformed slide to address and by making verbal references to what items are being commented upon. Contrary to the original model, the entity 'representation' is considered both an event and an artefact, whereas in the original model, the entity 'representation' is as an artefact only.





### III. 4. LDS, amended

The model features three levels that are layered at the bottom, which permits the researcher to virtually zoom into the object of study from a detailed view to a more general level of analysis. The three different articles encompassed by the current study perform this ‘zooming’ because the first presents a descriptive view, the second an interpretative and the third a view on curricular representation exemplified by students’ representation of professional knowledge. The levels will be commented on in more detail below.

#### 6.1.1 The amended LDS

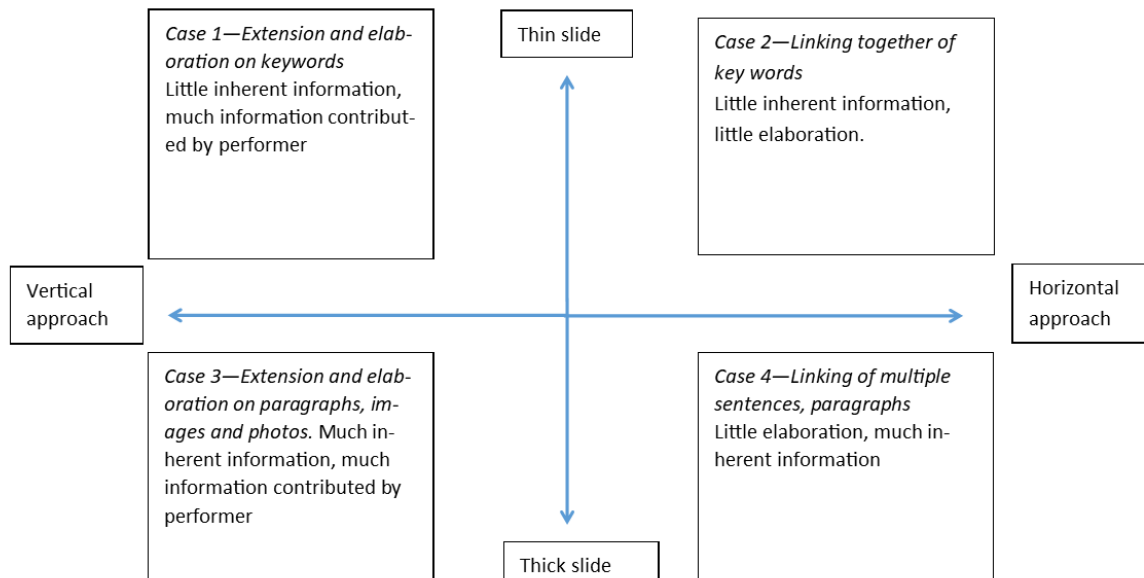
The first level of analysis corresponds to the first article of the thesis that performs the analysis at the *descriptive* level. A theoretical framework is established, which moves between a sociocultural world view and a social semiotic view on language and communication, as captured by the designs for learning perspective. The transformation cycles of the model are understood in terms of semiotic work: a preparatory stage of design precedes a performative stage of production where the design is the conceptual side of expression and the expression side of conception

(Kress & van Leeuwen, 2001). PowerPoint slides are midway between content and expression and can be compared with musical scores, which are artefacts yet to be articulated. The samples of empirical data provide insights into the communicative aspects of the transformation process modelled above. The finely grained information that a multimodal analysis provides serves as the basis on which to construct an understanding of how meaning is made in such settings. The analysis addresses the design of the semiotic artefact and what processes occur as the artefact is subjected to being incorporated in a multimodal event during the stage of production and its enactment in class.

### **6.1.2 The model of representation by improvisation**

The level of *interpretation* is explored in the second article. Because the artefacts and participants observed are ‘players’ in an ongoing relationship and thus have a quality of ‘liveness’, the second study seeks to interpret the descriptive findings using concepts from performance studies (Carlson, 2017; Schechner, 2017) and improvisation (Baker, 1989; Berliner, 1994; Sawyer, 2011). This approach is motivated by the quest to bring about an epistemological understanding of how knowledge is implemented and instantiated in action. The concept of improvisation, which is a method developed within the performing arts, has been made operational through the analysis of the jazz metaphor. Departing from the ethnomusicologist Berliner’s study, improvisation is shown as a process that involves reworking the precomposed materials and designs in relation to unanticipated ideas that are conceived, shaped and transformed under the special conditions of performance (Berliner, 1994). To further make improvisation possible to operationalise across educational settings, a review on the literature on jazz theory was conducted. Established approaches within jazz – of horizontal and vertical playing (Baker, 1989; Berliner, 1994; Bjørklund, 1983; Levine, 1989) – have been recontextualised as a means for the presenter to either go beyond the givens of the PowerPoint slides by elaborating and extending what is there or to connect what is already present by linking the material together. By drawing a parallel between musical lead sheets and PowerPoint slides, both of which are sparse designs that rely on the interpretation of a presenter, further insights were made as to what may constitute improvisational

framework in the current settings. Musical lead sheets and PowerPoint slides resemble each other regarding how they vary their constituent properties from being ‘thick’ to ‘thin’ (Davies, 2001).

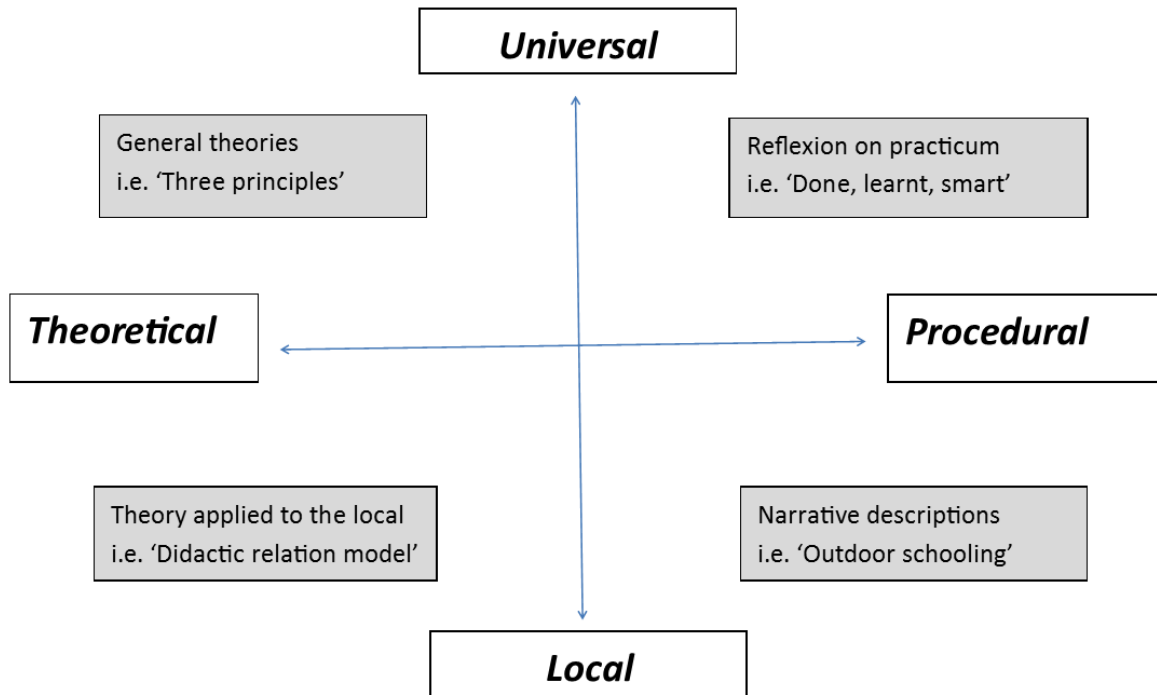


### Ill. 5. Improvisation modelled as a double matrix

The output of the second study is a double matrix that serves as a map, showing where the performance of preformed slides can be identified along the two axes of the double matrix. The matrix visualises a dynamic response to the research question on how improvisation materialises in the multimodal interplay between the semiotic artefact and the performer. The model illustrates how performances reside on the one hand between a dichotomy of thick or thin designs and on the other hand in a dichotomy of a horizontal or vertical approach to its performance. One implication of the findings is that the construct of the PCK may be considered a competence that relies on improvisational skills, where improvisation is the skill that mediates the processes of *transforming* and *representing* knowledge. The study contributes new knowledge to the act of improvisation linked to the transformation and representation of knowledge, and it does so by articulating this insight in propositional terms, drawing on language from the domain of jazz theory.

### 6.1.3 The model of knowledge landscape

Third, the revised LDS model incorporates a curricular level that goes beyond describing and interpreting the observations made of the presenters' performance. At this level, the focus is directed towards curricula, the subject content being transformed both at the stage of design and production. The processes investigated at the previous two levels reveal that a presentation involves the students' shaping of curricular topics by means of selecting what aspects of the topic at hand to include on the slides and by choosing how to give the material an apt representation by modes such as text, image, graphics or video. The students articulate the content when they perform their slides for an audience. This observation leads towards questioning what relationship exists between the representation of topics from curricula as performed by the students in the classroom and the 'world outside' from which curricular topics are derived. This is a question of epistemological concern. Schooling relies on a representational epistemology (Osberg & Biesta, 2003) in that the issues and topics subject to being taught are not *present* in the school settings as such. Of relevance to the current study, then, is the epistemological belief that it is not curricula *itself* which are being presented in the current context; rather, what the students perform are the *representations* of curricular topics, which are shaped by the students' situational interest and by the norms of the settings in TE. The cases analysed are several instances of students' representations of professional knowledge, first by the dissemination of chapters of a handbook on classroom management and thereafter on students' own reports from their practicum placement. These two sessions were analysed in terms of how the professional knowledge, as presented by the students, is theoretical or procedural and whether it is local and context-related knowledge or of a universal and general kind. The outcome of the study is a knowledge map (Burnett, 2006) that depicts the findings in a double dichotomy.



*Ill. 6. A 'knowledge landscape' based on students' representations of teachers' professional knowledge*

This map may aid a preservice teacher in discovering the dynamics in the interplay between campus and practicum, serving as an illustration of the variety of epistemological positions that students encounter during their education. The traditional gap between the knowledge required in practicum and the one presented on campus may be considered mutually dependent on each other because the knowledge representations made by students draw on inputs from both places.

## 7. Discussion

The overarching research question seeks to understand the presentation as a learning activity in teacher education. In the following section, the discussion will attempt to transcend the outputs of the three substudies to produce perspectives that may serve as a response to the overarching research question of the entire project. Theoretical stances will be revisited at this stage to provide summarising perspectives that may aid in the discussion to go beyond debating the substudies individually.

In the current settings, students deliver short lectures to their peer students. Consequently, the student teachers have a double role as they present. On the one hand, the students perform a teacher's role by delivering the subject content to their peers by means of performing this content using semiotic technology for support. At the same time, the student enters the role of a learner, a learner of teaching, by appropriating the role of a teacher, which here is framed in a setting representative of a learning situation in teacher education. Research on peer teaching and the principle of learning by teaching support the idea that learning occurs through practice in the profession, by learning to teach, learning while teaching and teaching to unlearn (Duran & Topping, 1982). Using the LDS to analyse settings in teacher education where students present, a certain paradox is revealed: the student presenting assumes a teacher's role, one that is framed by the conventions of the classroom of an institution in higher education. Yet at the same time, the presenter assumes the position of a learner, who assumes the role of a teacher to learn to become a teacher.

This section will focus on identifying further paradoxes that are inherent in the research domain of each of the three subprojects discussed in the corresponding articles. A paradox here is an apparent contradiction that exists in the field of study. These will be identified, and their resolution will be proposed by drawing on the knowledge obtained through this very research project. These paradoxes, their description and their resolutions will be discussed in view of the overall research question of the current study, on how student-led presentations supported by the use of semiotic technology can be understood as a learning activity in teacher education.

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## 7.1 Sawyer's paradoxes

The idea of thinking along the lines of paradoxes is inspired by the work of Sawyer, who is a key proponent of theorising improvisation as a skill that applies to educational settings. Already in his approach, he encountered a paradox: he claimed the following:

There remains a gap in our understanding of good teaching: How do good teachers use their fixed knowledge and implement it in a given classroom situation? In other words, how do the fixed structures of expertise become realised in the everyday improvisation of real-world classroom practice? (Sawyer, 2011, p. 11)

The apparent contradiction in this quotation resides between what Sawyer claims is the fixedness of the structural knowledge that experts are in command of and the fluidness that can be associated with the use of improvisation in the actual classroom practice. Sawyer (2011) made a distinction between three paradoxes that refer to separate domains in which paradoxical tension occurs in education: the teacher, learner and curricular paradox. The amended LDS will be used as a referential framework to identify the paradoxes inherent in the practices observed in the current project. By doing so, the already debated research findings, as outlined in the results chapter, can be elevated to another level, here by using paradoxes as a new lens.

## 7.2 The teacher paradox

According to Sawyer, the teacher paradox refers to how structure, which is represented by a large knowledge base of routines, plans and structures, must be weaved together within improvised practice by the teacher. Improvisation may resolve the teacher paradox by redefining teacher expertise as the mastery of a toolbox that can be executed in practice through improvisational activity (Sawyer, 2011). The teacher paradox addresses the teacher's execution of the teacher's role; transferred to the current setting, the teacher paradox is manifested in the student teachers' performance of the role of being teachers while conducting their

presentations. The paradox consists of the student teachers' command of structured knowledge, which is applied in an improvisational manner. In higher education, as observed in the current project, structures can be identified as the preformed representation of the subject content at hand, and the improvisational part relates to the performance of knowledge, that is, by horizontal and vertical approaches, as discussed in the current thesis. Hence, the *teacher paradox* in higher education may be translated into how 'the structures that need to be weaved together by improvisation' pertain to the transformation and representation of the subject content. The resolution to the teacher paradox, which here is situated in teacher education, is that the teacher student should obtain mastery of a toolbox related to the *transformation and representation of knowledge* by using the affordance of the semiotic technology at hand. Mastery encompasses the ability to perform the preformed in an improvisational manner.

### **7.2.1 The paradox of the construction and transmission of knowledge**

In the wake of such a resolution to the teacher paradox, a different paradox occurs, that of an epistemological kind. The LDS supports an interpretation of the learning process being a constructivist type of process; it does so by modelling at its centre the learner's process of constructing a representation of an aspect of the world by giving it shape, here drawing on the affordances of available modes and media. The nature of the representation – as discussed in the first article of the current study – is that of an expression made in a social context. The representation is not a one-to-one mirror of reality or isomorph with aspects of the world as a fixed entity. Rather, guided by the presenter's interest, it is a version of a socially constructed reality that is given a material shape by being preformed prior to being performed, thereby – according to the jazz metaphor – also being influenced by the circumstances of its performance. The active part in the student's own learning process is the student who preforms and performs the subject content.

On the other hand, the learning processes comply with a transmission view of teaching. The performing student's live construction of meaning can also be interpreted as a process of the transmission of information to the peer learners who



attend the session. The emerging paradox can be formulated as contradictory positions in that the peer student, who in the current settings assumes the position of audience, becomes passively engaged in the presenting student's active knowledge construction.

A resolution to the paradox above may be to acknowledge that there are conceptual differences between the educational practices of teaching and learning. Educational philosopher Gert Biesta (2015) zoomed in on the idea of the learner, building on the notion that learning is to be understood as an act of sense making or comprehension. He raised an epistemological question about the difference between knowing and meaning making as processes of *construction* (literally *sense making*) and as a process of *reception* (Biesta, 2015, p. 235). As an event unfolding in time and space, the concepts of teaching and learning may occur concurrently, such as during a presentation in higher education. A teacher conducts the task of teaching by performing knowledge to the learner, and the learners attend the event to learn. However, there is no causality that warrants that the activity of teaching will result in learning on the part of the people holding the role of learners. Learning, on the other hand, may occur despite the lack of the intended act of someone teaching, which proves that conceptually, learning is independent of the act of someone teaching.

By acknowledging that teaching and learning exist independently of each other, the current setting opens up for an understanding that the student who presents – and thereby assumes the role of a teacher – may also be the person who is the main *learner* in the activity that unfolds.

### 7.3 The learning paradox

The learning paradox refers to the teacher's process of scaffolding, which involves designing loose structures to support the students' learning processes, including content knowledge, skills and conceptual understanding. Improvisation, as conceived of by Sawyer, incorporates the students' own improvisational knowledge construction as they are effectively guided by their teacher (2011). Translated to the current study,

scaffolding encompasses the concept of designs *for* learning (Selander, 2008), which reflects how the subject teacher facilitates meaning making activities for the student teacher. Theoretically speaking, student teachers engage in two transformation processes, both of which are accommodated by the subject teacher, where the students use their available semiotic resources to *preform* and *perform* the subject content derived from the curricula of teacher education. In the current setting, *knowing* is participating in the discourses of the profession, utilising the modes and media made available through the teacher educator's design of the assignment. In the current context, design *for* learning reflects the scaffolding effort made by the teacher educator in staging the learning event. It encompasses the physical and social contextual framings that influence the student teachers' processes of meaning making. These contextual framings are the assignment formulated by the teacher educator that dictates what resources, such as PowerPoint, should be applied by the students in creating representations of the topics at hand.

The design aspect, as suggested by the title of the model of the LDS, refers to how meaning making is a process of design and redesign. Here, meaning making is a matter of giving shape to knowledge by utilising the available resources, and the knowledge representation made by the learner stands in relation to existing knowledge encountered in curricular objects, in and outside of school settings, in formal and informal circumstances. The notions of design *for* learning and design *in* learning further emphasise how learning – as a process of making meaning – is facilitated by the teacher by scaffolding within an institutional framing, which is an act of arranging for the learner to construct meaning by design, that is, *in* learning

The second part of the learning paradox addresses the student's own improvisational knowledge construction, which is grounded in a constructivist view of learning and knowing. As debated in the first article, the LDS resides in a constructivist epistemology in that the learning process is captured in the model by the learners by making *representations* of aspects of the world. Design *in* learning captures the learner's perspective and encompasses the learner's meaning making activities and includes the formation and transformation of knowledge. The two transformation

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cycles of the model capture the activities performed by the learner. In the current settings in the context of teacher education, the *learning paradox* should be understood based on the idea of presentation as a semiotic activity grounded in the theoretical perspectives of designs for learning. The notions of designs *for* and *in* learning captures this because the teacher through scaffolding caters to designs *for* learning, within which the student teachers' own improvised meaning making activities are considered to be designs *in* learning.

### 7.3.1 The paradox of learning to teach

However, because the learning activities take place in teacher education, there is another dimension to the learning paradox that is relevant to discuss: to teach by presenting, students first must go through a process of learning the subject content as well. This paradox, which is inherent in the learning paradox, can be named the paradox of *learning in order to teach*. This paradox takes into consideration the preforming activity that student teachers commit to prior to presenting. This activity, which according to the LDS constitutes a transformation cycle, features a dimension of learning on the part of the student. The learning aspect is captured by the process of designing and redesigning knowledge by making an apt representation using the available modes afforded by PowerPoint. Learning is taking place as the student transforms and makes a representation of curricular knowledge that may be experiential or captured from a book, such as the book on relational classroom management (Bergkastet, 2009), which is discussed in the second subinquiry of the current project.

## 7.4 The curriculum paradox

Sawyer stated the following:

Good curricula and lesson plans are necessary to guide teachers and students down the most effective learning trajectory towards the desired learning outcomes. Yet, the most effective curricula are those designed to foster improvisational learning within the curricula. Improvisation helps us resolve

the curriculum paradox: It is a productive way of thinking about the relation between curriculum as planned and curriculum as enacted. (Sawyer, 2011, p. 3)

Curriculum as planned is best described as the work of curriculum planners and is usually written outside the classroom. Curriculum as planned is forming statements of what students and teachers should do in the classroom, recommended resources and information regarding evaluation (Aoki, 2005). Curricular plans are formulated in general terms and can be referred to as curricula as intended (Goodlad, 1979). For the students of teacher education, the relevant curricular plans are the national guidelines for differentiated teacher education programmes and the plans for each subject as formulated at the institutional level. During their practicum placement, students base their teaching on the national curriculum. Typically, the aims formulated in the national curricula direct the content and methods of instruction for student-planned lessons in practicum, as illustrated by the examples given in the articles of the current project.

Central to the debate on curricula is the notion that curricula as intended are not equivalent to curricula as enacted. Whereas there may be one national curricular plan, there may be as many different enactments of the intentions of the curricula as there are teachers. The term curricula as enacted pertains to the realisation of the particular didactic plan in classroom settings. Thus, the enactment is expected to reflect intentions formulated as plans on many levels, spanning from the curriculum designers' to the subject teachers'. The current project is concerned with how curricula as planned is materialised in the classroom as the student teacher first preforms and thereafter performs the subject content. The very performance captures the stage of curricula as enacted.

Curricula are content, and the student teachers who perform their presentations have created a representation of curricula using the available media and software. The student teachers take the role of *teacher-as-curricular designer* (Mishra & Koehler, 2006). However, the current project stresses that there is a process of curricular

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interpretation going on as the preformed slides are being performed. The horizontal and vertical approaches to its performance reveal that the students redesign the PowerPoint slides during their performance by various means of selecting, elaborating and extending the slides' content. Thereby, the current project subscribes to a view of *curriculum design as bricolage*, a view that 'emphasizes situational creativity and flexibility, through tactically and contingently selecting and unselecting elements from what is available. Teachers constantly negotiate a balance between technology, pedagogy and content in ways that are appropriate to the specific parameters of an ever-changing educational context' (Herring et al., 2016, p. 21).

However, the curricular paradox takes on a new dimension in the current setting. According to the view on schooling as representational epistemology, 'our knowledge "stands for" or represents a world that is separate from our knowledge itself' (Osberg & Biesta, 2003, p. 84). Student teachers' representations of teachers' professional knowledge do not re-present some preexisting reality but actively construct it (Unsworth, 2011). Representations 'produce' and 'create' the object they assume to represent; that is, objects gain their meaning in and within representations. These representations are always influenced or mediated by ways of thinking about the world; therefore, they are not fixed (Miller & Colwill, 2010). This is the underlying view that also is embedded in the LDS; the understanding of learning and knowing is closely related to the learner's ability to represent his or her understanding by utilising all available modes and media. The student teachers observed in the current project have represented the world of schooling in the auditorium on campus by presenting images along with their own recollections of the what, how and whys of their own teaching experiences during practicum placement. The performativity theory supports the notion of what is being performed on stage is not reality itself; rather, it is framed by the arrangements organising a divide between performers and spectators. Hence, an understanding is reached that what is performed is different from the untransformed reality itself (Bateson, 1954).

The notion of 'curricula as enacted' lends itself to an exploration of the relationship between its existence outside of the classroom and its representation within. If we

borrow from the field of arts on the relationship between the performer and what is being performed, a question can be posed: 'Is it ever possible to understand the meaning of a work of art as separate from the way in which we receive it?' Translated to settings in education, the piece of art should be replaced with how a curricular topic is being performed in the classroom by a teacher using presentation technology. Are the curricula different from how a student teacher perceives it and turns it into a representation? Where, then, does the curricula reside? Do curricula exist independently of the teachers? Teachers 'are an integral part of the curriculum constructed and enacted in the classrooms' (Clandinin & Connelly, 1992, p. 363). Then, in terms of presentations as multimodal events, teachers become literally part of curriculum by taking into consideration the embodied meaning making resources that form intersemiotic coherence across the modes projected on screen and the modes utilised by the person performing.

A quote by Yeats may shed light on the contradictory position on seeing what is performed – curricula – as inseparable from its expression. This is quite contrary to the premises of the current study and introduces a new paradox, this time on the ontological level:

*O chestnut tree, great rooted blossomer,  
Are you the leaf, the blossom or the bole?  
O body swayed to music, O brightening glance,  
How can we know the dancer from the dance?*  
— William Butler Yeats (1989)

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## 8. Conclusion

Through three different research designs, the practice of presenting subject content has been investigated as a learning activity situated in teacher education. The settings observed were authentic learning situations representative of activities that take place in contemporary teacher education. Data were collected by video observation of student teachers presenting various curricular topics for their peers.

Informed by Shulman's construct of the PCK, the project has operationalised the processes of *transformation and representation*. As the theoretical framework developed, it became clear that transformation and representation are concepts that not only reflect the essential aspects of the teaching skill, but they also reach into multimodal social semiotic theories on language and communication. Therefore, the project has moved into a cross-disciplinary field, one where the content of established pedagogical concepts has been expanded by taking on additional meaning from the field of multimodality and social semiotics.

At the core of the current study is the LDS, an established model of how meaning is constructed in an educational setting. The current project contributes to the field of design for learning by using the LDS as a map to explore the field under scrutiny. The project may contribute to the field by actively applying an established theoretical framework to seek answers to the research questions that are pertinent to a widespread practice in higher education across the globe.

The amendment of the LDS may be considered a contribution to the field in that it merges the findings of the study on PowerPoint as semiotic technology and practice (Zhao et al., 2014) and the existing theoretical framework as manifested in perspectives of designs for learning, as described by Selander and Kress (2008, 2010) and Selander (2017). The 'liveness' of the presentation is captured by the notion of intersemiotic relationships, which is captured by the aforementioned study and embedded in the LDS model borrowed from the latter study.

The understanding of student-led presentations as a learning activity situated in teacher education is closely linked to an in-depth study of the concepts of the *transformation and representation* of the subject content. The term PCK may be considered a reference point that connects the project with fundamental ideas of what constitutes teachers' professional knowledge. At a time where digital technology is omnipresent in educational institutions at all levels, the present project may contribute to raising awareness that at its core, semiotic technologies are technologies for making meaning. Therefore, student teachers should become aware of the meaning making processes that are at the basis of the practice of presenting; it is a performative activity where the student teacher designs and enacts curricula, thereby performing a version of the curricular item. This notion raises epistemological concerns, as addressed in the current project.

The Norwegian national curriculum (LK06) has encouraged student activities where communicative skills are practised, by producing digital artefacts alone and then through communicative events unfolding in time where the meaning is distributed between multiple resources, both verbal and nonverbal. This observation may legitimise and explain the prevalence of *presentation* as a learning activity in compulsory school in a Norwegian context. Therefore, during their preservice years on campus, student teachers should be made aware of both the theoretical and practical implications of the curricular guidelines to which the current project may add relevant information.

The current research project is closely linked to educational practice and puts the student at the centre of observation. The project may be considered relevant because the settings that are subject to observation are naturally occurring learning activities initiated by subject teachers in TE. Critiques have been raised against how pedagogical disciplines are remote from educational practice (Hargreaves, 2007). However, the research outcome of the current project is more inclined to have a theoretical than practical value. The findings offer models of processes that may offer new perspectives on familiar activities; however, no normative propositional statements are formulated as to what should be considered a 'best practice'. In terms



of practical applicability, the outcome positions the project towards that of scientific pedagogical knowledge rather than pedagogical practical knowledge (Holm, Rasmussen, & Kruse, 2007). This can be considered a paradox, as long as the research has been focused on the performative aspects of teaching. On the other hand, the findings may encourage future research that operationalises the findings within research designs that aim at developing teaching methods concerned with effective teaching.

Within the confines of a PhD project, the inherent latency of doing research while studying to become a researcher offers its own challenges. The theoretical field of multimodality and social semiotics is still being developed as these theories are tested and systematised in various research settings. This can be illustrated by the book *Introducing Multimodality* (Jewitt et al., 2016), which using previous research in the field identifies three different directions of conducting multimodal studies. The timing of the release of an introductory handbook in 2016 illustrates how the field evolves and redefines itself partly based on the accumulated knowledge contributed by the actual application of theory in research projects. In a similar fashion, the current project may have contributed new perspectives to the theoretical foundations of designs for learning.

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# **Appendix**

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## Feltstudie knytt til doktorgradsprosjekt om bruk av presentasjonsteknologi i lærarutdanninga

Eg syner til den korte informasjonsøktta eg hadde med dykk den 30. september i xxx sin time. Eg informerte då om mitt doktorgradsprosjekt kor eg ynskjer å undersøka lærarstudentar sin bruk av Power-point og anna presentasjonsteknologi til framlegging av fagstoff, praksiserfaringar oa. Vi vart då samd om at eg kan vere til stades og samle data under dykkar framlegg den 13. og 14.11 kor de legg fram for kvar andre røynsler frå praksis og frå arbeidet med (namn på prosjekt). Med dette skrivet vil eg for ordensskuld be om ditt skriftlege samtykke på at du deltar i studien.

Som deltakar i studien skal du heilt enkelt stille til undervisninga slik du elles ville gjort, utan noko anna form for førebuing enn elles. For å samle inn data kan eg kome til å be om å få intervju deg åleine eller saman med andre studentar i klassen, før eller etter undervisningsøktta. Eg vil samle data ved å filme dei ulike presentasjonane med eit videokamera plassert bak i klasserommet, retta mot den/dei som underviser og lysbileta som presentasjonen støttar seg på. Videomaterialet og intervju vil bli transkribert, analysert og nytta som empirisk materiale i forskingsarbeidet mitt. Eg vil ikkje på nokon måte evaluere eller vurdere arbeidet dykkar, mitt arbeid er å observere og samle data for å forstå kva som skjer i undervisningssettingar der presentasjonsteknologi vert nytta.

Datamaterialet (video, intervju, notat) vil kun bli nytta av meg til å analysere det som har gått føre seg. Data vil bli lagra på serverar utilgjengeleg for andre og det vil verte sletta etter at doktorgradsprosjektet er over. I den grad data vil verte nytta i publikasjonar, kan eg garantere konfidensialitet ved at din person og (namn på høgskule) som institusjon er anonymisert og ikkje mogeleg å identifisere av lesaren.

Eg vil be om ditt informerte samtykke ved at du svarar meg på e-posten: [oystein.kvinge@hsh.no](mailto:oystein.kvinge@hsh.no) med «musikk» i emnefeltet, og ei kort melding om du kan delta i forskingsprosjektet eller ikkje. Om du har spørsmål kan du gjerne ringe eller sende e-post, sjå kontaktopplysningane i headinga på dette brevet. Eg vil understreke at det er friviljug å delta, og ein kan trekke seg undervegs utan å måtte forklare kvifor.

Prosjektet er ein del av HSH sitt overordna forskingsprosjekt «Improvisation in teacher education», og er meldt inn og registrert hjå Norsk samfunnsvitskapleg datateneste.

Bergen 30/9/2014

Beste helsing

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**I**

## RESEARCH

# Performing the Pre-Formed: Towards a Conceptual Framework for Understanding Teaching as Curricular Transformation

Øystein Kvinge\*, Magne Espeland\* and Kari Smith†

Presentation is the default mode of communication in higher education. Teacher education is no exception, and student teachers learn the practice of presenting by observing their subject teachers and by performing their own presentations. This study proposes an analytical framework based on the Learning Design Sequence (LDS) (Selander, 2008), which captures the design and processual aspects of presentation in the context of teacher education. Subject to observations are the student teachers' performances of reports from their practicum placement.

The study departs from Shulman's (1987) ideas regarding what constitute essential teaching skills. He identified the transformation and representation of subject content as two key aspects of teaching. Transformation entails didactic reasoning regarding how to make a subject matter comprehensible, whereas representation entails giving ideas a material shape.

By approaching presentation as a semiotic practice (Zhao, 2014), transformation and representation take on additional meaning; it is akin to a sign-making activity motivated by pedagogical ends. By using the LDS as an analytical tool, the students' agentic process of sign making is modelled as two transformation cycles. The first cycle captures the students' pre-forming activity of giving shape to knowledge by designing a semiotic artefact: a PowerPoint slide show. The second cycle captures the performance of the slides for an audience. The model reflects the dynamic multimodal interplay that occurs between the presenter and the semiotic artefact during performance.

The amended LDS supports the analysis of presentation at three levels: the semiotic, interpretative and curricular levels.

**Keywords:** semiotic technology; semiotic practice; transformation; presentation; representation; learning design sequence

## Introduction

'We need to develop better techniques for discovering and describing how knowledge is implemented and instantiated in practice, and, just as importantly, how the act of doing influences the nature of knowledge itself'. (Mishra & Koehler, 2006, p. 23)

The aim of this paper is to outline and discuss a conceptual model designed to analyse, describe and explain how curricular transformation may take place in 21<sup>st</sup> century teacher education programmes. The research context is a study of PowerPoint presentations performed by student teachers in response to compulsory assignments. Using the model of the Learning Design Sequence (LDS) (S. Selander, 2008; S. Selander & Kress, 2010) as an ana-

lytical tool, this study explores the transformation process that curricular items undergo from the state of being pre-formed to the state of being performed.

## Background

In the 21<sup>st</sup> century knowledge and information society, the practice of presenting with the visual support of PowerPoint slides has become popular for disseminating knowledge to an audience. Arguably, this practice stems from the lecture halls in higher education, where previously, overhead sheets served as a visual aid, now replaced by its digital equivalent. A recent study revealed that 92% of lecturers at Bergen University in Norway utilise presentation technology in their teaching (Kjeldsen & Guribye, 2015). Teacher education is not exempted from the practice of teaching by presenting, and student teachers learn by being exposed to the modelling role of teacher educators (Lunenberg, Korthagen, & Swennen, 2007). Modelling is about practicing what students are expected to accomplish in their teaching (Loughran & Berry, 2005), and what

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students experience as learners of teaching “dramatically shapes their view of practice” (Korthagen, Loughran, & Russell, 2006). Hand in hand with observing how teacher educators teach by presenting, students obtain first-hand experience with the phenomena when they present for peer students the outcome of assignments. Thus, presentation has a double function in teacher education in that it is resorted to extensively by teacher educators and student teachers alike (Drange & Rambo, G.-R.M & Birkeland, N. R., 2017) and in that it directly and indirectly affects the production and dissemination of knowledge.

Within the context of educational research, studies have for several decades focused on how the ubiquitous usage of PowerPoint has made this presentation tool the ‘default mode of discourse’ in higher education. Attention has been paid to how it affects the dynamics of pedagogical settings and the general relationship between presenter and students (Craig & Amernic, 2006). Questions have been asked as to what has become the central focal point of the teaching situation: the presentation medium itself or the teacher. The delivery of meaning, as opposed to the formulation of meaning, becomes most important (Angus, 1998). A major pedagogical issue with PowerPoint presentations is that receivers may become ‘passively engaged’ and not ‘actively engaged’, as Jones claims (Jones, 2003). Tufte warns that PowerPoint elevates form over content (Tufte, 2003), and Adams adds to this notion that the software package invites the usage of document templates that add a particular formatting to presentations, inevitably reducing the content to bullet points. He asks:

‘By reforming and presenting knowledge primarily as bulleted items couched on Microsoft templates, are teachers inadvertently short-circuiting the tacit, mimetic, and dialogic dimensions of the teaching-learning relationship (Adams, 2006, p. 409)?’

Recent studies apply a multimodal framework to analysing presentations in academic settings (Jurado, 2015; Querol Julián & Fortanet Gómez, 2014; Rowley-Jolivet & Carter-Thomas, 2005; Zhao, Djonov, & Van Leeuwen, 2014). Affiliated with the linguistic research on language in use, these studies are based on an understanding that in such events, meaning is made through the interplay of multiple semiotic resources or modes, not by speech or text alone. Modes constitute resources for making meaning, as they are deployed concurrently in oral and written text, i.e. the speaker elaborates through talk and gesture on an image or graph displayed on the screen. Taking the stance that meaning occurs in a context of signs mediated by technology and by embodied action, the presenter is attended to as a *sign maker* (Camiciottoli & Fortanet-Gómez, 2015).

This study borrows perspectives from the latter category of studies, wherein presentation is considered a semiotic practice. Understanding how meaning is made in familiar contexts in teacher education is a central issue. The study addresses a gap in the research literature by approaching well-established software as semiotic technology—that is, technology for making meaning—in combination with perspectives from pedagogy, which sees the teacher

as agentive in transforming the curricula by giving it a material representation motivated by pedagogical ends.

The research question reflects the paper’s intention; the aim is to establish a conceptual framework that offers an approach to analysing, describing and explaining the widespread practice under scrutiny. The main research question is:

- How can the multimodal and dynamic interplay between the student teacher and the digital representation of the curricula be analysed, described and understood?

### Multimodal social semiotic approach

By viewing the student teacher as a sign-maker, the focus goes beyond attending to how only speech and written text contribute to making meaning. Rather, speech and writing are considered distinct modes, as they are distinct from a point of materiality: meaning is conveyed as sound versus graphic substance (G. Kress & Bezemer, 2015). In principle actions, such as gestures, interaction with computers, posture and gaze are also potential resources for communicating meaning. These observations make it reasonable to apply a multimodal social semiotic approach at the substantive level in the current study: A basic assumption of social semiotics is that:

‘meanings derive from social action and interaction using semiotic resources as tools. It stresses the agency of sign makers, focusing on modes and their affordances, as well as the social uses and needs they serve (Jewitt, Bezemer, & O’Halloran, 2016, p. 58).’

A key aspect of social semiotics is that sign making, and thereby acts of meaning making, is a motivated activity. Essential is the notion that the sign maker, guided by his or her interest, is considered to select from available resources to make an apt representation or sign of the aspect of the world that is in focus currently. In semiotic terms, communication is about selecting the most apt signifier for the signified. In addition, signs, which are the expression side of meaning, are thought to be remade continuously according to the needs of the person acting. Signs are no stable entity; rather, the social semiotic approach views signs as invented by the acting person due to the needs of the given situation in the given social setting.

Therefore, learning, as conceived of within a social semiotic framework, revolves around the learner’s transformative action of sign making. Learning in a multimodal context involves re-making and re-designing meaning (G. Kress & Bezemer, 2015; G. R. Kress, 2010; S. Selander, 2017). Making signs in the context of teacher education, involves the learner’s remaking of teacher educators’ (and others’) signs according to the context of the lesson, and the different interests of the teacher and students. The transformative work of the student as a sign maker is evidence of the agency and interest of the sign-maker (G. Kress & Bezemer, 2015). The agency of the learner becomes an important matter of recognition.

This study approaches the phenomena of the transformation of curricula as the student teacher's agentive creation of a new representation of the issue at hand by first selecting what to represent, and second selecting a mode available for its expression. Transformation as such describes the process of giving meaning a shape, a process that entails semiotic change. There is, however, a distinction between the terms transformation and transduction to describe semiotic change (G. Kress & Bezemer, 2015; G. R. Kress, 2010). Transformation describes semiotic changes within the same mode, i.e. a student summarises an idea outlined in a book and gives it a new representation in terms of a text summary or a bullet point on a slide. The mode in this case is text, although the media for distribution changes. Such a semiotic change, from text to text is therefore described as intra-modal. Transduction describes semiotic changes from one mode to another. Such a semiotic change is referred to as inter-modal. An example that will be discussed below is how a student chooses to represent music using the mode of text. Transduction, in that case, describes the semiotic change from an audio to a visual mode. Of importance is the observation that not all properties of the idea at hand can be represented equally well in both modes; there are gains and losses depending on the context and purpose of its presentation.

To study the process of bringing ideas and concepts from a state of pre-formed to a state of performed, a social semiotic perspective on how meaning is made in different articulations is adopted. A preparatory stage of *design* precedes a performative stage of *production*, where design is the conceptual side of expression and the expression side of conception (G. Kress & Van Leeuwen, 2001; Van Leeuwen, 2005). In this research context, curricular ideas and concepts are at the stage of design captured by the semiotic artefact of a PowerPoint slide, made by the students, and they stand midway between content and expression. PowerPoint slides, at the stage of design, can be compared to 'intermediate productions' (G. Kress & Van Leeuwen, 2001; Van Leeuwen, 2005), such as a musical score. *Production* refers to the actual material articulation of the semiotic artefact or semiotic event. Musical scores become articulated as sound as the design is materialised at the stage of production. Similarly, production can be conceived of as the stage wherein the semiotic artefact of a PowerPoint slide is turned into a semiotic event; the meaning is articulated in action across modes afforded by the media and through the embodied modes—such as speech and gesture—deployed by the presenter.

The current study finds a theoretical foundation for an inquiry into how meaning is made in institutional social settings, where semiotic technology and semiotic artefacts play a central role. However, as an educational research effort, an additional pedagogical dimension is adopted from Shulman's ideas regarding what constitutes essential teaching skills. As will be explained below, his concepts of *transformation* and *representation* could be what merge transformative semiotic practice with pedagogy.

### **PCK: transformation and representation**

Schulman established the concept of pedagogical content knowledge (PCK) (L. Shulman, 1986, 1987), which captures what he considered the crucial elements of the

knowledge base of the teaching profession: knowing both the subject matter and the pedagogical reasoning required for teaching the subject content. Central to his thinking are the concepts of *transformation* and *representation*. In his terms, transformation is primarily concerned with the didactic planning and didactic design aspects of teaching:

'These forms of transformation, these aspects of the process wherein one moves from personal comprehension to preparing for the comprehension of others, are the essence of the act of pedagogical reasoning, of teaching as thinking, and of planning – whether explicitly or implicitly – the performance of teaching (L. Shulman, 1987, p. 16).'

His concept of *representation* reflects the expressive side of the teacher's transformation of subject content. Shulman's concept of *representation* aligns well with how student teachers give curricula a material appearance as a semiotic artefact, such as a PowerPoint slide:

'Representation involves thinking through the key ideas in the text or lesson and identifying the alternative ways of representing them to students. What analogies, metaphors, examples, demonstrations, simulations, and the like can help to build a bridge between the teacher's comprehension and that desired for the students (L. Shulman, 1987, p. 16)?'

It is worth noting that transformation, in Shulman's terms, involves both an aspect of implicit action, such as thinking, planning and designing, and an explicit action, formulated as "the performance of teaching" (Shulman, 1987). This dualism is also present in the situations explored in this particular study: the student teachers utilise semiotic technology first in the design process of making partial representations of curricula in terms of items on a series of slides, followed by the stage of production, which corresponds to the actual presentation of the slides. The curricular items subject to transformation may as such be considered to reside in the tension between *curricula as pre-formed* and *curricula as performed* (Van Leeuwen, 2016). They are designs that must be performed by means of the student teachers' in situ decision-making regarding upon which transformative and representative semiotic resources to draw.

### **Method**

Empirical data are student teachers' own responses to an assignment given early in the first term of a year course in music pedagogy. The compulsory task required the students to plan their first music lesson and to define the aims and purposes of their instructional activities. Relevant theory from the syllabus should support their planning and be used for reference. A curricular item, the Didactic Relation Model (Bjørndal, 1978), was utilised by the students as a tool for planning their lessons. Their planned lessons were carried out during their practicum placement. The students must submit a report based on their own experience and the feedback they received from their teacher in placement. These written reports became re-designed and transformed into PowerPoint slides, and



thereafter subject to presentation for peer students. The video-recorded presentations constitute the main source material in the current study. A single HD camera was positioned at the back of the classrooms to capture the student teachers' actions and speech and the projection screen. During the presentations, field notes were taken to supplement the video data.

The study design is an instrumental case study, which refers to an interest in a particular case with a view to examine an issue for insights (Stake, 1995). The instrumental case study is an appropriate tool, as it facilitates an understanding of a particular phenomenon other than the case itself. In this study, the cases comprise presentations performed by students; however, the phenomenon external to the situations is that of *curricular transformation*. It is common for instrumental case studies to 'test existing theory in a real site' (Mills, Durepos, & Wiebe, 2010) and the use of an instrumental case study may, as demonstrated herein, facilitate the development of new theory and demonstrate the applicability of the new theory. For this study, the theoretical model of the LDS, discussed below, provides a theoretical framework that helps conceptualise the phenomena under scrutiny. This framework will be subject to discussion in terms of its applicability, resulting in a revised model.

#### Data and transcription

The aim of analysing a situated, social activity is usually related to how participants make meaning in naturally occurring interactions, where information about the setting, manipulation of objects, body language, etc. may need to be integral to transcription (Lancaster, Hauck, Hampel, & Flewitt, 2013, p. 45). A transcription template was therefore developed to allow for a multi-layered notation of the multimodal action that unfolds during presentations. Each layer represents a separate mode. The layers were further categorised, drawing on the study on Power-Point conducted by Zhao, Djonov and Van Leeuwen (2014). These categories are labelled on the one hand as *resources for coordination*, including embodied gestures and inter-

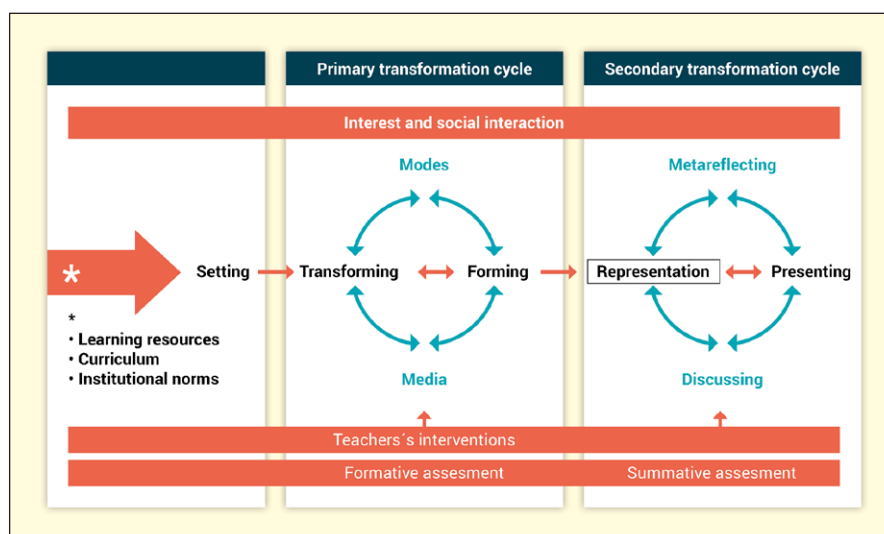
action with computers, and on the other hand as *semantic integration*, referring to the relationship between the presenter's speech and the visual content of the slides, such as text, images or graphics.

Regarding the analysis of multiple segments across a collection of cases, this approach does not attempt to draw on a statistical defence of the claims of regularity. At the heart of the approach is the concern for local, situated evidence of the relevance of the analysis (Heath, Hindmarsh, & Luff, 2010). For the purpose of this paper, the focus of the video analysis is directed towards a sample of three presentations performed by students in a year course in music pedagogy.

#### Analysis

To support the analysis of the data from the field, the project takes as a starting point the Learning Design Sequence, developed by Selander and Kress (2008, 2010). Their model supports the analysis of 'the design activity in learning sequences, the formation and transformation of knowledge (Selander, 2008)'. It may be conceived as a theoretical map that identifies critical incidents in a learning process, where the learner's activities are observed at the level of *sign-making*. The original LDS model is informed by observations made of pupils' actions in settings across a selection of secondary schools. The application of the model in this particular project, however, is motivated by the notion that student teachers are also learners who are engaged in learning processes that involve their transformation of curricular items.

A model of the formally framed LDS (**Figure 1**) features 1) contextual framing, which defines pre-conditions for activities and the staging of an activity; 2) the primary transformation cycle, where students utilise miscellaneous resources to process information and create their own representation; and 3) the secondary transformation cycle, where the students' work, in terms of their representations of a given topic, is being presented, discussed and assessed.



**Figure 1:** The learning design sequence, original (Selander & Kress, 2008, 2010).

In the settings observed in the current study, the student teachers engage with curricular items in two stages that correspond to the first and second transformation cycles of the LDS. In the first cycle, the student directs his or her transformative engagement towards the assignment issued by the teacher educator, towards recent personal experiences from the practicum and towards relevant texts from the syllabus. Available are semiotic resources afforded by the software and technology. The semiotic software permits the students to design a multimodal representation of the issue at hand. In material terms, the outcome of the first cycle is a PowerPoint slideshow. This is referred to as a *representation* in the LDS model. In the context of teacher education, researchers focus in this first cycle on design principles, which may be evidenced by the students' transformative selections of aspects of curricula. What is represented and through which modes? How are these modes combined and what cohesive ties exist among the various design elements?

Finally, and in correspondence with the LDS model's second transformation cycle, the student-made representation is presented for subject teachers and peer students for feedback, discussion and assessment. The settings, which are observed and video-recorded for the current study, are numerous instances of the second transformation cycle. Although the transformation this time takes place in real time, the presenter's agency and interest are also considered to be guiding the transformative processes across the modes available in the situation. The researcher's focus is on the multimodal interplay that occurs between the semiotic artefact, referred to as representation in the LDS, and the student teachers' speech and actions.

A set of analytical tools, as formulated by Van Leeuwen, are utilised to identify the interaction and processes that create cohesion across a range of modes (Van Leeuwen, 2005). These belong primarily to the category of *information linking*, which relates to how temporal or causal links are established between elements in multimodal texts, and in this case, multimodal action. The concepts of 'elaboration' and 'extension' specify the relation between modes. In the case of 'elaboration', content realised in one mode is restated through another mode in specific

ways, such as by providing an explanation, an example or a summary. In the case of 'extension', one mode adds new, related content to the content expressed in another mode.

**Findings**


The analysis that follows is directed towards a selection of three slides from three cases that are representative of the variation in the data collection. These slides are first investigated on their own to comment on their multimodal compositions. This constitutes the *design stage* in semiotic terms. Thereafter, the analysis investigates what happens when these slides are presented. Focus is then directed towards the interplay between the pre-formed slides and the meaning-making resources applied by the student who performs the slide. In semiotic terms, this constitutes the *production stage*. The structure of the text that follows below is organised example by example, first by looking at its design and thereafter at its production.

**Example 1. Design**

The first example (Figure 2) is selected from the aforementioned sessions, where first-year music teacher students presented with support of PowerPoint their experiences from practicum to their peers. Typically, the students presented the aim, content and assessment criteria of lessons that they carried out during practicum placement. The slide referred to below is the fifth in a set comprising a total of eight, and it appears after a slide detailing what characterise low, medium and high pupil achievements in a music lesson with the aim to teach a song.

Design wise, the current slide comprises two distinct elements: aligned with the top-left corner of the projected canvas is an unordered list featuring two clauses, each with a sub-clause. Below the list, aligned centre, is a graphic image depicting a musical notation in terms of an ascending C-major scale. Letters label the names of each individual step on the scale.

The student has utilised the affordance of the software to display a hierarchy among the four text lines in the unordered list. The indents of lines 2 and 4 suggest an A-B structure, where lines 1 and 3 proclaim the ideals of

SEMANTIC INTEGRATION		RESOURCES FOR COORDINATION
TEXT AND IMAGE ON SLIDE	LANGUAGE AS SPEECH	GESTURE
<ul style="list-style-type: none"> <li>-Goals as positive as possible</li> <li style="padding-left: 20px;">-How about low achievement?</li> <li>-Reachable for all</li> <li style="padding-left: 20px;">-Individual adjustments, i.e. by defining sub goals, spend longer time</li> </ul> 	<p><i>And the goals should be possible to reach for all, but still you can have individual adjustments where you, for example, [if they are going to learn the] C major scale, if that is the aim of the lesson, it may happen that a pupil can't cope with more than c, d, e and f for that lesson, and they perhaps will have g, a, b, no, h, and c for homework, or they will be looking at that for the next lesson, so it may take longer time for this pupil. It is very important to make individual adjustments.</i></p>	<p>[Pointing at screen]</p>

**Figure 2:** Transcript of example 1 featuring the components of the slide and the presenter's speech.

the curricular standard, whereas the subordinate clauses in lines 2 and 4 indicate the student's own reflection in terms of a desire to question and elaborate on the particular issues addressed in lines 1 and 3. The current slide extends and elaborates by *questioning and problematizing* the details of the prior slide, which specified the assessment criteria of the pupils' achievement. Rhythm, a cohesion mechanism organising temporal information, may therefore describe the relationship between the current and preceding slide.

The graphic image of an ascending C-major scale is aligned centre, below the bulleted list. The image features letters that serve as a caption, as they name the individual notes of the scale. The letters *anchor* (Barthes, 2003) the scale by drawing focus to the didactic aspect of the name of the notes. One might expect to find cohesive ties linking the image of the C-major scale with the textual content above. However, there appears to be no semantic link between the image and the points of the unordered list. The image finds no reference in the previous slide either, so there are no cohesive ties in the slide alone that serve to anchor the image semantically in the context of the music lesson explained.

### Example 1. Production

In what follows, example 1 will be discussed in terms of its production, which relates to the multimodal articulation of the slide. The transcript above of the student's speech begins with the student addressing text lines 3 and 4, and the transcript extends until the student ends the focus on that particular slide. During the transcribed sequence, the student is positioned next to the lectern, where the laptop is located. She stands facing the audience at an angle permitting her to view the projection screen if desired. The most prominent embodied meaning-making resource deployed by the presenter is speech, but gesture also comes into play for a moment.

As the transcript above reveals, text lines 3 and 4 are rephrased by the student, who combines the two sentence fragments into a single fuller sentence by inserting a conjunction between the two clause fragments: 'and the goals should be possible to reach for all, but still you can have individual adjustments where you ... for example (...)'. What follows is a brief spoken account in which the student exemplifies how she envisages the principle of individual adjustment may be turned into practice. The performance of the slide concludes with the student addressing the slide again by rephrasing the final bullet point. She does so by elaborating on the meaning by stressing its importance, 'It is very important to adjust this'.

The student's verbal account regarding teaching the C major scale establishes a cohesive tie to text lines 3 and 4. The example, performed by the student as speech, elaborates on the content of the sentence fragments. This cohesive link can be described as *elaboration by example*. Judging by the slide alone, the image of the C-major scale is apparently out of context, as pointed out above. However, as the student through the mode of speech begins elaborating on the content by giving an example, the image enters into inter semiotic relations. First, through a pointing gesture directed at the screen, the student integrates

the image into the discourse. The pointing gesture comprises one phase featuring a single stroke (Kendon, 2004) and runs parallel with the first part of the verbal utterance, as indicated in italics: "... [stroke begins] *for example, If they are going to learn* [stroke ends] the C-major scale". The movement is accomplished as a single stroke, where the left hand extends towards the projection screen before the arm is retracted to its recovery position. The left forearm movement's preparatory and recovery positions are the same; the arm rests along the body. The gesture can be described as a palm addressed gesture in that it is an open hand directed towards an object. Gesture partners with speech in the utterance produced, and directs the attention towards the visual illustration and its meaning in the current context.

The steps of the scale, as curricular entities, are referred to in the verbal mode of speech and the image becomes a visual counterpart to the student's spoken account. The affordance of speech allows the presenter to undertake didactic reflections, whereas the static image of the scale draws on the affordance of imagery; the visual features of the musical notation offer specific and immediate information. The image does as such offer information that is more specific about the properties of the musical scale and thus serves as an *illustration*.

Example 1, as described both in terms of design and production, indicates that presenting entails co-ordination of semiotic resources. If the slide is read as a text alone, the design of the slide features elements that are insufficiently integrated semantically, such as the C-major scale. The semantic links which integrates the elements are not present judging by the design alone, as these links are realised by the speech and gesture of the presenter. Co-ordination in this case involves including into the discourse elements which are present visually, but which are not yet semantically integrated.

The next example represents the widespread academic practice of integrating text quotations from the syllabus into the design. The pre-formed slides may be considered to represent curricula directly through the integration of curricular excerpts. However, as the analysis reveals, text quotations may also undergo transformative processes during performance.

### Example 2. Design

The slide selected for illustration in example 2 (**Figure 3**), is the third slide in a series of seven. Whereas the slide preceding the current slide reveals in detail how this student has planned the aims, constraints and 'what, how and why' of her lesson by applying the Didactic Relation Model, the current slide addresses in more detail just the two first elements: the aim and constraints. Therefore, there exists a cohesive tie between the preceding and current slide in that the current slide *extends* the content of the preceding by providing the rationale behind the choices made by the student at the planning stage.

The current slide features the main headline 'Didactic choices' and the three subheadings 'Didactic relation model', 'Aim' and 'Constraints'. Each subsection features 2–3 sub-clauses. The affordance of the software, as to designing the layout, is utilised to make the three

sub-headlines stand out by being prefixed by bullets, set in bold typeface and set in a larger font size than the sub-clauses. The overall structure of the slide does as such stand out.

There is a cohesive tie between the headline “Didactic relation model” and the quotation that follows immediately below; the headline states a topic and the quotation creates a cohesive tie by *extension*, as it states new information about the function and purpose of the model in question. In the consecutive sub-clause is a sentence fragment “better overview and control”, which relates semantically to the quotation above in that it elaborates on how the model may serve as an aid.

Judging by the current slide alone, there is no apparent link between the three sections ‘Didactic relation model’, ‘Aim’ and ‘Constraints’, however the preceding slide may explain this connection since the three sections correspond with the structure of the Didactic Relation Model. When analysing the slides in the design stage, it is therefore possible to identify a cohesive tie between the two slides in succession.

**Example 2. Production**

The current slide is performed by the student teacher who is positioned at the lectern, facing the peer students, yet with the possibility to face the projection screen. The analytical observations concern the relationship between the text quotation on the slide and the student’s verbal elaboration thereof. She introduces the first topic, that of the didactic relation model, by contextualising it; she does so by referring to the fact that the model is presented in a specific textbook of the syllabus. However, during her presentation, she rephrases the very quotation she has embedded in her slide. An interpretation takes place as she extends the viability of the model from concerning teachers only to students as well. However, she omits the latter part of the quotation and includes the sentence fragments ‘better overview and control’ from the clause below in its place. If the student’s verbal speech is considered the most prominent mode at this moment, the mode of speech may be considered to elaborate on the

text quotation by *interpreting* it; items are added to and omitted from the quotation. By flipping the roles, making the text quotation the most prominent, a different relation occurs. In the latter case, the text quotation becomes the more elaborate. The displayed text now elaborates on what is spoken, as it features information that is more specific regarding the purpose of the model.

**Example 3. Design**

The final example (Figure 4) is selected to analyse how a musical composition, Leonard Cohen’s song “Hallelujah”, is transformed by transduction at the design stage. The curricular item—Cohen’s tune—is represented using visual modes: lyrics as text and chord symbols as letters. Spatial organisation places the chord symbols at the appropriate place above the lyrics. The design resembles a widespread format used for distributing lyrics and chords on the Internet, where traditional musical devices, such as notes, clefs, bars, time and key signature are omitted. Due to the affordances and constraints of using the mode of text for musical representation, certain aspects of the tune cannot be represented at the design stage. Foregrounded in the current example are lyrics and chords and the overall compositional order of verses and choruses.

**Example 3. Production**

The transcribed section (overleaf) is the conclusion of the student’s presentation. The student brings the tune into the discourse by producing it on screen: ‘Then I brought along this’. She elaborates on the chord symbols by making the didactic assessment that they are achievable by the pupils: ‘as you can see, the chords are simple’. Further, she establishes a cohesive tie by extension, as she relates to the audience that she may adapt the tune according to how quickly the pupils learn. She thereby *extends* the meaning of the slide by providing related information, her didactic reasoning of the tune’s simplicity, which is a topic not represented in the slide.

The notion of transduction may aid the analysis as to what transformative process the curricular item of the tune is subject. Most notably, the case exemplifies how a

SEMANTIC INTEGRATION	
TEXT AND IMAGE ON SLIDE	LANGUAGE AS SPEECH
Didactic choices Didactic relation model. - “The model has a practical purpose; it is conceived of as an aid for the teacher in her pedagogic work, such as planning” (Hanken & Johansen, p. 153). - better overview and control  Aim: - Main aim, competence aim, sub-aims - Affective aims: “the pupils shall develop confidence to their own voice when singing and talking” and “The pupils shall be capable of making small compositions by voice or instruments which express different moods” (p. 61). - Realistic and reachable  Constraints (...)	<i>It is written in Hanken and Johansen’s book that the didactic relation model is conceived of as an aid, then, for us teachers or students. Yes, and it is better at getting an overview and control.</i>  <i>Ahm, when I was making this plan for the lesson, ahm, I started by finding out what the aim of the lesson should be. Ah, and then I made first the one main aim and put in, or added competence aims, ahm, and sub aims.</i>  <i>And the way it is written in Hanken and Johansen’s book, there is written quite a bit about affective aims, which is more about how the pupil should become confident with their own voices when singing and talking, and that the pupils shall be capable of making small compositions by voice or instruments which express different moods.</i>

**Figure 3:** Transcript of example 2 featuring the components of the slide and the presenter’s speech.

SEMANTIC INTEGRATION	
TEXT AND IMAGE ON SLIDE	LANGUAGE AS SPEECH
<p>Hallelujah</p> <p>G Em I heard there was a secret chord</p> <p>G Em That David played and it pleased the lord</p> <p>C D G D But you don't really care for music, do you?</p> <p>G C D Well it goes like this the fourth, the fifth</p> <p>Em C The minor fall and the major lift</p> <p>D B7 Em The baffled king composing hallelujah</p>	<p><i>Then I brought along this. (.) As you can see, the chords are simple, then you can also see how it goes, like, you can see how it goes individually. If there are students who learn it quickly, there is the option to add, like, make it more difficult, that they are challenged a little bit.</i></p>

**Figure 4:** Transcript of example 3 featuring the components of the slide and the presenter's speech.

curricular entity, which is a piece of music, is represented as a slide populated by text. The inter-modal semiotic change from sound to text makes certain aspects of the tune foregrounded and other aspects not represented at all. The aspects of the tune commented on by the presenter are visual; 'as you can see' she says, and she makes a judgement of the attainment of the chords based on their visual properties as notation. However, a representation of the tune as sound might reveal other aspects of the song, i.e. the tempo of chord changes and arpeggiated chords vs strum chords, which might contradict the claim of the tune's simplicity.

### Discussion

In the following section, the aim is to discuss a revised version of the LDS model (**Figure 5**) in view of the theoretical perspectives and empirical observations presented above. A revision of the model may therefore contribute to answering the research question of this paper in that it will serve as a graphic depiction of a conceptual framework that captures the processes, entities and relations at play in the situations observed.

The original LDS model features three perspectives that constitute the contextual framing and that influence the sign maker's meaning-making activities. These are institutional norms, learning resources and curricula. In the cases observed in the current study, the social setting is situated in an institutionalised environment in teacher education. Institutional norms are expressed through the assignments given by the subject teacher to which the student teachers respond and for which they receive feedback. Norms are the formal requirements that should be attended to by the student, such as abiding by academic routines, i.e. referencing the relevant literature and demonstrating its application in the current project. Examples include the students' demonstration of the use of the Didactic Relation Model as a tool for planning lessons, as well as the case wherein a pre-selected quotation from the syllabus is being interpreted during presentation. Such requirements constitute preconditions that regulate the setting by imposing formal, normative standards onto the transformation processes the students undertake.

Presentations are closely governed by what resources are made available for making meaning. The furnishing of classrooms in teacher education reflects the current trend of the digitalisation of the school system. Interactive whiteboards or projection screens are by their central position in the classroom given prominence, and they are utilised in educational practice. Their adoption by teacher educators further contributes to establishing presentation as a norm in terms of teaching methods. As referred to in the introduction, studies have found that teacher educators' practices shape student teachers' views of teaching (Korthagen et al., 2006). It can therefore be assumed that the modelling role of teacher educators contributes to establishing the presentation format as a norm in the dissemination of knowledge. The use of semiotic technology in teacher education may as such be considered as representing a norm that comes to be expressed via the omniscient presence of the technology and its application by teacher educators.

Curricula constitute a part of the contextual framing of the situations observed. Adapted to the current setting, curricula can be conceived of as 'plans, on several levels of generality, made for guiding teacher students' learning and the actualization of those plans' (Glatthorn, Boschee, & Whitehead, 2006). The example that features a student's reasoning regarding how to implement the Didactic Relation Model (ex. 2) illustrates how a student interprets curricular plans and puts those plans into practice. Other data show a small portion of the students' choices regarding how to represent curricula at the design stage. Images, text quotations, bulleted lists and music as chords/lyrics represent evidence of students' re-making of curricular items through transformation and transduction.

Central to this study is the epistemological belief that the curriculum *itself* is not being presented in the current context; rather what the students perform is a *representation* of curricular objects. A representation is never an exact reproduction of anything in existence. This notion stems from the epistemological position that knowledge and knowing do not exist in themselves devoid of any expression or form (Selander, 2017). The issue of curricular representation is therefore more of a matter of *how*

curricula are shaped and given a material form by the students. As shown by the data, these representations are very much subject to individual student's choices regarding how to re-design the curricular items at hand.

Curricula are usually thought of as represented on three levels—intended, implemented and attained (Goodlad, 1979). Of concern in the current study is the level of implementation that can be further refined into perceived curriculum, which reflects the interpretation of a curriculum by teachers, and operational curriculum, which reflects the 'curricula-in-action' in the classrooms (Thijs & Van den Akker, 2009). The current study shows how the process of presenting entails interpretation, both at the stage of design and at the stage of production. At the stage of design, interpretation is expressed in terms of the student teachers' design choices pertaining to the multimodal re-design of the topics at hand. Interpretation is then expressed through the selection of *what* to represent and *how* to represent it. At the stage of production, the design is materialised as a multimodal event. Interpretation at this stage is expressed through the students' elaboration and extension of the visual content. Examples have shown how a quotation is interpreted and how selections of text are commented upon.

In the current context, the term 'operational curricula', or 'curricula-in-action', can be conceived of through designs turned into production. The element of 'action' is captured by how the curricular design is articulated during its performance. Zhao et al. (2014) liken the presenter to that of an 'author' who makes decisions about how to combine the meaning-making resources deployed in the slides. Examples above show how the students bring into the discourse visual elements that are not semantically integrated until the presenter points or makes verbal reference, such as to images or song lyrics. New relations occur dynamically, 'in action', between the spoken utterances and gestural actions of the presenter and the visual elements of the slides. Thus, in the current context, the

operational dimension of curricular implementation is reflected by the notion of curricula as being performed.

Essential to the multimodal social semiotic approach is the idea that *transformations* and *transductions* are evidence of the agency and interest of the sign-maker (G. Kress & Bezemer, 2015). The notion of agency corresponds well with how the term *interest* is present as an overarching principle in the original LDS model. In the context of teacher education, however, the term *interest* takes on additional meaning, as it echoes the transformation process in Shulman's PCK construct; the transformation of subject content should be motivated by pedagogical reflection and a pedagogical purpose. As such, the student's interest is encouraged to be directed towards both the curricular items itself and their representation, both at the design stage and the production stage. When applying the LDS to settings in teacher education, the term *interest* should therefore reflect the overarching principle of PCK. A crucial aspect of PCK would then be to raise the students' awareness of the pedagogical affordance of modes in terms of how aspects of the topic in question are best represented, through transformation or transduction, and further how to make a coherent representation during the production stage by drawing on embodied resources, such as speech and gesture.

This brings the focus to the first transformation unit. This cycle models the students' agency and interest by reflecting how students turn curricular items into a preliminary material representation in the shape of slides. A revised cycle should reflect the acts of transformation and transduction, as illustrated by the data. These processes do challenge the students' perceptions of how to represent the item at hand best. Norms suggest that bullet points on a PowerPoint slide is the way to go, but the affordances of modes in terms of capturing meaning can best be represented in a revised LDS model by including the distinction between intra- and inter-modal transformation.

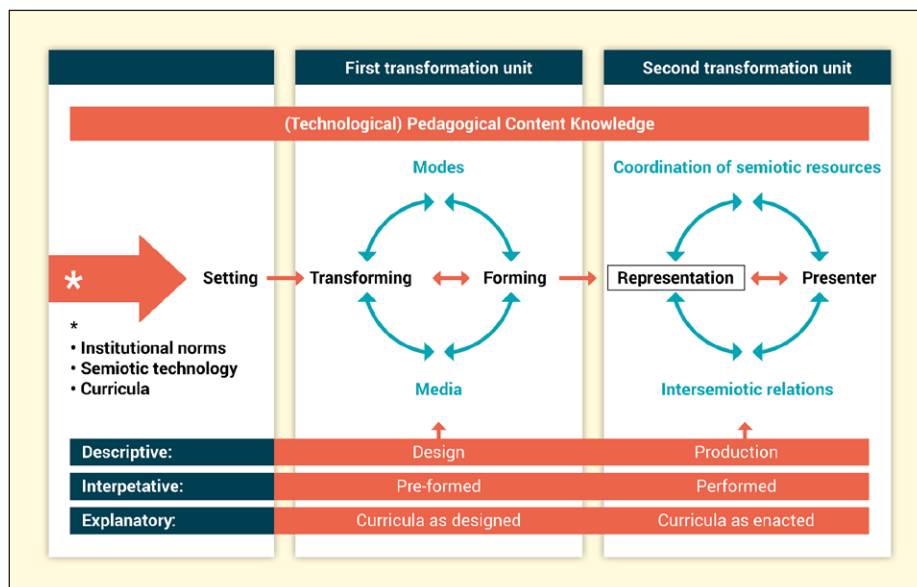


Figure 5: The Learning Design Sequence, amended.

The second transformation cycle of the original model represents the stage of discussion, assessment and reflection. This study does not object to that observation, rather, the situations observed conform to these notions in that the presentations indeed were subject to discussion, reflection and assessment. However, the issue at stake in the current study is gaining insight into the process of curricular transformation, which at this stage takes place in action. The data suggest that cohesive ties are detectable by governing principles, such as spatial composition, rhythm, dialogue and information linking. In particular, the cohesive ties of elaboration and extension are detectable at the stage of performance. The revised model should reflect the processual aspects and features of presentations; therefore, the notions of *inter semiotic relations* and *coordination of semiotic resources* are key terms embedded in the model. These capture the relationship between the presenter and the semiotic artefact during performance.

### Conclusion

This research project set out to determine how a common setting in contemporary teacher education could be described, analysed and understood. The strategy has been to devise a theoretical construct of curricular transformation in terms of a revision of the LDS model.

The LDS model was originally conceived of as a map that details the meaning-making activities that students undertake in compulsory school settings. The one-way process it depicts puts the pupils' design activities at the center. The model reflects the epistemological belief that learning and knowing are equivalent to the re-designing and re-making of knowledge. The transformation of knowledge is a key term that captures the pupils' interest and agency in the process of giving shape to knowledge.

Transferred to activities in teacher education that involve presentation, the LDS model is adapted to map students' activities of pre-forming and performing knowledge. It may seem paradoxical that the model and the process it depicts in teacher education resemble a pedagogical paradigm that puts the teacher-led transformation and transmission of knowledge at its center. This view of teaching becomes apparent if the sessions observed are interpreted as an activity intended to simulate activities in schools outside the realm of teacher education. The current trend in epistemology, on the contrary, acknowledges the agency of the learner in the construction of knowledge (Biesta & Osberg, 2007). The revised LDS model may then work as a reminder that Shulman's ideas of the representation and transformation of subject content is a dynamic enterprise, where representation is neither the semiotic artefact alone nor the teacher's speech and actions alone. Rather, the representation of the topic at hand occurs in the multimodal interplay between the pre-formed and the performer.

The settings observed may also be interpreted as activities in which teacher candidates participate as *learners of teaching*. In that respect, the LDS model may aid in directing the focus towards the topics that are represented, which in this case are the students' own experiences from practicum and their reflexive analysis of the preparation for and outcome of their music lessons. Conceived

of as learners of teaching, the student teachers perform their own reflections on recent experiences from practicum placement. Presentations supported by PowerPoint may then be considered a vehicle for reflexive practice. The learning dimension is captured by how the students become able to engage in the discourses of the profession using the available modes and media of the socially situated settings to express their meaning.

### Competing Interests

The authors have no competing interests to declare.

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**II**



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## TEACHER EDUCATION & DEVELOPMENT | RESEARCH ARTICLE

# “Playin” the changes’—A jazz approach to researching student-teachers’ PowerPoint presentations

Øystein Kvinge<sup>1\*</sup>

**Abstract:** The current study aims to interpret student-teachers’ PowerPoint presentations using concepts derived from jazz improvisation. The purpose of the study is to acquire insight on how knowledge is instantiated in action in a ubiquitous educational setting. If musical lead sheets depict the draft model that provides players with a framework for improvising, Power Point slides may be studied in terms of their properties as an improvisational framework. Works for performance vary in their constitutive properties, differing in terms of how much slack is left for the performer’s interpretation. The concepts of horizontal and vertical playing are adopted to study the performance of the student teachers’ PowerPoints slides. A vertical approach involves elaborating and expanding on the constituent parts of the slides, whereas a horizontal approach involves connecting the pre-formed elements into coherent linear phrases. The outcome of the study is a model with a double matrix that supports a reflection on how curricula are transformed by being pre-formed and performed. Since the model illustrates the students’ agentive re-shaping of curricula, the model is aligned with the essential teaching skills conceptualised as Pedagogical content knowledge (PCK). In view of PCK, improvisation should be considered a skill that is required to mediate the transformation of the pre-formed during performance. Empirical data are collected by video recording music students’ presentations of music lessons planned for their practicum placement.

### ABOUT THE AUTHOR

Øystein Kvinge (f. 1972) has previously been working in the field of arts management in Bergen, Norway. He began his career at the BIT20 Ensemble and the Music Factory festival, and moved later on to the administration of Norwegian national company of contemporary dance, Carte Blanche, where he stayed for 8 ½ years. He worked as programme coordinator at the Bergen international festival from 2011 until he started as a PhD student at the Western Norway University of Applied Sciences (HVL) in January 2014. Currently, he teaches music at various programmes for teacher education at the Western Norway University of Applied Sciences in Bergen.

### PUBLIC INTEREST STATEMENT

This study is motivated by teachers who report that they improvise when they teach. The study puts PowerPoint-led teaching under scrutiny, investigating how student-teachers perform their PowerPoint slides. To focus the research, the concept of improvisation is borrowed from jazz music. In jazz, improvisation involves reworking pre-composed materials and designs. By analysing presentations, it appears that students who present also rework their own pre-composed designs as they talk through their slides. The study summarises its findings by presenting a model that shows how slides vary from being “thin” to “thick” in terms of content. The presenters’ performances of slides span between elaborating on the givens or by connecting the givens without adding information. The study concludes that improvisation can be considered a teaching skill that captures what students do when they transform and represent knowledge, both at the stage of pre-forming and performing.

**Subjects: Teacher Education & Training; Teachers & Teacher Education; Semiotics**

**Keywords: improvisation; jazz; social semiotics; PCK; presentation**

**By Øystein Kvinge**

*My assertion is that the key features that teaching should share with jazz music and theatrical improvisation, although it currently does not, is the availability of an explicitly held and deliberately taught body of knowledge about how to successfully improvise in order to accomplish the intended aims of the profession (Dezutter, 2011)*

## 1. Introduction

In the knowledge and information society of the twenty-first century, teaching with the visual support of presentation software, such as PowerPoint, Prezi and Keynote, has become a widespread format for producing and disseminating knowledge. A recent study revealed that 92% of lecturers at Bergen University in Norway utilise these tools in their teaching (Kjeldsen & Guribye, 2015). In a national survey conducted in 2014 across all institutions of higher education in Norway, 90% of the teacher staff and 56% of the students reported that they use presentation tools on a regular basis (*Digital tilstand 2014/2015*). Teacher education is not exempted from this practice, and student-teachers gain first-hand experience with the ubiquitous practice of presenting when they share the outcome of various subjects' assignments with their peers. Thus, presentations have a double function: they are a format resorted to by teacher educators and student-teachers alike.

Previous research on the use of presentation software in educational settings has mainly addressed the use of PowerPoint, noting how the technology affects the dynamics of pedagogical settings and the general relationship between the presenter and students (Craig & Amernic, 2006), and even going so far to claim that receivers may become "passively engaged" and not "actively engaged" (Jones, 2003). PowerPoint elevates form over content (Tufte, 2003) because the templates exert a particular formatting to the presentations. Inevitably, the content becomes reduced to bullet points, which affects the tacit, mimetic and dialogic dimensions of the teaching-learning relationship (Adams, 2006). A strain of research investigated what design principles may help the presenter communicate more effectively. Students' own preferences have been assessed as to what construction principles works best (Apperson, Laws, & Scepanisky, 2008; Rockwell & Singleton, 2007). Based on the cognitive load theory (Sweller, 2011), it is argued that the design of PowerPoint slides should adhere to the principles of coherence and redundancy by avoiding extraneous information (Atkinson & Atkinson, 2004; Clark, Nguyen, & Sweller, 2011).

Recent studies on presentations in academic settings have applied a multimodal framework for the analysis of the practice (Jurado, 2015; Querol-Julián & Fortanet-Gómez, 2014; Rowley-Jolivet & Carter-Thomas, 2005; Zhao, Djonov, & van Leeuwen, 2014). Affiliated with the linguistic research on language in use, these studies are based on an understanding that during presentations, meaning is made through the interplay of multiple semiotic resources or modes, not by speech or text alone. Here, modes constitute resources for making meaning (Kress, 2010), and they are deployed concurrently during presentations, that is, the speaker elaborates through the modes of speech on information presented on screen through the modes of image and text. Taking the stance that meaning occurs in the context of signs mediated by technology and embodied action, the presenter is attended to as a *sign maker* (Camiciottoli & Fortanet-Gómez, 2015).

By adopting a multimodal approach to examine presentations, the current study aims to contribute a new understanding of the epistemology of teaching as it is conducted in teacher education in the twenty-first century. Presenting entails giving curricular items a shape and form for representation across a series of slides. Ideally, the design is adapted to the target audience's prior knowledge. Therefore, the presentation draws on the teaching skills of *curricular transformation* and *curricular representation* that constitute a part of the concept of pedagogical content knowledge (PCK)

(Shulman, 1986, 1987). PCK is a construct that describes the essential skills particular to the teaching profession. However, the transformation and representation of curricula are not completed by merely designing the slides; this process becomes completed in action as the presenter interacts with the elements on the slides i.e. by elaborating on the content and providing examples. Researching presentations, thus, provides an opportunity to study PCK as it unfolds in teacher education by “discovering and describing how knowledge is implemented and instantiated in practice” and by studying “(...) how the act of doing influences the nature of knowledge itself” (Mishra & Koehler, 2006, p. 23).

Based on the empirical data derived from music student-teachers’ presentations of compulsory assignments for their peers, the current study proposes a model that describes the dynamic interplay that occurs during presentations between the presenter and the digital representation of curricula featured on the slides. Acknowledging that presentations encompass the articulation of knowledge in action, the present study utilises theoretical perspectives from the performing arts as analytical tools. In particular, the concept of improvisation is applied as an analytical lens because the ability to improvise resides in the tension between the pre-formed and the performed.

### **1.1. Performing the pre-formed**

The act of presenting can be likened to that of a performance. Performance theorists have agreed that “all performance is based upon some pre-existing model, script or pattern of action” (Carlson, 2017, p. 12), and there is no performance without pre-performance (MacAloon, 1984). The student-teachers observed in the current study transformed curricular items by turning them into a *pre-formed* (Van Leeuwen, 2016) representation of the current topic in terms of text and images on a set of slides; these are *performed* during the presentation. The performance aspect is also a result of knowledge communication being decontextualised by the mediation technologies (Knoblauch, 2008). Thus, this type of performance is inescapably influenced and governed by the pre-formed because the pre-formed designs of the PowerPoint slides are drafts by their very nature and *require* someone to perform them to form them into some sort of coherent meaning.

The use of metaphors in exploring a domain for research may reveal connections that otherwise might not be seen. Using jazz improvisation as the root metaphor (Pepper, 1942) can enable the researcher to use a concept as a heuristic device to assist in understanding a different field (Black, 1962). A standard notation format for music within the jazz community is the lead sheet. The current study views the lead sheet as a pre-formed element that guides a jazz musician’s improvised performance. By acknowledging the “draft” nature of the constituent parts of lead sheets, concepts from a musical domain can be ported to the context of education by force of metaphor: similarly, the PowerPoint slides are draft designs. Contrary to scores for classical music, the lead sheets are sparse in terms of how much musical information is represented. These provide “the bare bone-bones musical information—melody, chords and form—that you need to play a tune” (Baerman, 2004, p. 20). This musical framework leaves a substantial space for the performer(s) to interpret and rework the musical material. Lead sheets depict “the kind of skeletal model that typically provides players with a framework for improvising” (Berliner, 1994, p. 507). However, the free space is not limitless because “with a lead sheet, players are in a genuine sense “tied to” the “score”—that is, they must agree to submit to the “givens” of the piece and respond accordingly” (Nielsen, 2015, p.5).

The notions of “thick” and “thin” works are used by the philosopher Stephen Davies to describe musical works’ constitutive properties (Davies, 2001). “Thin works” are characterised as featuring few determinative properties compared to their counterpart, “thick” works. Pieces that are represented as lead sheets, and thus only provide the melody, chords and form, can be considered thin works. An important observation is that the thinner the work is, the freer the performer is “to control aspects of the performance” (Davies, 2001, p. 20). Consequently, pertaining to the performance of thin works, most qualities of the performance should be ascribed to the performer’s interpretation, not to the work.

Building on the notion that jazz improvisation is guided by the pre-formed constituent properties of “lead sheets”, in the current study, jazz will be utilised as a toolbox that supplies the theoretical devices for studying student-teachers’ performances of the pre-formed curricula. Hence, the research question is as follows:

*How does improvisation materialise in the interplay between the pre-formed curricula and the performer in student-led PowerPoint presentations in teacher education?*

### **1.2. Improvisation—Reworking the pre-composed**

The epistemological motivation for researching improvisation as a professional skill can be found in prior debates on what constitutes professional knowledge. An important contribution to the debate is Schön’s critique of the prevailing view of the time that competent practice is the “application of knowledge to instrumental decisions” (Schön, 1992, p. 9). Schön questioned the ability of theoretical knowledge to capture the “indeterminate zones of practice” and hence called for a view of professional practice as a reflection exercised in and on action. The tacit dimension of practice may be referred to as “art” (Eisner & Reinharz, 1984) or “professional artistry” (Kinsella, 2010) because the conception of art contrasts with the positivistic view on practice as guided by theory. “Pedagogical tact” (Van Manen, 1986) is in *its very practice* a kind of knowing; it captures the teachers’ ability to know instantly how to deal with the interactive teaching–learning situations. Montuori (2003) brought the concept of improvisation into the discussion on professional practice using the term as a musical metaphor to “bring in all the elements from the arts that were successfully avoided by the social sciences” (Montuori, 2003, p. 239).

The Latin root of improvisation is *improvisus*, or unforeseen or unprepared. In his landmark book *Thinking in Jazz*, ethno-musicologist Paul Berliner (1994) claimed that the popular conception of improvisation as “performance without previous preparation” is fundamentally misleading; he revealed there is “a lifetime of preparation and knowledge behind every idea that an improviser performs” (Berliner, 1994, p. 17). Berliner’s definition of improvisation in jazz music is as follows:

Improvisation involves reworking pre-composed material and designs in relation to unanticipated ideas conceived, shaped and transformed under the special conditions of performance, thereby adding unique features to every creation. (1994, p. 241)

A close reading of educational researchers Beghetto and Kaufman’s (2011) definition reveals that they modified Berliner’s wording to fit in the domain of education. Their interpretation of improvisation may serve as an example of how other researchers also have looked at the performing arts and borrowed analytical concepts from this realm to explore the domain of education. Beghetto and Kaufman (2011) identified *curricula* as the material subject to transformation across two stages—*as-planned* and *as-lived*:

Disciplined improvisation in teaching for creativity 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).

The current study departs from the common denominators shared by the above definitions of improvisation. By analysing these definitions, it becomes clear that the concept of improvisation encompasses elements and processes that must be operationalised in the current study to make the concept work as a utility for researching the practice of presentation. First, the current study identifies the PowerPoint slides created by student-teachers as “pre-composed materials and designs”. These can be examined according to their constituent properties and considered “lead sheets” around which the processual aspects of presentation revolves. In this regard, the definitions of improvisation convey “re-working” as the process that unfolds during performance. Then, the current

study must apply methods for identifying and describing the processes of reworking the curricular designs, which is expected to take place in the observed settings where student-teachers perform their PowerPoint slides. If this happens, the research question can be responded to in terms of how improvisation materialises in the interplay between the pre-formed curricula and the student performer. In the following section, the methodological approach will be outlined in more detail.

## 2. Method

The present study was organised around a compulsory assignment in music pedagogy that was given to a group of 18 first-year music student-teachers at a Norwegian teacher training college. The student-teachers were required to work individually or in groups of two to three to make plans for a music lesson that they would later carry out during practicum placement in a primary school. The aim of their lesson would be to teach a song of their choice to a group of pupils. Using the didactic relation model (Bjørndal, 1978) and core texts on music pedagogy from the syllabus, student-teachers were asked to write an assignment on their own reflections on the didactic aspects of teaching this song to their target group. This assignment would later be converted to PowerPoint slides and presented by the student-teachers to their peers under supervision of their subject teacher. All the student-teacher presentations were subject to video observations and constituted the empirical material of the current study.

The total number of presentations was 12, and each presentation spanned from six to eight slides. The total number of slides presented was 75. The average duration of a presentation was 8:45 min. A single HD camera was positioned at the back of the classroom to capture the student-teachers' actions, speech and projected PowerPoint slides. During the presentations, field notes were made using an observation template, and emerging issues were addressed in a full class subsequently after each session.

The current study was designed to be an instrumental case study (Stake, 1995). The instrumental case study is an appropriate tool because it facilitates an understanding of a particular phenomenon other than the case itself. In the present study, the cases comprise several presentations performed by music student-teachers; however, the phenomena external to the situations is that of *improvisation*, which in the current context is perceived of as a skill that is manifested in the student-teachers' design and reworking of the PowerPoint slides. In instrumental case study research, the focus of the study is more likely to be known in advance and then designed around an established theory or methods. The case is of secondary interest: it plays a supportive role, and it facilitates our understanding of something else (Denzin & Lincoln, 2005). Importing the concepts derived from jazz improvisation provides a theoretical framework that helps conceptualise the phenomena under scrutiny. It is common for instrumental case studies to "test existing theory in a real site" (Mills, Durepos, & Wiebe, 2010), and the use of an instrumental case may, as demonstrated by the current study, facilitate the development and demonstrate the applicability of the existing theory in a different domain than where it originated.

The instrumental case study approach does not attempt to draw on a statistical defence of the claims of regularity. At the heart of the approach is the concern for local, situated evidence of the relevance of the analysis (Heath, Hindmarsh, & Luff, 2010). The aim of analysing situated, social activity is usually related to how participants make meaning in naturally occurring interactions where information about the setting, manipulation of objects, body language and so forth may need to be integral to transcription (Lancaster, Hauck, Hampel, & Flewitt, 2013). The collected video material was transcribed using the HyperTranscribe software (Hesse-Biber, Kinder, & Dupuis, 2009). Primarily, the spoken words of the presenters were attended to and transcribed to text in their entirety. The text components of the accompanying slides were transcribed and included as separate text sections in the transcripts, demarcated by brackets to separate the units from the spoken words. Images were represented in the transcripts by text snippets that describe the content of the image.

The transcribed files were imported into the HyperResearch software for coding, categorisation, review and annotation. A priori codes derived from the multimodal theory were first applied to segments to capture the various kinds of organising principles that pertain to the pre-formed slides as separate entities and between the pre-formed slides and the performer during the presentation. In the next iteration, codes were grouped according to common features and categorised in abstract terms. The latter representation of the data formed the basis on which an evaluation of candidate concepts from within the jazz theory could be made.

### 3. Analytical framework

To support the analysis of the data from the field, the current study adopted the learning design sequence (LDS) (Figure 1) as an analytical framework (Selander, 2008, 2017; Selander & Kress, 2010). This model was selected because it reflects the properties of improvisation, as discussed above, in that it conceptualises the elements and processes of the pre-formed and performance. The LDS may be conceived of as a theoretical map that identifies the learner's activities at the level of *sign-making*. Thus, the model aligns the current study with the branch of studies on PowerPoint that are grounded in a multimodal social semiotic approach:

A basic assumption of social semiotics is that “meanings derive from social action and interaction using semiotic resources as tools”. It stresses the agency of sign makers, focusing on modes and their affordances, as well as the social uses and needs they serve. (Jewitt, Bezemer, & O'Halloran, 2016, p. 58)

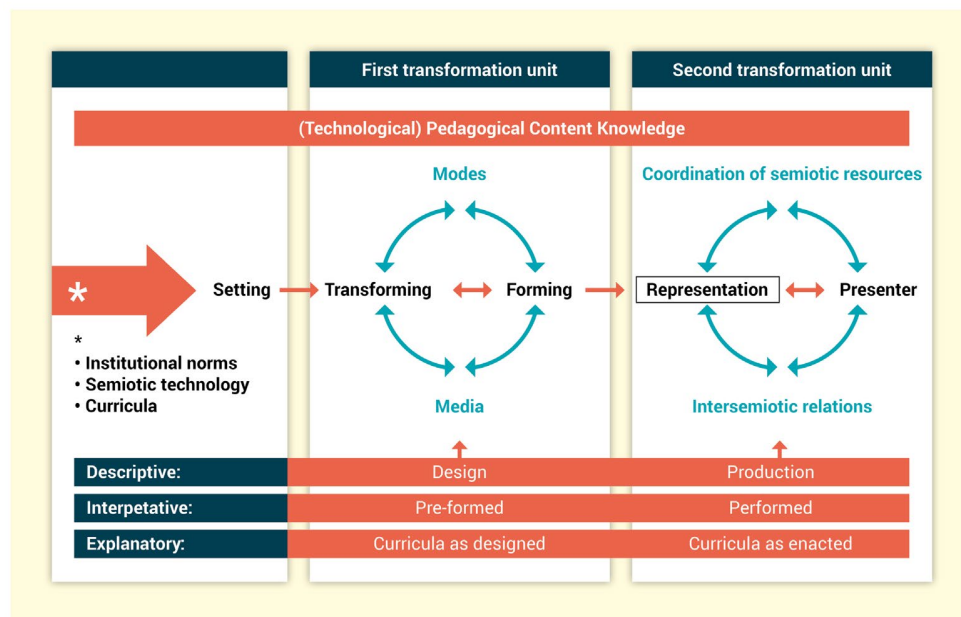
A key aspect of social semiotics is that sign-making, and thereby the acts of meaning making, is a motivated activity. Essential is the notion that the sign-maker, guided by his or her interest, selects from the available resources to make an apt representation—or sign—of the aspect of the world that is in focus at the moment. In an educational context, the sign-making activity is thought to be pedagogically motivated. In semiotic terms, communication is about selecting the most apt signifier for the signified. And signs, which are the expression side of meaning, are thought to be continuously remade according to the need of the person acting. Signs are not a stable entity; rather, the social semiotic approach sees a sign as being invented by the acting person because of the needs of the given situation in the given social setting.

Multimodal research attends to the interplay between modes to look at the specific work of each mode and how each mode interacts with and contributes to the others in the multimodal ensemble. In the current setting, this multimodal cohesion occurs across meaning-making devices within the pre-formed slide and between the pre-formed slides and the presenter during a performance.

In the settings observed in the current study, the student-teachers engaged with the assignment in two stages that correspond to the first and second transformation units of the learning design sequence. In the first unit, the learner directed his or her transformative engagement towards the reflexive written assignment that they had completed individually or by work in groups. Available were the semiotic resources afforded by the software (PowerPoint), that is, text, fonts, images and colours, which allowed the student-teachers to convert their written text into a multimodal representation. In material terms, the outcome of the first cycle was a PowerPoint slideshow, and this is what is referred to as a *representation* in the LDS-model and a lead sheet according to the jazz metaphor. The first transformation unit maps the part of the process where the *representation* is *pre-formed*.

The second unit of the LDS-model maps the stage in the process where the presenter *performed the pre-formed*. The settings that were observed and video recorded for the current study were numerous instances of the second transformation unit. This unit made up settings where knowledge could be instantiated in action by being performed by a presenter. Although the transformation of curricula now takes place in real time, the presenter's agency and interest were also considered to be guiding the transformative processes across the modes available in the situation. The

**Figure 1. The learning design sequence, amended (Kvinge, 2018).**



researcher’s focus was directed towards the multimodal interplay that occurred between the *pre-formed* semiotic artefact, referred to as a *representation* in the LDS, and the student-teacher’s actions, such as speech and gesture.

By attending to the multimodal composition of the slides and the multimodal interaction between the performer and pre-formed, the stage was set to analyse the elements and processes observed using the concepts derived from jazz. By doing so, the research question could be answered: how improvisation materialises in the interplay between the presenter and the representation of curricula. In the following section, the two transformation units of the LDS will be placed under closer scrutiny by testing the appropriate concepts from the art of jazz improvisation as analytical devices.

### 3.1. Analysis: Pre-formed Slides

To approach the PowerPoint slides as “lead sheets”, two contrasting samples will be discussed in the following section. The two samples were selected because they are representative of the variation width (Yin, 2003, 2012) in the data material in terms of how much pre-composed materials were featured on the slides. Considered as “lead sheets”, they differ in their configuration because the “givens” vary from being sparse on the one hand and more towards being fully articulated texts on the other. This observation suggests that pre-formed PowerPoint slides may be positioned along an axis spanning from “thin” to “thick”, depending on how much space they leave for the presenter’s interpretation.

#### 3.1.1. A thin work

Contextually, the sample slide below (Figure 2) is captured from the introduction part of a presentation made by a music student-teacher, and it provides an overview of the content of the lesson he planned for his practicum placement. His lesson was based on using the tune “La ti do re” as a warm-up exercise for the primary school students. The tune is based on the Sol-fa-principle, where the syllables of the text correspond to the pitch. The slide was displayed for his peers during his explanation of the Sol-fa-principle and how he intended to introduce the tune to his pupils.

Design wise, the slide is based on a template off the PowerPoint software. Wave shapes divide the screen vertically between superordinate elements, such as the main headline and subordinate



Figure 2. “Thin work”.



content elements. The main heading is centre aligned. The text elements are featured in a bulleted list, aligned left, consisting of five list items that are keywords. In terms of cohesion, the spatial organisation of the elements suggests that the keywords belong together and that they refer to various aspects of the main headline. Figure 2 represents a *form* in terms of how the elements that are subject to being performed—the list items—are placed in a certain order. The content is reduced to a “bare-bones” state in that the list items feature a bare minimum: just the keywords. In terms of its properties as a “lead sheet”, the heading is given similar prominence as the title of a tune, hinting at what the work thematically is focused on. Despite its sparse inherent information load, the layout suggests cohesive ties between the heading and the constitutive elements of the list items. As a piece of a work subject to performance, the slide can be characterised as “thin” in that the content, being keywords, do not fully articulate meaning and leave the presenter with the challenge of interpreting and articulating the keywords’ meaning during the performance of the slide.

### 3.1.2. *Thick work*

The context of the next sample is a student-teacher’s presentation of a generic plan for instructing a musical learning process to a group of primary school pupils. Her presentation began with the slide below (Figure 3), which introduces the concept of *curricular aims* on various levels as an organising principle for a teacher’s work. Throughout her presentation, she broke down the principle of the aim as an overarching idea down to how it determines her own planning of the lesson to be conducted in practicum.

Figure 3 is not based on a design template. It features ordered text elements on a white background. The heading stands out because of its heavier weight in terms of font size. The main text elements are organised as three bulleted list items. The first list item is a sentence fragment that establishes a cohesive tie to the heading, elaborating on it. The second list item elaborates on the first list item by providing further specification. A nested list item, in terms of a sentence fragment, further elaborates on the second list item. The final bulleted item is a quotation from a textbook from the syllabus for the music student-teachers’ education.

Figure 3. “Thick work”.

## Aim

- Various aims for various subjects
- Three main aims of Music: «Musicking», «Composing» and «Listening»
  - Partial aims pertaining to each main aim
- «The aims are organised by what the pupils are expected to have achieved by 2., 4., 7. and 10th grade. For a shorter period of teaching, it may be smart to make work related aims which will be more specific compared to the other aims. (Hanken & Johansen, 2013, p. 60)»

Inherent cohesion exists among the list items by means of how each element elaborates on the one above by further specifying or extending on the meaning's potential. The inherent logic of the list items can be considered *nested* in terms of how they support the item above by elaborating or extending on its meaning.

In terms of being a lead sheet, the heading may be perceived of as the title of a work. It introduces the overall theme, or "aim", that then becomes gradually more elaborated on throughout the form. The structure of Figure 3 is organised using a bulleted list. The list provides the slide with a *form*, which suggests the order in which the items should be addressed by a performer. The internal cohesion supports this view in that the cohesive ties in terms of elaboration move from the general headline, which states the topic, to the specifics of the quotation from the syllabus at the bottom of the slide. The "givens" of this slide contrast those of the previous sample (Figure 2) in that the list items are more elaborate and self-contained in terms of their expression of meaning. The sentence fragments articulate meaning more specifically than the keywords do, as does the quotation from the syllabus to an even greater extent. Therefore, the slide suggests the existence of a "thick" work in terms of PowerPoint slides that have cohesive and more articulated determinative properties.

### **3.2. Lead sheets performed—Horizontal and vertical approaches**

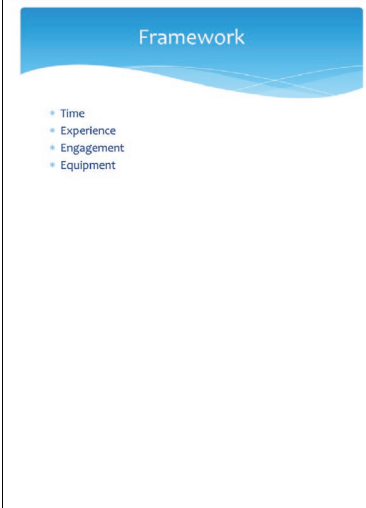
Having analysed aspects of the *pre-formed* slides in terms of their properties as "lead sheets", the next step is to identify what concepts derived from jazz may pertain to the stage of *performance*. Berliner explained that "Performers are also sensitive to the relationship between the constituent elements of the phrase and their harmonic backgrounds" (1994, p. 250); this suggests that there is a relationship between the melodic invention of the jazz improviser and the underlying harmonies that constitute an important part of the "givens" of the lead sheet. Researching improvisation in educational settings, therefore, requires the researcher to attend to the interplay between the presenter's utterances and the elements of the digital representation of the curricula.

Method accounts on jazz improvisation within musicology refer to the terms *horizontal playing* and *vertical playing*, which capture two approaches to improvisation that both relate to the underlying lead sheet; however, they do so in different manners. A vertical approach to performing jazz tunes is based on the underlying chord schedule by "relating to each chord change as it passes" (Longo, 1992, as cited in Holbrook, 2008, p. 3). The soloist's musical material articulates the chords or the base chord's remote extensions and alterations using the pitches derived from the chord for melodic invention. A horizontal approach is less concerned with describing each chord and incorporating the chord changes in the formulation of melodies, though it does rely on chord progression as a general rule (Berliner, 1994, p. 128). Amadie and Christensen (1990) explained the distinction between the two approaches as improvisation based on chords and improvisation based on scales, where a scale-based approach is equivalent to horizontal playing. A simple explanation of the horizontal approach would be "superimposing a scale or mode over an entire chord progression" (Berliner, 1994, p. 128). In the following, this relationship between the *pre-formed* and the *performed* is transferred from the domain of jazz improvisation to the practice of presenting. The terms "vertical" and "horizontal" approach will be tested as analytical devices that can describe the performance of slides by applying the terms to samples that match the characteristics of "thick" and "thin" works.

#### **3.2.1. Ex. 1—Vertical approach to performing a "thin work"**

The context of the next sample is a student-teacher's explanation of his planned music lesson. In the slide, he gives an account of how external factors might impact his plans. His analysis of what constitutes external factors is a step towards integrating the principles of the didactic relations model (Bjørndal, 1978) into his planning. The student-teacher engages with the curricula of teacher education by making a qualified assessment of what local terms and conditions might impact his own teaching during his practicum placement.

**Figure 4. A thin slide subject to vertical performance.**

Semantic integration	
Pre-formed	Performed
	<p><i>Student (speech):</i> 'The framework is of course if I all of a sudden have less time than I need, that things take longer than planned, that forty-five minutes are much too short, or, if I do it very quickly. Then we would apply a few more musical instruments. As to experience, I am not sure if they are (...) I have been planning for 7th grade by the way, and I don't know if it may be a little difficult for them. If they have, and this is what I think about experience, that they may not have been singing much alone, and that they have not been singing together, that they have not been singing canon, and been concentrating on their own beat, not starting on someone else's and all that. Staying focused'.</p>

The student-teacher's slide (Figure 4) contains a headline and one bulleted list. The template emphasises the division between the title and content of the page using a graphical shape and colour to set them apart. The title and the four list items are single keywords, which leave a large space for the performer's interpretations. There is a semantic link between the headline and the list items in that the keywords detail the topic introduced by the headline. A form in terms of the order of the elements is indicated by the list itself. The slide is considered "thin" because the determinate properties are few and not fully articulated; hence, there is space remaining for the performer to interpret the lead sheet.


The student-teacher performed the list items of the slide one by one. "Time" was elaborated on by providing several examples of scenarios that might occur in practice. Coping strategies in the case of too much time were also mentioned. The elaboration made by the student-teacher moved beyond what is suggested by the keywords alone. It is therefore relevant to draw a parallel between the concept of *vertical improvisation* and the way of extending the meaning's potential of the "givens" of a PowerPoint slide. In this case, the student-teacher related to the underlying material by outlining the elements one by one and elaborating on what the list items might mean in a given setting. Likewise, jazz soloists who apply a vertical approach move beyond the "givens" of the chord symbols of the lead sheet, which by convention is represented in its most basic form, and outline the harmony by creating melodic material derived from the chord's extensions and its alterations. The sample in Figure 4 exemplifies a vertical approach to performing a thin work.

### 3.2.2. Ex 2–Vertical approach to performing a "thick work"

The context of the next sample is a music student-teacher's presentation of her plans for a lesson on teaching pupils older songs. Because the student-teacher's practicum placement coincided with a school anniversary, the choice of the musical theme was influenced by the local circumstances.

The sample slide below (Figure 5) features a headline that states its topic. Two bullet points follow, and a colour image aligned to the right extends the last sentence. There is cohesion between the heading and the two bulleted items. The heading states the topic—"Aim of the Lesson"—and the two sentences appear to formulate the aims by further specifying what those aims are. There is no reference that states where the formulation of the aims is taken from or if they are quotations of curricula or student-made formulations. The order of the elements indicates that the second element elaborates on what is expressed in the first one. The image depicts a group of pupils wearing

**Figure 5. Thick work subject to vertical performance.**

Semantic integration	
Pre-formed	Performed
<p><b>AIM OF THE LESSON</b></p> <ul style="list-style-type: none"> <li>- Perform songs and tunes from older times → weekly theme at school</li> <li>- Perceive and apply pulse, rhythm, form, melody, timbre, dynamics, tempo and simple harmony for listening and music making</li> </ul> 	<p><i>Student (speech):</i> Ahm, we used for a starting point some competence aims of the curricula for 5th until 7th grade, and these we broke down and turned into learning aims for the lesson. Ahm, one of those, perform songs and tunes from older times, we included since when we were there, the school ran a week-long theme, ehm, due to the anniversary, ahm, and as you can see from the photo, one of the days the pupils dressed up in clothes from older times.</p>

vintage clothes. There is no caption for the image that would help linking the motif of the photo to the text, but the reference to “older times”, as expressed in the first list item, becomes more specific in terms of the image, which displays the enactment of “old times” in the local context of the school classroom.

The slide is comparatively more self-explained than the “thin” slide referred to above; its content is more articulated, and its meaning is expressed across several modes, such as text, photo and layout. The slide in Figure 5 serves as an example of “thick” work.

The performance of this “thick” work was vertically oriented, that is, towards the “givens” and by elaborating on these “givens”. The opening phrase extended the meaning of the content of the slide by specifying that the aims are formulations that come from the national curriculum. Thus, the speech provided the reference for the aims formulated on the slide, which now can be understood as quotations of external sources. Furthermore, an explanation was provided as to why the curricular aims were selected. The photo was commented on, and the comment anchored (Barthes, 2003) the photo in the context by emphasising what aspects of the image to attend to; it is the clothing that is of interest and that contributes to expanding the scope of the student-teacher’s account on the experiences from practicum.

The performance complied with a vertical approach, yet this time, it was based on a “thick” work. Although the “givens” of the slide were comparatively elaborated on, the speech contributed important contextual information that extended the overall meaning potential of the components of the slide.

### 3.2.3. Ex. 3–Horizontal approach to performing a “thin work”

The sample below is the introductory slide performed by a student-teacher who planned a music lesson for her practicum placement and who aimed at teaching her pupils a more popular song. The slide serves as an overview that addresses parts of the local and external conditions that could impact her planned lesson.

No layout from the available PowerPoint templates was applied to her slides. The main items are a headline on white background and a bulleted list that suggest a form, determining in what order to address the elements. The headline is generic in that it does not address the specifics of the student-teacher’s assignment. The headline does not immediately connect semantically with the five items on the list; however, the topics suggested by the list items indicate that what is represented

**Figure 6. A thin slide subject to horizontal performance.**

Semiotic integration	
Pre-formed	Performed
<p><b>Didactics assignment</b></p> <ul style="list-style-type: none"> <li>• Double lesson (90 min)</li> <li>• 15 pupils</li> <li>• 1 teacher</li> <li>• Aim: Pupils shall learn to sing a song (vocal and instrumental)</li> <li>• Can be developed into a project work</li> </ul>	<p><i>Student:</i> Ahm, for a starting point I have a double lesson of ninety minutes. Ahm, where the class consists of fifteen pupils and one teacher. The aim of the lesson, is, that the pupils shall learn a song, which is Hallelujah, ahm, and I have allowed for developing it into project work.</p>

are the local conditions for the planned lesson. The list elements are keywords, sentence fragments and sentences, leaving room for interpretation. The bottom two items are sentences that express meaning on their own. The draft character and the short-hand writing of the constituent parts indicate that the sample below can be considered “thin” (Figure 6).

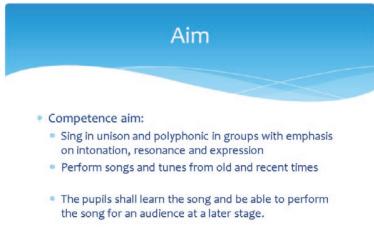
The performance of the slide differed from the previous sample. Most notably, the performance was characterised by linking together the “givens” already present on the slide into a coherent whole, as opposed to elaborating and extending on the potential meaning of the items. The student initiated the spoken phrase by establishing the slide as “her starting point”. The information then became contextualised in the local, which was the host school for her practicum placement. What followed were the list items linked together by speech but with one exception: the title of the song was not “given” on the pre-formed slide. The performance resembled that of a jazz improviser’s horizontal approach in that it oriented towards creating a coherent “line” by linking together and, thus superimposing, the “givens” along the temporal dimension. A vertical approach was not applied because there was little “going beyond the givens” by elaborating or extending on the meaning potential of the list items. Hence, the slide represents a horizontal approach to performing a thin slide.

#### 3.2.4. Ex 4.–Horizontal approach to performing a “thick work”

The final example captures how a student-teacher gave an account of the aim of his planned music lesson. According to the didactic relation model, the “aim” was a specific category that the music student-teachers should address when planning their lessons. In the slide, the aims are formulated as references to the general guidelines of the national curricula, and these general aims should be reflected by the concrete learning activities devised by students as they carry out the planning of their own lessons.

The sample below (Figure 7) is based on a design template from the PowerPoint software. Wave shapes contribute to dividing the screen vertically between superordinate elements, such as the main headline and the subordinate content elements. The main heading is aligned in the centre and reads “Aim”, which in turn is more general compared to the more elaborate “Aim of the Lesson” in the previous example. The content elements are featured as three sentences organised in a bulleted list that are aligned to the left. A separate list headline applies for all three subsequent list items in that they are all indented; however, the third is separated from the rest by an extra line space. Therefore, the final list element is ambiguous as to whether it belongs to the main list or if it is a separate entity.

**Figure 7. A thick work subject to horizontal performance.**

Semantic integration	
Pre-formed	Performed
	<p><i>Student (speech):</i> Then, the aims. Based on the competence aims, this is to sing in unison and polyphonic in groups with emphasis on intonation, resonance and expression, yes.</p> <p>Perform songs and tunes from old and recent times, and no surprise, but the aim of the lesson is to learn the tune and possibly perform the song at a later stage, based on that.</p>

In terms of cohesion, the list items can be interpreted as an elaboration of the headline: the main headline “Aim” is further specified by the list headline that reads “Competence aim”. The list items may be read as detailing what the competence aims of the national curricula are. However, the last item on the list, which is separated from the rest by an extra line space, remains ambiguous in that it may either be taken as a general principle, one responding to the headline, or taken as a formulation of the aim of the concrete lesson that was explained by the student. This slide may be labelled “thick” in that it features elements that articulate meaning on their own with, to some extent, cohesive ties among them.

The performance of the slide followed the order of the content elements and abided to the inherent form of the slide. Beginning with a conjunction, the student-teacher glued the “given” elements of the slide together by pronouncing what was written. There was minimal elaboration on the elements, the only instance being the specification expressed as “no surprise but, the aim of the lesson is”, which contributed to tying the final list item to the local context, thus separating the element from the two above, which referred to the competence aims expressed in the curricula. The performance of the sample represented a horizontal approach to a “thick” piece of work. The determinative properties of the slides were foregrounded and given a linear verbal representation, with few alterations contributed by the performer. There was no going in-depth beyond the givens, which characterises a horizontal approach.

#### 4. Discussion

The analysis of the samples above indicates that a student-teacher’s presentation can be positioned in a matrix consisting of two crossing continuums. The pre-formed slides reside between “thin” and “thick” works. “Thin” slides feature few determinative elements, and those elements that are present are not fully articulated in terms of their self-contained expression of meaning. “Thick” slides feature self-contained entities, such as sentences and paragraphs that may be quotations or originate from the student-teacher’s own text production. A second matrix reflects a span between the “vertical” and “horizontal”, which captures the student-teacher’s approach to articulating the constituent elements of the slide as these are performed. A vertical approach addresses the elements of the slides in terms of elaborating and extending on their potential meaning one by one. This is equivalent to the “chordal approach” that develops musical material by going beyond what is “given” by augmenting and altering the harmonic foundations of a jazz lead sheet. On the opposite end resides the horizontal approach, which attends to the linear articulation of the givens, or the pre-formed elements on the slides. This resembles the melodic approach to jazz improvisation, which pays less attention to going in-depth beyond the givens, but rather invents coherent lines stretching across several bars. These observations are summarised in the following matrix:

The double matrix should be regarded as a theoretical construct that can capture what improvisation entails in the current setting. The theoretical construct operationalises, here in an educational context, what may be considered key aspects of improvisation, as defined by Berliner (1994) and

echoed by educational researchers Beghetto and Kaufman (2011): that of “re-working pre-composed materials and designs”, which in the current setting are represented by “thick” and “thin” slides. A “horizontal” or “vertical” approach captures how “ideas conceived, shaped and transformed under the special conditions of performance” (Berliner, 1994), which are the student-teacher’ verbal expressions, relate to the pre-formed slides. The research question asks how improvisation materialises in the multimodal interplay between the *pre-formed* and the *performer*. The question was formulated to capture the primary features of disciplined improvisation, an informed activity that takes place within structures, which in the current setting are the curricular items featured in the pre-formed PowerPoint slides.

The current project is grounded in a discussion of the nature of student-teachers’ professional knowledge as it unfolds in teacher education in the twenty-first century. The dichotomy between seeing professional knowledge as the instrumental application of scientific knowledge on practice on the one hand and the metaphorical use of artistry on the other constitutes a backdrop towards which this project should be understood. The current study sought to find a middle ground between the two contrasting views by applying theoretical concepts derived from jazz improvisation to understand the aspects of presentations practiced in teacher education. Theorising improvisation constitutes a middle ground because it envisages the possibility of applying propositional knowledge, which is developed within the arts, on a knowledge practice that is liable to escape the articulation of its nature in propositional terms. The research effort should be regarded as an attempt to meet the need for developing a body of knowledge “about how to successfully improvise in order to accomplish the intended aims of the profession” (Dezutter, 2011, p. 29).

The design of the present study does not support making inferences as to what design and performance principles are the more efficient for learning and instruction. However, the double matrix may be aligned to the findings advocated by other studies on PowerPoint. A vertical performance of a thick slide may, in principle, conflict with the coherence principle (Clark et al., 2011), which encourages the exclusion of extraneous material. In practice, one should cut text on screen that will be narrated. In this sense, thin slides are favoured over thick slides, provided the presenter applies a vertical approach and goes beyond the givens of the slide. Such views are based on a cognitive approach to presentations that assumes that there are limits to how much information can be processed by the receiver at one time.

The outcome of the current study may inform the practices that take place in teacher education, wherein student-teachers present various topics for each other. The present study sees a presentation as a way of operationalising the concept of pedagogical content knowledge (PCK). At the core of PCK are the core teaching skills of *transformation* and *representation*, both of which become activated as the student-teacher engages with the topic at hand when preparing it for presentation. The current study argues that the imported concept of improvisation is a factor that mediates the transition of turning the pre-formed into performance. Improvisation is the mediating activity on part of the student-teacher that negotiates the space between the pre-formed and the performed. The present study does advocate a view that a presentation may be considered an exercise where the curricular theory of teacher education is turned into practice; PCK is a skill that in the current context resides in the tension between the pre-formed and the performed because both are stages of transforming curricula into multimodal representations.

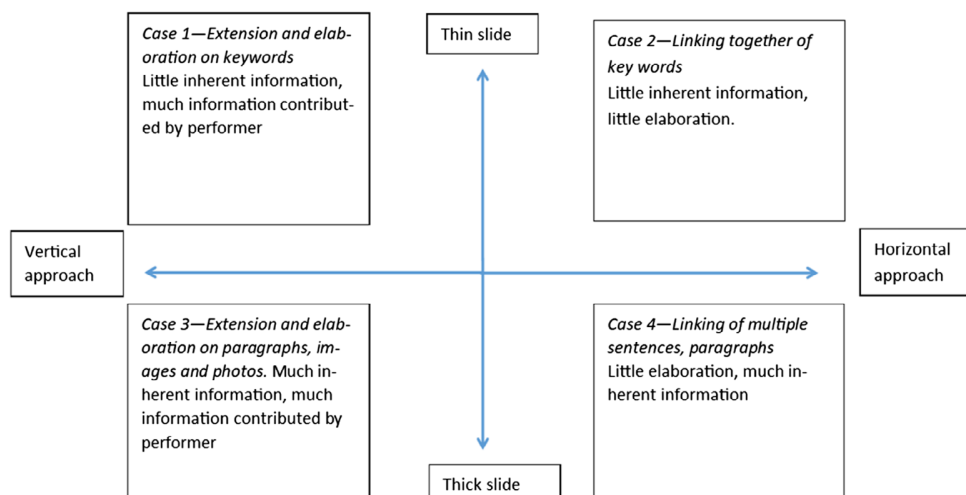
Then, what is the connection between presenting and teaching? The settings observed were selected for scrutiny because they represent a widespread mode of disseminating knowledge in teacher education and beyond. Still, the practice can be identified as belonging to the paradigm that sees teaching as a transmission of knowledge, a view that currently is being surpassed by a constructivist view of knowledge. In a similar vein, the practice observed can be understood as a method for student-teachers to construe their professional knowledge in terms of understanding teaching as a practice of representation. To a large extent, education relies on a representational epistemology (Osberg & Biesta, 2003) that is illustrated by the analysed samples above. The student-teachers’

own experiences from practicum and the concepts and ideas from the curricula of teacher education are turned into *representations* by the student-teachers' own design of PowerPoint slides and in the subsequent performance of these.

A recent study (Kvinge, 2018) dealt in-depth with the student-teachers' own representations of the teaching profession itself, as exemplified by their own reflexions on their experiences from practicum placement. Thereby, the student-teachers constructed their versions of what may be considered a teacher's professional knowledge. The current study, however, shows that to represent the "aspects of the world" by means of a presentation is subject to the fluid logics of improvisation. Thereby, the representation cannot, from an epistemological point of view, be understood as one-to-one reflection of the real world it claims to be a reference of. Rather, the findings adhere to a constructivist view of knowledge, whereby student-teachers' own presentations should be considered their agentive design of a version of "reality", whether this reality is a curricular entity, such as a declaration of an aim for teaching outcome, or the student-teacher's own recollections and analysis of experiences from a recent practicum placement.

The validity of the current study's findings depends on whether the double matrix (Figure 8) can be considered as representing what it claims to be a model of. The current study is based on the observation of indicators thought to represent the phenomena of improvisation as conceived of by studying the application of improvisation in jazz. Through the process of analysis, a construct in terms of a double matrix is established to represent the findings of the research effort. Inferences have been made that the indicators observed in the field correspond with certain properties of improvisation, ones adopted from jazz. Based on these inferences, a theoretical construct has been visualised in the form of a model. Although a model has been constructed, the theoretical validity of it, according to Maxwell, is conditioned by the "... validity of the blocks from which the researcher builds a model, as these are applied to the setting or phenomenon studied" and "... to the validity of the way the blocks are put together, as a theory of this setting or phenomenon" (Maxwell, 1992, p. 291). In this case, the "blocks" are the theoretical devices borrowed from the domain of musical performances. These are borrowed because they, as metaphors, both capture the properties of the structures and frameworks presented in the current study and the different approaches to reworking the predesigned elements. Transparency, ensured by a multimodal approach to transcription, may invite the research community to judge whether the blocks indeed capture the indicators that the blocks are considered to be an instance of.

**Figure 8. Variations of performances of the pre-formed.**





## 5. Conclusion

In the teacher education setting observed, the very presentations have been unidirectional because the student-teachers performed their presentations without inviting the listeners to participate in a dialogue. This has conditioned the research project to focus on the relationship between the performing student-teacher and the pre-formed semiotic artefact. In accordance with multimodal social semiotic principles, this focus was sufficient for investigating how meaning is instantiated in action across the meaning-making devices employed by the presenter in the design of a pre-formed artefact and by means of the embodied resources, such as speech. Future studies should take into consideration the co-construction of meaning that occurs when a third party, the student-teachers watching, contribute by participating in the dialogue. Such a study could be motivated by extending the existing research on classroom talk that is approached through the lens of improvisation and the jazz metaphor. The focus could then be directed towards the semiotic artefact to investigate if and how it impacts the dialogue in the common effort by the teacher and students to construe meaning.

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**III**

## CHAPTER 9

# Teaching represented: a study of student-teachers' representations of the professional practice of teaching

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### ABSTRACT

This paper explores student-teachers' representations of what is considered teachers' professional knowledge. Acknowledging the gap between theory and practice in teacher education, the current study investigates what this gap might mean in terms of how student-teachers represent knowledge of the profession. The study maps students' representations of knowledge in a double dichotomy that spans between the universal and local and the theoretical and procedural. The knowledge landscape mapped questions what epistemologies students encounter both in and outside of campus during their education. A discussion follows on how the traditional gap between theory and practice can be understood when the representations of professional knowledge are made by teacher-students themselves.

### INTRODUCTION

Most teacher education programs include a theoretical as well as a practical component. This combination of a practical and a scientific-oriented route into the profession is also grounded in the Norwegian framework plan: "Teacher education institutions offer integrated, profession-orientated primary and lower

secondary teacher education [...] rooted in research and experience-based knowledge (Ministry of Education and Research, 2016)". A benefit of this model is that students may become better qualified to teach during their preservice years. However, integrating disparate domains such as theory and practice on the one hand and experience and research-based knowledge on the other can be a complex undertaking.

The Ministry of Education and Research claims that the programs offered by educational institutions are "integrated". The current study acknowledges the idea of a program being "integrated" as a reference to how the program succeeds in merging the academic disciplines disseminated on campus with the practical aspects of the profession encountered during practicum placement. Presumably, an integrated approach strives to create coherence between the disparate domains of the educational institution and the field of practice. The Ministry of Education and Research claims that the programs are rooted in both "research and experience-based knowledge". Hence, teacher education is facing a challenge in integrating knowledge from varying, sometimes opposite, epistemological positions. It is important to note here that research-based knowledge may be abstract and theoretical, whereas experience-based knowledge may remain unarticulated.

Researchers studying education claim there is a "gap" between what is taught on campus and what skills are required to succeed in the classroom. This perceived gap between theory and practice is not unique for Norwegian teacher education; instead, it seems to be a challenge shared globally. Critique stems from the assumption that knowledge and practices taught within preservice programs will enable professional practice in the workplace. However, there is a disparity between the types of skills and knowledge taught in educational institutions and the reality of the workplace (Allen & Wright, 2014).

The current study aims to investigate how professional knowledge is represented by student-teachers. The study departs from the assumption that throughout their preservice years, student-teachers encounter the teaching profession in various epistemological disguises that influence students' perceptions of what a teacher's professional knowledge is. The abovementioned gap can then be investigated by exploring the epistemological positions that are represented by the student-teachers participating in this study.

The research question posed is as follows:

*What epistemological positions can be inferred from the student-teachers' own representations of professional teacher knowledge as experienced on campus and in practicum?*

In the current study, a class of first-year student-teachers were observed as they shared with their peer students the interpretations of chapters of a handbook on classroom management (Bergkastet, 2009). The same group of students were observed when they shared their experiences from the first practicum placement. In both settings, the students conveyed their messages by presenting them using PowerPoint. Video recordings of the presentations were transcribed and analyzed slide-by-slide. A model, designed as a double dichotomy, was created to capture a variety of different epistemological positions expressed by the students. The foundations for the discussion were four representative samples from the data collection; these illustrate the extremes of a double dichotomy that situates the student-teachers' representations of professional knowledge between local or global and between theoretical or procedural.

## **BACKGROUND**

In 1904, Dewey identified two approaches to combining theoretical knowledge and practical skills in teacher education (Dewey, 1904). *The apprenticeship approach* encompasses teaching the practical skills to do the job proficiently. The apprentice learns from observing demonstrations and best practices that are encountered in practicum and on campus. *The laboratory view* advocates the need to design practical experiences to “inform and make real and vital the two components of theoretical work – subject matter knowledge and educational principles and theory”. Dewey claimed that the apprenticeship approach looks backward because it is based on imitating the local, particular and situated and the “hard-won gains of past tradition and practice”. The laboratory view looks forward because it generates transferable, general knowledge. A similar conception of knowledge is conceived of by Bruner (1986) who referred to “paradigmatic knowledge”, which is the finite, certain and objective, and “narrative knowledge”, which is socially constructed and embedded in a certain context (Bruner, 1986).

For decades, debates have centered on the relationship between professional knowledge and its application. Referring to the “indeterminate zones of practice”, Donald Schön (Schön, 1992) illustrated how the theoretical foundations

of professions fail to capture the complexity of practice. The grittiness of reality escapes ready-made models derived from theory, and accordingly, questions arise as to what constitutes competent practice. A mode of professional knowledge is one embedded in action. Metaphors such as “the artistry of teaching” (Eisner & Reinhartz, 1984) and “pedagogical tact” (Van Manen, 2008) reflect ideas of professional knowledge tacitly expressed in the action of teaching, or doing.

Schön (1983) introduced the terms “knowing-in-action” and “reflection-in-action” to capture the tacit knowledge embedded in action and to place a focus on the on-the-spot decision-making of professional practitioners (Schön, 1983). The reflexive approach is echoed by Shulman’s (1998) view that the exercise of *judgement* is what negotiates the ground between theory and practice, and knowledge and its application (Shulman, 1998).

Traditionally, academic knowledge from an educational institution has preceded over the practical knowledge and expertise that resides in the schools (Zeichner, 2010) and curricula in Teacher Education leans toward the “paradigmatic” type (Burnett, 2006). The “action-guiding” knowledge required in practicum differs from the “abstract, systemized expert knowledge” that resides in teacher education (Korthagen & Kessels, 1999, p. 5). Students perceive in-the-field experience as practical, real and immediate, whereas on-campus work is considered theoretical, remote and of “little value in becoming a teacher” (Allen, 2009, p. 653).

Literature, thus, refers to knowledge pertaining to the teaching profession along opposing positions. Theoretical knowledge that resides in educational institutions is contrasted by the practical and action-oriented skills required in practicum. Knowledge can be universal and transferrable on the one hand, or it can be local and context bound. These observations will be addressed when discussing the findings of the current study further below.

### **TEACHER EDUCATION – SITUATED BETWEEN PRESENCE AND REPRESENTATION**

The goal of the current study is to explore what epistemological positions are expressed when student-teachers report on knowledge practices on campus and in practicum. To pursue this goal, some clarification is needed on the ontological basis of the study. A key question is the following. In what way is the teaching

profession itself present in the activities in which the student-teachers take part, both on campus and during practicum placement?

Traditionally, educational institutions present knowledge about the world “outside” and for that very reason they rely upon a representational epistemology. This is an epistemology that says that our knowledge “stands for” or represents a world that is separate from our knowledge itself (Osberg & Biesta, 2003, p. 84). This quote originally aimed at explaining how the evolution of a world of education has led to a split between the “world outside” in which pupils learn, and a separate world of institutional, educational practices. The world outside needs to be represented in the school classroom, something which has become a realm of its own. The statement may also hold true for activities in teacher education; the outside world of the teaching profession is brought into the classrooms and lecture halls on campus by means of mediating tools and artefacts. That is, handbooks on classroom management convey aspects of the profession by representing it in terms of text, graphics and images.

However, a representation is not a reflection of the real world or a mirror of reality. It should be considered a version of people, places, things, objects or concepts. In educational settings, words and images are combined to represent ideas, make meanings and represent versions of the world. Therefore, student-teachers' representations of professional knowledge do not *re-present* some pre-existing reality, but actively construct it (Unsworth, 2011). Representations “produce” and “create” the object they assume to represent, that is, objects gain their meaning in and within representations. Such representations are always influenced or mediated by ways of thinking about the world; therefore, they are not fixed (Miller & Colwill, 2010).

The teaching profession is also sometimes *present* for the student-teachers since they participate in the very practice of teaching during practicum placement. Then, the profession is not “re-presented” in a remote institutional context; instead the profession itself is being *present* in the situated context of the school environment.

The current study puts the student-teachers' agency at the center of the process of learning and emphasizes the transformative and agentic action performed by the students when making their own representations of curricular knowledge and representations of their experiences from practicum. Fundamentally, the approach grounds the study in a constructivist worldview to approach the problem of a gap between theory and practice as an issue of



representation, where representation cannot be an isomorph with “reality”, instead it is evidence of the student-teachers’ engagement with certain aspects of the teaching profession. Borrowing a social semiotic perspective on the act of making meaning, representation ultimately becomes a *sign-making* activity. Representation is defined in the following.

...process in which the makers of signs (...) seek to make a representation of some object or entity, whether physical or semiotic, and in which their interest in the object, at the point of making the representation, is a complex one, arising out of the cultural, social and psychological history of the sign-maker, and focused by the specific context in which the sign-maker produces the sign (Kress, 2006, p. 7).

To pursue the intention of the study, access to observing the student-teachers’ representational practices and sign-making activities is essential.

### **EMPIRICAL SETTING**

By informally surveying teacher educators’ plans for the current term, it became apparent that using PowerPoint would be an established method for making students share their assignments. The current study is based on data retrieved from observing on two separate occasions a full class of first-year student-teachers (N = 17) in a class on pedagogy.

The first setting centered on the outcome of a compulsory assignment. As a means for preparing the student-teachers’ forthcoming practicum placement, a book from the syllabus on classroom management and relational competence (Bergkastet, 2009) was the subject for analysis by the students. The various book chapters were distributed among the student-teachers, and the student-teachers were responsible for presenting to their peers an interpretation of the chapters. The student-teachers were told to pay attention to what tools and methods for classroom management were introduced by the handbook. They were asked to promote what aspects of the text they liked and what challenges the methods and approaches of the handbook introduced.

The second session took place a month later. The subjects of the presentations were the student-teachers’ reports on their recent practicum placement. The purpose of the assignment was to link the student-teachers’ experiences

with the curricular topics, such as a teacher's role, classroom management and didactic planning. The student-teachers were told to report on their systematic observations on their pupils' learning activities, on the practicum regarding a teacher's ways of managing a class, means of organizing learning activities and means of developing supportive conditions for learning.

## DESIGN

The study design is an instrumental case study, which uses a particular case to examine an issue for insights (Stake, 1995). The instrumental case study is an appropriate tool because it facilitates an understanding of a particular phenomenon other than the case itself. In the present study, the cases comprise presentations performed by the student-teachers. However, the phenomenon external to the situation is that of *student-teachers' epistemological positioning*, which is expected to be observed in the student-teachers' representations of professional practice.

The empirical material was collected by observing and video recording both sessions in which the full class of first-year student-teachers (N = 17) used PowerPoint to present the outcomes of compulsory assignments. The class was organized into five groups of three-to-four members. Each presentation lasted 8-12 minutes and comprised from 6 (min.) to 17 (max.) slides. The total number of slides presented was 75.

Because of the multimodal nature of communication in instructional communication (Mishra, 2008, p. 363), video was considered the best tool for capturing data in the field. A single HD camera was positioned at the back of the classroom to capture the student-teachers' actions and speech and the visual content projected on screen. During the presentations, field notes were taken using an observation template to capture thoughts and ideas evoked in session.

The video recordings were turned into data by transcribing speech and incorporating into the transcripts other meaning-making resources such as text, graphics and images. Segments of speech and the corresponding PowerPoint slides were first coded and categorized using HyperResearch software (Hesse-Biber, Kinder & Dupuis). A code book of 51 codes was established across all data sources. Some codes were defined close to the data-reflecting aspects of professional knowledge thought to be represented by the data segments. A priori codes were derived from the theoretical backdrop and applied where appropriate.

To achieve further abstraction, code categories were labelled *universal domain* and *local domain*, depending on the context of the expression of knowledge implicit in the allocated code segment. Further diversification was achieved by sorting the codes according to the segments, producing *propositional* knowledge or *procedural* knowledge. For this paper, a selection of samples, representing the variation width along the two dichotomies, is used as an illustration.

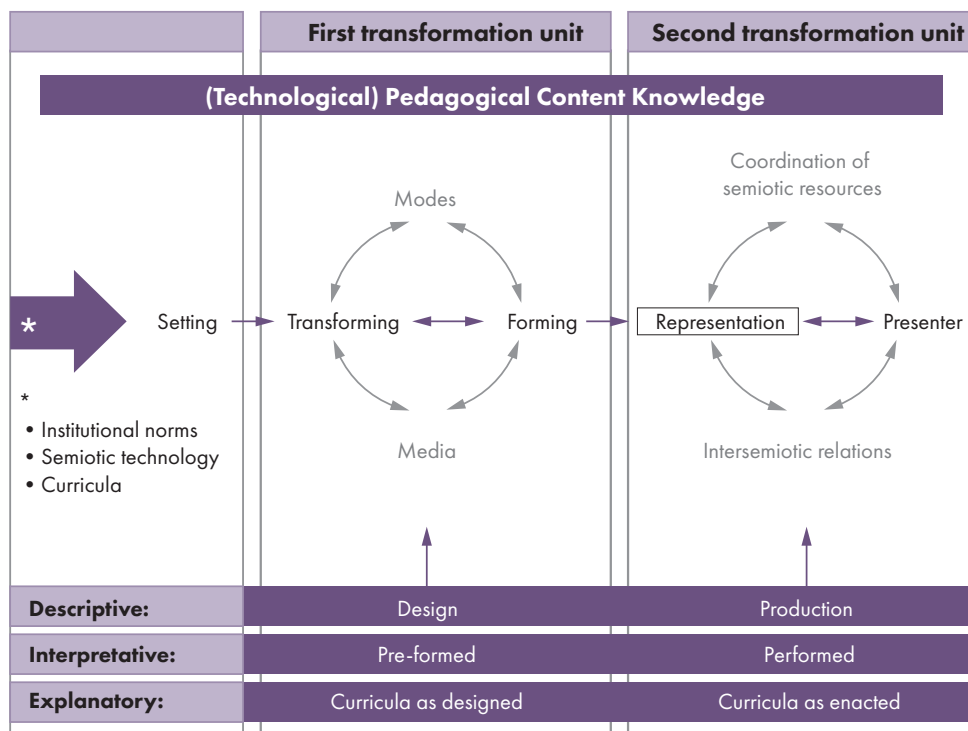
To obtain a more in-depth understanding of the phenomena of representation of professional knowledge, a multimodal analysis was conducted on candidate samples. Analysis was carried out by studying the slides and their constituent elements alone and studying the interactions between the presenter's speech and the meaning-making resources embedded in the slide, such as text, images and photos. Drawing on a recent study on PowerPoint presentations (Zhao, Djonov & Van Leeuwen, 2014), transcripts for publication featured the overarching heading *semantic integration*, which spans across transcribed speech, and *visual information*, which encompasses the elements projected as slides.

### **Analytical framework**

To support the analysis of the data from the field, the study adopted the amended Learning Design Sequence (LDS) as an analytical framework. The original model is aimed at mapping "the design activity in learning sequences, the formation and transformation of knowledge" (S. Selander, 2008; S. Selander & Kress, 2010). In the current context, this corresponds to the student-teachers' learning process as they make representations by giving shape to the chapters from the handbook on classroom management and by giving shape to their experiences from practicum. Essential to this is the notion that the sign maker, guided by his or her interest, selects from the available resources to make an apt representation, or sign, of the aspect of the world that is in focus. The student-teachers apply semiotic software (PowerPoint) to make a representation of the issue at stake, drawing on the software's affordances in terms of applying fonts, layout, colors, tables, images and so forth. In the context of initial teacher education, the student-teachers' sign-making activities are thought to be pedagogically motivated.

A mode is a socially organized set of semiotic resources for making meaning. Examples of modes include image, writing, layout and speech (Jewitt, Bezemer & O'Halloran, 2016). Fundamental to the multimodal social-semiotic approach

is an understanding that where several modes are involved in a communicative event, all the modes can be combined to represent a message's meaning (Kress & Van Leeuwen, 2001). The meaning of any message is, however, distributed across all these modes and not necessarily evenly. Therefore, each mode is partial in relation to the whole of the meaning, and speech and text are no exceptions (Kress & Jewitt, 2003). Therefore, multimodal research attends to the interplay between modes and looks at the specific work of each mode and how each mode interacts with and contributes to the others in the multimodal ensemble. In the current setting, such a multimodal interplay occurs across meaning-making devices within the *pre-formed* PowerPoint slide and between the *pre-formed* slides and the presenter during *performance* (Van Leeuwen, 2016).



**Figure 9.1** Learning design sequence amended (Kvinge, 2017 (in press)).

In the two settings observed in the current study, the student-teachers engage by creating a representation of the issue at stake in two stages; these correspond

to the first and second transformation units of the LDS. In the first unit, the student-teacher directs his or her transformative engagement toward the assignment issued by the teacher educator, toward his or her own recent experiences from practicum and toward aspects of the designated chapter. The semiotic software permits the student to design a multimodal representation of the issue at stake. In material terms, the outcome of the first cycle is a set of PowerPoint slides. The first transformation unit maps the part of the process where the *representation is pre-formed*.

In correspondence with the LDS model's second transformation unit, the student-teacher's representation is performed for the instructor and peer student-teachers for discussion, feedback and assessment. The settings observed and video recorded for the current study show numerous instances of the second transformation unit. Although the transformation this time takes place in real time, the presenter's agency and interest are also considered to be guiding the transformative processes across the modes available in the situation. The researcher's focus is directed at the multimodal interplay that occurs between the *pre-formed* semiotic artefact and the student-teacher who performs the presentation.

## FINDINGS

The following section presents four transcripts that constitute different epistemological positions regarding how they represent a teacher's professional knowledge. The transcript template features both the pre-formed slides, which are referred to as *visual information* in the left column, and the accompanying student-teacher's performance, which is represented as speech in the right column. Combined, the modes in the slides and the presenter's speech constitute a *semantic unit*, where meaning is distributed between the resources at play. This is thought to be in accordance with a multimodal social-semiotic view on how meaning is made and influenced by the norms prevalent in the current setting. A motivation for doing so is to gain insight into the transformative principles that underpin a student's representation of what may be interpreted as an epistemological position.

### **Curricular theory – procedural knowledge as universal theory**

The first empirical example is taken from the dataset where student-teachers' presentations are responding to an assignment on pedagogy. Chapters of a book were

distributed among the student-teachers for peer presentations. The book itself was referred to by one student-teacher as a “practical handbook for teachers in primary school which proposes ideas for efficient teaching, and which illustrates the importance of the teacher”. The current slide was presented as one in a series of eight, and it sums up a section of the handbook that discusses the logistics of the classroom and principles for effective communication. The transcript below represents the slide (left) and the presenter’s full spoken comments about this slide (right).

**Table 9.1** ex. 1.

Semantic integration	
Visual information:	Presenter’s speech:
<p><b>Three principles of organizing</b></p> <ol style="list-style-type: none"> <li>1. <b>eye contact with pupils</b></li> <li>2. <b>move about quickly and efficiently</b></li> <li>3. <b>movement without disturbance or “traffic jam”</b></li> </ol>	<p>Then, there are three specific principles mentioned in the book, and the first is that the teacher should be able to have eye contact with all pupils when teaching and when giving messages for all. The second is that the teacher must be able to get to the pupils in a quick and efficient manner to assist, encourage and correct. And the third is that the teacher should be able to move about to do what is required without making disturbance or causing a traffic jam.</p>

The slide displays how a student-teacher has engaged with the original text and transformed a chapter of a book on the logistics of a classroom into three principles. The affordance of the software is used to format the principles into three numbered bullet points. The formatting makes the principles appear as a set of rules governing good classroom practices. The sentences do not have a subject clause, yet it is apparent from the context that the principles are meant to apply to teachers. The missing subject clause, however, makes the second principle appear imperative and takes it in the direction of becoming a “commandment”. The absence of images or illustrations of any sort emphasizes the context independence and universality of the principles. The presenter elaborates on the bullet points in her talk by specifying on what occasions the teacher should observe the principles. However, the principles still emerge as a normative theory of universal applicability.

The example is typical of a category of data where what is represented is primarily practical knowledge that resides in the teacher's actions in a classroom setting. The book is a representation of a teacher's reality. At its core, such knowledge can be considered experiential and "narrative" because it usually is embedded in a context. The author of the textbook transforms the practical wisdom of classroom management by selecting what aspects of "the reality of it" to present and how to represent it. Being a curricular entity, the handbook serves as a medium for bringing the practical knowledge, which resides in the classroom context, to the student-teachers' attention. The student-teachers, however, engage with the book as theoretical knowledge of the "paradigmatic" kind, and their transformation turns the textbook chapter into normative rules which are context independent.

### **Curricular theory – applied to the local**

The second empirical example is taken from a session where a group of students reported on their experiences in practicum. Throughout their presentations, the group reported on observations made on a teacher's role, classroom management and didactic planning, all of which were central items for the class on pedagogy.

Example 2 (below) features a slide describing how the current group utilized the Didactic Relation Model (Bjørndal, 1978) as a tool for planning and conducting a lesson. The slide is designed using three elements. The headline introduces the topic (didactic planning) and is separated from the other elements because it is placed in the designated area for a headline provided by the selected PowerPoint template.

Left is an unordered list featuring seven items that appear to be key words to support the presenter's reasoning. The key words do not convey meaning entirely by themselves, although the heading and the context of the presentation may give the viewer ideas of its intentions. The sparse design of the current slide forces the presenter to articulate its full meaning.

A sample of the Didactic Relation Model is embedded in the slide; however, the characters are too small for the viewers to read. The outline of the layout of the template does convey ideas of how the form is structured in terms of columns and headlines. The filled-in model, being an artefact representing "the world outside", contributes to making the slide appear as a representation of the reality experienced by the group of students.

Table 9.2 ex. 2.

Semantic integration		Presenter's speech:															
<p><b>Visual information:</b></p> <div style="background-color: #4a4a8a; color: white; padding: 10px; text-align: center;"> <p><b>DIDACTIC PLAN</b></p> </div> <p>Plan for teaching made by students at: Autumn, 201x</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Class:</td> <td style="width: 33%;">Teacher:</td> <td style="width: 33%;">Time:</td> </tr> <tr> <td colspan="3">Competence aims from The National Curriculum for Knowledge Promotion (LK06):</td> </tr> <tr> <td colspan="3">Competence aims expressed as learning aims of this particular session.</td> </tr> <tr> <td colspan="3">What should the pupil know after completion of class/learning outcome?</td> </tr> <tr> <td colspan="3">How would you begin the class? How would you motivate the pupils?</td> </tr> </table> <div style="text-align: center; margin-top: 20px;"> </div>		Class:	Teacher:	Time:	Competence aims from The National Curriculum for Knowledge Promotion (LK06):			Competence aims expressed as learning aims of this particular session.			What should the pupil know after completion of class/learning outcome?			How would you begin the class? How would you motivate the pupils?			<p>Ahm, planning using the (didactic) diamond has been quite helpful, because, to us students, it is, like, limiting your time, and finding what equipment you need, and stuff like that, before the lesson begins, and using it as a manuscript. Ahm, prior to the lesson, we did a little pre-assessment, and the teacher used the diamond in a way to know what we were about to do, and she would give feedback on what would work and what would not. And another benefit of the diamond is that the teacher after class can go back and give us feedback and reflect on what we did. And the diamond is kind of a reusable thing, because you can use it in different classes in various subjects.</p>
Class:	Teacher:	Time:															
Competence aims from The National Curriculum for Knowledge Promotion (LK06):																	
Competence aims expressed as learning aims of this particular session.																	
What should the pupil know after completion of class/learning outcome?																	
How would you begin the class? How would you motivate the pupils?																	
<ul style="list-style-type: none"> <li>- Before lesson</li> <li>- Limit time</li> <li>- Equipment</li> <li>- Manuscript</li> <li>- Pre assessment</li> <li>- Feedback or reflexion</li> <li>- Re-use</li> </ul>																	



The transcript of Example 2 features the presenter's entire speech pertaining to the slide. The speaker gives context to the slide by relating to the audience how the didactic relation model was used by the student-teacher and supervising teacher during practicum placement. The speaker elaborates and extends on the meaning of the key words by contributing new information. The apparent disparate list of key words is made into a coherent whole as the student-teacher relates to the audience how the template for didactic planning was put into use by the student-teachers as a tool for planning and by the practicum teacher as a tool for assessment.

The example represents a category of empirical data grounded in the student-teachers' own practicum experiences. However, the student-teacher's narrative describes a meeting between formal theoretical knowledge, in terms of the didactic relation model, and its application in practicum. Like Example 1, this category reports on student-teachers engaging with theoretical knowledge, which are items of the formal curriculum of teacher education. Whereas the first example illustrates student-teachers reporting practical knowledge articulated as "universal" theoretical principles, the current example reports on how the universal theoretical principle of didactic planning is applied to the local circumstances situated in practicum.

### **The particular becomes universal**

A third example is selected from the second observation session where the student-teachers reported on their practicum experiences. In this case, the student-teacher filled in a standard report schedule designed for learning through self-evaluation (Tiller, 2017). The template invites the student-teacher to inscribe events that he or she is engaged in and make brief reflexive statements on what he or she learnt and what he or she considered "smart" in terms of knowledge worth passing on to others.

Affordance of the software is used to set up a table where the green color marks the first row as a headline. The columns below detail the content of each heading. The headlines evolve, left to right, from a concrete telling of what was done in practicum toward a higher level of abstraction and generalizability. Judging by just the slide, it is not clear whether there is a logical connection between the elements inscribed in each row. However, the presenter suggested that the group of student-teachers have emphasized showing a variety of elements. Hence, there is no cohesion across and between the elements of the table.

**Table 9.3** ex. 3.

Semantic integration			Presenter's speech:
Visual information			
What we did	What we learned	Smart to pass on	<p>Um, then we have made a "Did, learnt &amp; smart" schedule. We did not select one event in particular, rather we have emphasized various things we have done, learnt and found to be smart. During the practicum placement, we have joined a culture week, we have had two days of outdoor teaching and we have created butterflies during the culture week, um, a lot follows down the column. And we have learnt various teaching methods, become better at instructing, and we have become more confident when teaching, and we have learnt various ways of getting attention, and stuff like that. And we have found out, for example that it is smart, we knew good planning is essential, but now we have more insight in why that is smart. It is smart to prepare alternative tasks for those who finish early.</p>
Joined culture week	Different methods	Good planning	
Acquainted w/ each pupil	Better at instruction	Be well prepared	
Make butterflies during culture week	Become more confident when teaching	Prepare alternative activities to quick pupils	
Test the teacher role	Various methods to call for attention	Good observations	
		Make good relations	

At the beginning, a comment by the presenter makes it clear how the content is organized. The presenter engages with the slide by articulating verbally the content of the table's cells, yet there is no in-depth elaboration of the content, and there are items not commented on at all. Rather than supporting a discussion of what makes "did, learnt & smart" relevant for the student-teachers' leaning and development, the display of the slide serves as evidence that the student-teacher did indeed make such a schedule.

This example represents a category of sample data that is grounded in the local, situated and context-specific. This is in contrast to the previous examples that were grounded in theory. Situated in the local, the current example displays how student-teachers generate knowledge based on their experiences gained in the practicum placement. The column of "smart to pass on" is knowledge of a universal character, in that it is transferrable to another context. It resembles the first example in that it is formulated as short principles, or "rules of thumb", for good practice. However, contrary to the first example, which summarized principles of a handbook, these rules for good practice are generated by the student-teachers themselves and are based on their personal experiences in practicum.

### **Procedural knowledge situated in the local**

The fourth and final example is selected from a session where the students reported from practicum. The example represents a category of slides and narratives that detail the local and situated events as they happened, and it is void of theoretical references.

The student-teacher avoids the common practice of listing key words and embeds in the slide three images from the field on which are commented. Affordance of the media allows the student-teacher to set up the images as a collage and to add the caption "day out" in the top right corner of the collage. The images document people and events that took place one day, but there are few visual clues that suggest what exactly took place in the settings captured by the camera. The caption helps link the images to the same day and event.

Therefore, the student-teacher's verbal contribution is a decisive factor in making the slide represent concrete practicum experiences. The student-teacher's speech contributes verbal captions that address what is prominent in the collection of images. Thus, the poor weather, a visit to the school garden

Table 9.4 ex. 4.

Semantic integration	Presenter's speech:
<p data-bbox="405 1604 432 1798">Visual information</p> 	<p data-bbox="456 362 1230 702">Then, we had a day of outdoor school, we were not fortunate with the weather conditions, it started raining, but not as much as we thought, so it actually went well. Um, we walked about in the school garden, and then we experienced a little problem in the middle, the sea level had risen and set our fireplace under water, so then we met a challenge where we just had to quickly improvise and make a new fireplace, but it ended well, we found a new place quickly. Then we divided the children into groups where four pupils were allowed to collaborate on lighting the fire. They had done so previously and knew how to do it, and some teachers just observed that it all went well. They enjoyed doing it. The other pupils collected sticks and prepared those for making campfire twists at the fire. That also went well, the children had done so previously, so it was not something we should teach them to do. We played a few games, the sheriff among others, and stuff.</p>

and the activity of lighting a campfire are themes that anchor the images by detailing what happened, why choices for action were made and where it took place.

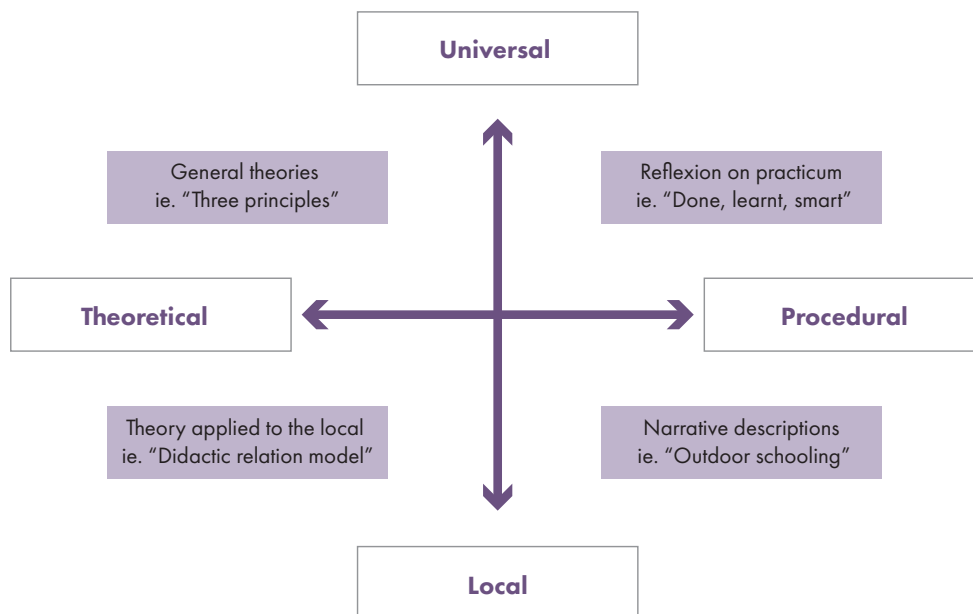
This final example represents a kind of professional knowledge that resides in the student-teacher's action and performance in the field. As discussed in the review section of this paper, it resembles the action-guiding knowledge regarded as essential to teachers. This mode of knowledge is represented by the student-teacher as images, and the mode of imagery is chosen as a means for representation across several samples within the same category. The images are supported by a spoken narrative that declares what procedures and action unfolded. This category of findings is defined by representing action anchored in the local, situated context. The knowledge is procedural because it unfolds in action as a response to the circumstances. The knowledge is exercised in the performance, which in this case is the carrying out of a field trip and reorganizing the plan by improvisation in response to unforeseen circumstances.

## **DISCUSSION**

The above analysis has centered around four examples that represent what can be considered a teacher's professional knowledge. The examples are student-teachers' self-made representations of the knowledge practices that they have encountered in the field and on campus. According to the current study's ontological basis, there is no fixed reality as such. These examples are assumed to construct reality. Each sample, therefore, constitutes a version of what may be considered representing professional knowledge. The representations are subject to the perspective chosen by the student-teachers who design and perform the slide. The Learning Design Sequence supports this ontological perspective in that it puts the student-teachers' transformative activities at the center. The term transformation is a dynamic concept because it captures the agency of the student-teachers as they select the aspects of the world on which to focus. Governed by their interest, they choose what aspects of the issue to represent. They make choices as to what affordances of the semiotic technology to use so that they can give meaning with a shape and design, as exemplified by the four transcripts above. The Learning Design Sequence also captures how transformation occurs at the stage of presentation: the set of slides become subject to

transformation, yet again. The examples have shown how the presenter interacts with elements of the slides by elaborating and extending on their content, thereby altering the meaning of the slides. Representation, in the context of this study, can be described as an aspect of the teaching profession that is both pre-formed and performed by a student.

The analysis of the student-teachers' representations reveals that there is difference among the student-made representations of teacher's professional knowledge. The metaphor "professional knowledge landscape" as conceived of by Clandinin & Connelly (1998), p. 5), may be helpful because it acknowledges that teachers draw on a breadth of knowledge and that knowledge is both "narrative" and "paradigmatic". What would a map of such a landscape look like? In the following, the observations of the current study are placed along two axes.



**Figure 9.2** Professional knowledge landscape.

The horizontal axis reflects the span between theoretical knowledge on the one hand and procedural knowledge on the other. It reflects the analytical observations of whether the student-teachers' representations stem from a theoretical domain or from actions and activities in the field. The dichotomy is reflected

in the data material. The first encounter with theory is the representation on classroom management. The student-teachers transformed the book's content into rules, or "commandments", for best practice. The sample featuring the didactic relation model illustrates how theoretical devices, taught at the educational institution, can be applied during practicum. The procedural dimension is encountered in the samples featuring the story about outdoor schooling. The knowledge of the student teachers resides in the actions taken during the day in response to changing weather conditions. The "Done, Learnt, Smart" schedule evolves from the practical undertakings made by the student-teachers, such as participating in making butterflies together with their pupils. The epistemological positions of this axis are also reflected in the literature review which reports on pre-services teachers' complaints on the disparity between theoretical approach practiced on campus, and the action guiding knowledge called for in the practicum.

However, contrary to the traditional opposing view between theory and practice, the data reveal that there are other characteristic features that serve to diversify the "knowledge landscape". "Contextuality" appears to be a feature common across the samples. A second dichotomy introduces a universal dimension on one end and a local one on the other. The universal dimension is associated with normative statements and formulations of rules that are independent of the context. The handbook on classroom management is turned into a representation by the student-teacher that expresses normative statements on what good principles are and how to adhere to them. Such principles are universal in their application as they can be transferred to most classroom settings. The outcomes of the student-teachers' reflection on what they have learnt in practicum are universal. The "Done, Learnt, Smart" schedule takes the local experience as a starting point and encourages the student-teachers to identify what experiences from their practicum placement should be passed on to others. Preparing extra work for able learners became a rule. The particularities of the practicum are turned into universal lessons.

The local dimension is, on the other hand, situated and contextual. The use of the didactic relation model for planning local activities in practicum is an example of how theory is anchored in the local. The model for didactic planning forces the student-teacher to argue for the aim, content and assessment

methods of the lesson, while taking into consideration the local factors of each pupil's ability and the general framework factors of the host school. Theoretical knowledge on general didactics are adapted to local conditions. The local dimension is also present in the student-teacher's account of the "outdoor schooling" because it is a narrative of what events took place. The local represent the contextual because it influences the activities and actions accounted for on that day. Procedural knowledge was exercised in the local context in response to the local circumstances. The imagery of the PowerPoint slides emphasizes the local dimension because it gives a visual account of the events.

## CONCLUSION

The current study observed settings in which student-teachers are at the center of meaning making activities. What is represented during performances of PowerPoint slides are the students' own constructions of reality and their own constructions of teachers' professional knowledge. The semiotic technology and the practice of presenting does not "mediate reality" as if reality were a fixed and finite object that is represented in the settings observed. The focus is instead directed towards *transformation* as an activity which involves the students' own meaning making. In the current setting, students give shape to experiences, ideas and conceptions related to teachers' professional knowledge. The outcome of the study shows a diverse "knowledge landscape", which reflects the contradictory positions that are inferred from the representations constructed by the students themselves.

Traditionally, the understanding of a "gap" is based on the assumption that the professional knowledge that student-teachers encounter on campus and during practicum wear different "epistemological disguises". The theoretical map handed out on campus does not fit the landscape encountered during practicum placement.

The current study turns the table and draws a map based on the students' own representations of teachers' professional knowledge. Such a map may aid the pre-service teacher in discovering the dynamics in the interplay between campus and practicum. The one does not exclude the other, instead, professional knowledge seems to rely on mutual inputs from different positions of the "knowledge landscape".



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	Sivertsen, Børge, PhD	Insomnia in older adults. Consequences, assessment and treatment.
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<b>V</b>	Janvin, Carmen Ani Cristea, PhD	Cognitive impairment in patients with Parkinson's disease: profiles and implications for prognosis
	Braarud, Hanne Cecilie, Dr. psychol.	Infant regulation of distress: A longitudinal study of transactions between mothers and infants
	Tveito, Torill Helene, PhD	Sick Leave and Subjective Health Complaints

	Magnussen, Liv Heide, PhD	Returning disability pensioners with back pain to work
	Thuen, Elin Marie, Dr.philos.	Learning environment, students' coping styles and emotional and behavioural problems. A study of Norwegian secondary school students.
	Solberg, Ole Asbjørn, PhD	Peacekeeping warriors – A longitudinal study of Norwegian peacekeepers in Kosovo
<b>2007 H</b>	Søreide, Gunn Elisabeth, Dr.philos.	Narrative construction of teacher identity
	Svensen, Erling, PhD	WORK & HEALTH. Cognitive Activation Theory of Stress applied in an organisational setting.
	Øverland, Simon Nygaard, PhD	Mental health and impairment in disability benefits. Studies applying linkages between health surveys and administrative registries.
	Eichele, Tom, PhD	Electrophysiological and Hemodynamic Correlates of Expectancy in Target Processing
	Børhaug, Kjetil, Dr.philos.	Oppseding til demokrati. Ein studie av politisk oppseding i norsk skule.
	Eikeland, Thorleif, Dr.philos.	Om å vokse opp på barnehjem og på sykehus. En undersøkelse av barnehjemsbarns opplevelser på barnehjem sammenholdt med sanatoriebarns beskrivelse av langvarige sykehusopphold – og et forsøk på forklaring.
	Wadel, Carl Cato, Dr.philos.	Medarbeidersamhandling og medarbeiderledelse i en lagbasert organisasjon
	Vinje, Hege Forbech, PhD	Thriving despite adversity: Job engagement and self-care among community nurses
	Noort, Maurits van den, PhD	Working memory capacity and foreign language acquisition
<b>2008 V</b>	Breivik, Kyrre, Dr.psychol.	The Adjustment of Children and Adolescents in Different Post-Divorce Family Structures. A Norwegian Study of Risks and Mechanisms.
	Johnsen, Grethe E., PhD	Memory impairment in patients with posttraumatic stress disorder
	Sætrevik, Bjørn, PhD	Cognitive Control in Auditory Processing
	Carvalhosa, Susana Fonseca, PhD	Prevention of bullying in schools: an ecological model
<b>2008 H</b>	Brønnick, Kolbjørn Selvåg	Attentional dysfunction in dementia associated with Parkinson's disease.
	Posserud, Maj-Britt Rocio	Epidemiology of autism spectrum disorders
	Haug, Ellen	Multilevel correlates of physical activity in the school setting
	Skjerve, Arvid	Assessing mild dementia – a study of brief cognitive tests.

	Kjønniksen, Lise	The association between adolescent experiences in physical activity and leisure time physical activity in adulthood: a ten year longitudinal study
	Gundersen, Hilde	The effects of alcohol and expectancy on brain function
	Omvik, Siri	Insomnia – a night and day problem
<b>2009 V</b>	Molde, Helge	Pathological gambling: prevalence, mechanisms and treatment outcome.
	Foss, Else	Den omsorgsfulle væremåte. En studie av voksnes væremåte i forhold til barn i barnehagen.
	Westrheim, Kariane	Education in a Political Context: A study of Knowledge Processes and Learning Sites in the PKK.
	Wehling, Eike	Cognitive and olfactory changes in aging
	Wangberg, Silje C.	Internet based interventions to support health behaviours: The role of self-efficacy.
	Nielsen, Morten B.	Methodological issues in research on workplace bullying. Operationalisations, measurements and samples.
	Sandu, Anca Larisa	MRI measures of brain volume and cortical complexity in clinical groups and during development.
	Guribye, Eugene	Refugees and mental health interventions
	Sørensen, Lin	Emotional problems in inattentive children – effects on cognitive control functions.
	Tjomsland, Hege E.	Health promotion with teachers. Evaluation of the Norwegian Network of Health Promoting Schools: Quantitative and qualitative analyses of predisposing, reinforcing and enabling conditions related to teacher participation and program sustainability.
	Helleve, Ingrid	Productive interactions in ICT supported communities of learners
<b>2009 H</b>	Skorpen, Aina Øye, Christine	Dagliglivet i en psykiatrisk institusjon: En analyse av miljøterapeutiske praksiser
	Andreassen, Cecilie Schou	WORKAHOLISM – Antecedents and Outcomes
	Stang, Ingun	Being in the same boat: An empowerment intervention in breast cancer self-help groups
	Sequeira, Sarah Dorothee Dos Santos	The effects of background noise on asymmetrical speech perception
	Kleiven, Jo, dr.philos.	The Lillehammer scales: Measuring common motives for vacation and leisure behavior
	Jónsdóttir, Guðrún	Dubito ergo sum? Ni jenter møter naturfaglig kunnskap.
	Hove, Oddbjørn	Mental health disorders in adults with intellectual disabilities - Methods of assessment and prevalence of mental health disorders and problem behaviour
	Wageningen, Heidi Karin van	The role of glutamate on brain function

	Bjørkvik, Jofrid	God nok? Selvaktelse og interpersonlig fungering hos pasienter innen psykisk helsevern: Forholdet til diagnoser, symptomer og behandlingsutbytte
	Andersson, Martin	A study of attention control in children and elderly using a forced-attention dichotic listening paradigm
	Almås, Aslaug Grov	Teachers in the Digital Network Society: Visions and Realities. A study of teachers' experiences with the use of ICT in teaching and learning.
	Ulvik, Marit	Lærerutdanning som dannning? Tre stemmer i diskusjonen
<b>2010</b>	Skår, Randi	Læringsprosesser i sykepleieres profesjonsutøvelse. En studie av sykepleieres læringserfaringer.
<b>V</b>	Roald, Knut	Kvalitetsvurdering som organisasjonslæring mellom skole og skoleeigar
	Lunde, Linn-Heidi	Chronic pain in older adults. Consequences, assessment and treatment.
	Danielsen, Anne Grete	Perceived psychosocial support, students' self-reported academic initiative and perceived life satisfaction
	Hysing, Mari	Mental health in children with chronic illness
	Olsen, Olav Kjellevold	Are good leaders moral leaders? The relationship between effective military operational leadership and morals
	Riese, Hanne	Friendship and learning. Entrepreneurship education through mini-enterprises.
	Holthe, Asle	Evaluating the implementation of the Norwegian guidelines for healthy school meals: A case study involving three secondary schools
<b>H</b>	Hauge, Lars Johan	Environmental antecedents of workplace bullying: A multi-design approach
	Bjørkelo, Brita	Whistleblowing at work: Antecedents and consequences
	Reme, Silje Endresen	Common Complaints – Common Cure? Psychiatric comorbidity and predictors of treatment outcome in low back pain and irritable bowel syndrome
	Helland, Wenche Andersen	Communication difficulties in children identified with psychiatric problems
	Beneventi, Harald	Neuronal correlates of working memory in dyslexia
	Thygesen, Elin	Subjective health and coping in care-dependent old persons living at home
	Aanes, Mette Marthinussen	Poor social relationships as a threat to belongingness needs. Interpersonal stress and subjective health complaints: Mediating and moderating factors.
	Anker, Morten Gustav	Client directed outcome informed couple therapy

	Bull, Torill	Combining employment and child care: The subjective well-being of single women in Scandinavia and in Southern Europe
	Viig, Nina Grieg	Tilrettelegging for læreres deltakelse i helsefremmende arbeid. En kvalitativ og kvantitativ analyse av sammenhengen mellom organisatoriske forhold og læreres deltakelse i utvikling og implementering av Europeisk Nettverk av Helsefremmende Skoler i Norge
	Wolff, Katharina	To know or not to know? Attitudes towards receiving genetic information among patients and the general public.
	Ogden, Terje, dr.philos.	Familiebasert behandling av alvorlige atferdsproblemer blant barn og ungdom. Evaluering og implementering av evidensbaserte behandlingsprogrammer i Norge.
	Solberg, Mona Elin	Self-reported bullying and victimisation at school: Prevalence, overlap and psychosocial adjustment.
<b>2011</b>	Bye, Hege Høivik	Self-presentation in job interviews. Individual and cultural differences in applicant self-presentation during job interviews and hiring managers' evaluation
<b>V</b>	Notelaers, Guy	Workplace bullying. A risk control perspective.
	Moltu, Christian	Being a therapist in difficult therapeutic impasses. A hermeneutic phenomenological analysis of skilled psychotherapists' experiences, needs, and strategies in difficult therapies ending well.
	Myrseth, Helga	Pathological Gambling - Treatment and Personality Factors
	Schanche, Elisabeth	From self-criticism to self-compassion. An empirical investigation of hypothesized change processes in the Affect Phobia Treatment Model of short-term dynamic psychotherapy for patients with Cluster C personality disorders.
	Våpenstad, Eystein Victor, dr.philos.	Det tempererte nærvær. En teoretisk undersøkelse av psykoterautens subjektivitet i psykoanalyse og psykoanalytisk psykoterapi.
	Haukebø, Kristin	Cognitive, behavioral and neural correlates of dental and intra-oral injection phobia. Results from one treatment and one fMRI study of randomized, controlled design.
	Harris, Anette	Adaptation and health in extreme and isolated environments. From 78°N to 75°S.
	Bjørknes, Ragnhild	Parent Management Training-Oregon Model: intervention effects on maternal practice and child behavior in ethnic minority families
	Mamen, Asgeir	Aspects of using physical training in patients with substance dependence and additional mental distress
	Espevik, Roar	Expert teams: Do shared mental models of team members make a difference
	Haara, Frode Olav	Unveiling teachers' reasons for choosing practical activities in mathematics teaching

<b>2011</b>	Hauge, Hans Abraham	How can employee empowerment be made conducive to both employee health and organisation performance? An empirical investigation of a tailor-made approach to organisation learning in a municipal public service organisation.
<b>H</b>	Melkevik, Ole Rogstad	Screen-based sedentary behaviours: pastimes for the poor, inactive and overweight? A cross-national survey of children and adolescents in 39 countries.
	Vøllestad, Jon	Mindfulness-based treatment for anxiety disorders. A quantitative review of the evidence, results from a randomized controlled trial, and a qualitative exploration of patient experiences.
	Tolo, Astrid	Hvordan blir lærerkompetanse konstruert? En kvalitativ studie av PPU-studenters kunnskapsutvikling.
	Saus, Evelyn-Rose	Training effectiveness: Situation awareness training in simulators
	Nordgreen, Tine	Internet-based self-help for social anxiety disorder and panic disorder. Factors associated with effect and use of self-help.
	Munkvold, Linda Helen	Oppositional Defiant Disorder: Informant discrepancies, gender differences, co-occurring mental health problems and neurocognitive function.
	Christiansen, Øivin	Når barn plasseres utenfor hjemmet: beslutninger, forløp og relasjoner. Under barnevernets (ved)tak.
	Brunborg, Geir Scott	Conditionability and Reinforcement Sensitivity in Gambling Behaviour
	Hystad, Sigurd William	Measuring Psychological Resiliency: Validation of an Adapted Norwegian Hardiness Scale
<b>2012</b>	Roness, Dag	Hvorfor bli lærer? Motivasjon for utdanning og utøving.
<b>V</b>	Fjermestad, Krister Westlye	The therapeutic alliance in cognitive behavioural therapy for youth anxiety disorders
	Jenssen, Eirik Sørnes	Tilpasset opplæring i norsk skole: politikeres, skolelederes og læreres handlingsvalg
	Saksvik-Lehouillier, Ingvild	Shift work tolerance and adaptation to shift work among offshore workers and nurses
	Johansen, Venke Frederike	Når det intime blir offentlig. Om kvinners åpenhet om brystkreft og om markedsføring av brystkreftsaken.
	Herheim, Rune	Pupils collaborating in pairs at a computer in mathematics learning: investigating verbal communication patterns and qualities
	Vie, Tina Løkke	Cognitive appraisal, emotions and subjective health complaints among victims of workplace bullying: A stress-theoretical approach
	Jones, Lise Øen	Effects of reading skills, spelling skills and accompanying efficacy beliefs on participation in education. A study in Norwegian prisons.



<b>2012</b> <b>H</b>	Danielsen, Yngvild Sørebo	Childhood obesity – characteristics and treatment. Psychological perspectives.
	Horverak, Jøri Gytre	Sense or sensibility in hiring processes. Interviewee and interviewer characteristics as antecedents of immigrant applicants' employment probabilities. An experimental approach.
	Jøsendal, Ola	Development and evaluation of BE smokeFREE, a school-based smoking prevention program
	Osnes, Berge	Temporal and Posterior Frontal Involvement in Auditory Speech Perception
	Drageset, Sigrunn	Psychological distress, coping and social support in the diagnostic and preoperative phase of breast cancer
	Aasland, Merethe Schanke	Destructive leadership: Conceptualization, measurement, prevalence and outcomes
	Bakibinga, Pauline	The experience of job engagement and self-care among Ugandan nurses and midwives
	Skogen, Jens Christoffer	Foetal and early origins of old age health. Linkage between birth records and the old age cohort of the Hordaland Health Study (HUSK)
	Leveresen, Ingrid	Adolescents' leisure activity participation and their life satisfaction: The role of demographic characteristics and psychological processes
	Hanss, Daniel	Explaining sustainable consumption: Findings from cross-sectional and intervention approaches
	Rød, Per Arne	Barn i klem mellom foreldrekonflikter og samfunnsmessig beskyttelse
<b>2013</b> <b>V</b>	Mentzoni, Rune Aune	Structural Characteristics in Gambling
	Knudsen, Ann Kristin	Long-term sickness absence and disability pension award as consequences of common mental disorders. Epidemiological studies using a population-based health survey and official ill health benefit registries.
	Strand, Mari	Emotional information processing in recurrent MDD
	Veseth, Marius	Recovery in bipolar disorder. A reflexive-collaborative exploration of the lived experiences of healing and growth when battling a severe mental illness
	Mæland, Silje	Sick leave for patients with severe subjective health complaints. Challenges in general practice.
	Mjaaland, Thera	At the frontiers of change? Women and girls' pursuit of education in north-western Tigray, Ethiopia
	Odéen, Magnus	Coping at work. The role of knowledge and coping expectancies in health and sick leave.
	Hynninen, Kia Minna Johanna	Anxiety, depression and sleep disturbance in chronic obstructive pulmonary disease (COPD). Associations, prevalence and effect of psychological treatment.

	Flo, Elisabeth	Sleep and health in shift working nurses
	Aasen, Elin Margrethe	From paternalism to patient participation? The older patients undergoing hemodialysis, their next of kin and the nurses: a discursive perspective on perception of patient participation in dialysis units
	Ekornås, Belinda	Emotional and Behavioural Problems in Children: Self-perception, peer relationships, and motor abilities
	Corbin, J. Hope	North-South Partnerships for Health: Key Factors for Partnership Success from the Perspective of the KIWAKKUKI
	Birkeland, Marianne Skogbrott	Development of global self-esteem: The transition from adolescence to adulthood
<b>2013</b>	Gianella-Malca, Camila	Challenges in Implementing the Colombian Constitutional Court's Health-Care System Ruling of 2008
<b>H</b>	Hovland, Anders	Panic disorder – Treatment outcomes and psychophysiological concomitants
	Mortensen, Øystein	The transition to parenthood – Couple relationships put to the test
	Årdal, Guro	Major Depressive Disorder – a Ten Year Follow-up Study. Inhibition, Information Processing and Health Related Quality of Life
	Johansen, Rino Bandlitz	The impact of military identity on performance in the Norwegian armed forces
	Bøe, Tormod	Socioeconomic Status and Mental Health in Children and Adolescents
<b>2014</b>	Nordmo, Ivar	Gjennom nåløyet – studenters læringserfaringer i psykologutdanningen
<b>V</b>	Dovran, Anders	Childhood Trauma and Mental Health Problems in Adult Life
	Hegelstad, Wenche ten Velden	Early Detection and Intervention in Psychosis: A Long-Term Perspective
	Urheim, Ragnar	Forståelse av pasientaggresjon og forklaringer på nedgang i voldsrate ved Regional sikkerhetsavdeling, Sandviken sykehus
	Kinn, Liv Grethe	Round-Trips to Work. Qualitative studies of how persons with severe mental illness experience work integration.
	Rød, Anne Marie Kinn	Consequences of social defeat stress for behaviour and sleep. Short-term and long-term assessments in rats.
	Nygård, Merethe	Schizophrenia – Cognitive Function, Brain Abnormalities, and Cannabis Use
	Tjora, Tore	Smoking from adolescence through adulthood: the role of family, friends, depression and socioeconomic status. Predictors of smoking from age 13 to 30 in the “The Norwegian Longitudinal Health Behaviour Study” (NLHB)
	Vangsnes, Vigdis	The Dramaturgy and Didactics of Computer Gaming. A Study of a Medium in the Educational Context of Kindergartens.

	Nordahl, Kristin Berg	Early Father-Child Interaction in a Father-Friendly Context: Gender Differences, Child Outcomes, and Protective Factors related to Fathers' Parenting Behaviors with One-year-olds
<b>2014</b>	Sandvik, Asle Makoto	Psychopathy – the heterogeneity of the construct
<b>H</b>	Skotheim, Siv	Maternal emotional distress and early mother-infant interaction: Psychological, social and nutritional contributions
	Halleland, Helene Barone	Executive Functioning in adult Attention Deficit Hyperactivity Disorder (ADHD). From basic mechanisms to functional outcome.
	Halvorsen, Kirsti Vindal	Partnerskap i lærerutdanning, sett fra et økologisk perspektiv
	Solbue, Vibeke	Dialogen som visker ut kategorier. En studie av hvilke erfaringer innvandrerdømmere og norskfødte med innvandrerforeldre har med videregående skole. Hva forteller ungdommenes erfaringer om videregående skoles håndtering av etniske ulikheter?
	Kvalevaag, Anne Lise	Fathers' mental health and child development. The predictive value of fathers' psychological distress during pregnancy for the social, emotional and behavioural development of their children
	Sandal, Ann Karin	Ungdom og utdanningsval. Om elevar sine opplevingar av val og overgangsprosessar.
	Haug, Thomas	Predictors and moderators of treatment outcome from high- and low-intensity cognitive behavioral therapy for anxiety disorders. Association between patient and process factors, and the outcome from guided self-help, stepped care, and face-to-face cognitive behavioral therapy.
	Sjølie, Hege	Experiences of Members of a Crisis Resolution Home Treatment Team. Personal history, professional role and emotional support in a CRHT team.
	Falkenberg, Liv Eggset	Neuronal underpinnings of healthy and dysfunctional cognitive control
	Mrdalj, Jelena	The early life condition. Importance for sleep, circadian rhythmicity, behaviour and response to later life challenges
	Hesjedal, Elisabeth	Tverrprofesjonelt samarbeid mellom skule og barnevern: Kva kan støtte utsette barn og unge?
<b>2015</b>	Hauken, May Aasebø	« <i>The cancer treatment was only half the work!</i> » A Mixed-Method Study of Rehabilitation among Young Adult Cancer Survivors
<b>V</b>	Ryland, Hilde Katrin	Social functioning and mental health in children: the influence of chronic illness and intellectual function
	Rønsen, Anne Kristin	Vurdering som profesjonskompetanse. Refleksjonsbasert utvikling av læreres kompetanse i formativ vurdering

	Hoff, Helge Andreas	Thinking about Symptoms of Psychopathy in Norway: Content Validation of the Comprehensive Assessment of Psychopathic Personality (CAPP) Model in a Norwegian Setting
	Schmid, Marit Therese	Executive Functioning in recurrent- and first episode Major Depressive Disorder. Longitudinal studies
	Sand, Liv	Body Image Distortion and Eating Disturbances in Children and Adolescents
	Matanda, Dennis Juma	Child physical growth and care practices in Kenya: Evidence from Demographic and Health Surveys
	Amugsi, Dickson Abanimi	Child care practices, resources for care, and nutritional outcomes in Ghana: Findings from Demographic and Health Surveys
	Jakobsen, Hilde	The good beating: Social norms supporting men's partner violence in Tanzania
	Sagoe, Dominic	Nonmedical anabolic-androgenic steroid use: Prevalence, attitudes, and social perception
	Eide, Helene Marie Kjærgård	Narrating the relationship between leadership and learning outcomes. A study of public narratives in the Norwegian educational sector.
<b>2015</b>	Wubs, Annegreet Gera	Intimate partner violence among adolescents in South Africa and Tanzania
<b>H</b>	Hjelmervik, Helene Susanne	Sex and sex-hormonal effects on brain organization of fronto-parietal networks
	Dahl, Berit Misund	The meaning of professional identity in public health nursing
	Røykenes, Kari	Testangst hos sykepleierstudenter: «Alternativ behandling»
	Bless, Josef Johann	The smartphone as a research tool in psychology. Assessment of language lateralization and training of auditory attention.
	Løvrvik, Camilla Margrethe Sigvaldsen	Common mental disorders and work participation – the role of return-to-work expectations
	Lehmann, Stine	Mental Disorders in Foster Children: A Study of Prevalence, Comorbidity, and Risk Factors
	Knapstad, Marit	Psychological factors in long-term sickness absence: the role of shame and social support. Epidemiological studies based on the Health Assets Project.
<b>2016</b>	Kvestad, Ingrid	Biological risks and neurodevelopment in young North Indian children
<b>V</b>	Sælør, Knut Tore	Hinderløyper, halmstrå og hengende snører. En kvalitativ studie av håp innenfor psykisk helse- og rusfeltet.
	Mellingen, Sonja	Alkoholbruk, partilfredshet og samlivsstatus. Før, inn i, og etter svangerskapet – korrelater eller konsekvenser?
	Thun, Eirunn	Shift work: negative consequences and protective factors

	Hilt, Line Torbjørnsen	The borderlands of educational inclusion. Analyses of inclusion and exclusion processes for minority language students
	Havnen, Audun	Treatment of obsessive-compulsive disorder and the importance of assessing clinical effectiveness
	Slåtten, Hilde	Gay-related name-calling among young adolescents. Exploring the importance of the context.
	Ree, Eline	Staying at work. The role of expectancies and beliefs in health and workplace interventions.
	Morken, Frøydis	Reading and writing processing in dyslexia
<b>2016</b>	Løvoll, Helga Synnevåg	Inside the outdoor experience. On the distinction between pleasant and interesting feelings and their implication in the motivational process.
<b>H</b>	Hjeltnes, Aslak	Facing social fears: An investigation of mindfulness-based stress reduction for young adults with social anxiety disorder
	Øyeflaten, Irene Larsen	Long-term sick leave and work rehabilitation. Prognostic factors for return to work.
	Henriksen, Roger Ekeberg	Social relationships, stress and infection risk in mother and child
	Johnsen, Iren	«Only a friend» - The bereavement process of young adults who have lost a friend to a traumatic death. A mixed methods study.
	Helle, Siri	Cannabis use in non-affective psychoses: Relationship to age at onset, cognitive functioning and social cognition
	Glambek, Mats	Workplace bullying and expulsion in working life. A representative study addressing prospective associations and explanatory conditions.
	Oanes, Camilla Jensen	Tilbakemelding i terapi. På hvilke måter opplever terapeuter at tilbakemeldingsprosedyrer kan virke inn på terapeutiske praksiser?
	Reknes, Iselin	Exposure to workplace bullying among nurses: Health outcomes and individual coping
	Chimhutu, Victor	Results-Based Financing (RBF) in the health sector of a low-income country. From agenda setting to implementation: The case of Tanzania
	Ness, Ingunn Johanne	The Room of Opportunity. Understanding how knowledge and ideas are constructed in multidisciplinary groups working with developing innovative ideas.
	Hollekim, Ragnhild	Contemporary discourses on children and parenting in Norway. An empirical study based on two cases.
	Doran, Rouven	Eco-friendly travelling: The relevance of perceived norms and social comparison
<b>2017</b>	Katsi, Masego	The power of context in health partnerships: Exploring synergy and antagonism between external and internal ideologies in implementing Safe Male Circumcision (SMC) for HIV prevention in Botswana
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Jamaludin, Nor Lelawati Binti	The “why” and “how” of International Students’ Ambassadorship Roles in International Education
Berthelsen, Mona	Effects of shift work and psychological and social work factors on mental distress. Studies of onshore/offshore workers and nurses in Norway.
Krane, Vibeke	Lærer-elev-relasjoner, elevers psykiske helse og frafall i videregående skole – en eksplorerende studie om samarbeid og den store betydningen av de små ting
Søvik, Margaret Ljosnes	Evaluating the implementation of the Empowering Coaching™ program in Norway
Tonheim, Milfrid	A troublesome transition: Social reintegration of girl soldiers returning ‘home’
Senneseth, Mette	Improving social network support for partners facing spousal cancer while caring for minors. A randomized controlled trial.
Urke, Helga Bjørnøy	Child health and child care of very young children in Bolivia, Colombia and Peru.
Bakhturidze, George	Public Participation in Tobacco Control Policy-making in Georgia
Fismen, Anne-Siri	Adolescent eating habits. Trends and socio-economic status.
<b>2017</b> <b>H</b>	
Hagatun, Susanne	Internet-based cognitive-behavioural therapy for insomnia. A randomised controlled trial in Norway.
Eichele, Heike	Electrophysiological Correlates of Performance Monitoring in Children with Tourette Syndrome. A developmental perspective.
Risan, Ulf Patrick	Accommodating trauma in police interviews. An exploration of rapport in investigative interviews of traumatized victims.
Sandhåland, Hilde	Safety on board offshore vessels: A study of shipboard factors and situation awareness
Blågestad, Tone Fidje	Less pain – better sleep and mood? Interrelatedness of pain, sleep and mood in total hip arthroplasty patients
Kronstad, Morten	Frå skulebenk til deadlines. Korleis nettjournalistar og journaliststudentar lærer, og korleis dei utviklar journalistfagleg kunnskap
Vedaa, Øystein	Shift work: The importance of sufficient time for rest between shifts.
Steine, Iris Mulders	Predictors of symptoms outcomes among adult survivors of sexual abuse: The role of abuse characteristics, cumulative childhood maltreatment, genetic variants, and perceived social support.
Høgheim, Sigve	Making math interesting: An experimental study of interventions to encourage interest in mathematics

2018 V	Brevik, Erlend Joramo	Adult Attention Deficit Hyperactivity Disorder. Beyond the Core Symptoms of the Diagnostic and Statistical Manual of Mental Disorders.
	Erevik, Eilin Kristine	User-generated alcohol-related content on social media: Determinants and relation to offline alcohol use
	Hagen, Egon	Cognitive and psychological functioning in patients with substance use disorder; from initial assessment to one-year recovery
	Adólfssdóttir, Steinunn	Subcomponents of executive functions: Effects of age and brain maturations
	Brattabø, Ingfrid Vaksdal	Detection of child maltreatment, the role of dental health personnel – A national cross-sectional study among public dental health personnel in Norway
	Fylkesnes, Marte Knag	Frykt, forhandlinger og deltakelse. Ungdommer og foreldre med etnisk minoritetsbakgrunn i møte med den norske barnevernstjenesten.
	Stiegler, Jan Reidar	Processing emotions in emotion-focused therapy. Exploring the impact of the two-chair dialogue intervention.
	Egelandstal, Kjetil	Clickers and Formative Feedback at University Lectures. Exploring students and teachers' reception and use of feedback from clicker interventions.
	Torjussen, Lars Petter Storm	Foreningen av visdom og veltalenhet – utkast til en universitetsdidaktikk gjennom en kritikk og videreføring av Skjervheims pedagogiske filosofi på bakgrunn av Arendt og Foucault. <i>Eller hvorfor menneskelivet er mer som å spille fløyte enn å bygge et hus.</i>
Selvik, Sabreen	A childhood at refuges. Children with multiple relocations at refuges for abused women.	
2018 H	Leino, Tony Mathias	Structural game characteristics, game features, financial outcomes and gambling behaviour
	Raknes, Solfrid	Anxious Adolescents: Prevalence, Correlates, and Preventive Cognitive Behavioural Interventions
	Morken, Katharina Teresa Enehaug	Mentalization-based treatment of female patients with severe personality disorder and substance use disorder
	Braatveit, Kirsten Johanne	Intellectual disability among in-patients with substance use disorders
	Barua, Padmaja	Unequal Interdependencies: Exploring Power and Agency in Domestic Work Relations in Contemporary India
	Darkwah, Ernest	Caring for “parentless” children. An exploration of work-related experiences of caregivers in children's homes in Ghana.
	Valdersnes, Kjersti Bergheim	Safety Climate perceptions in High Reliability Organizations – the role of Psychological Capital

<b>2019</b> <b>V</b>	Kongsgården, Petter	Vurderingspraksiser i teknologirike læringsmiljøer. En undersøkelse av læreres vurderingspraksiser i teknologirike læringsmiljøer og implikasjoner på elevenes medvirkning i egen læringsprosess.
	Vikene, Kjetil	Complexity in Rhythm and Parkinson's disease: Cognitive and Neuronal Correlates
	Heradstveit, Ove	Alcohol- and drug use among adolescents. School-related problems, childhood mental health problems, and psychiatric diagnoses.
	Riise, Eili Nygard	Concentrated exposure and response prevention for obsessive-compulsive disorder in adolescents: the Bergen 4-day treatment
	Vik, Alexandra	Imaging the Aging Brain: From Morphometry to Functional Connectivity
	Krossbakken, Elfrid	Personal and Contextual Factors Influencing Gaming Behaviour. Risk Factors and Prevention of Video Game Addiction.
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