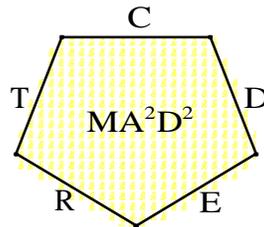A Mathematics Teacher's Journey of Identity Construction and Change

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MA^2D^2

(pentagon diagram with vertices labeled C, T, D, R, E and center labeled MA^2D^2)

Abstract

Despite some gains, improving mathematics instruction remains an area of concern in the United States. The implementation of the Common Core Standards and the challenge of teaching the 21st Century student require mathematics teachers to examine their pedagogy to determine if they need to change or improve their practices. This paper provides a personal account of my journey when determining my identity as a mathematics teacher and how constructing my identity helped in changing and improving my practices as a mathematics teacher. The study was done using autoethnography, a burgeoning research method, and identity theory. This study has the goals of giving "voice" to the classroom teacher and providing a practical method for improving instruction. The findings indicate that my identity is composed of many facets, and my identity is a key factor underlying who I am as a mathematics teacher. The findings also resulted in the development of the Math Madness Model (M^3) Instrument, which can facilitate self-studies by other mathematics classroom teachers and educators with the purpose of improving their practices.

A Mathematics Teacher's Journey of Identity Construction and Change

Mathematics Pedagogy: An Art

Great teachers are not born, they are made. Just as the most talented musicians or artists become great by reflecting on their art, beginning teachers become accomplished teachers, and skilled teachers become great teachers, by thinking hard about their teaching and finding ways to improve it (Artzt, 2002). I consider teaching as the art of captivating and motivating students to maximize their potential. Just as Artzt, I consider teaching an art because an artist is always searching for ways in which to improve and refine his/her craft. Facilitating the learning of mathematics should be a craft that is continuously examined and refined so that the potential of the students is maximized. However, according to the report from the Third International Mathematics and Science Study (TIMSS), mathematics teachers' practices have not changed greatly because teachers mimic the practices of their forbearers (Hiebert & Gallimore, 2002). The National Assessment of Educational Progress (NAEP) indicates that there is a need for change in the practices of mathematics teachers because students are not being served well by the traditional pedagogical approaches (Burrill & Hollweg, 2003). If the United States is serious about improving students' mathematical learning, it has no choice but to invest in more effective and sustained opportunities for teachers to learn about their practices (Kilpatrick, Martin & Schifter, 2003).

The Significance of the Study

This study is important because I provide detailed descriptions of how I saw a need to change my practices, and the process of change relative to my teacher identity, with an emphasis on revealing the factors that most influenced the process (Clarke, 1997). One of the challenges for the secondary mathematics classroom teacher is to ensure mathematics instruction standards-based (Kilpatrick, Martin et al., 2003). Within the standards-based classroom, the teacher should orchestrate classroom discourse and facilitate rather than validate student development of

mathematical understanding (Herrera and Owens, 2001). This autoethnography details my reflective journey of changing from the validator to the facilitator. My account serves as a potential blueprint for other classroom teachers and educators who want to improve their practices. The research question guiding this autoethnographic study is: In what ways does a teacher's reflection on mathematics practice facilitate teacher identity construction and change of practices?

The Methodology: Autoethnography

Autoethnography is a form of ethnography in which the researcher's life and experiences are the focus of the research (Reed-Danahay, 1997). In autoethnography, the researcher is the subject, and the researcher's interpretation of the experience is the data (Ellis and Bochner, 2000). Chang (2008) states that autoethnography has become a powerful source of research for practitioners in the fields of humanistic disciplines such as education, counseling, social work and religion. The nature of the writing of autoethnography may appeal to readers more than conventional scholarly writing because the author's voice resonates from the page. The process of self-discovery in autoethnographic research gives the writer more insight about self and others and also permits the readers to understand themselves better. Autoethnographic writing therefore can transform the lives of the writer and reader in the process of the exchange of experiences. As I share my experiences, those reading my story can possibly make connections to their experiences that result in insight into their own practices.

Data Collection and Analysis

In this autoethnographic study, I am the primary data source.   The experiences for this study of teacher identity construction and change of practices are recounted by memory, self-observation (archived videotaped lessons), self-reflection (journal writing), and external data (student questionnaires) (Chang, 2008). The data from memory, self-observation and self-reflection capture the past and present perspectives of my lived experiences. The external data source of student questionnaires about the videotaped lessons provides additional perspectives and

contextual information for my reflection and study of my practice. The ten principles of teacher

identity proposed by Danielwicz (2001) in her book Teaching Selves, provide a framework for

viewing and analyzing the videotaped lessons.

Supporting data for this study, including videotaped lessons of two classes over a 4 week

period, student commentary and my reflective journal were used to identify the principles of my

identity. In coding the principles in the data set, I used nine different highlighter colors, one for

each of the nine principles (enactment, a principle, cannot be highlighted), as shown (Table 1).

Principle	Characteristic	Color
Discourse richness and openness	Promotes open communication between learners	Red
Dialogue and dialogic curriculum	Promotes questioning, listening, answering and agreeing	Pink
Collaboration	Sharing ideas of common ideals with other peers	Peach
Deliberation	Makes the curriculum meaningful to the learner	Orange
Reflexivity	Questions past activities for assessment	Indigo
Theorizing	Creative, realistic practice	Green
Agency	Decision to participate, pressure or remain silent	Blue
Multiple Representations	Represents discipline to others in multiple ways	Yellow
Authority	Controls the learning environment	Purple

Table 1   Teacher Identity Characteristics Coding

For example, after transcribing the videotaped lessons, I examined the dialogue and color-

coded the transcription to indicate which of the principles were evident in the dialogue. If the

interaction promoted discourse richness, I color- coded that vignette red. In examining the student

commentary, I color- coded each of the comments according to the property of the principle to

which it pertained.

Findings

Identity construction is revealing, enlightening, humbling, continuous and intense. My identity as a mathematics teacher is a "Coat of Many Colors." The colors of my coat and the characteristic represented are: red-discourse richness, pink-dialogue, orange-deliberation, yellow-reflexivity, green-theorizing, blue-agency and purple-authority.

Identity construction is revealing because through this process I gained more insight as to who I am as a mathematics teacher. Seeing myself teach and examining my practice showed me that if I look with the lens of 'student learning' in mind, I can remove the piercing lens (Chang, 2008). The piercing lens seeks to bash or tear down whereas the lens which searches for productive practices does not.

Identity construction is enlightening for me as a teacher due to the fact that I now realize my own power. I now know the power I have with regards to my own teaching. I can honestly ask and answer the question: Did I facilitate that well? I realize that I should ask that question before I blame students for not grasping the concept.

Examining my identity humbled me. I had to admit to areas of weakness in facilitating learning. I had to be honest with myself and own my mistakes in procedures and tactics. I realized that one of the first steps to growth is humility.

Implications

The implications of my study can be far reaching. Improving classroom teaching starts with the teacher's desire to improve. A teacher's desire to improve is predicated on the fact that the teacher wants to more effectively help students learn. I conducted my study because I saw the need for improvement in my teaching after videotaping myself for a graduate class, and I wanted to give voice to the process. Given the opportunity to view themselves teach, most teachers will see a need to improve and my study provides a means for doing that. Using the ten principles (Table 1) proposed by Danielwicz (2001) in Teaching Selves, I developed the

instrument, the Math Madness Model (M^3). The Math Madness Model (M^3) Instrument developed from my study gives mathematics educators and classroom teachers an instrument to possibly use in the process of self-examination and improvement. The symbol on the front page illustrates the model. The principles inside the pentagon are those that call for teacher-student interaction in the classroom. The principles on the outside are the responsibility of the teacher to promote the interaction and learning inside of the classroom. The personal story presented in this paper and the instrument developed through the process can provide a method for self-examination and pedagogy improvement when teaching mathematics.

<div align="center">References</div>

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Appendix

MATH "MADNESS" MODEL INSTRUMENT

Principle	Characteristic	4 Always	3 Sometimes	2 Seldom	1 Never
Agency	The power to ACT: Participates in the discussion or remains quiet as students discuss				
Authority	Control is earned through RESPECT. Presence is evident through voice and demeanor				
Collaboration	Consults peers relative to strategies and opinions about pedagogy				
Deliberation	Makes the curriculum meaningful: Not just covering material				
Dialogue and Dialogic curriculum	Promotes student communication free of direction or intimidation				
Discourse richness and openness	Promotes student engagement through discussion				
Enactment	Consistently practices beliefs				
Multiple Representations	Promotes students to present the mathematics in multiple ways				
Reflexivity	Self-conscious consideration of actions taken during instruction				
Theorizing in Practice	Develops theories of learning while engaged in instruction				

Anthony B. Stinson, Ph.D. (2009)(Adapted from Teaching Selves, Danielewicz, 2001)