

Teacher Noticing: Advancing Understanding of Teaching, Learning, Policy, and Practice in Mathematics Education

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INTRODUCTION

Human beings have the innate ability to notice the events that occur in the environment around. Whereas this ability appears to be mundane and ordinary, it has received growing attention from educational researchers and practitioners alike who tend to view it from a conceptual and methodical perspective. In classrooms, teachers do notice something happen and yet ignore other things. Teacher noticing generally refers to what teachers observe and how they make sense of their observations to respond to classroom situations. There is a general consensus that teacher noticing involves three inter-rated processes and skills: attending, interpreting, and deciding (Jacobs, Lamb, & Philipp, 2010). Teacher noticing is also found to be highly contextual and interdependent and can take place both in a top-down and a bottom-up manner (Sherin & Russ, 2015).

As its name suggests, teachers are the primary focus of teacher noticing research and yet research contributions in this area in relation to teaching, learning, policy, and practice in mathematics education have been widely demonstrated. For teachers, learning to engage in productive noticing is considered an important instructional skill (Huang & Li, 2012). For students, they show better mathematical understanding from the adaptive practice of teachers who understand their thinking through noticing (Sun & van Es, 2015). Teachers who notice the dynamic working in their classrooms are more ready to make and implement policy that creates favorable conditions for student learning (Star, Lynch, & Perova, 2011). Teacher noticing has been a recognized component of expert practice that allows teachers to develop sensitivities toward certain aspects of their work relevant to their practice (Mason, 2002). Despite all these research efforts, as a relatively new area of inquiry in mathematics education, there are still many unanswered research questions that merit further empirical investigation.

This special issue focuses on studies that report teacher noticing for advancing our understanding of teaching, learning, policy, and practice in mathematics education. We are particularly interested in studies that examine novel issues or tackle problems with new approaches or methodologies in mathematics teacher noticing and can make significant contributions to and impact on the mathematics education community. We received submissions from mathematics education researchers working in the relevant fields from around the world. Eventually, seven articles were published after rigorous double-blind peer review. These articles reported research led by authors from Belgium, Chile, Colombia, Singapore, Spain, Turkey, and USA.

ARTICLE SYNOPSIS

For quick reference, a brief synopsis of each article is provided below:

A Proposal to Enhance Preservice Teacher's Noticing

In this article, Castro, Pino-Fan, and Velásquez-Echavarría (2018) presented a proposal for the development of teacher noticing with the help of dimensions taken from the teacher's didactic-mathematical knowledge model, making up a Guide for Didactical Reflection. The proposal was based on a study conducted during a time span of two years while the preservice teachers were in their teaching practicum. The methodology was qualitative and data were taken in video, audio, observing rubrics, and interviews formats. The results indicated that the Guide could help develop teachers' noticing, in order to identify and to question several specific domains of teacher knowledge involved in mathematics teaching. The results also suggested that prospective teachers were moved into action and translate their noticing in didactic action during class. The authors hypothesized that preservice

effective noticing occurred at the intersection of practice and discussion over the practice, with the help of 'noticing tools' with respect to the mathematical activities of students.

Further Investigation into the Quality of Teachers' Noticing Expertise: A Proposed Framework for Evaluating Teachers' Models of Students' Mathematical Thinking

In this article, Lee (2018) suggested that a possible way to develop teacher noticing expertise was to engage the teacher concerned in a situation focused on student thinking via clinical interviews. The author added that noticing students' thinking productively through clinical interviews remained a challenge because it required a broad range of knowledge and there was an absence of a framework to inform and evaluate the process. The author discussed the development of such a framework for evaluating the quality of pre-service teachers' noticing expertise in a context where students' thinking was emphasized by removing normal classroom interruptions. The framework was used for this purpose through three empirical examples of pre-service teachers who engaged in an intervention that involved conducting clinical interviews and analyzing students' mathematical thinking by watching video-recordings of their clinical interviews.

Using Video Cases and Small-scale Research Projects to Explore Prospective Mathematics Teachers' Noticing of Student Thinking

In this article, Ulusoy and Çakiroğlu (2018) investigated how prospective teachers notice student mathematical thinking in a video-based learning environment and in analyzing students' thinking when they researched in their practice schools in the scope of a 14-week elective course program. Instructional process of the course had two phases. In the first phase, a group of eight prospective mathematics teachers analyzed video cases related to students' mathematical thinking. In the second phase, they explored actual students' mathematical thinking through diagnostic interviews in their practice schools in order to conduct a small-scale research project. The results indicated that prospective teachers tended to be more simplistic in analyzing students' thinking in their early video-case analyses and they came up with deeper analysis of students' thinking by making sound inferences from data and proposing pedagogical strategies. Moreover, prospective teachers mentioned that micro-case videos functioned as a catalyst for enhancing their noticing of students' thinking before conducting small-scale research projects.

Pre-service K-8 Teachers' Professional Noticing and Strategy Evaluation Skills: An Exploratory Study

In this article, Zambak and Magiera (2018) discussed pre-service teachers' professional noticing of student mathematical reasoning and strategies, their ability to assess the validity of student reasoning and strategies, and to select student strategy for class discussion. Their research findings revealed that pre-service teachers with strong awareness of mathematically significant aspects of student reasoning and strategies were better positioned to assess the validity of student reasoning and strategies. Pre-service teachers with higher strategy evaluation skills were more likely to choose the strategy to engage class in justification or to advance students' conceptual understanding compared to pre-service teachers with low strategy evaluation skills.

Exploring the Effectiveness of Video-Vignettes to Develop Mathematics Student Teachers' Feedback Competence

In this article, Muñiz-Rodríguez, Alonso, Rodríguez-Muñiz, De Coninck, Vanderlinde, and Valcke (2018) described the design, implementation, and evaluation of a competence development intervention with secondary mathematics student teachers, where the intervention was built on videotaped response-based simulations. A pre-test/post-test design was used. Mathematics student teachers were invited to respond to open-ended questions while watching a series of video-vignettes which focused on providing feedback to students in different real-life classroom situations. Content analysis of student teachers' answers was used to map changes in their feedback competence development and a scale was developed to capture the related feedback self-efficacy. The results indicated that the intervention had a positive impact on the development of mathematics student teachers' feedback competence. Implications and directions for future research were also provided.

Enhancing Noticing: Using a Hypothetical Learning Trajectory to Improve Pre-service Primary Teachers' Professional Discourse

In this article, Ivars, Fernández, Llinares, and Choy (2018) showed that the use of a hypothetical learning trajectory as a guide was able to help pre-service teachers develop a more detailed discourse when interpreting

students' mathematical thinking and enhance their noticing skill. Moreover, the enhancement of the noticing skill was linked to their mathematical content knowledge. This research also provided teacher educators with resources to help pre-service teachers develop a more detailed professional discourse to attend to the details of students' answers and their mathematical levels of thinking in teacher education programs.

Analyzing the Impact of Video Representation Complexity on Preservice Teacher Noticing of Children's Thinking

In this article, Superfine and Bragelman (2018) developed a rubric to code the complexity of the salient teaching and learning events captured in video and analyzed the relationship between video complexity and preservice teacher noticing, drawing from the cognitive load theory. There were two categories significantly highlighted children's mathematical thinking and another two categories significantly masked children's mathematical thinking for preservice teachers. The implications of the results for the design of their instructional platform and other video-based learning environments used in preservice teacher education settings were discussed.

CONCLUSION

The articles in this special issue will significantly contribute to the burgeoning area of teacher noticing, with a focus on how we can gain more understanding of teaching, learning, policy, and practice in mathematics education. Collectively, these articles highlight the work that has been done in this area, but also identify the need for further efforts to establish appropriate agenda for future studies. As Thomas (2017) put, "we in the research community might explore the impact of different ways that noticing is characterized or operationalized. For example, what are the differences or similarities in teachers' developmental pathways when teacher noticing is treated as a socially situated practice or, alternately, an assemblage of skills?" (p. 513). We hope that researchers and practitioners who are intrigued by mathematics teaching noticing can collaborate to resolve the lingering issues and address the emerging challenges. Such a collaboration is definitely crucial to help translate theory into practice so that they are both benefited.

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