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RESEARCH

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

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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' agentive 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 21st 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 analytical tool, this study explores the transformation process that curricular items undergo from the state of being preformed to the state of being performed.

Background

In the 21st 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 & Rambø, 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 PowerPoint conducted by Zhao, Djonov and Van Leeuwen (2014) These categories are labelled on the one hand as *resources for coordination*, including embodied gestures and interaction 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.

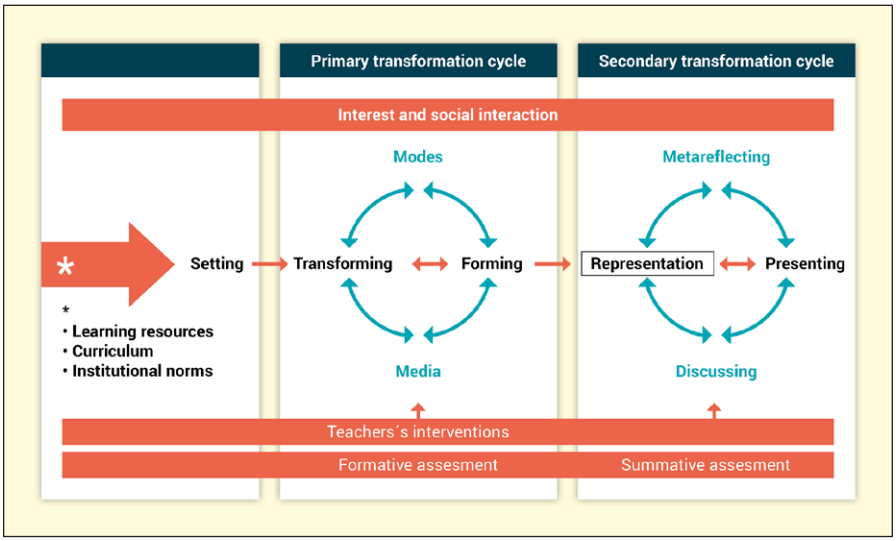

Figure 1: The learning design sequence, original (Selander & Kress, 2008, 2010).

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
-Goals as positive as possible -How about low achievement? -Reachable for all -Individual adjustments, i.e. by de fining sub goals, spend longer time  	*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.*	[Pointing at screen]

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 arms 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 explains 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 (...)	*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.* *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.* *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.*

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
Hallelujah G Em I heard there was a secret chord G Em That David played and it pleased the lord C D G D But you don't really care for music, do you? G C D Well it goes like this the fourth, the fifth Em C The minor fall and the major lift D B7 Em The baffled king composing hallelujah	*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.*

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.

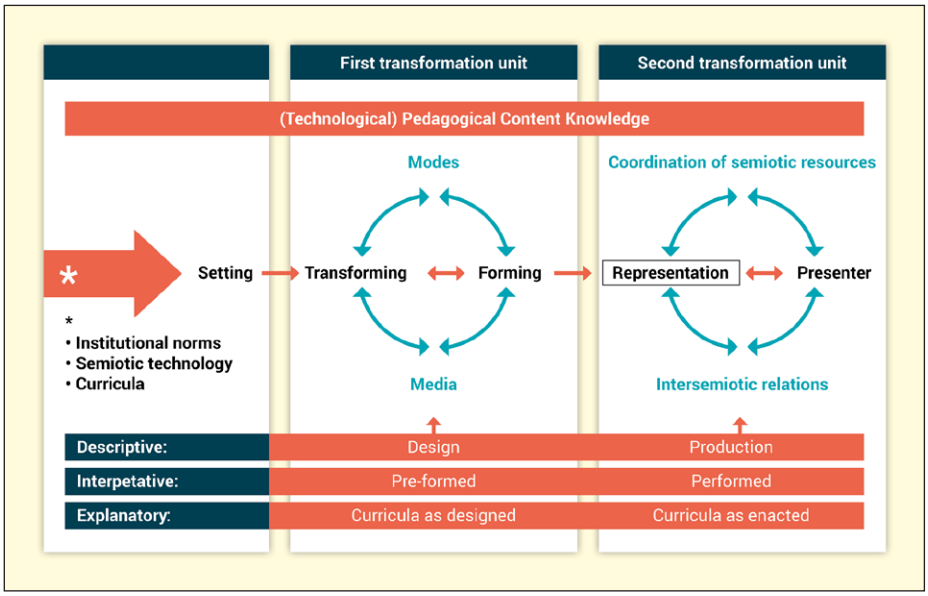

Figure 5: The Learning Design Sequence, amended.

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 detectible 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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