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# Analysing student teachers' lesson plans: Mathematical and didactical organisations

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*I investigate 17 mathematics student teachers' productions, in view of examining the synergy and interaction between their mathematical and didactical knowledge. The concrete data material consists in lesson plans elaborated for the final exam of a unit on "numbers, arithmetic and algebra". The anthropological theory of the didactic is used as a framework to analyse these components of practical and theoretical knowledge.*

**Keywords:** Didactic divide, lesson study, mathematical and didactical organisations.

## INTRODUCTION

Mathematics teacher education is often described as consisting of several components such as mathematical contents, didactics and pedagogy. Bergsten and Grevholm (2004, p. 125) introduced the term *didactic divide* to indicate a lack of connection between such components. In this paper, I wish to investigate the degrees of didactic divide (or coherence!) by analysing certain productions of Faroese mathematics student teachers for an exam in a module that seeks to integrate the teaching of mathematical contents and didactics (in the context of algebra and arithmetic). This is my first research project as part of my work towards the Ph.D.

## THEORETICAL FRAMEWORK AND RESEARCH QUESTIONS

In the anthropological theory of the didactic, human practice and knowledge is modelled in terms of *praxeologies*, which consist of a *practice block* and a *knowledge block*. The practice block consists of *types of tasks* and corresponding *techniques*. The knowledge block contains *technology* (discourse on techniques) and *theory* (unifying discourse on technology). For

more detail see Barbé and colleagues (2005). In our study we consider *mathematical* and *didactical* praxeologies (defined by tasks being of mathematical and didactical nature) and their mutual connections. We can then formulate the research question of the study as follows: *What links and gaps can we observe in the mathematical and didactical praxeologies of students as evidenced in their plans for a lesson on school algebra, produced in the setting of a teacher education course?* Naturally, a methodological problem is closely linked to this question: *How can we, concretely, extract the components of mathematical and didactical praxeologies from a lesson plan?*

## CONTEXT AND STUDY

The mathematics teacher education programme at the University of the Faroe Islands can be described as mainly consecutive (cf. Winsløw et al., 2007) in the sense that general pedagogy and other generic courses make up the first two years of the programme, while the last two years comprise units with a main focus on contents and a secondary, integrated focus on didactics. One of these units in the third year is the source of our data for investigating the above research question. Halfway through the course, the format of *lesson plan* is introduced (in connection to the wider idea of *lesson study*) as a way to work with a school mathematical theme.

The task (a didactical one) is "to plan a lesson on a specific theme" (e.g., "how to add two fractions?"). The theme in turn can be described as a mathematical praxeology, in this case focused on techniques for adding fractions, descriptions and justifications of the techniques (technology), and mathematical links to similar practices (including theoretical notions such as commutativity, inverses etc.). The lesson plan will potentially articulate both elements of this mathemat-

ical praxeology and also present choices of didactic techniques, and as these are explicit (written) there will be elements of didactic technology and theory to analyse. The students elaborate (individually) one such lesson plan which forms the basis of the final oral exam in the course. Their presentation of the plan may take up to 20 minutes followed by questions from the lecturer. While the main data will be the lesson plans themselves, transcripts from the exam will also be used to complement the information regarding students' mathematical and didactic theory blocks.

My analysis focuses on the students' choice of didactic techniques, the justification of these techniques in relation to the mathematical praxeology, the preciseness of their didactic technology, their reference to explicit didactic theory and the connection between didactic and mathematical theory blocks (for instance, didactic theory on the teaching of fractions could be more or less connected to the theoretical components of the mathematical praxeologies proposed by the lesson).

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