PHOTO-ELICITATION/PHOTOVOICE INTERVIEWS TO STUDY MATHEMATICS TEACHER IDENTITY

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How do mathematics teachers think of themselves? The construct of identity—how teachers see themselves—is an important and understudied construct in understanding mathematics teaching. This study investigates the use of Photo-Elicitation/Photovoice Interviews with six high school Algebra I teachers. Each teacher captured or chose photographs of their "world," then presented them during a formal interview. Through stories elicited in this process, mathematics teacher revealed personal/private identities they often covered up with their professional identity. These mathematics teacher identities fell along a professional learning continuum with a conservative identity on one end and radical multiculturalist identity on the other end.

Keywords: Teacher Education–Inservice/Professional Development; Teacher Knowledge; Teacher Beliefs Equity and Diversity

Objective of the Research Study

Over the last several decades, mathematics educational researchers built a substantial body of work exploring how to support mathematics teachers. Spurred by Shulman (1987), researchers have focused on teacher's professional knowledge of mathematics (Hill et al., 2007), their beliefs about how mathematics is learned (Philipp, 2007), and their dispositions towards mathematics (National Research Council, 2001), among other things. However, Shulman also warned that taking this professionalization too far risks losing sight of the human element inherent to what makes teachers teach. Shulman wrote, "We must achieve standards without standardization. We must be careful that the knowledge-base approach does not produce an overly technical image of teaching, a scientific enterprise that has lost its soul" (Shulman, 1987, p. 20).

Many mathematics teachers might feel successful in their professional responsibilities of mathematics teaching, yet still feel disconnected, unfulfilled, and even powerless in connecting their personal identity with who they are in the classroom (de Freitas, 2008; Drake, Empson, & Dominguez, 2003; Van Zoest & Bohl, 2005). Most educational research focuses only on the person that exists in this professional role–the teacher in the classroom. By uncovering the personal story that lies beneath the professional story and allowing mathematics teachers to confront and reflect upon these aspects of their identity, we might begin to know the "soul" or identity of a mathematics teacher.

This study investigated teachers' conceptions, notions, and stories of themselves through the construct of *mathematics teacher identity*. In particular, the following research questions guided the investigation: What kinds of things does a photo-elicitation/photovoice interview capture about mathematics teachers in regards to identity? What does the photo-elicitation/photovoice interview reveal about mathematics teachers that may not be captured through other research methods?

Theoretical Framework

Many scholars have looked at the construct of the identity as a lens for research in education (Bishop, 2012; Boaler & Greeno, 2000; Cobb, Gresalfi, & Hodge, 2009; de Freitas, 2008; Drake, Spillane, & Hufferd-Ackles, 2001; Gee, 2000; Holland, Lachicotte, Skinner, & Cain, 1998; Van Zoest & Bohl, 2005). This extensive work on identity in education centers on the constructs of *dilemma*, *relationships*, *narrative*, *agency*, and the *photo-elicitation/photovoice interview* to understand the identity of teachers or students.

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Dilemma

The work on teacher identity historically centers on the construct of "dilemma" (Connelly & Clandinin, 1995; Lampert, 1985; Lyons, 1990; Shulman, 1988). Lampert (1985), one of the first researchers to write about her teaching as scholarly work, framed her journey into connecting her teaching practice to her personal beliefs through the dilemmas she encountered in her classroom. Lyons (1990) also examined teachers' dilemmas, particularly analyzing how teachers resolved or dealt with moral dilemmas that came up in their relationship to students, finding that when teachers responded to dilemmas, they were forced to examine themselves, which led to growth—to change.

Clandinin and Connelly (1996, 1995) use the idea of dilemma as central to their construct of Teachers' Professional Knowledge Landscapes, finding that the *big* dilemma teachers face is between theory and practice. To navigate this dilemma, teachers tell both *Cover stories* and *Secret stories*. *Cover stories* are the stories, "In which they portray themselves as characters who are certain, expert people. These cover stories are a way of managing their dilemmas" (Clandinin & Connelly, 1996, p. 15). *Secret stories* takes place behind closed doors, often revealed only in private spaces (i.e., happy hours or parking lot chats), among like-minded colleagues.

Palmer (2007) uses the term *Divided Life* to mean the same thing—the separation of external from their internal, causing a psychic rift between teacher-selves and the way teacher actually perceive themselves. de Freitas's (2008) work exploring mathematics teacher identity through classroom discourse found the same warring elements, referred to as procedural registers versus personal narrative registers.

Relationships

Relationships and formed with other teachers is another construct researchers use in exploring teacher identity (Grier & Johnston, 2009; Holland et al., 1998; Van Zoest & Bohl, 2005; Wenger, 1998). Wenger (1998) uses the construct of *Communities of Practice* to look at identity formation, particularly within socially-constructed spaces. In this definition, a teacher creates his or her identity through learning how to be a member of a particular community of practice, in this case, the community of teaching. Van Zoest and Bohl (2005) build their definition of mathematics teacher identity through this idea of the various communities of practice that a person inhabits as they become a mathematics teacher. Holland, Lachicotte, Skinner, and Cain (1998) study identity within the aspect of creation; identity as enacted in the building, forging, and authorship of *Figured Worlds*. Grier and Johnston (2009), in looking at the identities of STEM career changers, found that socialization into the teaching culture was crucial to creating a teacher identity.

Narrative

Hiebert, Gallimore, and Stigler (2002) pushed forward the idea of using narratives as a way to understand teaching. This idea echoes Bruner's (1986, 1996) ideas about the need for a narrative construal as necessary for studying teachers and teaching. Doyle (1997) also showed that narrative-based research on teaching was just as valid and measurable as any other forms of research, especially quantitative endeavors. Drake and Drake, Empson, and Dominguez (2001, 2006) found that mathematics teacher identity was best elicited through the *Math Stories*, which were teacher narratives about prior and current experiences with mathematics. Sfard and Prusak even go so far to claim that identity and narrative are one and the same, "No, no mistake here: We did not say that identities were *finding their expression* in stories—we said they *were* stories" (Sfard & Prusak, 2005, p. 14).

Agency

Agency and power are other constructs used to understand mathematics teacher identity (Crockett, 2008; de Freitas, 2008; Gee, 2000; Gutstein, 2006). Gee (2000) defines a teacher *Discourse identity* as the individual traits of a teacher that are recognized through discourse/dialogue of/with the teacher. When a teacher's *Discourse identity* is legitimized/seen by others, the teacher moves away from a socially defined professional identity, and is thereby open to understand the hegemony of the system they live within.

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Palmer (2007) similarly says that the choice to live "divided no more" by rectifying the dilemma of warring identities, is the first step towards true teacher social revolution.

Crockett (2008) outlines a culturally-based continuum to categorize mathematics teacher identity. Teachers often start with a *Conservative* identity, characterized by practice and beliefs that mimic the "traditional" mathematics education they encountered as a student. Then, teachers move to a *Liberal* identity, characterized by inquiry-based, "reform" teaching practices mirroring the ideas promoted by NCTM (National Council of Teachers of Mathematics, 2000). Finally, an identity that teachers rarely ascend to is the *Radical Multicultural* identity, which involves teachers empowering students to act independently, make free choices, and use mathematics to not just see, but also do something about the injustice in their own communities and worlds (Freire, 1970; Gutstein, 2003).

The Photo-Elicitation/Photovoice Interview

The Photo-Elicitation/Photovoice Interview is a research method that anchors an exploration into identity by adding a visual structure to teachers' narratives. Researchers introduce photographs, either selected by the participant or the researcher, into the interview context (Clark-Ibanez, 2004; Gauntlett & Holzwarth, 2006; Harper, 2002). The method successfully elicits identity for a number of reasons. First, visual and creative methods like this are especially useful for studying identities (Brown, Wiggins, & Secord, 2009; Clark-Ibanez, 2004; Gauntlett & Holzwarth, 2006). Second, visual and creative research methods open up imaginative spaces in a non-invasive way that honors teachers' busy schedules and responsibilities (Clark-Ibanez, 2004; Gauntlett & Holzwarth, 2006; Harper, 2002). Third, this method has a strong history of studying identity within other social sciences, such as nursing and anthropology research (Hansen-Ketchum & Myrick, 2008). It is only recently being used within education research (Clark-Ibanez, 2004). Fourth, the PEI excels in generating a narrative structure authored by the research participants themselves (Brown et al., 2009; Clark-Ibanez, 2004; Gauntlett & Holzwarth, 2006). Finally, photovoice techniques elicit teachers prior knowledge by focusing on what they know rather than what they do not know; this empowering reflection leads to social action and critical consciousness (Freire, 1970; Wang & Burris, 1997).

Methods and Procedures

The six teachers who participated in this study taught Algebra I at six different high schools located in large, urban cities in a large Southwestern state. I had previously interacted with all six teachers through research, professional development workshops, and classroom observations for a previous research project. I chose teachers who expressed interests in exploring and talking about their identities as it connected to their mathematics teaching and whom I felt would tell "good" stories.

The Process

I first visited each teacher to give them digital cameras and a loose prompt to "capture your world as a mathematics teacher" in at least twenty photographs. We then set up a time and date to sit individually for a formal Photo-Elicitation/Photovoice Interview two weeks in the future. During these two weeks, I observed at least one Algebra I class period for each teacher to get a feel for their teaching practice and style, to get to know their classroom and school culture, and to be available to answer any questions each teacher might have about the study, the research method, or what types of photographs they should capture. A day or two before the scheduled interview, I sent an email to each teacher reminding them about the interview and also prompting them to choose the ten most important photographs out of original twenty in order them by importance. This forced editing of the photograph pool right before the interview provides a space for each teacher to reflect upon each photograph.

I then sat with each teacher for the actual Photo-Elicitation/Photovoice Interview, each one taking place after school in the teacher's classroom and lasting at least 90 minutes. In the interview, each teacher shared one photograph at a time in order of self-selected importance. I used a minimal interview structure, using non-judgmental and non-evaluative language such as, "Tell me more about that," or, "How does that

connect to you as a mathematics teacher?" (Johnston, 2004). I also used clinical interview strategies to get teachers to elaborate more on how each image connected to their identity (Ginsburg, 1997).

Data Sources

Audio data from each interview was captured with digital recorder and then transcribed for analysis using a grounded theory coding structure. I coded for emerging themes of mathematics teacher identity centering on the overlap of professional and personal identities (Corbin & Strauss, 2007; Merriam, 2009). The main data source was the interview of each teacher, which I transcribed in InqScribe to build an emerging coding scheme. Each interview consisted of at least 90-minutes of transcribed audio. While the actual photographs that teachers shared and the notes I took during classroom observations added tremendous depth to the interview, I did not consider them as primary data and did not thoroughly analyze them.

Analysis Approach

Analysis began during transcription. InqScribe allowed the inclusion of time codes for every line of interview data, as well the tagging of thematic codes in order to start build a general grounded theory (Corbin & Strauss, 2008). These first-pass codes formed the initial stages of a categorical scheme to organize the data, (Corbin & Strauss, 2007). Then, using a textual conversion script I wrote in Perl, I imported the transcripts from InqScribe into Transana.

I then built a theoretical sample by analyzing the two longest interviews, listening to the audio and reading the transcripts in order to create individual audio clips that seemed important (Corbin & Strauss, 2008). Each clip captured something that eluded to mathematics teacher identity, which allowed me to create a deeper, more robust code set grounded in a more general understanding of the data now that I had transcribed all the interviews. For the first interview, I created 103 clips. For the second interview, I created 69 clips. Both of these clips generated a total of 446 codes within 35 categories.

At this point, I started to see the need to combine similar categories or drop categories to make the analysis more manageable. I went through the code set with a specific lens of looking at the how teachers were telling *Cover* or *Secret stories* (Clandinin & Connelly, 1996; Connelly & Clandinin, 1995) in order to collapse the categories. I then used the second-pass code set to analyze the remaining four interviews, adding codes and categories as necessary. This allowed me to focus specifically on the construct of mathematics teacher identity in a way that was not specific to any one teacher. It also allowed me to see initial conclusions from the data as we noticed how certain codes or categories were used again and again. This third-pass (and final) code set contained 206 codes within 14 categories.

I then went back and wrote up a four-page summary of the main categories and keywords I found for each teacher. I emailed each teacher their summary, asking them to add to, edit, or clarify anything in the summary they wanted in order to create a form of member-check validity (Corbin & Strauss, 2007). I specifically asked each teacher to ensure that what I was finding was true to his or her "voice" and to check that I was being "real." I also asked each teacher to choose a pseudonym that was both personal and unique. Feedback from each teacher was incorporated back into the analysis.

Results

This paper looked specifically at the usage of the Photo-Eliciation/Photovoice interview in eliciting teacher identity. Specifically, I examined what was revealed through the interviews and what this method captured that other research methods might miss. Deeper analysis into the actual construction of mathematics teacher identities and formation of agency will be forthcoming in further papers.

Cover Stories Initially

In each interview, the first few photographs usually involved the teacher talking about something in their past that was important to them in terms of their mathematics identity. Usually it was a picture of their family, which elicited a narrative of a parent who was "good" at mathematics and therefore taught

them that they could be too. This led to a narrative where teachers revealed they chose to be a mathematics teacher because of this prior experience, because they liked math.

In fact, this "I like math" was the most dominant *Cover story*. The following transcript shows how one teacher, Mr. Ginobili, initially creates a story that his sister and him became mathematics teachers because they inherited a "math gene" from their accountant father. All of this comes from a photograph Mr. Ginobili shares of his sister.

Mr. Ginobili: Just the fact that, for both of us [Self and Sister], math is our passion.
Interviewer: For her as well?
Mr. Ginobili: Yeah. I mean, she became the math lead, and they told her, like, what would you want to do and stuff like that. And she was like, math was definitely her thing. And I mean, I see that coming from my father because of the accounting. And the fact that number sense really came, is an easy trait for us to attain.
Interviewer: So tell me about that, then. So you feel like you were instilled with a high sense of number sense?
Mr. Ginobili: Yeah, I think so. I mean, and it's probably, you know, a gene that we developed, that we got from our dad or anything like that.

Photographs Reveal Secret Stories

A traditional interview or belief survey might end here, taking up this teachers' cover story as valid and concluding that this particular teacher holds an entity-based view of mathematics as genetically predestined—the belief in a "math gene." This might lead to conclusions of his teaching practice as "traditional." Yet, through the anchoring structure of the Photo-Elicitation/Photovoice interview, teachers were forced to stare at the photograph and continue to reflect on what the image meant to them. This opened up space to go beyond the *Cover story* and reveal the *Secret story* that connected to their personal/private identity.

For instance, minutes after talking about this "math gene," Mr. Ginobili reveals a *Secret story* about his competitive, yet supportive, teaching relationship with his sister. Mr. Ginobili reveals his passion for working with struggling students.

Interviewer: What do you see in yourself in your sister?
Mr. Ginobili: I think we really have the same passion for the kids. You know, I'll go over to her house every once in a while and she'll be thinking about, "Oh, well this kid is really struggling with this and I need to have an activity for them." And she's really passionate for each one of her kids. And I, I don't want to say that I have that same passion, because she really goes far beyond what's necessary of her. But you know, and like, I still, I do have a little bit of passion for my kids, you know. If I see one of them struggling, you know, you always want to talk to them and figure out what's wrong and stuff like that.

A few minutes later, another *Secret story* further reveals that, through Mr. Ginobili's relationship with his sister, he understands the importance of listening to his students. He reflects upon a teaching belief of valuing listening to students' prior knowledge.

Mr. Ginobili: I think the skills that are really helped me as a teacher and more as a mentor to the kids, is something that she sees in me and she likes and that's why she comes to me more than she does my brother, right? Because she's told me before, she's like, well, if I need somebody that I can talk to and will listen to me, I'm going to call you because, you know, you have that in you. And it's one of the things that makes me want to be a teacher, is the fact that I can listen to kids and I like listening to people, the stories and really try to help them out whenever possible. And so she sees that in me.

Through these Photo-eliciting/Photovoice interviews, teachers revealed the *Secret stories* that described their mathematics teaching practice, weaving narratives that reflected how they saw themselves as a mathematics teacher rather than the usual *Cover stories* they are used to living with.

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Discussion and Conclusion

This study fills a current gap in the research on understanding mathematics teacher through the lens of identity. This research extends previous research on teacher identity by incorporating the structure of the Photo-Elicitation/Photovoice Interview to ground the teacher's space for authorship. I successfully explored a research tool that captured teachers' voices without hovering, disrupting their practice, or looking for only what I wanted to see. I attempted to answer Shulman's (1988) call that the best forms of teacher support must involve meeting teachers where they are. This study introduces a professional development tool that gets teachers to reflect on themselves in a minimally invasive and easily implementable way. Mathematics teacher identities are unique and varied; so getting teachers to reflect on their own identity as mathematics teachers helps them become more aware of their own teaching practice.

With more time and resources to do follow up interviews or observations, I might have been better able connect the results with actual teacher practice or student reports. I could also have incorporated multiple narratives into building a mathematics teacher identity, a limitation of singular interview structure.

In the end, this experience allowed teachers to get past their *Cover* stories, remove the "mask" (as one teachers put it), and reveal how they really see themselves. Perhaps if there were more developed constructs to understand these identities, we as a research community can better show the value in knowing what makes each mathematics teacher human, unique and special.

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