
Mathematics Teachers' Use of Data and Evidence in Practice: Intersection of Accountability and Agency

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Using data as an educational reform strategy has gained significant traction in recent years; however, there is little research that provides insight into what actually happens in practice for teachers. School and district accountability expectations commonly specify particular data and questions on which teachers should focus. In contrast, engaging in action research positions teachers as active change agents who pose their own questions and seek their own answers through data use. This project investigates the ways a group of mathematics teachers use data within the overlapping contexts of teacher accountability policies and their work as teacher researchers and offers insights into mathematics teachers' agency.

Introduction

In recent years, there has been a press for the use of data and evidence in schools, particularly in the United States, Australia, and England. There is, however, relatively little research that provides insight into the specific practices used by teachers or into the influences of school and policy contexts on teachers' daily uses of data (Little, 2012). Current accountability policies commonly require teachers to use particular data to answer questions posed by individuals outside the classroom (e.g., administrators, school boards). In contrast, when conducting action research, teachers actively pose their own questions and use data to seek their own answers to problems in their classroom practice. Therefore, examining teachers' work within the overlapping contexts of: (a) their school and its accountability policies, and (b) their work as teacher researchers, offers insights into potentially conflicting positions for teachers using data and evidence¹ in practice. This presentation is part of an on-going dissertation study that explores

the ways a group of mathematics teachers use and make sense of data and evidence and will address the questions: (a) *How do teachers discuss data and evidence?* and (b) *In what ways do issues of teacher agency surface as teachers discuss data and evidence over time?*

Relevant Literature

Teacher Data Use

Within the public discourse around data use there is a fundamental assumption that an increased focus on data is necessarily a positive reform strategy. Coburn and Turner (2011) define the process of data use as “what actually happens when individuals interact with assessments, test scores, and other forms of data in the course of their on going work” (p. 175). The ways in which educational stakeholders take up data-related activities involve complex relationships that can vary even within the same school (Datnow, Park, & Kennedy-Lewis, 2012). Additionally, individuals use and interpret data in ways that are strongly influenced by social interactions, worldviews, and power dynamics (Coburn, Toure, & Yamashita, 2009). Teachers regularly gather information from students to guide their instruction (e.g., assessments). An important distinction, however, lies in the framing of how teachers are positioned with respect to that data – Are teachers driven by data, or are they independent researchers posing their own questions and using data to answer them?

Teacher Action Research

Action research typically takes the form of a spiralling cycle of planning, action, data collection, and reflection. By framing teachers as individuals who pose their own questions and seek their own answers, the teacher action research paradigm positions teachers as active agents for change within their classrooms. Teachers are seen as co-constructors of knowledge, working together with colleagues or university researchers to investigate their own teaching, curriculum, policies, etc. Many have argued that the recognition of practitioners as valid generators of knowledge about their own practice has the

potential to challenge the status quo of the educational system in order to provide more equitable educational opportunities for students and empowered experiences for teachers (e.g., Jaworski, 1998).

Teacher Agency

Teachers experience agency when they feel they have the capacity to change the existing state of affairs and make choices based on personal goals, interest, and motivations (Ketelaar, Beijaard, Boshuizen, & Den Brok, 2012). I operationalize *teacher agency* as teachers' beliefs that they can act as independent agents. Teachers' agency can be impacted by both: (a) the different ways in which data-driven versus action research ideologies position teachers as more or less in control of educational change and (b) the social and cultural environments in which teachers use data.

Theoretical Framework

Coburn and Turner (2011) developed a theoretical framework to support the understanding of how teachers use data in practice, which includes four interrelated categories: (1) interventions to promote data use, (2) organizational and political context, (3) processes of data use, and (4) potential outcomes. Their framework is organized so that the processes of data use category, is situated within the surrounding category of organizational and political contexts. The first and fourth categories, interventions and outcomes, are represented as the inputs and outputs to the system, respectively. Coburn and Turner build primarily from Sensemaking Theory and interpretivist traditions, to which I add critical considerations of agency and power. The categories of this framework will be unpacked as a part of the presentation.

Method

Participants and Setting

This project investigates the practices of four mathematics teachers at

a linguistically and culturally diverse suburban middle school in the Midwest, US. The group is comprised of two seventh grade and two eighth grade teachers with teaching experience ranging from two to 30 years. All four teachers expressed a strong learning disposition and desire to improve their practice. For the past two academic years they have been engaged in departmental professional development focused on mathematics classroom discourse. During the current academic year the teachers will engage in cycles of action research based on the interests they cultivated during their previous two years of work. They will meet as an action research study group, along with the university facilitator and/or myself about once a month for two hours to share ideas and support one another in the process.

Data Sources

I will conduct individual interviews with the four teachers, their administrator, and curriculum and mathematics support personnel at least four times throughout the school year using a semi-structured interview protocol based on the Coburn and Turner (2011) framework. All interviews will be recorded and will serve as a data source for this investigation. Additionally video recordings of all of the action research study group sessions will serve as the second data source.

Data Analyses

I adopt a dialogic perspective of language use (i.e., Wortham, 2001) and I will use narrative discourse analysis techniques in order to determine how teachers discuss data and evidence. Through this analysis I will also gain insights into issues of teacher agency because narratives provide a means for teachers to construct their identities (e.g., Wortham, 2001) and the ways teachers construct their identities can offer insight into the ways they are experiencing teacher agency (e.g., Ketelaar et al., 2012).

In order to identify narratives I will use an open view of narrative structure that recognizes a variety of possible story openings, co-construction, and multiple story genres (Georgakopoulou, 2007). Narrative transcription will focus on the linguistic features of

narrative suggested by Gee (1991), dividing the text into lines and stanzas. I will examine each narrative using both the Coburn and Turner (2011) framework and the ways teachers position themselves through their stories (Wortham, 2001). I will then seek to understand the connections across the data sources and look for patterns in teachers' narratives across time, attending to the principle of emergence to make sense of how teachers' contributions build on one another (Wortham, 2001).

Relevance and Contributions to the Field

This project will contribute to the practice of and research on mathematics teaching and learning in multiple ways. First, it will provide much needed insight into the nuanced ways mathematics teachers use data in practice. Since teachers interact most directly and most consistently with students, they have a unique perspective to add to conversations among administrators and policy-makers regarding the data and evidence that are most informative for changing classroom practice. Second, this project has the potential to transform the field's understanding of the ways action research can impact teachers' capacity to change their practice using data and evidence. Overall, by understanding how teachers use and make sense of data and evidence, the proposed study can link the fields of teacher education research and educational policy to contribute to future supports for teachers to make effective use of the data to thereby improve mathematics instruction for students.

Notes

1. *Data* exist in a raw form without any inherent meaning, so whether or not data become meaningful information is dependent on the individual interacting with that data. In contrast, *evidence* is based on data, but used with a purpose. Evidence, therefore, is inherently tied to interpretation.

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