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# inVisible Theory in Pre-Service Mathematics Teachers' Practicum Tasks

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**ABSTRACT**

The present study adds to an ongoing debate about third spaces in teacher education, spaces where theory and practice come together. One third space is constituted by the written tasks from practicum. Yet research has shown only modest emphasis on theory in such tasks. Tasks from two versions of a programme are used to represent two different positions on linking theory and practice. The tasks were therefore analysed with respect to the demarcation of conceptual objects as well as practice-based contexts. The findings indicate a difference with respect to the demarcation of conceptual objects, especially concepts relating to mathematics and mathematics education. This is seen as indicative of the reduced encouragement of linking theory and practice.

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## Introduction

It is common practice in teacher education to assign written tasks to student teachers during their practicum (Shalem & Rusznyak, 2013). Such practicum tasks may serve as a third space, a space without an imposed hierarchy between knowledge discourses in school and knowledge discourses in university (Zeichner, 2010). The present study uses practicum tasks from two versions of a secondary teacher education programme at a Swedish university. As part of the implementation of the reformed programme, a new practicum portfolio with different practicum tasks was introduced. When the tasks in this new portfolio were presented to a group of prospective secondary mathematics teachers, they reacted to how tasks differed from the tasks they had grown accustomed to in their previous mathematics studies. Acknowledging these students' concerns, the present article discusses how practicum tasks can give access to learning from practicum. From this, a discussion on different positions in relation to theory for teachers is initiated.

Practicum refers to the part of teacher education in which student teachers observe or engage in teaching at schools. It is standard practice worldwide but is differently labelled and organised. A common distinction is made between field experiences that take place one day a week and focus on observation, and student teaching with longer duration and more responsibility for teaching (see also Österling & Christiansen, 2018). The space for theory and practice to meet is relevant for practicum in all its forms, and in this article, the term *practicum* will be used inclusively. The case presented here is from one Swedish institution, where the practicum model has elements of both observations and responsibility for teaching.

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Different positions on theoretical and practical knowledge in teacher education exist in policy and research (see, for example, Cochran-Smith & Lytle, 1999; Eriksen & Bjerke, 2019). In recent times, the role of theory in policy seems to be diminishing in favour of the practical. Access to theoretical knowledge from university-based teacher education is at risk in the US (Arbaugh et al., 2015), challenged as it is by less expensive, school-based teacher education systems where practical experience is seen as a sufficient grounding for teachers. In Scandinavia, despite state-funded university teacher education, a similar shift away from theory in teacher education can be traced. For instance, a comparison of three institutions in three different countries demonstrated less opportunity to engage theory in reflections on practicum in the included institutions in Norway and Finland than in the US (Jenset et al., 2019). In Sweden and England, Beach and Bagley (2013) traced a shift in policy away from theoretically-based knowledge towards contextual and individual types of knowledge. Recent research demonstrates how practicum observation protocols from universities in six different countries differ in the explicitness of requiring a knowledge base (Christiansen et al., 2019). Clearly, teacher education is part of a political context, and Grossman and McDonald (2008) have emphasised how positions taken on policy need to be considered in research on teacher education.

A challenge for teacher education is the disconnect between theory and practice imposed by situating theory in the university context and practice in the school context (Eriksen & Bjerke, 2019; Gainsburg, 2012), and a conceptual language foregrounded in research is often absent in the school context (Grossman & McDonald, 2008). This disconnect goes beyond the organisation of teacher education and, in a symposium discussion (Hirst & Carr, 2005), Hirst foregrounds a theory-dependent perspective, whereby teaching is a principled enterprise which can be theoretically described and to some extent generalised. In Carr's contrasting theory-independent perspective, the rationality of theory is not more valued than the rationality of the self-inquiry reflections of practitioners. From this perspective, teaching cannot be discursively described, and a technical language for teaching becomes superfluous. Foregrounding conceptual language thus challenges a theory-independent position on teaching.

Theory-independent self-inquiry reflections have been described as well-established but, at the same time, as problematic within teacher education practices (see Adler & Davis, 2006; Clarà, 2015; Ensor, 2001; Grossman & McDonald, 2008). They are problematic in the sense that the important or privileged knowledge remains invisible for students (Adler & Davis, 2006; Ensor, 2001). However, the meaning of the term "reflection" is ambiguous (Clarà, 2015), and a different meaning can be ascribed whereby quality of reflection is related to the presence of theoretical constructs (e.g., Kaasila & Lauriala, 2012; Kasmer, 2013). Similarly, teacher learning has been described as a process of enriching practical knowledge in a discourse of practice "with a specifically defined vocabulary of selected concepts representing theory" (Oonk et al., 2015, p. 562). The latter meaning of the word reflections thus, unlike self-inquiry reflections, holds potential for a third space.

The theory-dependent perspective, especially when teaching is learned independently from context, has also been problematised. Carr's (Hirst & Carr, 2005) two main objections are that theories cannot be separated from their context, and as a consequence should not be privileged over contextual, practical knowledge. Several studies point to the challenges of transferring knowledge from university to teaching in the classroom. Time spent in teacher education is described as a "brief detour" (Nolan, 2012, p. 111) where students spend a few semesters between their time in school as learners and their return to school as teachers. According to Nolan (2012), this explains why teacher education struggles to challenge persistent school practices. For student teachers to make use of the practices that were emphasised in their teacher education requires a school culture that is open to such practices (Gainsburg, 2012). Both examples demonstrate a hierarchy between practices in university and practices in school. From a student perspective, an opposite hierarchy is evident, whereby connecting the mathematics content in university courses to the future teacher profession was found to be important

(Skog & Andersson, 2015). Rather than concluding that theory isredundant, the hierarchies between spaces can be challenged.

One possible space, where knowledge from both university and school may integrate, is constituted by written practicum tasks. Earlier research on written tasks in Swedish teacher education has demonstrated that student teachers in Early Childhood Education perceive academic writing as a "means to underpin the vocational field with theory" (Erixon & Erixon Arreman, 2019)—a perceived hierarchy. Less hierarchy was described in students' responses to practicum tasks in vocational teacher education, where students could make connections between the different knowledge cultures of vocational and pedagogical knowledge (Lagercrantz All et al., 2018). However, while practicum tasks can be a space for connections between contextual and conceptual knowledge, avoiding imposing a hierarchy between knowledge discourses from school and university is still challenging.

In practicum tasks, student teachers have access to the contextual situation, but they are distanced from the conceptual knowledge of the university. This study focuses on the request for conceptual knowledge in practicum tasks. A framework based on the identification of conceptual objects of study (COS) and practice-based contexts (PBC) was used:

> By definition, an application task consists of exploring the relation between two objects of analysis, a conceptual object of study and a practice-based context. By a conceptual object of study, we mean systematization of ideas, ranging in scale from a paradigm, to an educational perspective (specific theory), a claim or a specific concept. By practice-based context, we refer to some or other instance from the field of practice. (Shalem & Rusznyak, 2013, p. 1124)

Thus, among practicum tasks, only those which contain both COS and PBC will be referred to as application tasks. The use of COS is narrower than "theory" and refers to groups of objects that carry similar meanings across different contexts. It is also broader than a formal technical language as foregrounded by Grossman and McDonald (2008), through the inclusion of systematisations of ideas. The demarcation of PBC includes the role of school context in the tasks. Exploring the demarcation of COS and PBC can reveal the privileged approach to learning from practice regardless of the content matter or level taught. Using the same framework, Christiansen et al. (2018) found little demarcation of theory in application tasks in a professional development programme for teachers in South Africa. For mathematics in particular, Adler and Davis (2006) demonstrated how tasks focusing on mathematics content had a more conceptual syntax than tasks focusing on teaching and pedagogy. The tasks focusing on teaching instead took a self-evaluative perspective, and Adler and Davis concluded that such tasks did not facilitate the realisation of the teaching practices foregrounded in the course. Thus, the invisible conceptual syntax inhibited the participating teachers from accessing the intended knowledge about teaching. This issue of epistemic access is discussed further in the section on theoretical background.

Using a previously developed framework facilitates comparisons across contexts and different categories of teachers and adds to a cumulative knowledge building in the education field. Hence, this article furthers our understanding of the relevance of visibility of conceptual objects in practicum tasks.

## Research Questions

The purpose of the present study is to investigate the visibility of conceptual objects in application tasks in one Swedish secondary mathematics teacher education programme. Three research questions are posed for the analysis:

(1) To what extent are conceptual objects and practice-based contexts visible in practicum tasks?
(2) To what extent are mathematics-related conceptual objects visible in practicum tasks?
(3) What becomes privileged in practicum tasks inside and outside the third space?

The rationale for looking at application tasks is that they can reveal different theoretical positions on integrating and accessing theory and practice in practicum.

## Theoretical Background

To further reveal the pedagogic consequences of theoretical or context-based tasks, this article takes as its point of departure Bernstein's (1999) sociological theories on education. Bernstein distinguishes between a vertical discourse, which "takes the form of a coherent, explicit, and systematically principled structure … or … a series of specialized languages" (p. 159), and a horizontal discourse, which "entails a set of strategies which are local, segmentally organized, context specific and dependent" (p. 159). Learners are typically introduced to the horizontal discourse with the pedagogic aim of access and inclusion. This, according to Bernstein (1999), and exemplified in Dowling (1996), may result in their exclusion from the vertical discourse, and thus the context-independent and principled structures.

Access to a vertical discourse is connected to a visible pedagogy, with either a strong grammar with explicit use of principled conceptualisations, or a weaker grammar of showing or modelling (Bernstein, 1999). The horizontal discourse instead relies on the tacitly acquired gaze, a gaze acquired from participation in social arenas. What makes a tacit gaze troublesome is that, when this gaze requires experiences from particular social arenas, it becomes inaccessible to certain groups of learners (Maton, 2013). In the present study, the mathematics arena with a visible pedagogy and explicitly demarcated conceptual objects (Adler & Davis, 2006) rarely scaffolds students to develop a gaze for tacit knowledge of teaching. This knowledge, however, can be made more accessible through making it more visible.

One visible part of the vertical discourse is the presence of conceptual language. The notion of "concept" in education is multifaceted and has been "most frequently used to describe a grouping of objects or behaviours with the same defining features that has become recognized through research or widespread usage" (Entwistle, 2007, p. 2), or defined as "what is to be found in scientific textbooks, in scientific debates, or in the thesaurus of a language, thus in authoritative texts regarding the concept in question" (Larsson & Halldén, 2010, p. 645). In a Vygotskian outlining of teacher education, Smagorinsky et al. (2003) argue that concepts signify theoretical abstractions. From a socio-cultural position, spontaneous concepts are tied to cultural practices and learning in specific contexts, whereas scientific concepts are grounded in general principles, and therefore it is possible to apply them in different contexts.

From this, parallels can be seen between the Vygotskian description of scientific concepts and the specialised language of Bernstein's vertical discourse, and between the spontaneous concepts in situated contexts and horizontal discourse. The present study takes these similarities as a premise for discussing how the visible use of conceptual objects and a situated context relates to access to learning in mathematics teacher education.

## Methodology

To operationalise these theoretical assumptions, the methodology developed by Shalem and Rusznyak (2013) (briefly mentioned above) was utilised. First, the context of the present study is described.

### *Context and Data*

In 2011, national reform of teacher education was implemented in Sweden. In the researched institution, the reformed and the former programmes ran concurrently between 2011 and 2014. The two programmes are henceforward referred to as the *former* and the *recent* programmes. For the case

presented in this article, all practicum tasks were gathered from secondary mathematics student teachers' practica during this period.

The author of this article was one of the teachers on several courses, both in the former and the recent programmes. The tasks in the former programme were developed over time, through a process of collegial collaboration. In the recent programme, tasks were developed centrally by the university. At that time, I tried to follow shared routines and praxis for tasks, but became hesitant due to, amongst other factors, the negative reaction from student teachers to the portfolio tasks in the recent programme. Rather than relying on student teachers' emotional responses, this article is a way of critically analysing how the reform impacted on access to a third space.

In Sweden, the extent of practica as well as the standards and goals for teacher education are regulated nationally (see Christiansen et al., 2021). Within the national regulations there is room for universities to decide on practicum organisation and which parts of the national standards are to be assessed. In the former programme, government policy documents highlighted how practicum was not only an arena for putting theory into practice but was also to be regarded as *education*, as opposed to the practising of skills implied by the term *practice*. To manifest this view of practicum, the concept of "school-based education" replaced the former concept of "practice". The reform of 2011 was largely based on a government report (Ministry of Education, 2008), which focused on practicum as an area of improvement in teacher education. Three recommendations were made: first, that practicum tasks be adjusted to suit the ongoing work in placement schools; second, that practica be organised as separate courses; and third, that examination be based clearly on stated standards.

When this new policy was implemented in the researched institution, it imposed several administrative changes. Before the reform, practicum placements had been part of various educational courses, with a range of different practices for tasks and assessments. After the reform, practica became separated from theoretical courses, and were instead undertaken as separate courses. A set of centrally developed assessment criteria was developed and an online teaching portfolio mandated. The portfolio tasks were developed collaboratively across all teacher education programmes. For both programmes, tasks were mandatory.

Practicum was 20 weeks full time in both programmes, and an overview of the data, together with differences between the two programmes, is found in Table 1. In the recent programme, the time was distributed across three periods of four, six and ten weeks, respectively, and conducted as three separate practicum courses. The tasks in the recent programme were part of a digital teaching portfolio, developed for practicum only and not adapted specifically for mathematics. In the former programme, there were three practicum periods of 2–10 weeks, where two periods were integral parts of courses in mathematics education for secondary teachers, and thus included in this study. The written course assignments were all related to mathematics education. All practicum tasks from the programmes between 2011 and 2014 were included in this study—39 tasks from the former programme, and 20 tasks from the recent programme.

**Table 1.** An overview of the included data and the different framings of the two programmes.

| | Former programme | Recent programme |
|---|---|---|
| Number of tasks | 39 | 20 |
| Context | Practicum was part of courses in mathematics education, and two different courses were included, one with two weeks practicum, early in the programme, and one with ten weeks later in the programme. | Practicum was given as separate courses. The programme included three practicum courses, one in each of the three final semesters of the programme. The practicum courses lasted four, six and ten weeks, respectively. All were included. |
| Tasks | Tasks were described in the course syllabi, and only tasks assigned for the practicum part were included. | Tasks were described in the new teaching portfolio, and all tasks were included. |

**Table 2.** The nine possible cases for demarcation of COS and PBC.

| | | COS demarcation | | |
|---|---|---|---|---|
| | | Strong | Weak | None |
| PBC demarcation | Strong | A | B | C |
| | Weak | D | E | F |
| | None | G | H | I |

These data enable a discussion on how access to a third space differed for a similar group of student teachers due to seemingly administrative changes.

## Analytic Approach

Analysis consisted of three steps: first was a content analysis of COS and PBC, which gave a quantitative description of the demarcation of COS and PBC. This indicated some generalities, but at the same time reduced the information in the data (Golafshani, 2003). To learn more from the data, the content analysis was followed by two steps of qualitative analysis: a thematic analysis of strongly demarcated COS and a discussion of two telling cases.

The content analysis consisted of a categorisation based on the demarcation of COS and PBC as *strong*, *weak*, or *non-demarcated*, which resulted in a three-by-three matrix with a total of nine different categories (see Table 2). The unit of analysis consisted of one task. Each task was coded for level of demarcation of COS and PBC. Qualitative analysis software was used for coding.

The idea is that tasks with a demarcation of both PBC and COS had potential to provide a third space in which theory and practice coexist and interact. In this model, categories A, B, D, and E can be considered application tasks, and have the potential for providing a third space in which both COS and PBC are demarcated to some extent. In the shaded categories in Table 2, either COS or PBC is missing, and these categories thus cannot provide a third space. The demarcation of COS indicates what was seen on the surface of the text (concepts, words, descriptions, signs) and is related to visible pedagogies (Bernstein, 1999), and hence accessibility for students. The demarcation of PBC, on the other hand, indicates whether the task required a connection to context.

Tasks containing theoretical concepts from either mathematics, mathematics education or general education were categorised as strong COS, and tasks 1 and 2, below, served to make the analytic distinctions between strong and weak demarcations of COS transparent.

### Task 1: Strongly Demarcated COS

> Plan for 2–3 lessons … . The plans need to treat the concept you selected for the previous task. Describe the selected activities and justify your choices. Each lesson needs assessable outcomes and must connect to curricular goals … . Find support in course literature, ICT[1] or other subject educational resources. It needs to be clearly stated what, how and for whom the planning is intended. Since the necessary concept has already been investigated (Task 2), this will be the point of departure for your planning. Also, consider how assessment will be done (to facilitate data collection for task 4).
>
> (Part of task from former programme[2])

In this example, an explicit focus for the planning, the previously investigated concept, was provided. In addition, planning was expected to be the systematic development of a lesson plan, based on support from course readings and resources for teaching, and connected to investigation of learners' conceptual understanding (the reference to "Task 2"). Therefore, for this task, "lesson plan" is considered to be a conceptual object.

[1]Information and communication technology, for example the use of online resources for teaching.
[2]The whole task was not cited/translated here, where several instructions are left out.

Difficult to categorise were those words that could have either an everyday or a theoretical meaning, such as "planning", "task" (as in a mathematical task) or "reflection". This was resolved by adapting a strategy from Christiansen et al. (2018) whereby the textual context was used to determine whether those words appeared in a manner that allowed students to systematise their knowledge. Another criterion was whether the concept was used in the literature that students were required to read, as in Task 1, above.

The distinction is illustrated by Task 2, below, where planning was categorised as weakly demarcated COS.

### *Task 2: Weakly Demarcated COS*

> Give a brief summary of the lesson to be attended by the university teacher. Include the following: Goal/theme of the lesson, group of learners, the purpose of the lesson, the content and the outline.
>
> (Task from recent programme)

In this example, it was not evident if planning was an everyday concept or a concept related to principles for planning and teaching mathematics. There is mention of what to include, which can be considered a systematic approach to lesson planning, but no request to consider connections between the parts, or what informs the planning. Hence the categorisation as weakly demarcated COS.

A strong demarcation of PBC was indicated when a specific context, typically a lesson, was mentioned, as in "the lesson attended by the university teacher" in Task 2, above. Mention of a general context was coded as weak demarcation of PBC—for example, "compare course readings with events from your field experience".

The second step was to identify themes within the strongly demarcated COS category. Unlike the initial coding of COS, single concepts or conceptual objects were used as units of analysis, and since a task often contained several conceptual objects, the analysis addressed more units than the number of tasks. The results are presented as four qualitatively described themes. The mathematics theme was inferred from the second research question. The identification of mathematics concepts was straightforward; however, it was not always possible to differentiate between mathematics and mathematics educational concepts. A thematisation, based on an inductive coding of the strongly demarcated concepts, followed by an organisation of codes under themes (see Braun & Clarke, 2006), resulted in three themes: national curriculum, assessment theory, and general education theory. In the assessment theory category, the most common concepts were formative assessment or grading. The most common concepts in the national curriculum category were policy documents, knowledge criteria, the mathematics syllabus content, and "mathematical abilities".[3] Other conceptual objects or themes occurred once or twice, such as "special needs students" or "metacognition" and they were therefore assigned to the more general category of education concepts.

The third step was selecting and analysing two "telling tasks", using two characteristics of telling cases: to provide context and to provide better understanding of theoretical constructs (Andrews, 2017). Here, telling tasks served to see practicum tasks in context, and provided a better understanding of the theoretical constructs, in this case, of tasks as a third space. The purpose was to provide deeper insights into the privileged knowledge in tasks within a third space, but also in tasks outside a third space. As telling tasks, I return to Task 1 and Task 2 above, that is, two tasks on lesson planning, one from each programme.

### *Limitations*

From the limited number of tasks included in this study, the quantitative description cannot claim generalisability beyond the investigated cases. Instead, use of the earlier developed framework of COS and PBC enabled cumulative learning from earlier results across cases and contexts.

[3]Referring to five strands of mathematical proficiency (förmågor) in the mathematics curriculum.

**Table 3.** Tasks within the former programme (20 tasks): relative frequencies.

| | | COS demarcation | | | |
|---|---|---|---|---|---|
| Former | | Strong (%) | Weak (%) | None (%) | Total (%) |
| PBC demarcation | Strong | 55 | 10 | 5 | 70 |
| | Weak | 10 | 5 | 0 | 15 |
| | None | 0 | 5 | 10 | 15 |
| | Total | 65 | 20 | 15 | |

**Table 4.** Tasks within the recent programme (39 tasks): relative frequencies.

| | | COS demarcation | | | |
|---|---|---|---|---|---|
| Recent programme | | Strong (%) | Weak (%) | None (%) | Total (%) |
| PBC demarcation | Strong | 26 | 13 | 33 | 72 |
| | Weak | 0 | 0 | 0 | 0 |
| | None | 0 | 3 | 26 | 29 |
| | Total | 26 | 16 | 59 | |

Two limitations with the coding procedure had to be considered. First, was the difficulty of determining what counted as weak or strong demarcation of COS. This was met through coding comparisons with a fellow researcher (inter-coder reliability), as well as transparency in the use of COS and PBC (concept validity). Second, was how the different foci were related to changes in policy and organisation. The author's position of researching their own institution implies some potential bias, wherefore analytic distinctions are provided with criteria and examples for strengthened transparency, both in the method description and in the results, below.

## Results

The presentation of results follows the described analytic approach. First, the results from the content analysis of COS and PBC are presented; second, the analysis of conceptual objects is presented; and third, two telling tasks are discussed.

### *Content Analysis of COS and PBC*

The results of the analysis on demarcation of COS and PBC are presented in the tables below, showing the distribution of the categories from Table 2. Table 3 concerns tasks from the former programme and Table 4 focuses on tasks from the recent programme.

PBC was strongly demarcated in 70% of tasks, COS was strongly demarcated in 65% of tasks, and 55% of tasks demonstrated a strong demarcation of both. Eighty per cent of the tasks could be considered application tasks. The analysis indicates that the former programme used conceptual language while making several connections to the practice-based context. A typical task in this programme was one with demarcation of both the practice-based context and the theoretical concepts. Below is one example of such a task:

> Example 1:
>
> The assessment task is based on practicum experiences together with course literature. In relation to the planned teaching, perform formative and summative assessment of one/more larger tasks.
>
> Formative assessment—consider how you can learn more about learners' abilities and knowledge. You may choose the form of evaluations (e.g., written or oral) and how your feedback to learners will be communicated. The assessment needs to give learners the opportunity to develop some of their mathematical abilities.
>
> (Task from former programme)

Here, formative assessment was described in the "course literature", and therefore analysed as strongly demarcated COS. Means and purposes for implementing formative assessment were suggested as learners' development and planning for feedback. The PBC was strongly demarcated as "based in your practicum experience".

Table 4 shows the distribution across categories of tasks from the recent programme. The tasks in the recent programme were also predominantly coded as strong PBC; however, there was a greater spread in the degree of COS demarcation. The largest category was the one with no demarcation of COS and strong PBC (33%), while the total share of tasks with no demarcation of COS was 59%; 39% of the tasks were considered application tasks. Below is one example of a task with no demarcation of PBC or COS:

> Example 2:
>
> After the visit by the university teacher, write a brief reflection on how you understood the main content of the tripartite conversation. Describe briefly the content of the conversation, your own insights, and other issues you wish to raise.
>
> (Task from recent programme)

This task captured both the strength and weakness of the method of analysis, since the described conversation between the student teacher, the mentor, and the visiting university teacher typically would be based on the specific lesson and could give rise to conceptually informed discussions. The method of categorising visibility of COS and PBC therefore overlooks the fact that many students would engage in principled or conceptual discourse when responding to this task. However, it was not demarcated that this is desired. Thus, the strength is that the method reveals visibility, or invisibility, of this discourse.

Most tasks with no demarcation of COS or PBC were administrative, whereby students were expected to provide a plan or schedule their teaching. An exception to this is illustrated by Example 3:

> Example 3:
>
> Here is where you provide the final reflection after completion of the reflection seminar. In your final reflection, assess and give examples of your own strengths and areas of development for your next practicum course, based on your experiences and the intended outcomes of the course.
>
> (Task from recent programme)

Students were explicitly required to exemplify the personal "strengths and areas of development" through reflection. This reflection thus explicitly requires self-evaluation—a self-inquiry approach related to the "intended outcomes" which, as described earlier, is closely connected to governmental goals for teacher education and not explicitly to any theoretical perspective.

Summing up, Category A (representing both strongly demarcated COS and PBC, see Table 2) indicated a substantial difference between the programmes—55% of the tasks in the former programme compared to 26% of the tasks in the recent programme. The four categories representing application tasks represented 80% of tasks in the former programme and 39% in the recent programme. The demarcation of PBC was strong in both programmes (65% in the former programme and 72% in the recent programme), indicating a strong connection to practice-based contexts, as typically expected from practicum tasks. By contrast, the column representing non-demarcated COS contained 15% of the tasks in the former programme and 59% of the tasks in the recent programme, whereas the former programme had a stronger demarcation of COS (65%) than the recent programme (26%). To better understand if and how application tasks could give access to a third space, the cases of strongly demarcated COS were submitted to further analysis.

### *Conceptual Objects Within the Strongly Demarcated COS Categories*

The thematisation of the tasks with strongly demarcated COS (A, D, and G categories, see Table 2) resulted in four areas: mathematics and mathematics education; national curriculum; assessment theory; and general education theory.

In the recent programme, no *mathematics* or *mathematics educational concepts* were demarcated (0). This was expected, since tasks in the recent programme were not subject specific. However, even requests to use any subject-specific concepts at all were absent. In the former programme, mathematics was frequently demarcated. A typical task was "(a)sk learners to solve the tasks. Think about what you could find out about learners' mental calculation strategies."

Both programmes contained conceptual objects from *assessment theory*. In the former programme, the assessment tasks mostly contained specific descriptions where theoretical concepts were to be used in the analysis of assessments—"assess the task using two different methods, i.e., analytic, holistic or 'right or wrong'". In the recent programme, students were asked to "document the knowledge and knowledge development of learners", without specifying methods or categories of knowledge.

Few conceptual objects relating to *general educational theory* were found in either of the two programmes. In the former programme, the examples consisted of learning study and related concepts. In the recent programme, the examples consisted of concepts related to special needs learners; again, not specifying what theoretical concepts to use.

In both programmes, the national *curriculum* was required to be used for selecting content or assessing learners. Tasks within the former programme referred primarily to the subject matter curriculum, as in "(t)he purpose of this task is to plan, perform and evaluate a part of school mathematics content in line with the course curriculum". In the recent programme, similar tasks were found, and these were the only tasks in which the content matter was mentioned. In addition, some tasks in the recent programme assessed student teachers' ethics in relation to values expressed in the generic parts of the curriculum, such as in "discuss your action from an ethical perspective, based on your personal values and values expressed in the curriculum".

A similarity between the two programmes was the foregrounding of the national curriculum. The tasks did not privilege a critical stance on curriculum standards, treating them rather as a requirement for student teachers to understand how to implement the curriculum as intended.

The demarcation of COS found in the former programme lay mainly in the focus on mathematics education, naturally, since practica were part of courses in mathematics education. In the recent programme, mathematics was taken out, but the analysis of COS indicates that no other specialised languages were added.

## Two Telling Tasks

The analysis above illustrates how tasks from the former programme required a specialised language related to mathematics educational concepts, whereas the recent programme tended to focus on student teachers' self-inquiry. To better understand what spaces student teachers were given access to through the practicum tasks, Tasks 1 and 2 from the methods section were revisited. Both tasks concerned lesson planning, and both had a strongly demarcated PBC, specifying that the lesson plan/plans concerned a specific class taught by the student teacher. The question was whether these tasks would give access to the third space, and what actually was privileged.

Tasks in the former programme were often part of a sequence: step one was to plan a specific task; step two to let learners solve the task and pay attention to their conceptual understanding; step three was on planning a lesson or sequence of lessons; and step four was assessment. Task 1, above, on lesson planning was an example of the third step, making reference to previous investigations of learners' understanding and looking forward to assessments. The instructions were rather detailed, with explicit instructions on reference systems, number of words and suggested structure and headings; altogether, several details in line with requests for a vertical discourse. The request to justify activities and to use different resources for planning, signalled an understanding of lesson planning as a knowledge-informed enterprise. The target of this task is a lesson plan based on investigations of learners' understanding and preparing for forthcoming assessments.

Task 2 was from the recent programme, where tasks were shorter, often no more than four lines. These tasks were part of a digital teaching portfolio, and each portfolio started with the task of formulating individual goals, followed by a self-evaluation task, while the last task was to describe areas for improvement. As a whole, the portfolio signalled that the student themself was the target of tasks.

Task 2 provided some opportunities for systematising principles of lesson plans, requiring information about "goals/themes, the group of learners, the purpose of the lesson, the content and the outline", which were quite similar to those in Task 1. The principle was possible to grasp, whereas the request for a "brief summary" made the process of principled planning less demarcated. There was no demarcation of the content to be taught, nor the theories or readings upon which the planning should be based. On the one hand, Task 2 left a space for creativity and innovation; on the other hand, it required a gaze for lesson planning. This task could have been fulfilled without engaging any knowledge from the university space, and hence a third space will only emerge when students themselves interpret this as the target of the task.

Comparing these two telling tasks with a strong demarcation of COS, as in Task 1, was connected to specified content as well as requirements for some theory base, that is, making connections to the university contexts of teacher education. There was a fairly explicit request for students to engage in a vertical discourse, with de-contextualised and conceptual language. In Task 2, the visible request was to engage in a context-dependent and more descriptive discourse. Thus, through bringing in some of the context, and reading two tasks as telling tasks, we learned more about what enabled access to a third space.

## Discussion

This discussion first addresses the research questions and relevance of results, before returning to the rationale for this study, the perspective of epistemic access, and the different positions on theory and practice. Finally, I raise a discussion on policy and trends in teacher education. The analysis of COS and PBC answers the first research question about the visibility of conceptual objects and practice-based contexts in practicum tasks and demonstrates how PBC is present, as would be expected in practicum tasks. There is less demarcation of COS in the recent, reformed programme than in the former programme. This result indicates a shift in the presence of conceptual objects, and in line with earlier studies (Adler & Davis, 2006; Christiansen et al., 2018; Shalem & Rusznyak, 2013) demonstrates how tasks in teacher education do not always explicitly connect to conceptual objects. However, this article also found several examples of application tasks that could work as a third space where theory and practice meet. The problem is that, while this space was widely present in the former programme, it diminished in the recent programme.

For an increased understanding of what these results entail, this quantitative description was combined with qualitative analysis. The analysis of the conceptual objects helped to answer the second research question, about the presence of conceptual objects related to mathematics or mathematics education. The present result indicates that the former programme was often based on mathematics educational theories. This is probably best explained by the fact that practicum was part of, and visibly connected to, courses in mathematics education, and thus adapted to the specific student group of prospective secondary mathematics teachers. The demarcation of specific literature as well as specified mathematics educational concepts is often found in earlier research on practicum from the field of mathematics education (Österling & Christiansen, 2018), as theory-enriched practical knowledge (Oonk et al., 2015). Removing mathematics and mathematics educational concepts from application tasks without replacing them with something else has made the conceptual language less visible. Mathematics and mathematics educational concepts must be considered an important part of the specialised language of secondary mathematics teachers. Presumably, the specialised language of other groups of teachers is to some extent related to both the content taught and the school level of learners.

The third analysis was a close reading of telling tasks, and invites a discussion of access to learning in relation to demarcation of COS. The two telling tasks reveal how student teachers, when writing about lesson planning, were explicitly expected to enter a third space in the former programme, but not in the recent. According to sociological perspectives, students who benefit most from a visible vertical discourse are those who do not have access to such discourse beforehand (Bernstein, 1999). Thus, if the intention is for students to engage in a vertical, theoretically informed discourse, then it should be noted that discourse is hidden and less accessible for some students in the recent programme.

In the case of mathematics, access to invisible education concepts is hindered not only by sociological factors but also the inherent differences between the mathematical and pedagogical knowledge fields. In mathematics educational research, the theory-dependent perspective has a strong base. For example, it has been found to provide the means for improving reflections (Kaasila & Lauriala, 2012; Kasmer, 2013; Oonk et al., 2015). Thus, the former programme, as part of courses in mathematics education, is in line with this research track in mathematics education. In relation to the third research question, these tasks require students to enter a third space, through privileging conceptual knowledge together with the practice-based context.

How can we understand the privileging in the recent programme? The invisible theory in the recent programme is in line with a theory-independent perspective, where the importance of personal, practical, and contextual experience is acknowledged. The observed shift inwards towards self-inquiry reflection and personal development in the recent programme can be compared to a desire for a constantly improving teacher (Christiansen et al., 2019), making teachers personally accountable for their development and results (Beach & Bagley, 2013; Österling, 2021).

This shift is not unique to the researched institution; rather, it is in line with the international trend of establishing cheaper, more practice-based teacher education (Arbaugh et al., 2015; Beach & Bagley, 2013). An emerging performativity model for teachers has been described in the UK, where "the state has declared itself expert in all aspects of education" (Lerman, 2014, p. 198), and perhaps the focus on assessment and curriculum goals found in this article traces a similar trend in Sweden. The immersion of policy in practicum tasks is explicit in Example 3 above, where student teachers are expected to reflect on their own performance, based on the intended outcomes. Instead of introducing student teachers to the third space of theory and practice, a different space emerges, a space where policy and individual performance meet.

The present study reveals an increased privileging of a theory-independent perspective, here represented by a weak demarcation of COS in practicum tasks from a university-based teacher education programme. In the former programme, COS was strongly related to mathematics or mathematics educational knowledge. In both programmes, the implementation of policy goals is given much emphasis.

Discussion of the role of theory in teacher education will continue. The purpose of this article has been to provide another empirical case, where practicum tasks provide a third space for integrating knowledge from both school and university contexts. This case shows how more can be done to make conceptual language and principles for teaching visible, and thus accessible, in practicum tasks.

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