

The quality of supervised peer discussions within the frame of co-operative learning

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Abstract: The aim of this study is to describe the quality of the discussions among engineering students in their second year learning calculus of several variables through co-operative work in small groups. The empirical material consists of a series of video-recorded lessons analysed within a theoretical framework from the anthropological theory of didactics.

Introduction

This presentation reports preliminary results from an on-going research project, based on classroom observations. The study is done in collaboration with the teachers involved.

Background

Co-operative learning is a well-established teaching and learning method, based on structured peer group discussions under supervision (Dunkels, 1996, D.W. Johnson & R. Johnson, 1999). The method has been used since 2003 in a course on calculus of several variables at Lund university (Backlund & Brandell, 2011). Each year 50-60 students take the course in their second year of a five-year engineering program. The same course is a compulsory part of all other longer engineering programs. However, students at other programs are offered traditional teaching, which consists of lectures and exercises.

The course is given during seven weeks with three to four sessions of co-operative learning (lessons) every week. During the lessons the students are divided into two groups, each supervised by a qualified teacher (a lecturer). The students are assigned by a lottery to small groups consisting of four (occasionally three) persons who work together during all the lessons. Instructions for the work are given in written lesson plans.

The course has been well received by the students and the examination results are satisfactory. When co-operative learning was first introduced a marked improvement occurred compared to earlier low results.

Aim of the study

The aim of the study is to shed light on the quality of the small group discussions and relate it to the supervision and the structured material guiding the students'

work each lesson (the lesson plans). If co-operative work turns out to offer students possibilities for discussions of higher quality, this fact may explain the good results of the co-operative learning method. Also, the results from this study may help to modify the method for use in other courses in the future to enhance students' learning. No comparison is done with students within the traditional set-up, but the common experience is that individual work dominates their exercises and that group discussions are rare.

Method and analysis

During March to May 2013 Seven (out of 21 in total) whole lessons were video recorded. Each recording focussed on one small group, every lesson a new one. All recordings have been looked through for the analysis. The structure of the co-operative group work and the content of the discussions have been summarised, with the intention to capture general aspects of the co-operative work, and to find interesting episodes related to the mathematics treated. One lesson has been transcribed in detail.

The Antropologic theory of didactics (ATD) is used in order to describe how and when students' discourse aim at questioning or explaining why certain methods or techniques are appropriate to use. Within ATD the *praxeology* is a framework describing all students' work as ultimately *solving tasks*. Different *types of tasks* given to students are solved using some *technique*, which is justified by a *technology* and an overarching *theory*, in this case a mathematical theory (Winsløw, 2006).

Preliminary results

Part of the group work is spent on individual, more or less silent work and the discussions many times concern the technique for solving a task. However, one main result is that the students spend a considerable amount of their group work time to discuss the technology involved. Students choose their arguments from various sources, such as definitions, theorems and examples from the textbook, and plots and computational results generated by Maple, but also produce their own justifications. The issues raised in the lesson plans are crucial for initiating the technology discussions. In some cases the supervisor initiates or further stimulates the discussions.

Examples in the form of transcripts from the video recordings will be presented for discussion.

References

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