

Summary and Critique of Wagner and Herbel-Eisermann (2014)

Julia Przybyla-Kuchek

University of Georgia: EMAT 7050

Final Paper

In this paper, I summarize and critique Wagner and Herbel-Eisenmann's (2014) article, "Identifying Authority Structures in Mathematics Classroom Discourse: A Case of a Teacher's Early Experience in a New Context." The article was chosen for two reasons: 1) my interest in mathematical identity is related to authority in the classroom and; 2) the authors' methods of analysis are unlike those of other studies I have read in mathematics education.

In the U.S., some students may heavily rely on the teacher as a source of mathematical authority simply because he or she is the teacher and is expected to "know everything." Students often expect teachers to give them the correct answers and tell them how to solve problems without questioning the teacher's methods. Because of this, it is challenging for teachers to establish students as their own source of mathematical authority. Students may occasionally challenge a teacher's solution, idea, or rule, (e.g. when students ask, "When am I ever going to use this in real life?") but ultimately, it is the teacher's decision whether it is acceptable or not. As mathematics educators, we want students to take charge of their learning of mathematics. We do not want students to *depend* on the teacher to disseminate knowledge and tell them right and wrong answers. We want students to be able to draw conclusions confidently and justify them, challenge other students' mathematical thinking, and question textbook strategies and solutions. Students who are able to do these things have a sense of mathematical authority. Thus, it is important that mathematics education research investigates students' mathematical authority and how teachers can help them develop that authority. The article described in this paper tests a framework for identifying authority structures in high school mathematics classroom discourse.

Summary of Article

Wagner and Herbel-Eisenmann (2014) qualitatively investigate how authority can be identified through discourse analysis in two different classroom contexts with the same teacher.

The first context is a 12th grade mathematics classroom in small school where the teacher is well-established. After the small school employing this teacher closes, the researchers follow him to a new, larger school where he teaches a ninth-grade mathematics course, the students do not know him, he has to “establish credibility among the students in the school, and [is] a special case of any teacher’s need to establish authority structures in a new course” (Wagner & Herbel-Eisenmann, 2014, p. 871). The results of this study demonstrate the complexity of analyzing authority and the usefulness of the authors’ conceptual framework.

Research Goals

Wagner and Herbel-Eisenmann (2014) describe two research goals: (1) “to “explore the use of the conceptual frame as a tool for understanding the relationship between language practice and authority relationships in a mathematics classroom” (p. 871); and (2) to “explore the case of how a teacher considers and enacts authority in changing contexts” (p. 874).

Rationale and Literature Review

To motivate the article, Wagner and Herbal-Eisenmann (2014) describe how some teachers struggle with balancing authority in their classrooms, torn between expectations of being the authority and developing students’ authority. Then, they briefly describe the current study and define authority. The authors adopt Pace and Hemming’s (2007) definition of authority: ‘a social relationship in which some people are granted the legitimacy to lead and others agree to follow’ (as cited in Wagner& Herbal-Eisenmann, 2014, p. 872). Wagner and Herbal-Eisenmann make a distinction between being in a position of authority and being an authority (one’s knowledge is viewed as applicable to a situation). They also acknowledge teachers’ inability to “give away” authority because of how they are positioned. Finally, the

authors refer to studies that have identified authority and focused on shifts in authority. Wagner and Herbel-Eisenmann take a unique approach in that they analyze implicit authority structures.

Framework

Previously, Herbel-Eisenmann and Wagner (2010) and Herbel-Eisenmann, Wagner, and Cortes (2010) conducted a large study where they quantitatively analyzed 148 mathematics classroom transcripts from eight U.S. teachers to develop a framework for identifying authority structures through mathematics classroom discourse. Using computer software, they found that most of the “lexical bundles” (frequently appearing groups of words spoken in a particular order) appearing in the language pattern of discourse of secondary mathematics classrooms belonged to a subcategory of bundles called “stance-bundles” (Herbel-Eisenmann et al., 2010). These were then categorized into four types of authority: personal authority, discourse as authority, discursive inevitability, and personal latitude (Herbel-Eisenmann & Wagner, 2010). Wagner and Herbel-Eisenmann (2014) describe each of these categories:

- *Personal authority* relates to the teachers being in authority and students expecting to obey or listen to the teacher. It is indicated by the use of *I* and *you* in the same sentence.
- *Discourse as authority* points to the mathematics as a field as an authority. The class follows what has to be done because that is how mathematics is done. Phrases such as “we need to” and “we have to” are indicative of this type of authority.
- *Discursive inevitability* “rests on language practices that suggest inevitability—what matters is not the actual probability of an event but rather the language that suggests inevitability” (Wagner & Herbel-Eisenmann, 2014, p. 873). There no

clear source of authority, but it exists outside the classroom. Phrases such as “you are going to” are indicative of this authority.

- *Personal latitude* is more reflective of student authority in that one is given an opportunity to make a decision. Open questions are indicative of this type of authority, e.g. use of “could have” or “if you want.”

The categories *discourse as authority* and *discursive inevitability* are both indicative of authority outside the classroom; whereas personal authority and personal latitude have sources of authority inside the classroom, teacher and student, respectively. Wagner and Herbel-Eisenmann suggest personal authority positions students or teachers as an authority; however, they found personal authority was persistently used by the teacher.

Methods

The authors collaborated with teachers in Atlantic Canada from 2008 to 2011, who were interested in learning about authority in their classrooms. The goal of this collaboration was to “better understand the issues they [the teachers] and their students associate with authority and to consider ways of developing repertoires for handling authority issues” (Wagner & Herbel-Eisenmann, 2014, p. 871). The authors interviewed each of the teachers at the beginning of the study to identify the teacher’s beliefs regarding authority and video-taped 15 consecutive lessons in a class of the teacher’s choice. They also met with and interviewed the teachers periodically throughout the course of the collaboration.

This article reports on the data from a single teacher, Mark, who had taught at a small high school where he was the sole mathematics teacher for three and a half years prior to the study. After the first year of data collection in a 12th grade classroom, Mark’s school closed, forcing him to take a new job. Wagner and Herbel-Eisenmann (2014) followed him to his new

school and filmed his 9th grade classroom. Nearly all of the beginning lessons were filmed in this new context in an effort to capture which authority structures were already in place and how new structures were negotiated. The authors chose to study this particular case because they believed it would illuminate authority structures in a situation where a teacher did not carry existing structures from previous years of teaching.

The transcripts from the classrooms were analyzed using lexical bundles in the framework described above. Wagner and Herbel-Eisenmann (2014) also looked for “patterns of speech that resembled those lexical bundles and …looked beyond the grammar for other evidence of the authority structures” (p. 875). Details are provided in table 1 (Wagner & Herbel-Eisenmann, 2014, p. 875).

Results

Interview. From their interview with Mark, Wagner and Herbel-Eisenmann (2014) determined Mark’s perceived authority structure aligns with that of personal authority, but wanted to move towards students having more authority. He thought his students were dependent on him for answers. There is also evidence Mark and his students also attributed authority to the textbook he used. Overall, Mark was frustrated with his students, wanting them to become less dependent on him and the textbook.

First classroom. Wagner and Herbel-Eisenmann (2014) present a transcript from Mark’s first classroom setting, containing examples from each of the four authority structures. In the transcript, there is a discussion about instantaneous rates of change. For example, Mark tells the students what he would like them to do without explaining why, demonstrating personal authority. He also stated things the students *should do* or *have to* do out of necessity without

Table 1 Analytical guide for identifying authority structures

| Authority structure | Linguistic clues | General indicators of the structure (that may not involve the particular linguistic clues previously identified) |
|--------------------------|--|---|
| Personal authority | <ul style="list-style-type: none"> • <i>I</i> and <i>you</i> in the same sentence • Exclusive imperatives • Closed questions • Choral response | Look for other evidence that someone is following the wishes of another for no explicitly given reason |
| Discourse as authority | <ul style="list-style-type: none"> • Modal verbs suggesting necessity (e.g., <i>have to</i>, <i>need to</i>, <i>must</i>) | Look for other evidence that certain actions must be done where no person/people are identified as demanding this |
| Discursive inevitability | <ul style="list-style-type: none"> • <i>Going to</i> | Look for other evidence that people speak as though they know what will happen without giving reasons why they know |
| Personal latitude | <ul style="list-style-type: none"> • Open questions • Inclusive imperatives • Verbs that indicate a changed mind (e.g., <i>was going to</i>, <i>could have</i>) • Constructions that suggest alternative choices (e.g., <i>If you want, you might want to</i>) | Look for other evidence that people are aware they or others are making choices |

explaining why, indicative of discourse as authority. Also indicative of discourse as an authority structure is his definition of instantaneous rate of change, for which Mark provides no origin. In this section of transcript, Mark mentions things they *are going to do* in the day's lesson and things *they* expect students *will be* doing later in 12th grade. Because of his use of the pronoun "they" without a specific reference, Wagner and Herbel-Eisenmann categorized this as discursive inevitability. Finally, personal latitude is evidenced by students' diverting a closed question Mark posed and his willingness to take up these questions. Wagner and Herbel-Eisenmann point out the conflicting nature of these questions. They express personal latitude, but also depend on

Mark's authority for answers. Mark's use of phrases like "if we want to" and "or it could be" allow students to exhibit personal latitude. The authors conclude one reason students were able to exhibit authority in this first setting was because of Mark's responsiveness to the questions students asked.

Second classroom. All parties involved in the study agreed students were more reliant on Mark as a personal authority in his new classroom than in his previous classroom (Wagner and Herbel-Eisenmann, 2014). Two reasons were hypothesized for the occurrence of this phenomenon: 1) Mark felt he had to establish himself as an authority because he was in a new environment and; 2) the students were also new to the school, being 9th graders and may have been looking for guidance.

Similar to the first context, all four authority structures were present in the data from the second classroom. In the transcript excerpt Wagner and Herbel-Eisenmann (2014) include, the students challenge Mark about the usefulness of learning prime factorization in real-life situations. Mark attempts to provide sufficient answers before exhibiting personal authority to get the students back on task. Thus, in addition to similar evidence of personal authority in the first context, Mark also used bald imperatives such as "try this" and "keep working" to close dialog. Also indicative of personal authority, students responded to Mark's questions in chorus. The discourse as authority and discursive inevitability structures were supported by similar evidence appearing in the first context. The only other significant difference was in evidence of personal latitude structures. Students questioned Mark because they were not satisfied with his answers. As before, Mark was responsive to these questions, allowing personal latitude. Students were still not satisfied. One student even responded by provoking Mark. When the class began "buzzing," Mark exhibited his authority to end it.

Wagner and Herbel-Eisenmann (2014) included a second transcript from this context, in which Mark had an explicit conversation with the students about authority (a meta-conversation). They found evidence of students' and Mark's desires to adopt a new authority structure. After this conversation, Mark reported students asking more questions in class. Based on conversations with Mark later in the year, it appeared as though the class was moving away from personal authority structures and towards personal latitude.

Reflections

Wagner and Herbel-Eisenmann (2014) found the framework developed in a prior study was useful, but not sufficient to identify authority structures in classroom discourse. They acknowledge a reliance on more the just grammatical features and suggest further development of the framework. Specifically, the development of categories beyond the four given in the study and development of details within the four categories are needed.

Wagner and Herbel-Eisenmann (2014) make recommendations for future studies, as well. The authors are interested in investigating the framework's ability to categorize authority structures over time within the same context. They are also curious as to the implications of the dominance of a particular authority structure. Finally, Wagner and Herbel-Eisenmann (2014) argue the need to investigate meta-conversations, or explicit conversations with students about their perceptions of authority structures, to determine its affect on authority structures in the classroom.

Critique of Study

Relevance to Mathematics

One main issue with Wagner and Herbel-Eisenmann's (2014) study is mathematics does not play a central role in the research. Although the study takes place in a mathematics

classroom, the study does not depend on mathematics content. In fact, the same study could easily be conducted in a science or history classroom with little to no change in the framework or results. The framework the authors created depends only on specific, non-mathematical language the teacher uses. For example, use of the words *I* and *you* in the same sentence (an indicator of a category of the framework) has no mathematical significance.

The only aspect of the framework that seems mathematically related is the coding of inclusive and exclusive imperatives. Although, these are not described in this study, Herbel-Eisenmann and Wagner (2010) adopted Rotman's (1988) definitions. Rotman claims the use of the inclusive imperatives (instructions that request the instructed to create a shared world with the instructor) positions one as a “thinker.” Examples of these instructions include define, consider, and prove. Instructions that instruct one to perform a task in an already established world, exclusive imperatives, position one as a “scribbler.” Rotman claims both are necessary in “doing mathematics.” Unfortunately, this is not discussed by Herbel-Eisenmann and Wagner (2014) nor is it highlighted in their data.

Rationale

Wagner and Herbel-Eisenmann (2014) provide a strong rationale for their study. The motivation for this investigation was rooted in teachers' struggle to balance mathematical authority structures in the classroom—a situation worth researching. From there, the authors describe results of other studies investigating authority, beginning with more theoretical works on authority, like those of Pace and Hastings (2007), and narrowing to specific work in identifying sources and shifts in authority in mathematics classrooms, like that of Skovmose (2001). Finally, their methods are justified by their goal of categorizing authority based on implicit structures. This is unique and important because participants may not be aware of the

authority structures in place. Thus simply interviewing participants may not prove to be as powerful and would likely overlook some authority structures.

Methods

Participants. The authors' choice to work with a single teacher for a detailed analysis of implicit authority structures in a mathematics classroom was appropriate. It would be impossible to do the same type of detailed analysis on a large scale. Although the framework was developed in a large scale study, the details and context surrounding the "stance-bundles" could not be analyzed to the extent in which a case study allows.

In addition, I argue Mark's unique situation provided the researchers with an opportunity to analyze authority structures in a classroom similar to those of a novice teacher. Although we do not know how experienced the other teachers collaborating with the researchers were, Mark was in a unique situation in that he had 4.5 years of teaching experience to draw from, but could not transfer his credibility to his new school. In a sense, this situation allowed the researchers to test their framework against a potential outlier. It would allow them to identify gaps in their framework.

On the other hand, because Mark was conscious of authority in his teaching and frequently discussed this with the researchers, the data collected from Mark's classroom may have been atypical from other classrooms and skewed the results. It is difficult to determine how the results would have changed had Mark not been collaborating with the researchers in an effort to shift the authority structures in his classroom.

Data collection. It was important the researchers collected data from not only interviews with Mark, but also classroom observations for several reasons: 1) Mark's views of authority structures affect how he teaches; 2) Mark may not be aware of all authority structures in his

classroom; and 3) collecting both sets of data allow Mark and the researchers to determine the accuracy of Mark's perception of existing authority structures in this classroom. It was also important the data was collected across two different contexts, since the authors' goal of the research was to explore authority structures in changing contexts. Mark's move from a school where authority structures carried over from previous years to a school where Mark felt he had to establish himself as a credible source of mathematics gave the researchers an opportunity identify authority structures in a completely new context (as opposed to changing only the mathematics content and where the authority structures themselves may not change). Having to establish himself in new school guaranteed a demonstration of establishing new structures.

The authors should have also collected data from the second classroom later in the year if they wanted to make claims on the changes in authority structures. Toward the end of the results section, the authors claim authority structures seemed to have shifted after the meta-discussion about authority, but they have no evidence other than how Mark feels about the class changed. In their conclusion section, Wagner and Herbel-Eisenmann (2014) suggest exploring the usefulness of the framework to identify authority structures over time, but did not take advantage of the opportunity in this study. There may have been other factors affecting their ability to do the data collection.

Data analysis. Wagner and Herbel-Eisenmann (2014) analyzed their data with respect to the framework they developed in a previous study (discussed below) and included a detailed report as to how they coded (as displayed in table 1). The extent to which the researchers agreed on codes, however, is not described. It would have been beneficial for the researcher to establish credibility had they taken some measures to ensure reliability of the interpretations of the data,

e.g. including inter-rater reliability data. The process of coding is unclear and compromises the reliability of the results.

Framework. Although the details for the development of the conceptual framework are absent from this article (likely due to page length restrictions), further analysis of Herbel-Eisenmann's previous work reveal details that question the validity of the use of the framework in the contexts in this study. There are several reasons why more care should have been taken to apply the framework to this particular study.

First, lexical bundles were originally identified based on common language patterns in U.S. classrooms (Herbel-Eisenmann, Drake, & Cirillo, 2009). The framework in this study is being applied to a teacher's classroom in Canada. Although both use the English language, there may be different patterns due to regional language differences. Care should have been taken to validate the use of the bundles in another cultural setting.

Second, the lexical bundles were identified based on language of seven middle school classrooms and only one (10th grade) high school classroom (Herbel-Eisenmann et al., 2009). It is possible that these lexical bundles may appear more or less often in middle school than high school classrooms. Based on the maturity (behavioral and mathematical) of the students in the classroom, teachers may engage in classroom conversations with students differently. Again, care should be taken to validate the use of this framework based largely on middle school classroom language in an upper level high school classroom.

Finally, the lexical bundles appear to favor the spoken words of the teacher and capture little representation of students' implicit authority structures. This may be due to how the data for the development of the framework was collected. To capture the classroom discourse, the researchers had one microphone for the teacher and only one other microphone to capture the

language of the students (Herbel-Eisenmann & Wagner, 2010). Thus, only a portion of the student conversation was represented, but all the words spoken by the teacher were captured. That is, of the 679,987 spoken words analyzed in the transcripts, it is possible that most of them are spoken by the teacher; however, the percentage of words spoken by teachers is not provided (Herbel-Eisenmann et al., 2010). Herbel-Eisenmann et al., (2010) noticed how few stance bundles were spoken by students: “The lexical bundles we examine here, in fact, were spoken almost exclusively by teachers” (p. 29). However, the authors justify their focus on teacher’s spoken words. “Since very few examples of utterances with lexical bundles in them were spoken by students, this helped us to see that stance (as expressed in stance bundles) was expressed most often by teachers. Although we frame this as being about "teacher stance," teacher stance necessarily influences the mathematics classroom discourse” (Herbel-Eisenmann et al., 2010, p. 32). I argue that lack of attention to student discourse hinders the framework’s ability to identify authority structures present in the classroom because of bias toward the teachers’ perspective. An analysis of small group discussion and more student discourse would provide more insight into where students place authority.

Although it appears that Wagner and Herbel-Eisenmann (2014) were able to find common lexical bundles with the framework and Mark’s classroom, a re-analysis identifying the common bundles in this classroom would have made a better comparison. For example, if the researchers had analyzed the lexical bundles in this classroom separate from previous studies, compared the lexical bundles in their previously generated lists, and determined all of most of the bundles to be common to their previous list, then the use of this framework would be validated. However, because such an analysis never took place, it is possible that other linguistic clues were present, but were overlooked.

Results

The excerpts from the transcripts chosen to be displayed in the report were appropriate because they highlighted the appearance of all four authority structures and appeared to represent typical language in the classroom. However, this is difficult to determine since we are not given data on nearly any other lessons. Though the study was purely qualitative in nature, the authors should have provided evidence supporting these transcripts as “typical” conversations. It would have been appreciated if they gave some numerical sense as to which authority structures were more or less prevalent in each setting. Wagner and Herbel-Eisenmann (2014) justify this: “It was not possible to characterize the class as fitting one authority structure, however, because all four structures appeared in every class, albeit with variations that may only be possible to describe qualitatively” (p. 881). I am not suggesting they label the class as having a single authority structure, but instead, at least provide percentages of how often each authority structure appeared in the classroom.

Conclusions

The authors’ conclusions aligned with the results of the study. They acknowledge their framework may have overlooked ways of identifying authority because they focused on mainly on grammatical features. They also provide reasonable ways to extend the research to help develop their framework. Wagner and Hebel-Eisenmann (2014) also found having explicit conversations with students about authority may be beneficial, but did have classroom evidence to support it. But these results only addressed one of their goals. Another goal was left unaddressed: to “explore the case of how a teacher considers and enacts authority in changing contexts” (Wagner & Herbel-Eisenmann, 2014, p. 874). Unfortunately, there were no strong conclusions about Mark’s classroom over changing contexts. They only concluded the classroom

authority structures were complicated, which is already known at the beginning of the study.

How the structures were different, which were more prevalent, and how the students potentially took more authority after an intervention, were left to be desired.

Overview

Identifying sources of mathematical authority in mathematics classroom is important to mathematics education research. Wagner & Herbel-Eisenmann (2014) set out to explore how language and authority in mathematics classrooms are related through the application of a framework developed in a series of analyses (Herbel-Eisenmann et al., 2009; Herbel-Eisenmann & Wagner, 2010; Herbel-Eisenmann, et al., 2010). The authors were able to successfully identify some language patterns dedicative of authority structures and extend their framework to look, at least somewhat, beyond common lexical bundles. This case study analysis helped the authors to see how complex authority in classrooms can be and how their framework begins to unravel some of these complexities through analysis of implicit authority structures present in mathematics classroom discourse.

The main critique I have of this study lies in the ability of the framework to accurately identify authority structures under the set of circumstances in this study. The fact that the authors were able to identify some language patterns common to Mark's classroom and their previously developed framework is not enough indicate the framework is highlighting data that accurately portrays the authority structures in these contexts. I would like to see a similar lexical bundle and stance bundle analysis of the transcripts from both of Mark's classrooms to compare to the lexical bundles found in the framework. If the same bundles frequently appear in both the framework and Mark's classrooms, then the framework would be validated and the usefulness of its ability to identify implicit authority structures in mathematics classrooms has been extended

beyond that of the original circumstances in which the framework was developed. Thus, the authors would have been able to claim the use of this framework in a wider range of mathematics classrooms.

Overall, this study provides future researchers of mathematics classroom discourse and authority a starting point to identify implicit authority structures from a teacher's perspective. More work needs to be done to extend this framework beyond teacher perspectives and more representative of students' perspectives. This would give a holistic sense of authority in the classroom and would also allow researchers to triangulate their data. For example, researchers could identify if teachers' view of authority structures are the same as those of students' perceptions.

References

- Herbel-Eisenmann, B., Drake, C. & Cirillo, M. (2009). "Muddying the clear waters": Teachers' take-up of the linguistic idea of revoicing. *Teacher and Teacher Education*, 25(2), 268–277.
- Herbel-Eisenmann, B. & Wagner, D. (2010). Appraising lexical bundles in mathematics classroom discourse: Obligation and choice. *Educational Studies in Mathematics*, 75(1), 43–63.
- Herbel-Eisenmann, B., Wagner, D., & Cortes, V. (2010). Lexical bundle analysis in mathematics classroom discourse: The significance of stance. *Educational Studies in Mathematics*, 75(1), 23–42.
- Pace, J., & Hemmings, A. (2007). Understanding authority in classrooms: A review of theory, ideology, and research. *Review of Educational Research*, 77, 4–27.

- Skovsmose, O. (2001). Landscapes of investigation. *ZDM-The International Journal on Mathematics Education*, 33(4), 123–132.
- Rotman, B. (1988). Towards a semiotics of mathematics. *Semiotica*, 72(1/2), 1-35.
- Wagner, D. & Herbel-Eisenmann, B. (2014). Identifying Authority Structures in Mathematics Classroom Discourse: A Case of a Teacher's Early Experience in a New Context. *ZDM-The International Journal on Mathematics Education*, 46, 871-882.