

# The Impact of Evidence-based Professional Development on Classroom Dynamics

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**Abstract:** Evidence-based data use in teacher professional development (PD) programs has been proposed as an effective way for supporting teacher learning and reflection. However, few studies provided empirical evidences on its impact on teachers' and students' classroom behaviour across PD sessions. This paper reports the findings of how a video-based mathematics teacher PD program, in which teachers reflected on self-captured videos supported by Classroom Discourse Analyzer (CDA), influenced the teacher and students' classroom engagement over time.

## Introduction

Data use to inform educational decision making has been increasingly emphasized in the fields of teaching, learning, and teacher education in recent years (e.g., Gold & Holodyski, 2016; Mandinach & Gummer, 2013; Marsh & Farrell, 2015). Among the data use literacy, the use of classroom videos is increasingly popular as a method for enhancing teaching and learning in the classroom-based settings (Borko, 2016; Nolan, Paatsch, & Scull, 2017), for measuring teacher knowledge and teaching competence (Kersting et al., 2016; Santagata & Yeh, 2016) and for supporting teacher professional development (PD) and 'noticing' (Sherin & Dyer, 2017) for example. However, relative to the large potential of data use in teacher PD, the evidence of systematically using self-captured classroom videos in teacher PD and its impact on teachers' and students' classroom behaviour was not sufficient (e.g., Poortman, Schildkamp, & Lai, 2016).

## The present study

To address this gap, the study uses an analytics-supported PD model in which mathematics teachers use the Classroom Discourse Analyzer (CDA; Chen, Clarke, & Resnick, 2014, 2015) to analyze and reflect on their self-captured classroom videos and discuss about their classroom behaviour with peer teachers. CDA allows teachers and facilitators to use a visual representation of classroom discourse as a lens to identify meaningful discourse patterns for discussion, learning and reflection in the PD community. The aim of the program was to help enhance the mathematics teachers' classroom talk competence in a school district in China. There were 30 mathematics teachers from 12 schools who received analytics-supported PD to learn about classroom talk (using Academically Productive Talk [APT] as part of the training materials; Michaels, O'Connor, & Resnick, 2008; Resnick, Michaels, & O'Connor, 2010).

## The preliminary results

In this poster presentation, we report the participating teachers' data regarding the influence of the three PD sessions on their classroom dynamics back to teaching. We report the preliminary findings from four perspectives of the changes of classroom dynamics: (1) percentages of teachers' and students' words; (2) percentages of students who spoke at least once; (3) average words per turn spoken by teachers and students; and (4) percentages of various teacher talk strategies used in the classroom.

### Percentages of teacher's and students' total words

We counted percentages of teachers' and students' words by dividing the teacher's and students' words by total words in each classroom and then averaged the teachers' data. We found that the percentages of teachers' words seemed to decrease and that of students' words seemed to increase across the three PD training sessions (the training interval was 1-2 months). In another word, after each PD session, the teachers tended to spoke less and allowed their students to speak more.

### Percentages of students who spoke at least once

The results showed that the percentages of students who spoke at least once in the classroom increased across the PD sessions, which suggests that the teachers engaged more students into classroom talk.

### Words per turn spoken by teachers and students

Interestingly, the words per turn in the student's data increased across the three PD sessions. It is likely that the students had deeper thinking and hence produced more words per turn during the discussion. This hypothesis would be further cross-validated and investigated in the project.

### Percentages of various teacher talk strategies used in the classroom

We then draw on theories and examples of teacher APT (adapted from Michaels et al. [2008] and Resnick et al. [2010]) to code the teachers' classroom discourse into two dimensions: (1) encouraging students to elaborate their own thinking (e.g., "Revoice", "Say More", "Press for Reasoning", and "Challenge"), and (2) encouraging students to think with others (e.g., "Restate", "Add On", "Agree/Disagree", "Explain Other"). We counted the percentages of various teacher talk strategies by dividing the number of teacher turns with a specific talk strategy by the total number of teacher turns and averaged the teachers' data. First, we found that in general the teachers used limited "Revoice" and "Challenging" talk moves in the three teaching occasions, but they seemed to be familiar with "Say more" talk strategies regardless of the PD training. Another large share of talk strategy used by the teachers, especially after the PD training sessions, is "Press for Reasoning", which increased gradually across the sessions. It suggests that the teachers used the strategy "Press for Reasoning" more in the classroom across the PD sessions. Second, we found in general the teachers used few talk strategies to encourage students to think with others. For example, the percentages of "Restate" and "Explain other" occurrences out of total teacher turns remained at a low level, so were the percentages of "Add on" and "Agree/Disagree".

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