

Building a paradidactic infrastructure for teachers' professional scholarship in Sweden

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This presentation describes analytical methods of our project that will investigate possibilities and conditions for a group of Swedish teachers who work to establish their own professional scholarship of teaching mathematics using two Japanese methods: structured problem solving and lesson study. An a priori analysis using tools from the anthropological theory of the didactic presents in what way the teachers transpose the Japanese model for structured problem solving and adapt its didactic techniques into the Swedish context. The analysis will also describe how or if lesson study can support construction of a paradidactic infrastructure that disseminates the formed knowledge, and the facilitators' role for the establishing process of the infrastructure.

Background

School teachers has been viewed as a semi-profession—the phenomenon is related to the fact that the teaching profession has not explicitly built a common theoretical knowledge as a basis for practice. Japanese mathematics teachers' cooperation in direct connection with their teaching practice is a key to developing professional knowledge of mathematics teaching (Asami-Johansson, to appear).

We plan a two years intervention project, in which groups of lower secondary mathematics teachers work collectively in a form of *lesson study*. The teachers transpose the professional knowledge of Japanese structured problem solving to a model based on the needs and conditions of their Swedish classrooms. The aim of the project is twofold: 1) To study how Swedish teachers' professional knowledge in lesson design and implementation of structured problem solving can be developed and established through collegial collaboration, and 2) to investigate how an infrastructure that disseminates the formed knowledge can be constructed.

Analytical methods

We employ an analytical tool called a *reference model* from *the anthropological theory of the didactic* (ATD, e.g. Chevallard, 2019). A reference model is the researchers assumptions on the research object (in this case, teachers' work), based on previous research results. It is descriptive, rather than normative, with the purpose of making the boundary between the intervention and the research clear. We will apply two different types of reference models: 1. A *praxeological reference model*, which is constructed from praxeological analyses of Japanese teachers' didactic techniques

when teaching by structured problem solving (Asami-Johansson, to appear). The praxeological reference model will be used for analysing the Swedish teachers' use and adaptation of different didactic techniques supplied by the Japanese model. 2. A *dialectic reference model of lesson study* (Otaki, Asami-Johansson & Hakamata, 2020), which originally was based on ATD's *dialectic model of inquiry*. This model will be used for studying the teachers' fundamental actions during their inquiry process of teaching knowledge through lesson study. It includes six dialectics between: 1. *Didactic stakes and teachers' gesture* (e.g. knowledge to be taught, and teacher's acts), 2. *Period and study program* (e.g. planning and reflecting on a lesson and whole curricular project), 3. *Didactic milieu and didactic infrastructure*, 4. *Predidactic and postdidactic* (e.g. pre and post lessons), 5. *School and noosphere* (e.g. teachers and educational policy makers), and 6. Teachers' role as *designer and analyser*. Another tool by ATD is a notion of *paradidactic infrastructure* that is a system that consists of both material and intangible components in order to produce knowledge and methods for and about teaching in the classroom. *Lesson study* is a typical intangible component of the Japanese paradidactic infrastructure.

A priori analysis

The praxeological reference model will provide knowledge about which of the didactic techniques of the Japanese methods that are suited respectively not suited for the Swedish teachers' praxis. The dialectic model of lesson study will provide knowledge about in what ways Swedish teachers adapt the Japanese methods in order to achieve their didactic stake in the classroom. For example, if some of the didactic techniques, say, board-writing, in which Japanese teachers use a board as a venue of reflective and collective learning for students, are regarded as unfit in the Swedish context, we can observe teachers' activities for adapting this technique possibly within the dialectic of pre and postdidactic, and teachers' role as designer and analyser. The model will also reveal how lesson study facilitates (or does not facilitate) sharing teachers' working process and establish their professional knowledge within the group. In that way, we can analyse the process of building teachers' paradidactic infrastructure in a small scale. In among others, dialectic between school/teachers and noosphere will describe the facilitators' role for the establishing process of the infrastructure.

References

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