Opportunities for progression in subject-matter didactics

*Teacher education research has a special interest in which professional knowledge teachers should have in order to teach a subject area, that is, which is the subject didactic competence required to conduct teaching. The science education part is short and comprised in the Swedish teacher education program for primary schools, which is challenging. This has also an impact on the students’ progression of learning. Progression can be described as the way in which learning is expressed, that is, evidence of the outcome of learning in individuals. This study concerns research on progression in relation to learning and in terms of subject didactic knowledge, how it is interpreted and staged in primary science context. We have found no research that combines these two parts subject didactic knowledge and progression in teacher education. By using peer conversations as a basis, together with text analysis (course documents) and collaborate classroom observations we have tried to make visible what, why and how subject didactics appears in the teacher program courses in science and technology and if and how, progression is expressed. The work has meant that we, as teacher educators and researchers, have developed a greater understanding of the subject didactic content and visualized course development opportunities relative to a thought about progression.*

*Keywords*: Collaborative Learning, Higher Education, Learning Progressions

Introduction

The professional skills that teachers need when teaching a specific subject has for a long time been of interest and relevance for teacher education. In the teacher education at the University of Gothenburg, this is referred to as subject-matter didactics inspired by the European didactic tradition (Klafki, 1995).

Another important issue in teacher education, as well as in other educational contexts, is the interest in progression of learning. Progression can be described in different ways, one a matter of individual learning, another, a matter of the extent to which various aspects of the curriculum connect. Research about progression exists (Säfström, 2017), and so does research on what subject-matter didactics knowledge is, and how it can be interpreted and integrated in different educational contexts (Kansanen, 2009). However, research investigating the progression of knowledge about subject-matter didactics in teacher education is rare.

In this study we state the research question, How can progression in subject-matter didactics of science and technology be described in teacher education courses?

**Method**

In an exploratory phase we approached both issues inductively by analysing theories that reflect different perspectives on subject didactic in line to our research question. The study departs in an investigation of our own teaching in the teacher education to gather empirical evidence of what, why and how subject-matter didactics appears in courses in the programme, and if and how progression is expressed. The empirical material consists of several observations of lessons (in table 1) and course document analyses directed toward student teachers in primary school teacher programmes. One course is for student teachers in primary school grade 1-3, and the other course is for student teachers in primary school grade 4-6. Course documents analysed were syllabi, course literature and course guides from those two primary science education courses. The analysis were made in regard of how and if subject didactics appeared in the relevant documents and whether there were any subject didactic progression. The material was analysed using Jenset et al. (2018) analysis instrument.

Table 1. Conducted observations and interviews in different contents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Content | Teacher | Observer | Interview | Hours |
| Human body | 1 | 2 | x | 4 |
| Energy | 3 | 1 | x | 2 |
| Materia and energy | 3 | 4 | x | 2 |
| Energy and transformation | 3 | 5 |  | 2 |
| Teaching about species | 6 | 7 | x | 2 (of 4) |
| Human reproduction 1 | 1 | 3 |  | 3 |
| Human reproduction 2 | 1 | 3 |  | 1,5 (of 3) |

**Results**

Based on the literature analysis, we strive to a common picture of what subject didactics is in relation to subject theory. Based on the course document analysis, our overall assessment of the course documents shows that the students get several opportunities to learn and practice subject didactics. Subject didactics occur in the teaching structure, course assignments, examinations and literature. The analysis also shows that one of the courses' literature lists shows a large part of the subject didactic character but also that this is not reflected in the content description of the teaching in the syllabus or course guide. Another result is that there is a big difference between the writing in terms of subject didactics in parts of the course that aims at student teachers for grades 4-6. In four out of five course parts, the subject didactics is not visible in the same way as it is in the fifth. With regard to subject didactic progression, it is not explicitly visible to great extent in any of the documents. Based on the observations made, it is difficult to see that subject didactic progression occurs explicitly.

The results show indications of progression in subject-matter didactics in the courses that links to certain tasks where students plan, implement and analyse teaching, as well as analyse pupils’ learning. The result also point to tasks with no clear or implicit progression that nevertheless can be interpreted as opportunities to strengthen progression in and between courses and tasks. Examples of such implicit opportunities that were identified are tasks that aim to develop system thinking in the subject areas and tasks that engage students in conceptual understanding.

**Discussion and conclusion**

The question is if the teaching we currently have in teacher education, explicitly emphasis subject-matter didactics or if it is something that we take for granted as teacher educators, invisible to students but assumed implied by our teaching. Our conclusions are that we should express more clearly for the students when we use the subject didactics in teaching and that we should review how the subject didactic progression can be expressed. Though, the question is if we can expand this in our courses. We also see that a closer cooperation between teachers in different course parts could be a fruitful way to increase the subject didactic progression.

In the course documents, subject didactics occur to an extent that does not correspond to the actual teaching. We discussed the reason for this; can it possibly be that we do not explicitly express when we use the subject didactics for the students? Could it possibly be that we need to expand the subject didactic content in relation to the course literature to some extent?

A possible subject didactic progression could be that the students are given increased opportunities to link the content of the courses more to the school practice by fulfilling the criteria in Jenset et al. (2018) analysis instruments that did not appear in our study. The progression could then be that more parts are covered further in the course or the longer the education progresses, or that all parts are treated in each course section.

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