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Creating Tomorrow

Learning student-teachers to orchestrate a classroom discussion for reasoning

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Abstract

Conducting a classroom dialogue for reasoning can be very challenging for teachers and, in particular for students-teachers. Research on classroom discussions provides examples of models that can be used to help teachers organize, analyse and conduct classroom discussions. One of these models is the five-practices framework (Stein, Engle, Smith, & Hughes, 2008). In this study we investigate how this framework has been applied in one course of mathematics' pedagogies for in-service student-teachers at the applied university of Amsterdam to support mathematics student-teachers in conducting classroom dialogue based on students reasoning. The study was conducted in the academic year 2017-18 and involved 15 in-service student-teachers and their teachers. The data concerns students written rapports to an individual assignment in which they were requested to use the five-practices in an hypothetical classroom discussion. The preliminary results confirm that the model can be useful for students-teachers to prepare themselves beforehand and to think about creating opportunities for dialogue to occur in the classroom. But, the practice of making connections during the classroom discussion remains misunderstood or superficially performed by the students teachers. These results suggest the need of a more fine grained description of the practice of connecting as ways to involve students-teachers in it.

Keywords: reasoning, classroom discussion, secondary education, mathematics, teacher education

Introduction

Reasoning within a discipline is a special kind of thinking and it can be described as "the capacity to think and talk to others about particular types of objects and processes in a particular way, characteristic of this discipline" (Sfard , 2015, p.249). Classroom dialogue can plays an important role for the development of discipline-based reasoning e.g. because it provides opportunities for students to explain their reasoning and align their (intuitive) ideas and approaches with well-defined understandings within the discipline. Conducting a classroom dialogue for reasoning can however be very challenging for teachers, in particular for students-teachers. One model that can help (student-)teachers to orchestrate classroom discussions is the five practices model of Stein, Engle, Smith, and Hughes (2008). This model specifies five key-actions that teachers can perform before and during a classroom discussion and in which they utilize students responses to the tasks in the discussion. The practices are: anticipating, monitoring, selecting, sequencing, and making connections between student responses. According to Stein, Engle, Smith, & Hughes (2008) the practices can make discussion-based pedagogy manageable for teachers.

The Analysing Teaching Moves Guide (ATM) developed by Correnti et al. (2015) can be used as an indicator of teachers' progress in orchestrating productive classroom discussions. The instrument aims to identify the extend to which students are provided or not with opportunities to learn in

the course of classroom discussions. The assumption is if students need to think to learn and if classroom discussions are important for prompting thinking, then "teaching moves during these discussions can be viewed as differentially affording opportunities (or not) for students to take on roles as active thinkers" (p.318). ATM captures teaching moves while conducting a classroom discussion around a task. The teaching moves are grouped into two main categories: (a) initiating moves in which teachers invite student thinking and participation in discussions and (b) rejoinder moves in which teachers response to students contributions. The ATM concerns moves that position students in relation to others and in relation to the discipline. This includes being expected to pose questions, provide explanations, and reach conclusions and this through reasoning with concepts and rules of the discipline. In our study we used the ATM instrument to get more insight in students-teachers' use of the five practices

Context of the study

In the course mathematics' pedagogies in the past two years the in-service students teachers are presented with two practice-based assignments in which they must develop a task or set of tasks for conceptual learning. The students work in the same design team (3-4 students) for about one semester and follow a design process based on the instructional model ADDIE (Analyse- Design- Development- Implementation and Evaluation). During the design process, a design team gets several opportunities to share their ideas with the rest of design groups. By this we expect to involve students-teachers in dialogue, argumentation and reasoning about mathematics pedagogies. The students get two assignments, each one takes about half semester. They are introduced to the five-practices only in the second assignment because we want them first to experience the need of it. This need usually arise during the evaluation of the first assignment in which all design teams (so far) realise that they skipped the classroom discussion or that they only perform it in a superficial way. In the second practice-based assignment the design teams are explicitly asked to conduct a classroom discussion and to use the five-practices.

Aim of the study

The authors' experiences in the past two years with the five-practices are very positive: they notice in students written rapports and when talking to students that the five-practices provide them with a way to think, plan and communicate about classroom dialogue and, that some students become more confident when conducting classroom discussions. Also we, as teachers, get more specific knowledge about student-teachers' difficulties in classroom dialogue. Based on these experiences we conducted a small study in which we aimed at better understand students' use of the five practices to prepare a classroom discussion. We investigate this through qualitative analyses of students written answers to an assignment in which students are requested to conduct an hypothetical classroom discussion around a given subject and task.

Method

The study is an explorative, qualitative study in which we investigate in-service students-teachers' use of the five practices for conducting a classroom dialogue. The participants are 14 out the 18 students attending the course. The data consists of a part of an individual written assignment in which students describe how they would apply each phase of the five-practices. The whole assignment consisted of the analysis of a conceptual task in mathematics, additional information about the goals and context of the task and student's answers to the task. The student-teachers had three weeks to do the whole assignment. Part of the assignment is to describe how to conduct a classroom discussions based on the student's answers to the task. This individual assignment was given to the students after they had finished the practice-based assignments in a design team. So the student-teachers were familiar with the five-practices and used this framework in the second practice-based assignments.

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The written reports were analysed by the authors in two phases. Firstly, the answers were graded by their general quality. Answers at 'advanced level' must include a specific and coherent description of the class discussion with the aid of the five practices; arguments for selection and use of certain student work; and explanation of the way the student-teacher use the student work and builds on it. Answers that only provide global descriptions or superficial argumentation were graded as 'sufficient level'. If student-teachers did not use the five-practices or if the argumentation was (extremely) poor, the answer was graded as 'inadequate'.
Secondly, the authors adapted and used the Analysing Teaching Moves Guide (ATM) to get more in depth insight in the way students-teachers used the different practices.
In both phases the authors analysed the student-teachers' work independently from each other and then discussed the results. When needed the analyses were adapted or the description of a category was made more sharp. The aim of the analysis was to develop a richer understanding of the opportunities of the five-practices framework for in-service student-teachers and the difficulties they experience in applying this framework as well as to indicate ways how to improve student-teachers' training in orchestrating classroom discussions.

Preliminary results and conclusions

Results about the general quality of the answers showed that most of the teacher-students performed at sufficient level (n=11); only three presented answers at advanced level and one student presented an inadequate answer. One main conclusion is that the framework seems to be useful for students-teachers to prepare the classroom dialogue as the great majority of students attained at least a sufficient level. But, the student-teachers struggle in connecting student responses and ideas, a practice that was often misunderstood or superficially performed. Analysis with ATM will help to provide more specific information in this matter and it will be presented at the conference.
This study confirms the value of the five-practices to conceptualize classroom discussions and the difficulty to apply this model to enhance reasoning when it comes to connect several aspects and representations of knowledge during the dialogue. The assignments, analysis and results of this study can be useful for teacher educators in mathematics or in other disciplines that aim to develop strategies to prepare student-teachers and teachers for classroom dialogues.

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