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Storying the Experiences of a First-Year Teacher's Mathematics-Related Teacher Identity with a Communities of Practice Lens

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by

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DEDICATION

To my family for their love and support.

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ABSTRACT

This longitudinal narrative inquiry explores the influences on a first-year elementary teacher's mathematics-related teacher identity, employing a community of practice lens. Identity is a complex concept. In this study, identity is viewed as socially constructed through new experiences. These social interactions can be seen as an individual participates in their communities of practice. A mathematics-related teacher identity intertwines a teacher's mathematical identity with their teacher identity. This can influence their classroom decisions, as well as their planning and implementation of mathematics lessons. To gain insights into the evolution of this mathematics-related teacher identity, I listened to the stories of Suzie, a first-year teacher, as she engaged with three distinct communities of practice: parent community, classroom community, and grade team community. My goal was to understand how the communities influenced her mathematics-related teacher identity. Suzie and I cultivated a research friend relationship, fostering trust and care throughout the study. This unique relationship allowed me gain a deeper understanding of Suzie's experiences. Throughout the school year, Suzie and I convened ten times to discuss her journey, supplemented by her monthly self-reflections. Employing a narrative approach, I made sense of Suzie's experiences through the storying and re-storying pivotal moments from her first year of teaching. I examined the stories both holistically and took a closer look at micro-moments. The findings from this study capture the interconnectedness of experiences within and between an individual's communities of practice. Suzie's stories illuminate the contributions confidence and communication in shaping a teacher's mathematics-related teacher identity. Based on these findings, I created a

new model to illustrate the construction of a mathematics-related teacher identity within communities of practice. Indicating the benefit of additional research on the effect of communication within a teacher's communities of practice and a teacher's confidence. An implication from this study, revealing the dynamic interplay between a teacher's communities of practice, is that teacher preparation and induction programs may need to reconsider the extent to which they prepare novice teachers to actively participate in and attend to these multiple Communities of Practice.

CHAPTER ONE: INTRODUCTION

My Story

First-year teaching, new school, new apartment, new area. I didn't know the other teachers, and only two (my mentor and department head) had come by my room to check on me during the planning days. I was the only teacher teaching Honors Algebra 1 and was given a pacing guide and the textbook to figure the rest out on my own. Other than that, I was on my own and felt alone. The classroom I was given was three halls away from the other math teachers. Some teachers met after school, but I was the head volleyball coach for the school and had practices and games I needed to run and coordinate. I never had a sense of belonging. Even when I had lunch with the other teachers they would talk about their children (who were my age) and the things they couldn't believe they did (things I would have done too). We never got together to plan lessons or talk about different teaching strategies. I was only sent an email with updated information on testing or pacing. Throughout the entire year, my principal did not set foot into my classroom once, and the only time we spoke was about volleyball. I don't know what I would have done if my background in math hadn't been so strong. I had earned my degree in mathematics and felt confident in my math knowledge and understood the trajectory of the content. Math brought me back to school each day, sharing a love of numbers and the intricate ways they work together with my students. This was the reason I got up in the mornings, to share my passion for math and make a difference in my student's relationship with math. We learned, talked, asked questions, and discovered things together. Each time a student told me they now had a new appreciation and understanding of math it made the other struggles worth it.

The story I just told could have been quite different if my confidence in mathematics and my mathematical identity had not been as strong as it was. I would not have been able to create a learning community in my classroom and would not have felt I belonged anywhere in the school, and inevitably would have left the field of teaching. The school environment and support provided can influence novice teachers' ability to belong to a community and be able to create a positive learning environment. Having a sense of belonging and being able to create communities' attributes to our identities (Lave, 1991; Wenger, 1998). This is extremely important for all novice teachers.

Throughout this paper, I will integrate poetry and vignettes to capture the emotions that transpired during that time. These experiences stem from my participant and myself. I employ poetry as it reveals the lived experience, enhancing the reader to empathize rather than just read about the experiences (Faulkner, 2019, p. 14).

Background

I couldn't focus.

multiplication tables

drills

practicing facts

she (the teacher) marked off if we got each of our 1's, our 2's our 3's.

I couldn't get past the 9's for the life of me

I remember being stuck

I was watching everyone else

seeing them progress

discouraged

why couldn't I get past the nines?

so frustrating

that anxiety

I have to get past my nines

I have to get past my nines

because all my classmates were going further

that hurt my self-esteem

all your peers wonder

why can't you just pass it?

you feel bad

you hold your peers' backs

it's hard

standard algorithm

this is how I expect you to do it

If you don't

then you're wrong

Not being given the opportunity to show

this is how I think

this is what helped

- Found poem from one of Suzie's memories of learning mathematics

Math. What are your first thoughts, memories, or feelings when you hear or read the word mathematics? Above I shared a found poem of an early memory my participant, Suzie (pseudonym), had while learning her multiplication facts. The pressures she felt, the anxiety and

fear she exhibited as she felt she was holding her classmates back in their learning echo in her words “I have to get past my nines.” This experience, and others like this one, lowered Suzie’s confidence in her ability to learn and do mathematics. Each person has at least one moment that impacted their relationship with mathematics, which is a foundational moment shaping their mathematical identity (Wood, 2013).

Mathematics evokes stronger emotions than other subjects (Hodgen & Askew, 2007; Nanna et al., 2021). It seems to be a subject people love and enjoy, or strongly dislike. Mathematical identity recognizes the relationship individuals have with mathematics. Each person has a mathematical identity unique to their experiences and how they make meaning from these experiences. These emotions tend to be rooted in our early learning and continue into adulthood (Brown, 2003; Hall et al., 2018; Hodgen & Askew, 2007; Nanna et al., 2021; Pipere & Micule, 2014). Often individuals who have struggled to learn mathematics express having low confidence in the subject and exhibited lower mathematical identities (Gibbons et al., 2018; Heyd-Metzuyanim & Shabtay, 2019; Ingram et al., 2018; Nanna et al., 2021). Confidence has a few definitions, but the first definition is, “the feeling that you can trust, believe in, and be sure about the abilities or good qualities of somebody/something” indicating an emotional response to an individual's confidence in the subject (Oxford, 2022, definition 1). Kaasila (2007a, b) expresses that confidence is essential to understanding how an individual sees themselves as learners and teachers of mathematics. While this relationship between confidence and identity has not been a focus in mathematics education identity studies, many studies mention confidence while exploring a teacher’s mathematical identity (Arslan et al., 2021; Gibbons et al., 2018; Grillo & Kier; 2021; Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Hodgen & Askew; 2007; Ingram et al., 2018; Kaasila, 2007a, b; Kaasila et al., 2011; Lieberman, 2009; Lutovac,

2020; Lutovac & Kassila, 2011, 2013; Machalow, 2020; Martino & Funghi, 2016; Mosvold & Bjuland, 2016; Nanna et al., 2021; Owens, 2014; Pipere & Micule, 2014; Skott, 2018).

In addition to an individual's mathematical identity, each person contains other identities, such as a professional identity. A professional identity reflects the individual's job or career. In the field of education, teachers develop a professional identity or teacher identity that influences the decisions and strategies they implement in their classroom (Beijaard et al., 2004; Lieberman, 2009; Pipere & Micule, 2014). It also plays a role in teacher retention (Aragon, 2016; Day et al., 2005; Nichols et al., 2017; Grillo & Kier, 2021). Teachers who teach mathematics have a unique identity known as mathematics-related teacher identity, that describes "how teachers understand themselves to be in relation to mathematics and its teaching" (Lutovic & Kaasila, 2018, p. 506). This concept intertwines a teacher's mathematical identity with their professional/teacher identity. Teachers' prior experiences in learning mathematics continue to impact their teaching practices, where their mathematical identity and their teacher identity are inseparable (Hodgen & Askew, 2007; Nanna et al., 2021).

Although the field of Mathematics Education has made progress in understanding the influences on a teacher's identity, there remains much to uncover. A mathematics-related teacher identity is an important because it affects various aspects, including a teacher's instructional methods for teaching mathematics, their classroom decisions, and even teacher retention. Gaining insight into this concept can offer new perspectives on how we can support teachers in continuously ddevelponing their mathematics-related teacher identity. In this study, my focus centers on the ongoing construction of the mathematics-related teacher identity of a first-year elementary teacher's. This teacher, Suzie, previously struggled with mathematics and thus lacked confidence in her mathematical abilities. However, during her teacher preparation program, she

began to have positive experiences that sparked a desire to change her perspective on mathematics. I explored her mathematics-related teacher identity by examining her sense of belonging and participation in her school communities. Additionally, I examined the connection between her mathematics-related teacher identity and confidence. Understanding how this relationship is influenced will provide insights for supporting positive mathematics-related teacher identities. This, in turn, could lead the development of professional development for teachers to establish strong communities, the restructuring of new teacher induction programs, and potential influences on college of education programs.

Purpose

The purpose of this narrative inquiry was to understand the continued development of a first-year teacher's mathematics-related teacher identity. The teacher in this study, Suzie, struggled with mathematics in the past. It is only recently, during her teacher preparation program, that she has begun to "open herself up" to mathematics. This study focused on both her mathematical identity and teacher identity, which together form what is referred to as her mathematics-related teacher identity. I examined her identity as it emerges through her participation and sense of belonging within the teacher's community of practice, her grade team, mathematics classroom, and parent community. Additionally, I examined the relationship between her identity and her level of confidence (confidence in planning, confidence in the content, confidence in teaching). Education programs typically group their students into cohorts, providing them with a supportive community. However, when these students enter their new roles as teachers within schools, how do they build and participate in these new communities? This study aims to provide insights for better supporting first-year teachers. The following questions served as a guide for this exploration.

Questions:

1) How is a first-year teacher's mathematics-related teacher identity influenced by her community of practice?
2) How does a mathematics-related teacher identity influence or is influenced by her level of confidence in that CoP?

Theoretical Framework

This study is centralized around lived experiences. These experiences are both social and personal. To understand what constitutes as an experience, I used Dewey's theory of experience to articulate the meaning of experience. A mathematics-related teacher identity intertwines a mathematical identity and teacher identity through their past and present experiences and how they envision themselves in the future. These experiences are both individual and social; where a sense of becoming, belonging, and ability to participate within mathematical communities contributes to individuals' identity (Graven & Lerman, 2020; Lave & Wenger, 1991). Lave and Wenger (1991) emphasize the importance of participating and belonging in social communities in the formation of identity. How one can participate and what one shares is rooted in their identity (Gee, 1999). Wenger's (1998) communities of practice provides a way of viewing a teacher's involvement in their teaching communities in the construction of identities.

Theory of Experience

Within this study, I explored my participant's lived experiences in her school communities and understood her past experiences learning mathematics. Dewey's theory of experience allowed me to understand what an experience is and how I can view experiences. "The belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally educative." (Dewey, 1997, p. 20). Not all experiences can

or should be viewed the same. Some experiences as Dewey describes are mis-educative. Experiences should promote growth not only physically, but intellectually and morally as well. This growth stimulates a future desire for experiences, encouraging our purpose and deepening the quality of our experiences. Dewey presents two principles that helps distinguish between worthwhile educational experiences: continuity and interaction. The principle of continuity expresses how every experience we have builds from one to another. Past experiences influence our future experiences and interactions (Dewey, 1997; Kim, 2016a). Kim (2016a) describes it beautifully, experience is "like an arch with fading margins, moves with us as we live our life, opening us to our next experience, which helps us glimpse that "untraveled world"." (p. 44). In this way, we continue to grow through new experiences (like our identities). The principle of interaction, or interaction of experience, relates to the social factors between objects or other people. Dewey expresses, "all human experience is ultimately social: that it involves contact and communication" (p. 29). This principle highlights the importance of the surrounding social factors. Mis-educative experiences can create a halt to our learning. This halt could stem from a student's classroom experience with a teacher or from an encounter with another teacher. That is why when planning lessons, we must constantly consider the future. A future where a desire for learning continues.

Dewey's idea of continuity is important for this study and emphasizes understanding the teacher's past experiences in addition to her current experiences. These past experiences may shed light on the decisions or emotions the teacher may have had during their lived experience. This theory also pulls in the importance of social interactions in education through lived experiences. Experiences are created with others. The ability to participate in these groups as well as what is shared is evocative of identity (Gee, 1999). Discovering these experiences

through narrative strengthens the connection between the environment's influence and the individual's lived experience (Fiddler, 2021).

Identity

"Nothing of me is original, I am the combined effort of everyone I've ever known" - Chuck Palaniuk

Identity in education has become a pivotal discussion topic in recent years (Beijaard et al., 2004; Sfard, & Prusak, A. 2005; Lutovac, and Kaasila, 2018). Especially when it comes to mathematical identity. Mathematical identity has been explored through multiple lenses and can be traced back to Meads (1934) and Erikson (1968) (Darragh, 2016; Graven & Lerman, 2020). Erikson's view of identity is aimed to answer the questions *who am I?* and *how did I come to be?* Which can be seen as an acquisition (Arslan et al., 2021; Darragh, 2016, McAdam, 2018). In this way, we have one identity that becomes solidified as time continues. Meads, on the other hand, views identity as multiple and can be contradictory (Darragh, 2016). Where identity is fluid and can change with new experiences (Beijaard et al., 2004; Sfard, & Prusak, 2005; Kaasila, 2007; Erikson, 2007; McAdams, & McLean, 2013; Lutovac, & Kaasila, 2014; Darragh, 2016). Others have followed this view of identity as being socially constructed and may vary across different contexts (Gee, 1999; Wenger, 2010). The social influences on identity give meaning to how one expresses themselves through discourse within their communities (Gee, 1999). Gee (1999) explains that language offers a means of understanding how an individual "projects themselves as a certain kind of person" (p. 13). Given this understanding, the way one view themselves and the way others view them can be dependent on the situation (Gee, 1999). This view of identity can be focused to a specific aspect, such as mathematics.

Teacher Identity and Mathematical Identity. In the late 1980s, the concept of identity was introduced into education, leading to an exploration of teacher identity (Arslan et al., 2021). Teacher identity "relates to teachers' beliefs and their practices in the classroom" (Heyd-Metzuyanim & Shabtay, 2019, p. 542). The trending perspective on teacher identity views identity as an ongoing, dynamic process in which our identities evolve and change as we gain new experiences and vary within different contexts (Beijaard et al., 2004; Lutovac & Kaasila, 2018). The definition used in studies can vary depending on the perspective of the researcher. Teacher identity can be related to the teacher's self-image influencing teaching methods, the teacher's role, or even expectations from other people or social groups of how a teacher should act or the knowledge they should have (Beijaard et al., 2004). Many studies use a sociocultural perspective such as Wenger, and view identity as a constant becoming (Arslan et al., 2021; Gujarati, 2013; Hodgen & Askew, 2007; Pipere & Micule, 2014; Skott, 2018). Here, identity is viewed as an action where it is what one does rather than what one is (Arslan et al., 2021; Hodgen & Askew, 2007).

Educational research on identity relationships began to focus on specific content in the late 1990s, and early 2000s. Mathematics education began to utilize this concept to understand an individual's relationship with mathematics, mathematical identity (Darragh, 2016). In the literature, there has been a consensus on the varying and vagueness of the definitions used for identity within mathematics education (Darragh, 2016; Graven & Heyd-Metzuyanim, 2019; Lutovac & Kaasila, 2018). Darragh expressed that mathematical identity has grown to become the concept that explains mathematical affect. There has been discussion of the correlation of other concepts to identity such as attitude, confidence, motivation, and hope, to name a few, but not one can completely encompass identity (Black et al., 2010; Cribbs et al., 2015; Grootenboer,

2013; Hima et al., 2019; Kaasila, 2007; Wilson; 2019). Emotions have also been found to influence our mathematical identity and teaching (Dvir, 2021; Hodgen & Askew, 2007; Nichols et al., 2017; Skott, 2018). Kaasila (2007a) expresses that self-confidence is essential in understanding how individuals "view themselves as learners and teachers of mathematics" indicating an important relationship between confidence and mathematical identity (p. 374). Like teacher identity, mathematical identity has begun to view identity as changing over time with new experiences (Darragh, 2016). The construction of identity can be both personal and social. Many researchers have used a narrative definition for mathematical identity where the story told becomes an individual's identity (Kassila, 2007a; McAdam & McLean, 2013; Sfard & Prusak, 2005). Sfard and Prusak (2005) define mathematical identities as the narratives themselves that are reifying, significant, and endorsable. These stories change and shift as new experiences and perspectives are gained. The way we view and tell our stories can also be influenced by whom we share our stories. The words we use, and the depiction presented may change based on the situation (Gee, 1999). In this way, multiple identities can be seen and may be different and even contradict one another. A socio-cultural perspective is also commonly used where the formation of mathematical identity is done through interactions with others (Darragh, 2016; Graven & Heyd-Metzuyanim, 2019; Lutovac & Kaasila, 2019).

Teacher identity and mathematical identity each have their trends and impacts, however, how can a teacher have one and not the other? All teachers who teach mathematics have their own unique experience influencing both their teacher and mathematical identities. The term "mathematics-related teacher identity" is used to "discuss the identities of all teachers who teach or will teach mathematics in the future" (Lutovic & Kaasila, 2018, p. 506). A general description of mathematics-related teacher identity is "how teachers understand themselves to be in relation

to mathematics and its teaching" (Lutovic & Kaasila, 2018, p. 506). Typically, in mathematics education, research has focused on mathematical identity on its own or the teacher identity of a mathematics teacher. Some studies have merged the two identities, but it is not as common (Arslan et al., 2021; Hodgen & Askew, 2007). Examining how the two identities work together can provide new understandings.

To understand identity for this study, I combine various aspects. In this study, identity is developed through the participation and belonging of different social groups (CoPs) (Lave & Wenger, 1991). Identity is viewed as constructed through the narratives told by individuals. This includes past, present, and future depictions and the meaning made from these stories (Kaasila, 2007; McAdam & McLean, 2013; Sfard & Prusak, 2005). Using language, I can gain an understanding of their "being and becoming" (Gee, 1999). I also recognize the emotional aspect of a mathematics-related teacher identity and believe there to be a salient connection between identity and confidence.

Sociocultural Theory

Sociocultural theory focuses on the impact social interactions have on individuals. Within this study, my interest lied in the construction of communities and the influences these communities have on a first-year teacher's mathematical identities. To navigate the social realm, Lave and Wenger (1991) conceptualized the communities of practice (CoPs). Within this frame of communities of practice, Wenger (2010) describes three basic dimensions: domain, community, and practice. A domain is the shared interest of the group. It is a commitment to continuing this particular interest or goal. Community refers to the "quality of the relationship that binds members" (Snyder &Wenger, 2010, p. 110). This is the foundation for learning and collaboration. A desire to help each other and share information. Practice is developed through

sharing and developing knowledge from the domain. Practices can include "tools, frameworks, methods, and stories – as well as activities related to learning and innovation" (Snyder & Wenger, 2010, p. 110). Activities provide members with a way to interact and gain a sense of belonging that contributes to their identity. Within Wenger's CoP, there are four important concepts: boundaries, identities, trajectories, and participation (Wenger, 2010). For this study, I focused on identity, trajectory, and participation. Identity in practice requires members to engage with one another and recognize others as participants. As part of the CoP, our identity is impacted by our experience participating in that community. Our past, present, and future are interconnected with one another. Where we have been and where we want to be also impacts our identity. In this trajectory, we are constantly becoming, and our identities are constantly renegotiated. Wenger discussed the relationship between newcomers and old-timers as history in the present. Old-timers provide the newcomers with their stories and the newcomers gain a glimpse into their possible trajectories. Also, newcomers' identities are invested in their future participation and are the most likely to take shape in the learning within their CoP. Lave (1991) goes into depth about the newcomer's participation in their CoP.

Through gradual participation, newcomers acquire knowledge and construct their identity. As newcomers engage in full participation, their identities strengthen within their CoP. Lave (1991) describes, “knowledgeable skill is encompassed in the process of assuming an identity as a practitioner, of becoming a full participant” (p. 68). Participation transforms a newcomer’s identity, allowing them to view themselves and how others view them differently. This may not always be a painless process and tensions may arise between newcomers and old-timers. Tensions may develop from old-timers' feelings of replacement. However, the success of both the newcomer and old-timer is intertwined. Newcomers will benefit the most from

opportunities for active participation, fostering their ongoing development. Gradually increasing participation contributes to their growth in the process of being-and-becoming. Engaging in discussions within the CoP allows members to continue their goals and shape their identities. Additionally, it allows members to construct and tell their stories.

The CoP is a situated practice bringing perspectives and languages into the complexities of the social world (Lave, 1991). In a CoP, language is used to build an image. It is used to describe, understand, connect, and relate to others. Language provides a way of understanding how an individual "projects themselves as a certain kind of person" (Gee, 1999, p. 13). This act of participating in being and becoming can be highlighted through language (Lave, 1991; Gee, 1999).

This study focused on the development of the mathematical identity and teacher identity of a newcomer, a first-year teacher. This development occurred through her participation and sense of belonging within her CoPs, which include her grade team, mathematics class, and interactions with students' parents. Using Lave's (1991) and Wenger's (1998) conceptualization of CoP provides social structures. Through this view, I observed the importance (domain), relationships (community), and experiences (practices) within the CoP. I also gained valuable insight into the way a first-year teacher perceives her participation in her grade team, gradually leading her to become an elementary mathematics teacher. This act could transform her identity if she becomes a full participant. During this time, the first-year teacher's language may shift to take on aspects of her CoP. She constructed and shared her stories of experiences during the school year as narratives. Narratives provide a way to story our experience in the community. Telling stories provides a way of making sense of these experiences and how they shape our identities.

Theoretical Map

Figure 1 represents how these theories connect. I used Dewey's theory of experience to guide my interpretation and understanding of experiences. As new experiences happen, they may change the perspective of old experiences. These experiences can influence both the mathematical identity and teacher identity, thus the mathematics-related teacher identity. The teacher's mathematical identity and teacher identity each influence and are influenced by several other factors such as participation and belonging to a community, confidence, and teaching beliefs. Individuals have a mathematical identity, and teachers have a teacher identity; however, when teaching mathematics, these two identities merge and form a mathematics-related teacher identity. The intersections of the identities in Figure 1 depict this merge. There has not been much research on this interaction, researchers tend to focus on either the mathematical identity or the teacher identity.

I have not found a map or figure yet that has illustrated the factors impacting a teacher's mathematical identity, teacher identity, or mathematics-related teacher identity. Thus, I created this theoretical map to help the readers visualize how these theories come together. In the map, I added some of the different factors contributing to a mathematical identity and teacher identity. The factors that are a part of this map have been discussed in different literature. This is not an exhaustive list of factors, nor do I go into detail on the interactions between the different factors. However, my goal is to provide a visual representation of the main factors that contribute to a mathematics-related teacher identity.

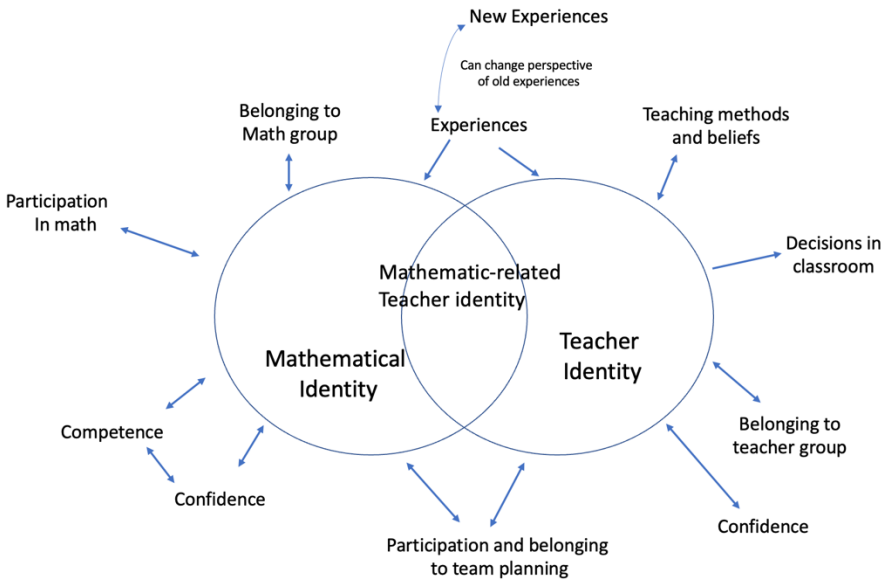

Figure 1:

Theoretical Map of Factors Contributing to a Mathematics-Related Teacher Identity

Intertwining

To understand these complex interactions, I used a narrative inquiry. Moen (2006) explains narrative as a way to make meaningful recounts of the complexities of our experiences with the surrounding world. The use of stories and poetry provides readers with a deeper connection of lived experience that embodies a moment in time (Faulkner, 2019). Through narrative inquiry, I expressed the lived experience of my participant in her first year of teaching. I focused on the experiences she perceived to be the most influential to her participation and sense of belonging to her CoPs, contributing to the ongoing development of her mathematics-related teacher identity. The act of telling these stories furthers the construction of identity (Kaasila, 2007a; Lave, 1991; Lave & Wenger, 1991). Narrative identity intertwines past experiences into imagined futures "creating a coherent account of identity through time" (McAdam & McLean, 2013, p. 233). This use of narrative and poetry can "mirror the

slipperiness of identity, the difficulty of capturing the shifting nature of who we are and want to be and resonates more fully with the way identity is created" (Faulkner, 2019b). Our identities are constantly evolving and becoming. There may be times of tension between the current and the desired future. To understand and make meaning of these experiences we tell stories, and the stories we tell are the construction of our identities.

In this study, I express how Suzie's mathematical identity and teacher identity form her mathematics-related teacher identity through the experiences she encounters during her first year of teaching. To understand this, I explored how Suzie's participation and sense of belonging to her CoPs contributed/influenced her identity. Additionally, I examined how Suzie's identity impacted the way she planned and enacted her mathematics lessons. Reflections on her implementation of the mathematics lesson also provided insight into her mathematics-related teacher identity. Exploring how her participation in her CoPs and her confidence in the mathematical content influenced her instruction and her mathematics-related teacher identity provides insights for the field of mathematics education to understand this intricate relationship. My goal was to explore how Suzie perceived her interactions with others and her sense of becoming/belonging to the communities within her school, and how this shaped her mathematics-related teacher identity. I also looked at the relationship between Suzie's confidence and her identity.

Suzie and I have known each other for two years before this study started. This provided us with a unique relationship as we embark on this discovery, a space where we can have open and free-flowing communication. This relationship can best be described as a research friend (Fiddler, 2022; Kim, 2016b). A research friend relationship bodes well for a narrative approach

where stories are told naturally (Fiddler, 2022). This created a space where we could discuss her experiences and understand the meaning together.

Researcher-Participant Relationship

The researcher-participant relationship is an important aspect of a narrative inquiry. Trust is at the center of this relationship. When beginning this study, I had to take a close look at my personal and professional identity (Bishop & Shepherd, 2011). My participant and I have built a strong relationship over the past few years. We first met two years prior to this study when she sought out help to pass the mathematics portion of a teacher education test. A year later, we spoke again about her progress in the education program and how the program had influenced her mathematical identity. We stayed connected leading up to this study. The closeness of our relationship allows for richer conversation and a deeper understanding of the construction of her mathematics-related teacher identity. In qualitative research, a close relationship is encouraged (Bishop & Shepherd, 2011). To better understand the development of an individual's identity and the influence of experiences, knowledge of their past, present, and discussions of their future are needed (Fiddler, 2022). My participant and I have explored past experiences and looked to the future. I have seen her struggle and have been there to help her. This provided a space where conversations of struggles and tensions were more forthcoming. The term participant does not seem appropriate for the relationship we have. Research friend describes it best (Fiddler, 2022). Having a close relationship instills a deeper desire for me to want her to succeed and have a positive first year. Kim (2016b) expresses the closeness of the relationship between the researcher and participant allows for vulnerability. This vulnerability opens me, the researcher, to reveal myself alongside my research friend to understand the lived experience. Throughout this study, we discover the understanding of shared experiences, discuss the evolution of future

goals, reflect on impactful moments, and examine the effects they have on Suzie's mathematics-related teacher identity. I was there to listen closely to Suzie, and gently probe her thoughts in open trusting conversations (Ellis, 2007). Narrative inquiry is unique where it is encouraged to have a close relationship that promotes growth and learning (Connelly & Clandinin, 1990; Kim, 2016b; Pinnegar & Daynes, 2007).

Your struggle I may see

My heart and ear are free

Without judgment

Without fear

The meaning we will find

Conclusion

In this study, I investigated the naturally occurring experiences of a first-year teacher's construction of her mathematics-related teacher identity. In this space, Suzie shared her perceptions and feelings about participating and belonging to her communities of practice. Examining this process over the school year brings depth to my understanding of how past and present experiences flow into future possibilities. Dewey's conception of experiences, the formation of a mathematics-related teacher identity, and becoming a part of social communities can be beautifully portrayed through a narrative. Understanding these experiences as stories illuminated the emotions and challenges Suzie faced during her first-year of teaching as she began her journey of becoming an elementary mathematics teacher.

Understanding the past provides perspective and direction for the future. To understand how this study is positioned in the current literature I provide an overview of the theoretical underpinnings and methodological choices used with identity research in mathematics education.

I also discuss common factors that have been described as influencing or being influenced by identity.

CHAPTER TWO: LITERATURE REVIEW

Over the past two decades, mathematics education has seen an increase in research about identity (Darragh, 2016; Graven & Heyd-Metzuyanim, 2019; Lutovac & Kaasila, 2018; Lutovac & Kaasila, 2019). Researchers have used identity to explore why there is disengagement in learning mathematics as well as exploring influences on teaching mathematics (Darragh, 2016; Graven & Heyd-Metzuyanim, 2019). There have been a few different literature reviews done over the past decade. Each review examined a different aspect of identity in mathematics education.

In these previous reviews, the focus was either on all literature related to mathematical identity in education (Darragh, 2016; Graven & Heyd-Metzuyanim, 2019), student or learners' identity exclusively (Radovic et al., 2018), or on teachers' mathematical identity including both pre-service and in-service teachers (Lutovac & Kaasila, 2018; Lutovac & Kaasila, 2019). These reviews have provided a condensed overview of how identity has been researched. Each review provided space to explain the differing definitions of identity (Darragh, 2016; Graven & Heyd-Metzuyanim, 2019; Lutovac & Kaasila, 2018) as well as future directions for researchers. The methodology used in the field was also extensively reviewed to help provide an overview of the methodological decisions (Lutovac & Kaasila, 2019).

The goal of this literature review is to select literature that is relevant "to inform a planned study- to create a focus, conceptual framework, design, and justification for this study" (Maxwell, 2006). I begin this review by explaining the specific criteria for this literature review. I then explain the search and selection of the articles for this review. Next, I describe the research

relevant to understanding the framework and design of this study. To do this, I explain why identity research is important in mathematics education. I then examine the theoretical underpinnings used to frame the current literature which has an emphasis on a sociocultural perspective. I then provide an overview of the methodological choices. I lastly describe two factors that have emerged as important to understanding a mathematics-related teacher identity: emotions and background. I end the review by explaining how this collection of literature informs the choices for this study.

Identity in this Review

Identity is a complex concept that has become a pivotal discussion topic in recent years (Beijaard et al., 2004; Lutovac & Kaasila, 2018; Sfard, & Prusak, 2005). In mathematics education, various phrases have been used to describe this concept: mathematical identity, mathematics identity, mathematics teacher identity, teacher's mathematical identity, and professional mathematics teacher identity (Lutovac & Kaasila, 2017). Each of these phrases has been used to describe a specific group of participants: pre-service teachers, specialized mathematics teachers, and non-specialized in mathematics but teach mathematics in elementary school. In this review, I will include both pre-service and in-service teachers. These teachers could be either primary (elementary) or secondary teachers who teach mathematics. Also, the number of years taught could vary. With the variety of participants included, I use the term mathematics-related teacher identity (Lutovac & Kaasila, 2017, 2018).

Method Search

In the following section, I describe how I compiled the 31 studies used in this literature review. When I began my search, I cast a wide net looking for articles related to mathematical identity. I did this to familiarize myself with the bulk of the literature. I used the following search

engines, Google Scholar, ERIC, and Education Database, because they are recognized as relevant databases in education. I initially searched using the term “mathematical identity” which produced over 7000 results. I then refined my search to "mathematical identity" and "education". This search reduced the number of results to 2,540. As I skimmed the articles, I realized most papers referred to student and pre-service mathematical identity. I focused my search on pre-service teachers. I searched "mathematical identity" and "pre-service teacher" and I received 208 results. I also utilized the citations that related to the construction of mathematical identity.

I next began to focus my efforts to find literature with in-service teachers. When conducting this refined search, I used the terms: "in-service teacher" and "mathematical identity". It produced 75 results. However, these results also included papers with pre-service teachers despite using the term "in-service.” I read the abstracts of the articles and found many papers that examined a mathematics teacher’s professional identity. Thus, I decided to include studies that looked at the professional identities of mathematics teachers as well. To expand this search, phrases such as “in-service teacher” “mathematical identity”; “mathematics teacher” “identity”; “professional identity” “mathematics teacher”; “professional identity” “elementary teacher” or “primary teacher”, were used in the search. Articles were also found using citations from related studies.

There was no set date range included in this search. This was because this area of study is still relatively recent, beginning around 2000, and any publication around this date could be considered foundational pieces. A few criteria lead to the exclusion of certain studies. First, the population of the paper had to include pre-service or in-service teachers. My primary language is English, so any study printed in a different language without a translation was excluded. I also prioritize peer-reviewed journal entries.

Some factors were noted within the studies but did not affect the inclusion or exclusion of the paper. This review includes studies with any teacher participants who taught mathematics. This included both secondary teachers who specialized in teaching mathematics and primary teachers who taught several subjects including mathematics. The years of experience a teacher had within the study did not affect the inclusion or exclusion. The number of participants was noted but did not influence inclusion or exclusion. Also, the location of the study did not influence the exclusion.

In this literature review, I have included 17 studies with in-service teacher participants, one study that has both in-service and pre-service teachers, and 13 studies with pre-service teachers.

Table 1:

Details of the collection of studies in this literature review

In-Service Teachers

Researcher	**Year**	**Location**	**Grade**	**Participants**
Gujarati	2013	USA	elementary	3
Arslan et al	2021	Turkey	secondary	2
Drake et al	2001	USA	elementary	10
Nichols et al	2017	USA	secondary	2

Table 1: (Continued).

Heyd-Metzuyanim & Shabtay	2019	Israel	elementary	12
Hodgen & Askew	2007	UK	elementary	1
Pipere & Micule	2014	Lativia	both	3
Grillo & Kier	2021	USA	secondary	2
Skott	2018	Denmark	secondary	1
Dvir	2021	Israel	College	2
Lieberman	2009	USA	secondary	7
Bjuland et al.	2012	Norway	elementary	1
Jong	2016	USA	elementary	1
Nanna et al.	2021	Indonesia	elementary	6
Westaway	2019	South Africa	both	1
Uygun-Erurt	2021	Turkey		8
Yildirim & Gurbuz	2022	Turkey	elementary	1

Table 1: (Continued).

	In-Service and Pre-Service Teachers			
Owens	2014	Australia	both	60
	Pre-Service Teachers			
Researcher	**Year**	**Location**	**Grade**	**participants**
Brown	2003	UK		200
Kaasila	2007a	Finland	elementary	4
Kaasila	2007b	Finland	elementary	1
Kaasila et al.	2011	Finland	elementary	6
Lutovac & Kaasila	2011	Finland	elementary	1
Lutovac & Kaasila	2014	Finland	elementary	6
Lutovac	2020	Finland	both	61
Martino & Funghi	2016	Italy	elementary	59
Saran	2018	USA	elementary	11
Machalow et al.	2020	USA	K-8	163
Gibbons et al.	2018	USA	elementary	22

Table 1: (Continued).

Ingram et al.	2018	Australia	elementary	3
Mosvold & Bjuland	2016	Norway	secondary	2

Table 1 provides an overview of details for each of the articles selected for this literature review. The dates of the articles range from 2001-2023. The article published in 2001 (Drake et al., 2001) has been cited in other studies and could be considered a foundational study. This collection of articles has been conducted across 12 countries: Denmark (1), Indonesia (1), Italy (1), Lativia (1), South Africa (1), Australia (2), Israel (2), Norway (2), UK (2), Turkey (3), Finland (6), and USA (9). The population size also varies from one participant to 200 participants with a mode of one participant and a median of three participants.

Literature Review Findings

Identity in Mathematics Education

Over the past two decades, mathematics education has seen an increase in research focusing on identity (Darragh, 2016; Graven & Heyd-Metzuyanim, 2019; Lutovac & Kaasila, 2018; Lutovac & Kaasila, 2019). Researchers have used identity to explore why there is disengagement in learning mathematics as well as exploring influences on teaching mathematics (Darragh, 2016; Graven & Heyd-Metzuyanim, 2019). Both aspects are important to understand. Past learning experiences influence the way an individual makes meaning of current experiences and can affect the way a teacher would instruct their class influencing their students' mathematical identities.

Currently, many countries are confronted with a decline in student participation in higher mathematics (Cribbs et al., 2015; Grootenboer, 2013; Vakil & Ayers, 2019). Recently, mathematical identity has become a focus of research to understand this phenomenon (Black et al., 2010; Cribbs et al., 2015; Saran, 2018). It is believed that students are developing negative mathematical identities in the early years of schooling (Brown, 2003; Hall et al., 2018; Hodgen & Askew; 2007; Pipere & Micule, 2014). Negative views of mathematics reduce class participation and the desire to learn, limiting their ability and inclination to take higher levels of mathematics (Grootenboer & Zevenbergen, 2008; Grootenboer, 2013). Early relationships with mathematics influence different career paths (Bishop, 2011; Grootenboer & Zevenbergen, 2008), reducing students seeking mathematics-heavy careers such as engineering and computer science (Burks et al., 2015; Cribbs et al., 2015).

Influences of negative mathematical identities in future careers are not limited to engineering and computer science, but also education. If choosing a career in education a negative view of mathematics can continue with them influencing their teaching career (Brown, 2003; Kaasila et al., 2012; Lutovac & Kaasila, 2011; Martino & Funghi, 2016; Machalow et al., 2020; Nanna et al., 2021; Pipere & Micule, 2014; Saran, 2018). It is also believed teachers' mathematics-related teacher identities can influence their student's mathematical identities, continuing the cycle of poor mathematical identities (Grootenboer, 2013; Gujarati, 2013; Nanna et al., 2021; Tabuk, 2018).

Teachers were once learners and may have a traditional method of how mathematics should be taught ingrained in them from their many years of being taught in this manner (Anthony et al, 2019; Battey & Levya, 2016; Hunter & Hunter, 2018; Milne, 2017). Rather than attempting to bring relevant learning to their students to enhance student learning, teachers tend

to revert to traditional methods and their experiences (Au, 2011; Illich, 1973; Roy, 2018; Westaway, 2019). Not only the specific content taught, but the opportunities students are given to interact and engage with the knowledge are influenced (Battey & Leyva, 2016; Hunter & Hunter, 2018; Milne, 2017). It is believed teachers' identities affect their teaching practices and pedagogical beliefs. For this reason, mathematical identity can be used to shift teaching methods to nontraditional methods (Arslan et al., 2021; Drake et al., 2001; Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Jong, 2016; Pipere & Micule, 2014; Owens, 2014).

Education can often feel ever-changing, and teachers can find themselves amid educational reforms where new teaching methods are encouraged (Gujarati, 2013; Drake et al., 2001; Westaway, 2019). However great this may seem it can create added stress. Teachers already face many pressures which are believed to contribute to their continuation in the education field (Aragon, 2016). In the United States, teacher shortages and retention are a concern (Aragon, 2016). It has been found that about 17 percent of teachers leave the field within their first five years, and this is higher in areas such as mathematics (Aragon, 2016). Teachers who have a sense of belonging and commitment are believed to continue teaching (Day et al., 2005; Grillo & Kier, 2021). Mathematics-related teacher identity is viewed by many researchers as “ways of being, becoming, and belonging” (Graven & Lerman, 2020). Education programs work towards changing their pre-service teacher's mathematical identities to become positive (Brown, 2003; Gibbons et al., 2018; Ingram et al., 2018; Kaasila et al., 2011; Saran, 2018). Exploring how schools are or are not supporting novice teachers to become integrated into positive communities is important. These communities support teacher retention and build identities (Aragon, 2016; Lave & Wenger, 1991; Wenger, 1998).

First-year teachers may experience additional stresses as they navigate their way through learning the curriculum, managing the classroom, working with parents, knowing who to contact for what, and connecting with the teacher and students they will be working with. They are new to it all. Helping teachers through this transitional period by balancing expectations, and emotions, and understanding how their incoming beliefs affect their identity will benefit them (Dvir, 2021; Skott, 2018). If supportive communities surround teachers, they may be able to relieve some of the stress during this transitional period.

Elementary teachers are in a unique position where most teach every core subject which includes mathematics. It seems common in the elementary school setting for teachers to have poor mathematical identities (Brown, 2003, Drake et al., 2001; Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Hodgen & Askew, 2007; Martino & Funghi, 2016). Martino and Funghi emphasize teachers who have lived with hard experiences in mathematics produce negative emotions toward mathematics. This creates a tension between what a teacher wants to become and how they make decisions in their practice and classroom. Since students' mathematical identities are the most influenced in their early learning, their teachers need to portray a positive image of mathematics.

Theoretical Underpinnings

When conducting research, we need to first understand the perspectives that come together to frame the idea central to its study. In the collection of studies in this review, the primary focus is identity. The definitions and participants may vary between the studies, but all studies involve a teacher (or future teacher) who is (or will) teach mathematics. Whether the teacher is a specialized mathematics teacher or teaches all subjects, both are included. While the definition and lens through which the mathematics-related teacher identity varies there is one

common underpinning for the majority (26 out of 31) of the studies, the use of a social theory. The theories and importance of social influences differed and are discussed further.

Socio-Cultural. There are multiple socio-cultural theories that are used to frame the research. In this subsection I have recognized the difference in research that used a communities of practice frame (following Lave and/or Wenger) and a learning and teaching frame (following Gee, Vygotsky, and Holland).

Communities of Practice (Wenger). Wenger (1998) or Lave and Wenger (1991) were references the most often, in 11 studies (Arslan et al., 2021; Bjuland et al., 2012; Gibbons et al., 2018; Gujarati, 2013; Hodgens & Askew, 2007; Lieberman, 2009; Nanna et al., 2021; Owens, 2014; Pipere & Micule, 2014; Skott, 2018; Westaway, 2019). This follows what Darragh (2016) found in her review of the literature. In these studies, the researchers discuss how identity is constructed within a social context. This social context was examined more extensively using Wenger's communities of practice (Arslan et al., 2021; Bjuland et al., 2012; Hodgens & Askew, 2007; Westaway, 2019). In Arslan et al.'s (2021) study, two middle school teachers were followed into their first-year teaching mathematics. In this study, the researchers were interested in how supportive and unsupportive working communities influenced the teacher's teaching practices (reform-oriented beliefs). Lieberman (2009) and Gibbons et al. (2018) both emphasized the construction of the teacher's identity was done through participation. In Lieberman's (2009) study, she examined how a lesson study could support the structure of teacher-learning communities to strengthen professional identities. This in return supported both student and teacher learning. Regardless of the focus, each of these studies highlights the role social interactions have in an individual's construction of their mathematics-related teacher identity. It

is also noteworthy that 10 of the 11 studies that reference Wenger or Lave and Wenger were studies with in-service teachers.

Learning and Teaching (Gee, Vygotsky, or Holland). While many of the studies have focused their social theory using Wenger (1998) some studies also combined this using additional theories such as Gee (Gujarati, 2013; Pipere and Micule, 2014), Vygotsky (Owens, 2014), or Holland (Skott, 2018) to complete their framework. Other studies utilized only Gee (Heyd-Metzuyanim & Shabtay, 2019; Saran; 2018), Vygotsky (Jong, 2016), or Holland (Heyd-Metzuyanim & Shabtay, 2019; Jong, 2016) to frame the social aspect of the construction of mathematics-related teacher identity. Heyd-Metzuyanim and Shabtay (2019) used a discourse analysis approach and blended their methods of Gee following Sfard and Prusak's (2005) definition of identity as a narrative. Here they examined the teacher's pedagogical discourse through the lens of their teacher's identity. The "discourses shape and orient teachers towards *what* to teach students, *how* to teach them, and *why* certain teaching actions are more effective than others." (Heyd-Metzuyanim & Shabtay, 2019, p. 543). Using Vygotsky's figured worlds individuals begin to recognize others as the role or actors they are within a social setting. Owen's (2014) study uses this frame as the teachers create mathematic lessons that incorporate their culture. By doing this the teachers can relate mathematics to their culture which built their mathematics-related teacher identity and made learning meaningful for their students.

A Narrative Approach to Theory. Two groups of researchers created their own framework to describe identity (Sfard & Prusak, 2005) or mathematical identity (Kaasila, 2007a) that are often used in mathematics education. Both describe identity as narratives.

Sfard and Prusak (2005) created this framework to make an operationalized definition of identity. They believed identity was "the missing link" between learning and its sociocultural

context (p. 15). In their paper they pull and acknowledge the identity work of Lave and Wenger (1991) and Gee and Holland et al.. They define identity "as collections of stories about persons or, more specifically, as those narratives about individuals that are *reifying, endorsable,* and *significant"* (p. 16). They emphasize that identities are the narratives themselves. This idea is used often in mathematics-related teacher identity studies (Bjuland et al., 2012; Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Kaasila et al., 2011; Lutovac, 2011; Lutovac & Kaasila, 2011; Machalow et al., 2020; Martino & Funghi, 2016; Mosvold & Bjuland, 2016; Pipere & Micule, 2014; Yildirim & Guibuz, 2022). While many studies reference the use of Sfard and Prusak's (2005) definition of identity, many of these studies only use a portion of the identity definition stating that identities are the collection of narratives (Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Kaasila et al., 2011; Lutovac, 2011; Lutovac & Kaasila, 2011; Machalow et al., 2020; Martino & Funghi, 2016; Pipere & Micule, 2014; Yildirim & Guibuz, 2022). Bjuland et al. (2012) use the whole definition of Sfard and Prusak, but do not describe how the narratives are *reifying, endorsable,* or *significant*. They do, however, continue with Sfard and Prusak's discourse methods. Heyde-Metzuyanim and Shabtay (2019) reference Sfard and Prusak's identity definition but use Sfard's (2008) framework for their discourse. They do expand and describe language that makes the narrative reifying but does not continue with significant and endorsable.

Kaasila (2007a) balances the psychological and social approach in his framework using narratives. He emphasizes an individual's mathematical identity has a social dimension where learning mathematics is influenced by teachers, peers, and books. The social context of the situation influences the experiences. It is through the telling of narratives about an individual's relationship with mathematics that their mathematical identity is manifested. Kaasila also

explains the narrator's relationship with the listener "guides what we tell and how we tell it" (Kaasila, 2007a, p. 206). Kaasila explains there is a connection between a pre-service teacher's knowledge, beliefs, conceptions, attitudes, and emotions contained within their mathematical identity. He provides three components that influence the view of mathematics:

> (1) their view of themselves as learners and teachers of mathematics, (2) their view of mathematics and its teaching and learning (Pehkonen & Pietila¨, 2003), and (3) their view of the social context of learning and teaching mathematics, i.e., the classroom context (Op 't Eynde et al. 2002). One essential aspect of the first component is self-confidence, which has a central role in the formation of a student's view of mathematics (p. 206).

While Kaasila himself has conducted research primarily with pre-service teachers (Kaasila, 2007a, 2007b; Kaasila et al., 2011; Lutovac & Kaasila, 2011; Lutovac & Kaasila, 2013) along with others (Machalow et al., 2020; Martino & Funghi, 2016), his view has also been used with in-service teachers (Arslan et al., 2021; Nanna et al., 2021; Pipere & Micule, 2014; Skott, 2018; Yildirim & Guibuz, 2022).

Non-Specified. Four other studies emulated the importance of social interactions but did not specify any theory. There was stress on the influences of 'social networks' (Grillo & Kier, 2021), interaction within social environments (Ingram et al., 2018), and emotional reactions to social experiences (Nichols et al., 2017). Brown (2003) was one of the earlier researchers studying mathematics-related teacher identity and expressed that "social practices cannot be separated from personal engagements" (p. 154).

Methodologies Used

With the different perspectives, identity research can provide there are different methods used in the current research. Each approach helps focus the study. All the studies collected for

this literature review used a qualitative approach. This was also the case in Lutovac and Kaasila's (2018) review where all 48 empirical studies used a qualitative methodological approach. The complex connections between experiences, beliefs, and emotions bode well for a qualitative approach. In this section, I describe the different methodological approaches used to study mathematics-related teacher identity. The approaches used are case study (Arslan et al., 2021; Dvir, 2021; Gujarati, 2013; Hodgen & Askew, 2007; Ingram et al., 2018; Lieberman, 2009; Mosvold & Bjuland, 2016; Skott, 2018; Westaway, 2019), discourse analysis (Heyd-M Metzuyanim and Shabtay, 2019; Kaasila, 2007b; Kaasila et al., 2011; Mosvold & Bjuland, 2016; Yildirim & Gurbuz, 2022), other qualitative designs (Brown, 2003; Gibbons et al., 2018; Grillo & Kier, 2021; Nanna et al., 2021; Nichols et al., 2017; Owens, 2014; Pipere & Micule, 2014; Saran, 2018; Uygun-Ergurt, 2021), and narrative (Bjuland et al., 2012; Drake et al., 2001; Jong, 2016; Kaasila, 2007a; Lutovac & Kaasila, 2011, 2013; Machalow et al., 2020; Martino & Funghi, 2016). It was also common for these studies to blend their methodological approaches primarily with a narrative approach (Brown, 2003; Dvir, 2021; Gujarati, 2013; Hodgen & Askew, 2007; Ingram et al., 2016; Kaasila, 2007b; Kaasila et al., 2011; Mosvold & Bjuland, 2016; Saran, 2018; Westaway, 2019; Yildirim & Gurbuz, 2022)

Case Study. Researchers who use case studies used between one and three participants to focus on the complex nature of identity. In these studies, multiple types of data were collected such as interviews and observations. These studies were also done across a period from one month (Westaway, 2019) up to five years (Lieberman, 2009). The longitudinal aspect of these studies allows the researchers to see if there are changes in their participants' mathematics-related teacher identity. This was an important aspect of the studies that were interventions (Dvir, 2021; Hodgen & Askew, 2007; Ingram et al., 2018; Lieberman, 2009). Hodgen and Askew

(2007) focused on one primary teacher's constructive narrative about her relationship with school mathematics and teaching. Ursula participated in professional development over a three-year period that worked on implementing the National Numeracy Strategy. When Ursula first began, her relationship with mathematics was negative where she felt "I can't do anything; I have a complete mental blank" (p. 470). However, through professional development, this relationship changed, and Ursula led mathematical professional development. In Ingram et al.'s (2018) study the college of education had purposeful interventions with their pre-service teachers. At the beginning of the program, pre-service teachers were given surveys to assess their mathematical content knowledge and others to understand their relationship with mathematics. The results from these surveys showed only 40% of the students entering the program had the mathematics proficiency to teach at the elementary level and only 37% felt confident to teach mathematics. The program provided students with access to tutoring and online resources. All classes were taught with a growth mindset approach. At the end of the first year, these numbers rose where 88% of the pre-service teachers demonstrated needed content knowledge, and 90% of the pre-service teachers either enjoyed teaching mathematics or were neutral. This relationship change can be seen in other studies without interventions as well. Gujarati (2013) focused her study on three early career elementary teachers who she described as having an "inverse" relationship between mathematics and teaching practices. Each participant had a negative relationship with mathematics stemming from their learning experiences. Despite this feeling towards mathematics, they made a significant effort to ensure their students did not have the same experience they had but had positive experiences. At the end of the six-month study, the teachers felt their relationship with mathematics had improved. Gujarati discusses a negative mathematics identity "does not have to be a life sentence for perpetuating negative experiences

in students or negative dispositions if teachers are willing to reflect openly and honestly on their beliefs and practices and want to change" (2013, p. 646).

Discourse Analysis. Discourse analysis looks at the language an individual uses that provide insight into the construction of their identity. It shows an image of the "kind of person" an individual feels they are, wants to be, or used to make justifications (Heyd-Metzuyanim & Shabtay, 2019; Kaasila, 2007b; Sfard & Prusak, 2005). Heyd-Metzuyanim and Shabtay (2019) explain that "discourses shape and orient teachers towards *what* to teach students, *how* to teach them, *why* certain teaching actions are more effective than others, and *who* can learn" (p. 543). Discourse analysis is used in five studies (Heyd-Metzuyanim and Shabtay, 2019; Kaasila, 2007b; Kaasila et al., 2011; Mosvold & Bjuland, 2016; Yildirim & Gurbuz, 2022) four of which use narratives (Kaasila, 2007b; Kaasila et al., 2011; Mosvold & Bjuland, 2016; Yildirim & Gurbuz, 2022). In Kaasila et al.'s (2011) study six elementary pre-service teachers were interviewed at the beginning and end of their mathematics education course. Through these interviews and along with their written autobiographies the researchers identified six repertoires of pre-service teachers and constructed their mathematical identity talk: victim, ego-defensive, fatalist, graining an insight, self-development, and responding to expectations. Through this process, the researchers also found that the pre-service teachers had gained insight and self-development indicating a shift in their identities. These same repertories were found in Yildirim and Gurbuz's (2022) study with one in-service elementary teacher. Mosvold and Bjuland (2016), on the other hand, used discourse analysis emphasizing positioning. In their study, they examined the language two pre-service teachers used to position themselves and how they were positioned by their mentor in conversations. This study describes how the act of positioning can be seen as

making sense of their participation in teaching mathematics. Through these studies, we can begin to understand the importance of discourse in the construction of identity.

Other Qualitative Design. Other qualitative approaches were also used such as phenomenology (Nichols et al., 2017; Pipere & Micule, 2014; Uygun-Ergurt, 2021), explanatory (Nanna et al., 2021), collaborative inquiry (Brown, 2003), lesson study (Saran, 2018), self-study (Gibbons et al., 2018), or none specified design (Grillo & Kier, 2021; Owens, 2014). Phenomenology examines lived experiences (Lichtman, 2013), which seem to align with identity. However, only three studies used this approach. Connections were examined between emotions and mathematics-related teacher identity (Nichols et al., 2017) and between anxiety and mathematics-related teacher identity (Uygun-Ergurt, 2021). Nichols et al. (2017) expressed phenomenology allows for unanticipated themes to emerge from the data. The first-year teachers in this study reflected on emotional episodes in their classrooms and how they related to their emerging teacher identities.

In another study, the researcher used a lesson study with pre-service teachers to enhance their pedagogical content knowledge (PCK) during their college of education program (Saran, 2018). While completing reflections, class discussions, and re-teaching lessons the pre-service teachers not only improved their PCK, but their mathematical identities became more positive as well. While this study primarily used a lesson study Saran also used narratives to gain insights into the pre-service teacher's experiences. Brown (2003) also used narrative in conjunction with collaborative inquiry to understand a pre-service teacher's mathematics and pedagogy related to their past, present, and future lives.

Narrative. There are definitions of identity that describe the telling of narratives to be the construction of an individual's identity, so the use of narratives should not be a surprise. Nine

studies primarily use a narrative approach (Bjuland et al., 2012; Drake et al., 2001; Jong, 2016; Kaasila, 2007a; Lutovac & Kaasila, 2011, 2013; Lutovac, 2020; Machalow et al., 2020; Martino & Funghi, 2016), and eleven others that combine the use of narrative with another mythological approach (Brown, 2003; Dvir, 2021; Gujarati, 2013; Hodgen & Askew, 2007; Ingram et al., 2018; Kaasila, 2007b; Kaasila et al., 2011; Mosvold & Bjuland, 2016; Saran, 2018; Westaway, 2019; Yildirim & Gurbuz, 2022). The use of narrative allows the researcher a glimpse into the past, present, and future views teachers have of themselves. Narratives provide a way to understand the teacher's past learning experiences with mathematics that have formed their current view (Brown, 2003; Drake et al., 2001; Dvir, 2021; Gujarati, 2013; Hodgen & Askew, 2007; Ingram et al., 2018; Jong, 2016; Kaasila, 2007a, b; Lutovac & Kaasila, 2011, 2013; Machalow et al., 2020; Martino & Funghi, 2016; Yildirim & Gurbuz, 2022).

Narratives were also used to understand the construction of a mathematics-related teacher identity whether through their language or through the themes that emerged. In Machalow et al.'s (2020) study, they collected 163 pre-service teachers' arc narratives over 20 years. They found that pre-service teachers who viewed mathematics as a set of procedures viewed themselves as being bad at mathematics and were reluctant to teach mathematics, while pre-service teachers who viewed mathematics as a network of concepts and felt confident in themselves often transmitted these same views to their students. They categorized these narratives using Drake et al. (2001) and McCulloch et al.'s (2013) findings: smooth track, minor setback, positive turning point, roller coaster, negative turning point, and consistently frustrated. Through their work, they described "the power of one's mathematical learning experiences to shape salient aspects of one's mathematics identity" (p. 24). This exemplifies the understanding of social learning experiences with mathematics to fully understand the construction of one's mathematical identity. Themes or

categories were also found inductively such as in Jong's (2016) study. Jong was able to three major themes that emerged from the data: influential mathematics education models, commitment to learning, and school-related factors. The use of narrative has been used often to gain different understandings related to one's mathematics-related teacher identity.

Factors Influencing Identity

In this collection of literature, there were two commonly discussed influential effects on one's mathematics-related teacher identity: emotions and past experiences. In the next two sections, I discuss the emotions associated with the construction of a mathematics-related teacher identity. I provide additional insight into one emotion, confidence. I then discuss the understanding of a teacher's past experiences that begin to shape their current identity.

Emotion. Our emotions can be a powerful force. It has been found that our emotions can influence our mathematical learning and teaching (Dvir, 2021; Hodgen & Askew, 2007; Nichols et al., 2017; Skott, 2018). In all thirty-one studies, there was some discussion about emotional aspects or feelings. Emotions in these studies emerged as the teacher's emotions toward mathematics (Drake et al., 2001; Dvir, 2021; Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Hodgen & Askew; 2007; Lutovac, 2020; Owens, 2014; Pipere & Micule, 2014) or transpired within social interactions in (Arslan et al., 2021; Dvir, 2021; Gujarati, 2013; Grillo & Kier, 2021; Hodgen & Askew, 2007; Nichols et al, 2017; Pipere & Micule, 2014; Skott, 2018). Confidence was mentioned by the participants, the research, or both in 21 studies. In all these studies the emotions the teachers felt had some impact on their identities: how they learned

mathematics, how they taught mathematics, or how they viewed themselves as a teacher, impacting their mathematics-related teacher identity.

Mathematics Relationships. Mathematics evokes stronger emotions than other subjects (Hodgen & Askew, 2007). These emotions can be rooted in our personal and social relationships with mathematics (Hodgen & Askew, 2007; Lutovac & Kaasila, 2011; Pipere & Micule, 2014). The failure or success one had with mathematics can be very emotional (Lutovac, 2020). In Pipere and Micule's study (2014) their participants all expressed having positive relationships with mathematics despite some struggles in their past. These feelings emerged from different social interactions from their past experiences. Even though all three teachers had positive feelings towards mathematics each one used this relationship differently: "to solve professional and life situations, to develop cognitive skills and the entire personality or to aid as a psychological coping strategy" (Pipere & Micule, 2014, p.15). Kaasila's (2007b) participant also expressed positive emotions with mathematics such as the joy she feels when discovering the solution to a problem. These feelings helped transform her teaching strategies into a love of pedagogy and care in her lesson planning.

Studies with teachers who had positive relationships with mathematics were not common. In 12 studies the teachers had negative emotions toward mathematics (Drake et al., 2001; Dvir, 2021; Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Hodgen & Askew, 2007; Kaasila et al., 2011; Lutovac & Kaasila, 2011, 2013; Machalow et al., 2020; Nanna et al., 2021; Yildirim & Gurbuz, 2022; Uygun-Eryurt, 2021). Six of these studies were with elementary teachers (Drake et al., 2001; Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Hodgen & Askew, 2007; Nanna et al., 2021; Yildirim & Gurbuz, 2022), two studies (Dvir, 2021; Uygun-Eryurt, 2021) did not disclose what school level the teacher was in their study, and four were with pre-service

teachers (Kaasila et al., 2011; Lutovac & Kaasila, 2011, 2013; Machalow et al., 2020). Some of these emotions emerged out of embarrassment of their low abilities, or fear of getting the wrong answer in class. In one study, a participant reflected how in one of her mathematics classes her teacher would point the blackboard sponge at them intending to throw it if they answered incorrectly (Kaasila et al. 2011). Not all negative emotions ended up being bad. Some teachers who had negative emotions toward mathematics used this feeling to make changes in their practice. They expressed how they did not want their students to feel the same way they had (Drake et al., 2001; Gujarati, 2013; Yildirim & Gurbuz, 2022; Uygun-Eryurt, 2021). Their experiences created a desire to make mathematics enjoyable for their students.

Other teachers discussed the changes in their teaching strategies (Dvir, 2021; Hodgen & Askew, 2007). Hodgen and Askew (2007) went into detail about Ursula's change. Through Ursula's participation in the professional development seminars, she was provided with the space she needed to repair her relationship with mathematics. This opened her up to using the new teaching methods introduced in the seminars. The new methods helped her students succeed in their mathematical learning.

Here we see hopes of change where a "negative mathematics identities can have positive effects; it does not have to be a life sentence for perpetuating negative experiences in students or negative dispositions if teachers are willing to reflect open and honestly on their beliefs and practices and want to change" (Gujarati, 2013; p. 645).

Social. Teachers invest a part of themselves into their teaching creating an emotional connection (Nichols et al., 2017). In this way, students' success or failure becomes the teachers' success or failure (Gujarati, 2013; Hodgen & Askew, 2007; Nichols et al., 2017). In some cases, a teacher's incoming beliefs may conflict with their desired image (Heyd-Metzuyanim &

Shabtay, 2019; Hodgen & Askew, 2007; Kaasila et al., 2011; Lutovac & Kaasila, 2011; Nichols et al., 2017) creating tension in the teacher's identity. Through reflection one can become aware of tensions between their current and desired self, evoking teacher change (Kaasila et al., 2011).

Tensions may arise for other reasons as well. In Arslan et al.'s (2021) study, one of their participants, Emel, felt tension between her teaching beliefs and other teachers and administrators at her school. She was discouraged in her reformed approach to teaching resulting in negative emotions and effects on her teaching practices. She was, however, able to resist some of the negativity and still implemented reformed teaching in two of her classes by reaching out to other supportive communities outside her school. Not all communities instill negative emotions. In two other studies, the schools provided communities that encouraged positive relationships revealing a commitment to the school (Grillo & Kier, 2021; Skott, 2018). Skott's participant explained her school invited her to participate and speak at different meetings. This made her feel recognized as valuable and she had a sense of belonging that enhanced her teacher identity. The idea of belonging continues in Dvir's (2021) study. In this study, the participant shared her negative emotions while learning mathematics with a group of teachers. As she shared, she realized she was not alone in her thoughts and feeling, and the group discussed topics surrounding her story elevating their teacher identity.

Emotional experiences can affect teachers in different ways. As seen in the literature, teachers' relationships with mathematics are malleable, and teachers can transform their experiences. Repairing the relationship between mathematics and learning and implementing new teaching methods help teachers gain positive mathematics-related teacher identities. Emotional episodes can occur in the present time or could have lasting effects on our background.

Confidence. Strong emotions are evoked while learning and teaching mathematics (Hodgen. & Askew, 2007; Nanna et al., 2021; Pipere & Micule, 2014). One specific emotion that is mentioned in 21 studies is confidence (Arslan et al., 2021; Gibbons et al., 2018; Grillo & Kier; 2021; Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Hodgen & Askew; 2007; Ingram et al., 2018; Kaasila, 2007a, b; Kaasila et al., 2011; Lieberman, 2009; Lutovac, 2020; Lutovac & Kassila, 2011, 2013; Machalow, 2020; Martino & Funghi, 2016; Mosvold & Bjuland, 2016; Nanna et al., 2021; Owens, 2014; Pipere & Micule, 2014; Skott, 2018). Confidence has an influential role in the construction of a mathematics-related teacher identity (Kaasila, 2007a, b; Nanna et al., 2021). This relationship between confidence and identity has not been explicitly explored. In this collection of literature, confidence was either brought up by the researcher, the participant, or both. The confidence the participants had in their mathematical ability or their confidence in teacher practice, including teaching, decisions, and pedagogical beliefs, were discussed. As one participant said, "self-confidence changes your life" (Pipere & Micule, 2014, p. 20).

Pre-service and in-service teachers alike both had struggles with their confidence in their mathematical abilities. Kaasila (2007a) expresses that self-confidence is "a central role in the formation of a student's view of mathematics" contributing to the construction of their mathematical identity. This level of confidence in individuals has been associated with past experiences learning mathematics (Kaasila et al., 2012; Lutovac & Kaasila, 2013; Lutovac, 2020). An individual's confidence in mathematics can emulate other emotions such as dislike, dread, or anxiety (Lutovac, 2020; Machalow, 2020; Saran, 2018). Confidence in mathematics can be changed. In Gibbons et al. (2018) and Ingram et al. (2018), they reported after taking mathematics methods courses pre-service teachers' confidence in mathematics increased. It is

important to have teachers who are confident in the material they are teaching. Machalow et al. (2020) explain that teachers who feel confident in themselves can transmit those ideas to their students. Not only does confidence in the content influence a teacher's students, but also contribute to their teaching practices. When teachers know the content, they will be confident in teaching the material (Nanna et al., 2021). When teachers are not confident, they may be hesitant in their teaching and decision-making (Arslan et al., 2021; Nanna et al., 2021). This can be seen in teachers' pedagogical beliefs (Heyd-Metzuyanim & Shabtay, 2019; Lieberman, 2009; Nanna et al., 2021). Liberman (2009) found that teachers who lacked confidence also struggled to teach or ask questions about pedagogical beliefs and teaching practices. While teachers who did have confidence it allowed them to take on more obligations or seek out opportunities (Grillo & Kier, 2021; Skott, 2018).

Emotions can be seen influencing an individual's mathematics-related teacher identity. These emotions can be positive or negative, but both can have an impact on the decision, practice, and relationships a teacher has in their classroom (Lutovac, 2020). While many emotions appear, confidence was described in several ways. Many of these emotions stemmed from the teacher's past experiences as a learner, leading to the importance of understanding the past experiences of mathematics teachers.

Personal Background. Each person who becomes a teacher comes into the profession with pre-existing experiences that have formed and shaped their beliefs about teaching or their relationship with mathematics (Gibbons et al., 2018). It is important to understand these past experiences and how they can influence decisions and meaning-making within a teacher's classroom. Lutovac and Kaasila (2018) expressed "we teach who we are" (p. 760). The majority, thirty, of the studies investigated their participants' past experiences and were briefly discussed.

Seven of the researchers discussed how teachers' backgrounds influenced the teacher's ideology (Grillo & Kier, 2021; Jong, 2016; Lieberman, 2009; Mosvold & Bjuland, 2016; Nichols et al., 2017; Owens, 2014). Teachers have their own unique experiences throughout their lives contributing to their identities. Their background and upbringing can influence the way they interpret and make meaning of situations (Mosvold & Bjuland, 2016; Nichols et al., 2017; Owens, 2014). Teachers' backgrounds can also play a role in what they value and the beliefs they have when entering their teaching career (Grillo & Kier, 2021; Jong, 2016; Lieberman, 2009; Nichols et al., 2017; Owens, 2014). Each of these leads to differences in the way a teacher would act or handle situations within their classroom. For example, one participant described how the way she learned in a monastery school encouraged her hands-on teaching method (Jong, 2016). This exemplifies how learning experiences within the school setting can influence the methods and teaching strategies teachers use in their classrooms (Arslan et al., 2021; Drake et al., 2001; Heyd-Metzuyanim & Shabtay, 2019, Lieberman, 2009).

Teachers' past experiences and/or feelings while learning mathematics in the school setting were another aspect that was discussed (Arslan et al., 2021; Brown, 2003; Drake et al., 2001; Dvir, 2021; Gibbons et al., 2018; Gujarati, 2013; Heyd-Metzuyanim & Shabtay, 2019; Hodgen & Askew, 2007; Kassila, 2007a, b; Kassial et al., 2011; Lieberman, 2009; Lutovac, 2020; Lutovac & Kaasila, 2011, 2014; Machalow et al., 2020; Martin & Funghi, 2016; Nanna et al., 2021; Pipere & Micule, 2014; Skott, 2018; Saran, 2018; Uygun-Eryurt, 2021; Yildirim & Gurbuz, 2022). Mathematics can bring about emotional responses rooted in early schooling (Hodgen & Askew; 2007; Pipere & Micule). These learning experiences are the foundation of a mathematics-related teacher identity. The way teachers viewed their relationship with mathematics was examined. Many teachers expressed having negative experiences while

learning mathematics in school (Dvir, 2021; Gujarati, 2013; Hodgen & Askew, 2007; Kaasila, 2007a; Lieberman, 2009; Lutovac, 2020; Lutovac & Kaasila, 2011; Machalow, 2020; Nanna et al., 2021; Uygun-Eryurt, 2021; Yildirim & Gurbuz, 2022). Many teachers experienced a "negative turning point" in their early learning (Drake et al., 2001; Dvir, 2021; Hodgen & Askew, 2007; Machalow, 2020; Nanana et al., 2021; Yildirim & Gurbuz, 2022). Where their negative relationship can be traced back to failing a test (Dvir, 2021; Lutovac, 2020) or having a certain teacher (Yildirim & Gurbuz, 2022).

Each teacher reacted differently to their past experiences. In Gujarati's study, the participants' past experiences created a desire to make the learning experience of mathematics better for their students. This was also seen in many other teachers (Brown, 2003; Kaasila, 2007a, Lutovac, 2020; Lutovac & Kaasila, 2011; Nanna et al., 2021; Yildirim & Gurbuz, 2022). In other studies, teachers struggled while learning mathematics which initially created fear (Dvir, 2021; Hodgen & Askew, 2007) or anxiety (Uygun-Eryurt, 2021) teaching mathematics. However, after participating in professional development, both teachers grew from their past and gained positive teacher identities, helping them provide instruction for student success.

Conclusion

This literature review examined 31 articles that have contributed to the framing and decisions I have made for this study. I began with the process I used to select the collection of literature for this review. Next, I explained the importance of studying identity in mathematics education. Identity has been used to understand difficulties in the education field. Strong identities can help teachers with curriculum reformations, retain teachers, and pass along positive mathematical identities to their students.

Theoretical underpinnings frame the research and help focus on the complexity of mathematics-related teacher identity. A social dimension was evident in the collection of literature. Social influences found on the construction of a mathematics-related teacher identity were described through the theoretical choices that focused the studies. This supports the use of Lave and Wenger's (1991) participation and sense of belonging within a community of practice.

The methodological choices for the studies in this review were case study, discourse analysis, other qualitative designs, and narrative. Some of these studies intertwined the methods and used narrative within other methods such as case study and discourse analysis. The theoretical underpinning and definition that tie stories and identity together (Kaasila, 2007a; Sfard & Prusak, 2005) laid the foundation for the use of narrative inquiry as the main methodology or use of narratives within another methodological choice to explore a mathematics-related teacher identity.

The literature also indicated that emotion and a teacher's past learning experiences play a key role in the construction of mathematics-related teacher identity. The importance of past experiences contributes to a teacher's current and imagined future mathematics-related teacher identity. These past experiences influence the way teachers engage with their students and the beliefs and decisions they make in their classrooms. Many of these experiences were laden with emotional components that formed the foundation of their mathematical identity. These emotions were carried with them into their teaching profession. Many emotions emerged in the studies, but one emotion, confidence, seemed salient. While confidence was brought up in twenty-one of the studies there was not much discussion surrounding its impact. Examining this relationship could provide additional insight into the formation and effects it has in the mathematics classroom.

CHAPTER THREE: METHODOLOGY

Life is shaped through the accumulation of experiences over time. Time provides us with a unique perspective and adds to our knowledge. Time in this study contributes to the fluidity of how one is becoming an elementary mathematics teacher. Identities are the ability to belong, and the interpretations of lived experiences that are interdependent on time. The truths and realities one creates are relative to the individual and the moments in time they are reflected upon. Similar to a Kaleidoscope, as time continues the base turns. The images we see and understand slowly begin to shift and change. We obtain a different view, but the object or experiences are still the same. We only gain a new perspective and understanding of objects in front of us. This study's view of reality and truth is the same. Using Dewey's (1938) pragmatic philosophy provides a way of viewing experiences. Through this perspective, experience is perceived as continually building on one another and influencing the next (Fiddler, 2021). Multiple realities and understandings may emerge and change as time continues. These realities are unique to the individual and are dependent on the social context. Clandinin and Connelly (2000) developed three narrative dimensions that draw on Dewey's philosophy. These dimensions create a space where the narrative inquiry takes place (Clandinin, 2006). These dimensions are the personal and social (interaction), past, present, and future (continuity), and place (situation). In this space, the researcher is not an objective observer but becomes a part of the experiences with the participant. Clandinin (2006) explains researchers "need to find ways to inquire into participants' experiences, their own experiences as well as the co-constructed experiences developed through

the relational inquiry process" (p. 47). These dimensions provide a space where the construction of a mathematics-related teacher identity is negotiated.

Over nine months, Suzie and I engaged in discussions and discovered meanings from naturally occurring experiences within her communities of practice (CoPs), delving into the emotions and reflections of planning and teaching mathematics lessons. These experiences occurred through interactions with other people, objects, and content. By examining Suzie's experiences in social communities, it is possible to understand both the social impacts and personal internalization these experiences provide on the continual development of a mathematics-related teacher identity.

Through this process, I listened to Suzie's narrative of her past learning experiences and her desired future. We made meaning together during Suzie's journey in becoming an elementary mathematics teacher.

Through your stories
I have seen you past
Through your heart
I see your future
Together
We discover

Purpose of the Study

The purpose of this narrative inquiry was to explore the continuing development of an elementary first-year teacher, Suzie, encompassing both her mathematical and teacher identities, and how these identities intertwine in shaping her mathematics-related teacher identity. This narrative inquiry aimed to understand the ongoing construction of Suzie's mathematic-related

teacher identity, shedding light on how her past experiences and struggles intersect with new experiences, thus contributing to the continual formation of her mathematics-related teacher identity. What impact does a teacher's past struggles with mathematics content have on their confidence to teach and build on their identity? To explore this further, I examined Suzie's perceptions of experiences and participation within her grade team, classroom community, and interaction with her students' parents. I also focused on how Suzie related to the specific mathematic content she will teach. Additionally, I explored how her confidence in the content impacted the way she plans and teaches the material.

Questions:

1) How is a first-year teacher's mathematics-related teacher identity influenced by her community of practice?
2) How does a mathematics-related teacher identity influence or is influenced by by her level of confidence in that CoP?

Research Design

Lived experiences are like a river (Dewey, 1935; Fiddler 2021). Emotions, experiences, and identities twist and turn influencing and continuing into the next stretch. Through Dewey's ontology, a narrative embraces the unknown. It allows the context to shape the story. Clandinin and Connelly (2000) describe a narrative of experience as "the personal and social; past, present, and future; combined with the notion of a place" (p. 50). I understand Suzie will continue to develop her mathematics-related teacher identity through personal and social interactions within her CoPs. As time continues, these social interactions affect the pre-existing reality and influence her understanding of events.

Narrative Inquiry

Narrative inquiries are used to discover and understand the complexities of lived experiences (Connelly & Clandinin, 1990; Kim, 2016d; Mertova & Webster, 2007; Moen, 2006; Pepper & Wildy, 2009). Kim (2016d) describes narrative used in education to honor the complexity of learning and teaching and seek connections through lived experiences. These experiences are both personal and social. Telling our lives as a story is natural. We have told and listened to stories all our lives. Narratives are the stories we tell about our lived experiences and social interactions (McAdam & McLean, 2013; Moen, 2006). Narratives allow us to view life through the reality of others. Highlighting experiences and feelings of emotions others may otherwise be unaware of. I hope to illuminate this story not only to learn from but to share with others who may experience similar situations. There is a great need to understand the challenges and conflicts first-year teachers face when trying to belong to teacher communities and begin teaching new content.

The Study

In this study, I followed one pre-service teacher, Suzie, from the completion of her college of education program through her first-year of teaching at a local elementary school. Suzie struggled with mathematics growing up and sought out tutoring to pass the mathematics portion of the General Knowledge Test, GKT, which is needed to become a certified educator. During this time, Suzie began to make connections to mathematics and appreciated the subject. As her time in the College of Education continued, she had teachers who were passionate about mathematics and shared a love of mathematics with their students. She also began to learn new teaching methods where mathematics could be relatable and hands-on for the students. This

encouraged a shift in her mathematical identity. At the end of her college of education experience, Suzie described her mathematical identity,

> *It's been an uphill battle (laughter) and um definitely that and I'm building my confidence in math and having the positive self-talk just telling myself I can do it, telling myself it's not scary, and just trying to be positive in it all. So, I would say my identity in math is guarded but I am opening myself up to it.*

I wanted to gain insight into what happens when the support and encouragement from the program are gone. Will the school community foster and encourage the continued development of Suzie's positive mathematic-related teacher identity, or will her identity transgress to a negative identity?

Setting

It is important to understand the context of this study. In this section, I capture the essence of the school Suzie's is currently teaching. Portions of the description were pulled from interviews with Suzie as she described how she feels when she arrives at school in the mornings. The next subsection explains the college of education program Suzie went through.

Suzie's School

This study takes place in a blend of a rural, residential, and commercial area in the Southeast United States. Suzie was hired as a first-grade teacher at one of the elementary schools in the school district. The school's population is diverse where the majority of the students are white (43%), Hispanic (31%), or black (19%). The school had a school grade of a B for three years before the pandemic. The most recent grade for the 2021 school year was a C. The school's motto is 'every *bird* every day.' This motto embodies the feel of the school. When you walk onto the school's campus you are greeted with warm smiles and greetings. The feeling of togetherness

is brought forth by the motto. It cultivates an environment of collaboration. It is a place that strives for excellence and puts the students first. Everyone works together for a common goal, to see the students succeed.

This image of togetherness can also be seen through the lessons being taught. The school district provides its teachers with a lesson plan for the modules they will teach. The teacher can make changes and additions to the lesson to accommodate their group of students. Providing the lessons keeps the lessons 'together' within and across the schools in the district.

Suzie is one of six teachers on the first-grade team. A team implies a group coming together for a common goal. That is exactly what this team does. They come together every Wednesday to support one another and promote student growth. Suzie describes her team as a "great support system and I honestly have a fantastic team and couldn't have asked for anything better to be quite honest." Radiance beamed from Suzie as she spoke about her team. Everyone on the team works well together and works positively. Suzie has already had one of her veteran teammates take her under her wing and help her navigate the new responsibilities, curriculum, and communication with parents.

College of Education

Suzie took part in an accredited elementary college of education program. This program is an intensive two-year program. To be accepted into the program individuals must have completed all general education courses. During the program, pre-service teachers are provided with both coursework and extensive fieldwork (internship). In the coursework, pre-service teachers take three mathematics methods courses (Suzie's cohort was the second with this requirement). In these courses, pre-service teachers learn different teaching philosophies, learn about the curriculum, and actively engaged in student-centered learning methods and the use of

manipulatives. The field experience begins their first semester in the program. Interns go to their placement school once a day each week for the first and second semesters. At the school, they have a collaborating teacher (a certified and clinically qualified teacher at the school) and a supervisor (a representative from the college of education who comes and observes activities each week). The number of days in the field increases to two days a week in the third semester, and five days a week in the final semester. The internship is accompanied by an hour-and-a-half seminar course. In the seminar, the supervisor richens their learning with discussions emphasizing inquiry, reflection, inclusion, identity, and cultural awareness. These seminars enlighten the pre-service teachers with an understanding of how their incoming beliefs influence their teaching practice.

Research-Friend

In this section, I describe the context of the study and the relationship between Suzie and myself. Suzie and I began developing a relationship two years before this study. This prior relationship created trust and rapport between us that could be described as a researcher-friend relationship (Ellis, 2007; Fiddler, 2022; Kim, 2016b). First, I describe how Suzie and I met. I then introduce Suzie, and then myself.

How We Met

The year prior to my first interaction with Suzie was my first year in the doctorate program for curriculum and instruction and I had been conducting face-to-face tutoring for undergraduate students seeking help to pass the mathematics portion of the GKT. At the end of my first semester, 2020 viciously presented itself. Schools, testing centers, stores, and restaurants were not permitting people. We were all waiting for what would happen next. Life would continue at some point. As testing centers began to open again and pre-service teachers resumed

their testing, I received an e-mail from Suzie inquiring about tutoring for the GKT. She had been struggling and wanted some additional help. I had begun tutoring via zoom but was still navigating my approach to tutoring on a virtual platform. We planned a time for tutoring, a time I had hoped my son would be napping. Things do not always go as planned and my son did not take a nap that day, but Suzie and I were able to talk and work through problems together. In this first interaction, Suzie was able to see me as more than just a mathematics tutor, she gained a glimpse into my life. This opened the relationship we made into more than just teacher-student. As we continued the tutoring sessions, we spoke more about her past experiences learning mathematics and I explained why certain aspects of word problems were important connecting it to her future teaching. Suzie continued to make strides over the next few months of tutoring. She had gained confidence and her anxiety was less. She was also able to make more connections. She took the mathematics portion of the GKT and passed!

A few months later, I began to think about how many of the students I had tutored had developed poor mathematical identities while in school. However, as we held tutoring sessions, I could begin to see a transformation. I reached out to Suzie and asked if she would speak with me about her past and present experiences with mathematics. We continued to talk through her last year in the college of education leading into her first year of teaching.

Suzie

Here I introduce Suzie using the first-person narrative to allow the reader to begin to feel a closer connection to her (Pepper & Wildy, 2009). This introduction was created using our conversations from interviews. The introduction was also given to Suzie for her to make additions or changes to keep true to her voice.

I just recently graduated from the Elementary College of Education program and am so excited to begin teaching. It has been a journey with ups and downs, especially at the beginning. I came into the program hating math, but now I realize there isn't anything to hate about it. I had one professor who had such a positive attitude toward math which we absorbed. She really made me begin to look at math from a teacher's perspective and realize how important it was for me to change my outlook on math. Once you understand why things work the way they do math isn't so bad. I want my students to enjoy math and understand its importance. I do not want them to hate it as I did.

During my program, I only taught two math lessons, and the first was awful. Learning was done online at that time, and my CT (Collaborating Teacher) did provide me with any resources. I had to try to figure it all out on my own. I ended up using my little sister's notes to help me. About halfway through the lesson my CT jumped in and began rephrasing my instruction. At that point, I began to give up. My CT encouraged me to try one more time. Even though I did not want to, I agreed. This time I was ready. I went online and really planned the lesson. I knew the content and prepared my wording. It went much better. This was a year ago. In my last year of internship, my new CT only taught reading and language, so I did not have to teach math, nor did I watch any math lessons. Coming into this first year of teaching I will have to teach all the subjects. Honestly, I am nervous about teaching math each day for my class. However, I feel I have learned a lot in my math methods courses to help me realize the kind of math teacher I want to be.

Below is a found poem created using Suzie's exact words from a semi-structured interview done before she started her first-year teaching. This poem portrays her desire of *becoming* an elementary mathematics teacher. Suzie illuminates a hope to change the

mathematic learning cycle so her students can experience a passion for mathematics rather than fear and anxiety.

I want to be

I'm not going to do what my teachers used to do.

denying your answer if you do it another way

I don't want my kids to have a negative attitude on math

I don't want them to be scared of math

because math is in everything we do in life,

it is so important that I change my outlook

so I can teach it for success.

make math hands-on

use of manipulatives

allowing group conversations

group discussion

make math space collaborative

discussion and hearing student's methods

being that facilitator of learning

I hope to instill

math is not scary

I don't want them to say they can't do something

You CAN do it

having that confidence

it's okay to make mistakes in math

it's how you bounce back from that mistake

Suzie was selected for this study because she originally had a negative mathematical identity. She self-identified herself as poor at mathematics and sought out help to pass the mathematics portion of the GKT. However, through her experiences in the college of education program, this identity began to shift, and Suzie wanted a positive mathematical identity. Suzie also expressed that she does not want to teach like her past teachers. She does not want to revert to a style of teaching where the teacher lectures and there is only one way to solve a math problem. She hopes to make her mathematics lessons a space where her students can collaborate and where each student's thoughts are valued. With Suzie's recent changes in her mathematical identity, I believe her identity could be easily swayed if she does not have supportive communities surrounding her.

Me

I think I always knew I would be a teacher. I had good awareness and was able to help others when they needed it. I coached volleyball camps, swim lessons, and swim team and loved breaking down the importance of each move. I was even a cadet teacher in high school. For some reason I fought this as I went into college, I wanted to apply the knowledge first. It was not until my senior year of college that I considered being a teacher. I was asked to tutor a student who was failing math. We met a few times, and I was able to break down the material and explain it, so she was able to understand. She then would then go and explain it to her classmates. She went from failing to one of the top grades in the course. It was at that moment I knew I would eventually teach mathematics. I wanted to pass along a positive view of mathematics and make it enjoyable, relatable, and understandable. Once I became a teacher that was my biggest goal. I wanted my students to have a better appreciation for mathematics. I loved teaching mathematics,

but it pained me to watch other students lose their desire to continue to learn mathematics. There were teachers I taught with that did not know the content, had no pedagogy, and could not relate the material to their students. I realized if I wanted to make a bigger difference, I would need to change my audience. So, here I am in my Doctorate program, and I am still seeing students who fear mathematics, but now they want to become teachers. I have realized there is more to teaching than content knowledge and a strong pedagogical knowledge, but the relationship we create with the content we teach. This relationship and identity influences our beliefs, the way we present the information, and the ability to pass along a love for the subject. I am passionate about passing along a positive mathematical identity to pre-service teachers, so they can spread an appreciation for mathematics to their students.

While I was teaching, we moved a few times, and I felt the pressures from others as a "newbie" with each new school. I felt I always had to prove myself before being listened to and accepted. I told you about my experience at my first school teaching, struggling to belong. However, I was also new to two other schools. Each had completely different feelings. One school pushed their teachers to plan together and to try new ideas with their students. The other school taught straight from the text and I felt I had to defend doing what was best for my students. The communities we find ourselves in can build us up or tear us down.

Story Collection

The stories presented in this study blend Suzie's experiences with my own, reflecting Suzie's perception of her experiences in the classroom and grade team. It is a story of participation and belonging to communities of practice (CoPs), preparation for mathematics lessons, and level of confidence in and teaching different mathematics content. To gather a deeper understanding of Suzie's self-perception of her identity and her confidence, I employed

multiple types of data collection. It is natural to talk about an experience as a story. Relationships are also lived out in narrative form (Gergen, 2001). Therefore, the primary data collection was semi-structured interviews with open-ended questions, allowing Suzie to express her meaningful stories. The purpose of using interviews was to reveal the participant's, in this study research friend's, "feelings, intentions, meanings, sub-contexts, or thoughts on a topic, situation, or idea" (Lichtman, 2013 p. 190). The research-friend relationship between Suzie and myself provided a space where Suzie felt comfortable speaking openly (Kim, 2016b). During our meetings, I provided Suzie with "the time and space to tell her story" (Connelly & Clandinin, p. 4, 1990). I engaged as an "active listener" aiming to gain a sense of her cognitive and emotional engagement with the story (Kim, 2016b). As I listened to Suzie's stories, there were times I found connections to similar experiences I had in my first-year of teaching. I shared those stories with Suzie, along with the associated emotions. This allowed us to engage in conversations that grew our own knowledge from one another.

I conducted multiple semi-structured interviews to gain insight into past experiences, current interactions indicative of identity within shorter moments, and, finally, an overview of her identity at the end of the school year. This process contributed to Suzie's construction of her identity within different contexts and the reality she viewed herself (Gergen, 2001; Lichtman, 2013).

The data collection unfolded in four phases: prior teaching, commencement to teaching, teaching cycles, and end of first-year teaching. Each phase consisted of semi-structured interviews that focused on Suzie's stories regarding her experiences with mathematics and teaching mathematics at different points in her life. The teaching cycle phase consisted of five rounds consisting of semi-structured interviews, audio-recorded reflections, and confidence

ranking. Towards the end of the school year, due to Suzie's limited time we only conducted semi-structured interviews for two additional months. Figure 2 illustrates the phases and data collected during each phase over time.

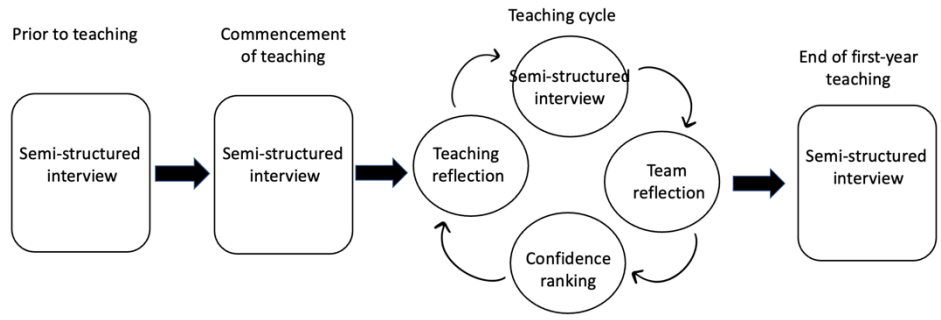

Figure 2:

Data Collection Process

Prior to Teaching

Many aspects of this study depended on an understanding of the past. I knew Suzie for two years prior to the start of this study. We learned together and discussed past experiences contributing to the development of her mathematical identity. Through the time we spent together we developed a rapport that generated meaningful and useful data (Lichtman, 2013). I interviewed Suzie prior to her first year of teaching. This interview allowed Suzie to tell her mathematical narrative and provided me with an understanding of her past experiences. I learned more details about Suzie's past mathematical learning experiences. Knowing these past experiences allows for a deeper understanding of Suzie's identity. In addition, as Dewey (1997) explains, these past experiences may influence her current and future experiences. While Suzie was in K-12 grades she began to form a negative relationship with mathematics. During her time in the college of education, a transformation started, and a positive shift began in Suzie's

mathematical identity. Suzie described that a professor she had affected her relationship with mathematics positively,

> *taking her courses she was just so insightful because she had that positive attitude about math and, to be honest until coming to University and taking my math (methods) courses I've always had a negative view of math but she really you know helped me get and to see math from a teacher standpoint to see why it's important for me to change my outlook on math, and um not to hate it.*

Having access to this past knowledge helped me understand Suzie's confidence levels with different mathematical topics and the way she made meaning of her current experiences. During this interview, Suzie also shared her desire as an elementary mathematics teacher before she began her first-year teaching. This provided me with Suzie's goals and hopes for her future year of teaching that we reflected on throughout the school year.

Commencement of Teaching

At the beginning of the school year, Suzie and I met online. During this time, Suzie shared with me her initial feelings about her school and working with her team. These initial emotions provided me with a baseline of understanding, in which I referenced throughout the subsequential semi-structured interviews. Suzie also shared with me how she was enjoying teaching mathematics, which was the opposite of her feeling over the summer.

Teaching Cycles

Each month Suzie and I conducted a cycle consisting of a semi-structured interview, audio recorded reflections/narratives, and a ranking of her self-confidence. Each of these provided me with different insights into her identity, sense of belonging, and confidence. In the following sections, I describe each data collection in more detail.

Semi-Structured Interview. At the beginning of each month, Suzie and I met online. Suzie shared her experiences and feelings that stood out to her during the month. These stories could be a specific moment while teaching, a change in her methods of teaching mathematics, or a conversation she had with a student or coworker. I also had some topics I wanted to talk about during this time if not brought up by Suzie. For instance, I asked Suzie about her audio-recorded reflection from the month prior. Additionally, I would ask Suzie about the school environment, grade team, or her classroom community. For example, I asked about the dynamics and support within her grade team. We also discussed the upcoming mathematics content, offering me a glimpse into her confidence regarding the topics she would be teaching. This discussion also opened our conversations to reflections about how she learned that same content during her schooling.

Audio-Recorded Reflections. Each month, there was also an audio-recorded reflection. This reflection could also be considered a narrative of Suzie's recent experiences. This reflection was recorded during Suzie's own time, affording her with the space to reflect about experiences as they happened, rather than waiting until our next meeting. This approach helped in capturing the emotions and thoughts that arose in the moment. Each reflection was between five and ten minutes where Suzie shared her thoughts and feelings that arose and the impacts it has on her mathematics-related teacher identity.

In the audio-recorded reflections, I asked Suzie to reflect on different events that she felt were meaningful at that time. Some topics she reflected on were the experiences she had with her grade team. Suzie shared some specific experiences such as how they used their student data. Suzie also reflected on how she felt she was able to contribute and participate. Other topics Suzie reflected on were her planning for a mathematics lessons, her level of confidence in

mathematical concepts, teaching implementation, as well as her new classroom management plans. While reflecting on these topics Suzie talked about specific situations that happened during the lesson. She also discussed what she felt worked well or what did not work well during the lesson. She also considered how well she thought her students absorbed the content. These reflections shed light on both Suzie's mathematical identity and her teacher identity. Where she reflected on both the mathematical content and her teaching methods and strategies.

Confidence Rating. Each month Suzie rated her confidence on a scale from one to ten both before teaching a mathematics lesson and after teaching the lesson. There were three different confidences I looked at: content, teaching implementation, and student reception. Understanding Suzie's confidence in the mathematics content gave me insights into her connections with her mathematical identity (Kaasila, 2007a). Suzie's level of confidence in her implementation of the lesson helped me understand the relationship between Suzie's mathematical identity and her teacher identity. The confidence level in her perception of her students' reception of the lesson helped me understand her teacher identity.

Before teaching the lesson, Suzie rated herself on two aspects: How confident do you feel with the math content? and how confident do you feel teaching the math lesson? There was also an open-ended question: What are you the most excited or nervous about implementing in this lesson? After she taught the lesson, she rated herself again, on the same two questions plus one more question: How confident are you that your students understood the concept? This rating process created an intentional pause for Suzie to think and reflect about the connection between her confidence and her teaching. She made the realization that she often felt she would teach the content in the way she learned. This contributed to both our understandings between Suzie's confidence and her identities.

Researcher Reflections. Throughout this study, I kept memos documenting my thoughts and feelings regarding our conversations and interactions. I wrote down my initial impressions and thoughts from our interviews, as well as notes on what I thought was important at that time. As Suzie and I continued to talk, some of my ideas and views of importance shifted, and I noted these changes as well.

End of First-Year Teaching

I conducted one final semi-structured interview in May. This interview reflected Suzie's entire first-year of teaching. Identity is dynamic and can change over time. This semi-structured interview captured how Suzie felt her identity evolved over the school year. I provided Suzie with the opportunity to reflect and narrate her story of her first-year of teaching. We discussed the lessons she had learned and her goals for her second year of teaching. I also ask Suzie to reflect on her participation and sense of becoming a member of her grade team. Additionally, Suzie reflected on what she felt impacted her mathematical identity and teacher identity. Suzie also shared what she believed contributed the most to her mathematics teaching and the aspects of her teaching she was the proudest of during the year. Suzie described her mathematics-related teacher identity in her own words, and I shared what she had said before she began teaching. This was a great moment where Suzie recognized how much she had grown as a mathematics teacher.

Overall

Over the school year, I captured an in-depth picture of Suzie's ongoing construction of her identity. The multiple collections throughout the year provided me with both in the moment (micro) construction of her identity as well as an overarching (macro) reflective construction of her identity. Suzie was able to talk about the moments she felt were most significant to her

becoming an elementary mathematics teacher. She also reflected on how her past learning influenced her feelings towards the content she taught and how this influenced her planning and teaching methods.

While these were the planned times for Suzie and me to meet and record information, it was not limited to only these planned meetings. I made sure Suzie knew if she even needed to talk, I was available. We also had various e-mail correspondence where I shared some words of encouragement, and she shared exciting moments that had just happened during the day.

Meaning Making

The process of meaning-making begins with a theoretical understanding of identity. In Chapter One, I expanded on my theoretical framework for mathematics-related teacher identity. An individual's experiences are foundational of their identity. As Suzie interacted within her CoPs, grade team, mathematics classroom, and parents, her participation and sense of belonging contributed to her identity (Lave & Wenger, 1991). Through the narration of her experiences as stories, she continues to construct her mathematics-related teacher identity (Kaasila, 2007a; Sfard & Prusak, 2005). The way Suzie portrays these stories offers a lens to understand her "being and becoming" an elementary mathematics teacher (Gee, 1999). In the following section, I outline the path to extracting meaning from Suzie's stories.

In narrative inquiry, different analytical approaches can be used, including thematic, structural, and performance as examples (Nasheeda et al., 2022). Since my primary focus is on the meaning of the experiences Suzie encountered, I used a thematic approach. To begin the understanding process, I framed my analysis around reflexive thematic analysis (Richards, 2022). This process consists of five steps: know the data, code the data, categorize the data, create themes, and interpret the data, while continuing to loop back and practice reflexivity

(Richards, 2022). In this first step of knowing the data, I engaged in what Kim (2016c) describes as flirting with the data. This involved immersing myself into the data to gain a deeper understanding without limiting my perspective. I *listened* to the data, not just what was being said, but how it was conveyed. I read the transcript and listened to Suzie's words. I reread my initial memos and added more of my thoughts. In the second step, instead of coding the data, I created a holistic story that encapsulates Suzie's reflections and our conversations for each month. These stories provided a narrative of Suzie's experiences and emotions she encountered in each month, all of which influenced her mathematics-related teacher identity. As I reflected on the holistic stories, recurring ideas began to emerge, leading me to the next step. In this step, I created categories that capture reoccurring ideas each month (Richards, 2022). As I created these categories, I would relisten to the data and add quotes from Suzie that fell within each category. Re-listening to the data also gave me a new perspective on what I thought was important and would add new categories. While relisting to Suzie's stories I began to see key moments that evoked a change in Suzie. These key moments provoked reflexivity in Suzie's teaching practices and shifted her perspective of herself as an elementary mathematics teacher. This gave me an understanding of how Suzie constructed her identity. These key moments laid the foundation for the fourth step, listening for emerging themes. These themes represented the ongoing construction of Suzie's mathematics-related teacher identity. Using these key moments, I created an overarching story that encapsulated Suzie's mathematics-related teacher identity. I then went back to Suzie's stories to delve deeper into the interpretation of these themes. I examined the progression of themes over time and considered their intensity and appearance within and across Suzie's CoPs. As I explored these trends and emotions associated with the themes, I examined how Suzie positioned herself within her various CoPs and how this positioning evolved during

the school year. Using Gee's (2011) identity-building tool allowed me to understand how Suzie built her reality of participation and a sense of belonging to her communities. The language that can be considered identifying would be where Suzie portrays becoming a certain role, or how she enacts her role (Gee, 1999). This can be seen with "I" statements. These roles Suzie created in her narrative contribute to the construction of her mathematics-related teacher identity.

Figure 3 visually outlines this analytical process. The data collected each month were condensed into a single narrative. From these narratives, emerging categories were found. Once the categories from each month were articulated, I looked across each month for common themes and key moments. These themes provided the baseline for an overarching narrative emphasizing key moments that changed Suzie's mathematics-related teacher identity.

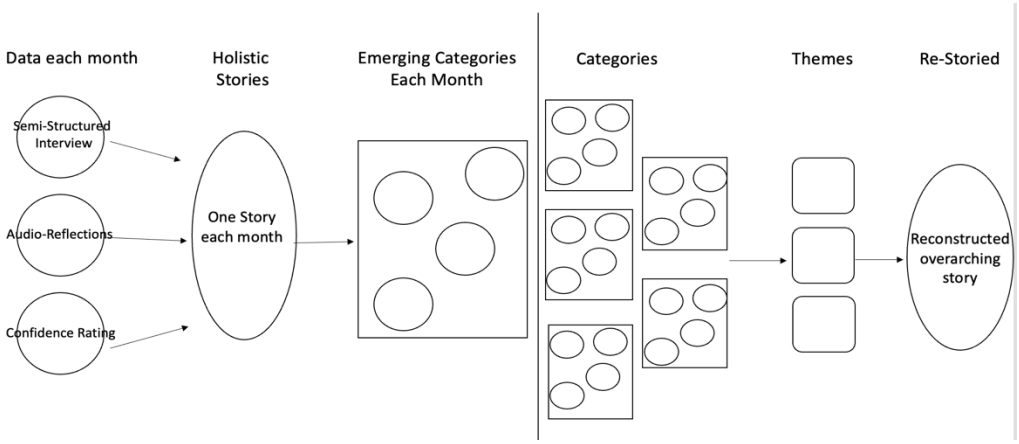

Figure 3:

Analysis Process

This analysis process was a creative process, and some parts are hard to describe. For instance, describing how I formulated the categories, how these categories evolved into themes, and how I conducted my cross-data analysis. Over the course of the year, some of my thoughts and ideas shifted, which was why going back and listening to Suzie's stories was so important in

my understanding the construction of her mathematics-related teacher identity. To facilitate my process, I used note cards to jot down my ideas, allowing me to rearrange these pieces as I organized my thoughts. I also highlighted aspects related to Suzie's teacher identity, mathematical identity, and where they merged as her mathematics-related teacher identity within her stories. I attempted to capture some of my process visually. Figures 4, 5, and 6 offer a visual representation of my analytical journey.

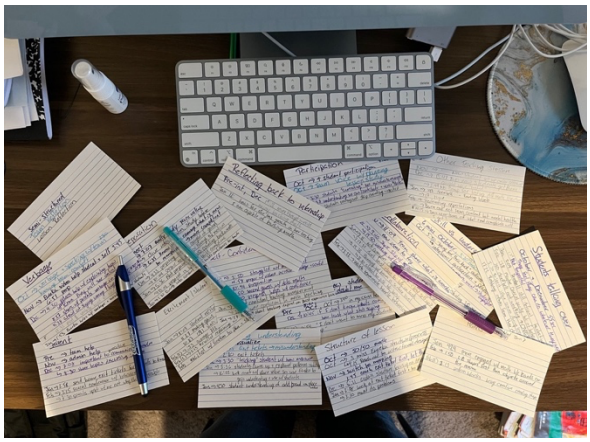

Figure 4:

Picture Writing Categories

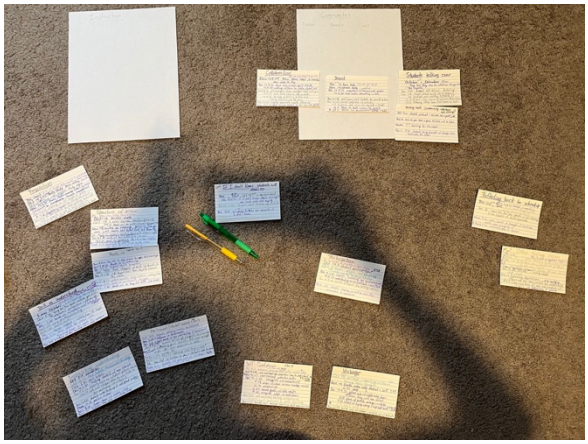

Figure 5:

Picture Organizing Categories into Themes

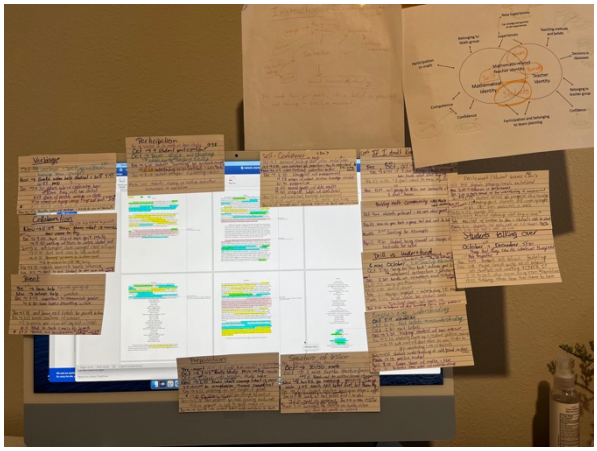

Figure 6:

Picture Looking Across Stories and Themes of Categories

Once I wrote the over-arching story, I shared it with Suzie to ensure she felt it captured the conversations we had throughout the school year. When I shared the story with Suzie she responded,

> Wow!! I just finished reading it and it is amazing!!! As I was reading, it was like I was going through my first year in a movie theater and watching everything on the big screen. You truly captured our conversations perfectly.

In Chapter Four, I share the reconstructed overarching story of a first-year teacher's mathematics-related teacher identity. I then go into details of key moments in Suzie's stories that happened in her CoPs. I also explain how these events contributed and influenced Suzie's identities (i.e., mathematical identity and teacher identity and how they worked together to create her mathematics-related teacher identity).

Quality

This is a study of discovery, using a narrative approach to research identity the apparency (visible), verisimilitude (lifelikeness), and transferability should be examined to understand the quality of the study (Connelly & Clandinin, 1990; Pepper & Wildy, 2009). Apparency refers to the ability to be easily seen or transparent. In this study, I have shared the research friend relationship Suzie and I have. This type of relationship created a space in which Suzie could openly share her stories and emotions. As part of the design of the study, I also engaged in this space with Suzie. I intentionally shared my story to provide an understanding of my influences on the study and its interpretation. For example, my involvement may impact Suzie's experiences and the way she makes meaning from these experiences. Verisimilitude enables the reader to express 'I can see that happening' (Connelly & Clandinin, 1990; Pepper & Wildy, 2009). Utilizing specific details in the narrative, including imagery and emotional descriptions, enhances the authenticity of the narrative for the reader. By using details and by presenting a progression of the context, I hope readers can sense the verisimilitude of the study. I am conducting this study with the intention that readers can relate to various aspects of Suzie's story, recognizing that each reader's relationship with the narrative may differ.

To ensure the trustworthiness of my paper I used member checking and triangulation (Kim, 2016c). This narrative is about Suzie's experience in her first year of teaching, and I wanted to stay true to her voice and her perspective on the effects of different experiences. To ensure I kept to Suzie's truth, I had her read the narratives throughout the study and ask if the narratives portray her story (Pepper & Wildy, 2009; Kim, 2016). Triangulation also helped provide a complete picture of Suzie's story. To triangulate her story I collected interviews, audio-recorded reflections, and confidence ratings. This is a study for understanding the emotions, the

challenges, or ease in participating and gaining a sense of belonging within CoPs, and the affects they have on a mathematics-related teacher identity.

While our relationship is described as research friend there could still be a role of power. I have made room in this study for Suzie to begin our conversations on what she feels is important to her. I also have created a space where Suzie's reflections are more open to her free thought. I delve into considerations of this relationship in a miniature chapter.

The end of this study does not mean the end of our communication. As I write, I took time to immerse myself in Suzie's story. I did this by listening and relisten to Suzie's reflection and interviews. Keeping Dewey's theory of continuity in mind I realized with new experiences new meaning and understanding of past experiences were made. I contacted Suzie as I wrote, giving her some sections of the paper to read to check if I am capturing her story. I was also available if she wanted to talk or meet. Once the study was completed, I still stayed connected with Suzie (Ellis, 2007). She is enjoying her second year of teaching, and feels she has grown much since the beginning of her first year of teaching.

Ethics

The first ethical responsibility is obtaining IRB approval. This study falls in line with a pre-existing IRB the elementary college of education has with the University with their recently graduated students. I also obtained my own IRB approval specific to this study. This, however, only looks at a small portion of what encompasses ethical research.

Within my ethical responsibility, I also needed to be aware of my and Suzie's effects on our study's ethics. Keeping my research honest and transparent presents this study more ethically (Bishop & Shepherd, 2011; Tracy, 2010). In this study, I have a close relationship with my participant, where I feel the term "research friend" is more appropriate (Fiddler, 2022). Some

may view a close relationship as an interference. I, however, view this relationship as deepening my understanding of my research friend's experiences. Bishop and Shepherd state, "qualitative methodologies encourage intimacy and closeness to data" (p. 1285). This close relationship also encouraged Suzie's truth to become visible. We can never really know what is going through the mind of a participant or their truthfulness (Bishop & Shepherd, 2011). However, with a research friend, the friendship allows for open conversation and vulnerability which richens my understanding.

We each carry our own past experiences, beliefs, and social ideologies. I have my own beliefs and biases that can influence my interpretation and understanding of situations. It can be hard to know what from myself will have the largest impact on this study. This is why I shared my story at the beginning. I know my beliefs may shift and change during the study as well. I wrote a second self-reflection that is shared at the end of this study. Creating a close relationship also opens the door to relational ethics. I needed to keep my research friend in mind as I wrote. I did not want to break the trust and friendship we had built. As we met, I created opportunities where Suzie could decide if she wanted something added or deleted from the story (Ellis, 2007). These opportunities increased our trust and respect.

Positionality

The varying experiences and cultural up-bringing's that Suzie and I had may cause differences in my interpretations. In some respects, I am an outsider. I never taught at the elementary level. The sense of community or 'togetherness' was not a part of the school culture where I taught. The planning of lessons and language used is also different between elementary and secondary teachers. I also never struggled with mathematics. This was always my strong subject and the class I felt most comfortable in. This led me to an innate instinct as I entered the

teaching profession. I felt confident and passionate while teaching mathematics. This is not the same for Suzie. During her internship she only taught two mathematics lessons, one was a "traumatizing" experience and for the second Suzie had to dive into the content to understand it herself first and then consider the teaching component. I am also a white female in my mid-thirties and Suzie self-identifies as a black woman in her early twenties. This creates a different lens we see the world through.

I do, however, possess an insider perspective as well. Suzie and I have built a relationship over the past two years. I have seen her struggle with mathematics along with her determination to become a teacher. This past bond we have created has allowed me to know Suzie more than just a student I tutored. I see Suzie as a teacher who wants to instill a passion for mathematics in her students, something she did not experience as a learner.

Coming Together/Conclusion

Through a narrative inquiry, I captured the emotions and tensions of lived experiences that influence a first-year teacher's mathematics-related teacher identity over time. Dewey provides the len to examine her experiences. Understanding how Suzie sees herself participating and belonging to her new communities of practice contributes to her identity (Lave & Wenger, 1991). Expressing these experiences as narratives provides a space where the construction of her mathematics-related teacher identity continues. This is also a space where I became a part of these experiences and we explored the continuity of these interactions (Clandinin, 2006).

Before I share the construction of Suzie’s mathematics-related teacher identity I go into more detail about the researcher friend relationship Suzie, and I have and the impact that has on this study. Then I share the re-constructed story of Suzie's mathematics-related teacher identity

over her first-year teaching. I examined the roles her communities of practice and confidence had in this development.

CHAPTER FOUR: IMPACTS OF THE RESEARCH FRIEND RELATIONSHIP

In this miniature chapter I go into more detail about the research friend relationship. This type of relationship is not discussed often but is an important aspect of this study and within narrative inquiries. We live in a world of labels, and the type of relationships we hold with others is not exempt from distinguishing the degree of closeness through some label. We have heard the terms "best friend" and "work friend" used and have some understanding of the difference between these types of relationships. This causes me to pause and explain the meaning and implications of a research friend relationship.

Narrative inquiry serves as a means of understanding experiences. In this process, the researcher and participant share more than just responses to a question. They share a part of their world and life with each other. Narrative inquirers are unique as they, "recognize the centrality of relationship among the participants and researcher" (Clandinin & Caine, p. 166, 2013). Throughout the study, the relationship between the researcher and participant continues to grow, as does the knowledge each gains from the other (Kim, 2016e). These interactions lead to the evolution and emergence of the subject being researched (Kim, 2016e). Connelly and Clandinin (1990) express the collaboration between researcher and participant similar to a friendship, where two or more individuals share interpretations of their experiences. Connelly and Clandinin further elaborate on three important aspects in the research relationship: "the equality between participants, the caring situation, and the feeling of connectedness" (p. 4). Equality empowers the participant to have a voice in the research process, where they feel empowered to share their

stories. This intertwines with providing a space where there is a connection between the researcher and participant and each feel cared for. This relationship establishes a space where both voices- the participant's and the researcher's - are heard, offering both the opportunities to learn and grow through the sharing of experiences.

How this Relationship ties in with my Ontology and Epistemology

Clandinin (2006) describes the intersection of three dimensions that form the narrative inquiry space: interaction (personal/social), continuity (time), and situation (place). The stories and conversations exchanged between Suzie and me transpired over multiple interactions (field-text as described by Clandinin and Caines (2013)). These conversations are co-composed by both Suzie and my reflections of past experiences (Clandinin & Caines, 2013). As we share our stories, our interactions are internalized through thoughts and emotions and projected onto new experiences and actions (Clandinin & Caines, 2013). The "place" where these interactions occur are, "where lives were lived as well as to the places where inquiry events occur" (Clandinin & Caines, p. 167, 2013). This indicates recognition of the place where we tell and reflect upon our experiences as well and the actual place the experience took place.

During the times that Suzie and I met, I provided Suzie "the time and space to tell her story" (Connelly & Clandinin, 1990, p. 4). Additionally, I shared my own experiences, engaging in conversations that grew our mutual knowledge. At the intersection of dimensions, Suzie and I could, "co-compose and negotiate the living, reliving, telling, and retelling of stories" (Clandinin & Caines, 2013, p. 169). Through this series of conversations, our voices begin to meld into one shared narrative. During this process, our prior experiences and notions were molder and evolved as a result of these encounters (Smith, 2007).

In Relation to the Data

Clandinin and Caines (2013) describe three phases of the data: field text, interim research text, and final research text. In my study, the field text encompasses the interview transcripts containing Suzie's stories and our conversations, as well as transcripts of Suzie's audio recorded reflections and my written memos. These data are composed and co-composed by both Suzie and me. From this collection of field texts, I am crafting holistic stories for each month. These would be the interim research texts. These texts are "shared and negotiated with participants prior to being composed into final text." (Clandinin & Caines, p. 169, 2013). The final research text is then written with the audience in mind, the final overarching story.

Throughout this process, it is first important to consider my own position and perspective as I enter this study. I have provided parts of my background in Chapter One and Chapter Three. Additionally, I have kept a personal journal to track how my position and understanding have changed during this journey (Kim, 2016e). "Narrative inquiry is an ongoing reflexive and reflective methodology" so having that space to reflect on my impacts on Suzie as well as how my views have changed is important (Clandinin & Caines, p. 171, 2013). Understanding the relationship between Suzie and myself, where we co-create our own community based on trust, care, and openness, sets a space where we can share stories and engage in meaningful conversations.

In the following chapter, I present the overarching story that emerged through the melding of Suzie's and my conversations and experiences. This story aims to provide readers with context and a vivid portrayal of the emotions and events that shape a teacher's mathematics-related teacher identity. The second section of the chapter is centered on Suzie's words and experiences, offering themes and excerpts from her stories that illuminate each CoP. I end the

chapter with a retrospective reflection of Suzie's experiences during the school year, and the hopes she has as she continues on her journey.

CHAPTER FIVE: CONSTRUCTING IDENTITY

As discussed in Chapters One and Three, I view mathematics-related teacher identity as the interweaving of a teacher's mathematical identity and teacher identity. This identity is developed through participation and a sense of belonging to different social groups, and is constructed through the stories shared with others. The stories shared are an accumulation of experiences, and play a pivotal role in this process. Dewey's (1997) principles of continuity and interaction provide a lens to understand the nature of these experience. Experiences promote growth and development of an individual's identity. Each experience builds upon another and offers new perspectives on past and present interactions. Experiences are interactive and involve contact or communication with others. In this study, I focused on Suzie's experiences, presented as narratives within her communities of practice (CoPs) through her first year of teaching, attending to Dewey's principles of continuity and interaction, I have highlighted the experiences Suzie believes impacted her mathematics-related teacher identity. A narrative methodology allowed me to understand how Suzie's experiences continually formed and influenced her self-conception as a mathematics teacher. Through our conversation and Suzie's self-reflections, I learned about Suzie through her own perspective. Within our dialogue Suzie articulated the stories that allowed me to understand how she constructed her mathematics-related teacher identity, during her first year of teaching. Throughout the year, Suzie's identity was continually being constructed through the interaction and experiences she gained. Although this study

captures Suzie's stories through the end of her first year of teaching, her journey and identities still continue to develop.

In this narrative inquiry, I set out to understand: How is a first-year teacher's mathematics-related teacher identity influenced by the different communities of practice? And, how does a mathematics-related teacher identity influence or is influenced by her level of confidence in that CoP? To do this, I share what I learned about Suzie's "being and becoming" an elementary mathematics teacher. As described in Chapter Three, the data for this study were drawn from the interviews, self-reflections, and confidence ratings over the course of the school year. I have taken these stories, Suzie and I shared during this time, and describe them in three parts: an overarching holistic story of Suzie's experiences, a detailed compilation of Suzie's experiences within her different communities of practice (CoPs), and her retrospective reflections on the lessons she learned from the first year of teaching.

In the first part, I share the overarching story that was co-constructed through the conversations between Suzie's and myself. This story was constructed through conversational spaces where Suzie and I came together and shared our teaching experiences (Clandinin, 2006). Our stories and emotions became intertwined as she reflected on past experiences, her current situation, and how these events might impact her future. In this first year, teachers learn much about their profession and themselves as educators. They find themselves amidst opportunities for great growth and/or challenges. This is a time when a teacher's mathematics-related teacher identity is continually being constructed through new experiences. This co-constructed narrative from one teacher brings to light moments many teachers have experienced, and embodies the emotions and struggles teachers face during the school year. This story is written in the first

person to capture the emotions and events of a first-year teacher. It also provides context so when specific events are discussed in the second part it is better understood.

In the second part, I examine Suzie's transitions and experiences within her CoPs. The key moments I share demonstrated a shift in Suzie's mathematical identity and/or her teacher identity. These moments provoked Suzie to reflect on her teaching practices, shift her self-perspective, or were repeated in her narratives. I discuss the impacts of these experiences and the progression over the school year influencing Suzie's mathematics-related teacher identity and confidence within each CoP. I use quotes and found poems from Suzie's stories to capture her voice.

The third part describes the growth Suzie feels she experienced during her first year of teaching. It provides a retrospective reflection on her first year of teaching. It captures how Suzie made meaning from her experiences and the transformation in her identity after she completed her first year of teaching. It offers insights into her visions for her second year of teaching. She displays a desire to continue to grow as an elementary teacher. This shows Suzie's continuing trajectory of her understanding of being and becoming a teacher. I tell this story in the first-person, using Suzie's perspective to illuminate the meaning she has made on her journey.

These stories are told in different perspectives, so I use the first-person pronoun *I* in two different ways. At times the *I* is my personal I as I reflect and tell the story. I also use the word *I* to tell the story from the perspective of Suzie. To distinguish between the I's in the stories, I begin by specifying when I am telling the story from Suzie's perspective.

Over-arching Story from Suzie's Perspective

(This section is written from Suzie's perspective, so the *I* corresponds to Suzie)

I've never been a math person. Math has always been a struggle for me as far back as I can remember. So, when I got a job offer to teach an all-contained class I was met with a variety of emotions. I was so excited to begin my teaching career but couldn't imagine how I was going to teach everything, I was scared. How could I be a successful math teacher when I was scared of math myself? How was I going to get in front of my students and explain the same concepts I struggled to learn?

The summer came and went so fast. I had plans, plans to get ahead, look at the curriculum, and understand the trajectory but I couldn't access my school account until it was time for the school year to begin. It's frustrating to feel held back by all the hoops you have to jump through just to be proactive. It was a whirlwind start to the school year. There is so much to navigate; setting up the classroom, various meetings, learning the curriculum, learning to communicate with parents, knowing who to go to with what questions. This alone could consume your energy and time. Fortunately, I was surrounded by a supportive grade team who helped me navigate the vast terrain. One team member really took me under her wing. Dealing with parents was something I hadn't done before and she helped me respond to parent e-mails in a professional way. She also helped me learn where to locate and understand how to use the school resources, and so much more.

Each Wednesday we held team meetings to touch base on how things were going in our classrooms and plan how many days to allocate to each lesson. I'm not going to lie it's intimidating going to these meetings. Even though everyone is really nice I hesitate to participate during these meetings. I realize I don't know all the teacher terminology yet and feel if I speak up, I'll feel out of place. I have questions, but I'm not always sure how to ask, and I don't want to seem like a bother by asking too many questions. I'd rather try to figure it out on my own, even

though it may take more time than just asking. Each week I'm learning new aspects of teaching and how to communicate with my team. I actually spoke up one week during our meeting while we were deciding what lesson we would plan together for our school-wide lesson study focusing on intentional planning. We were talking about the lesson study and the others were throwing out ideas for the lesson study. I sat back for a moment and then spoke up, "Can we do a math lesson?" I knew I was struggling with math and wanted to improve my instruction. My team is so great. They all agreed and we began planning our lesson. I really felt I had a voice and my team listened. The more I talk with my team the more comfortable I am sharing and I'm learning how to communicate with my team.

This was a big turning point in my understanding of teaching math. We came up with ways of making the lesson interactive and engaging for our students. There was a purpose behind each question we had our students do. I was so excited to teach this lesson to my students. I had been planning it with my team. I knew the content and understood the flow of the questioning. I could tell my students were making more connections during this lesson. I learned how to take my students' exit tickets and use their answers to improve my instruction. This whole experience made me realize I needed to reorganize the way I was planning and teaching my lessons. I know I struggled with math, but I want to be a successful math teacher. At our school, we have a learning design coach. I wrote an e-mail asking her for some help with my math lessons. Once I finished my e-mail, I sat there for a minute biting my lip deciding if I really wanted to hit the send button. I don’t know why but it’s hard for me to ask for help. I got up from the computer for a few minutes thinking about the e-mail. I didn’t want the content and the school year to pass me by while I was still trying to figure out how to teach math. I knew if I waited, I would struggle, and my students would struggle too. I walked back to my computer and pressed send. I’m so

glad I reached out when I did. We met and I explained how I was teaching my math lessons. I realized some of the things I was doing did not have a real purpose. I began reverse engineering my lesson. What are the key takeaways my students need to understand and now how do I get them there? I need to plan with purpose and intention.

When I was first teaching math my intimidation of the subject caused me fear and doubt that I was teaching it correctly. Now I'm realizing it's not that bad. I feel as though I can breathe a little. I'm still not confident with the content and realize I really need to prepare. When I'm prepared for the lesson, everything goes much smoother. I feel confident in what I'm telling my students and feel competent in my teaching. There are still some topics I go over and have a wave of anxiety come over me as I wonder, how will I be able to teach this?

Instant dread

I can't teach this topic

Memories of learning flood my head

The struggle and confusion linger with me

I have to teach this concept

I have to prepare

I need to feel confident in what I teach

Otherwise,

My students won't

Trust

Respect

Or learn.

I need to get out of my head

I prepare for the lesson

My confidence builds,

This concept isn't that bad.

I learn

what to say

what vocabulary is important

what should be emphasized for success.

I may not be where I want to be in my teaching,

but I'm better than I thought I would be.

Continue to grow

Continue to learn

Continue to reflect

Continue to become

An elementary mathematics teacher

-Poem from researcher's memos

I'm realizing I can re-learn the content and become more confident in what I'm teaching. When I'm prepared, I understand the terminology and how to phrase things for my students to learn best. But getting my students to stop talking over me is another battle. I feel like a broken record continually calling for their attention, using positive reinforcement, and taking free time away, why won't anything work? It's just so disrespectful. Not only does it show disrespect to me, but they are robbing their peers of learning. I want them to learn and have the opportunities for the best futures they can have. I plan my lessons with their interest and abilities in mind. But if they don't listen, does it matter what I do? It makes it hard to come to school in the mornings

because I never know what kind of day it will be. Will we get through the lessons, will my students retain the information, will it be a constant battle and I go home in tears from frustration? The emotions are overwhelming, and there is no escape in education. You can't leave your concerns for students' learning at school, you can't leave the emotions of talking back and disrespect at school. Those emotions and concerns seep into your life and you search for new ways to reach your students. It's not a battle with the content, it's managing the behavior and providing that space where all your students can learn. How do you reach those students who act like they don't want to learn? I've had conversations about the expectations, and I've had conferences to find out what might be causing the behavior. But what do you do when parents point the finger at you, the teacher must be doing something wrong and not look at what your child might be doing in the classroom.

It's gotten so bad that when I hear the ping that I have a new e-mail dread and fear sweep over me. What are parents going to be upset about now? It looms over your head over the night or the weekend. That's supposed to be my time to recharge and enjoy. It becomes a strain on your mental health. For the first time, I said I didn't want to teach anymore. And that brought me to tears. I have been so passionate about teaching and wanted to share and inspire a desire for knowledge in others that I can't believe I felt that way. I can't help but wonder if my class would be better with another teacher. One parent told me I was taking things too personally. How else am I supposed to take it? Teaching, the decisions I make, and how I manage my classroom are who I am. My team has been trying to support me during this time. It seems everyone has struggled at one point or another with classroom management and doubt. Someone told me: Remember while teaching things are happening in front of you and not to you. It's hard to separate an expression of frustration when it seems to be aimed at you.

I sat down and had a heart-to-heart with my students. I asked my students to start fresh and be positive role models. And that is what they are starting to do. They are holding classmates responsible for what they should be doing. It's not perfect, but the off-task talking is much better than where it was. I can get through the lessons without being exhausted from interruptions. Despite all the talking my class keeps making gains. They're learning, growing, and participating. I even heard some of my students comparing the lengths of objects which we had learned in a previous unit, and they were using the knowledge and reasoning we had discussed. It's times like these that warm my heart and assure me that I'm in the right profession.

I can't believe I made it through this first year and I never thought I would say this, but I actually enjoyed teaching math. I learned so much about myself and what kind of teacher I will become. I am learning what to do and what not to do. This year wasn't filled with rainbows and butterflies. There were real struggles, tears, and times I thought I wouldn't return. However, I'm becoming much more comfortable in my teaching and my attitude towards math has changed. I am understanding it, I am teaching it, and I am enjoying it which are all things I would not have envisioned for myself. But I've kept a positive mindset and I'm proud of myself for taking that leap and trusting myself. I'm learning how to speak up and I'm finding the right words to use. I'm excited for another year and know I am still growing and learning to become an elementary teacher.

Taking a Closer/Deeper Look

The story above provided an experiential narrative to understand the events and feeling that occurred during the school year and provided me with an in-depth understanding of Suzie's first year of teaching. It sets the context of emotions, tensions, self-doubt, and a realization of her ability and enjoyment of teaching mathematics. A narrative approach helps communicate the

understandings that I developed as I examined some specific moments during the school year that influenced Suzie's mathematics-related teacher identity.

In this section, I examine some pivotal moments Suzie experienced during her first year of teaching more closely. These moments caused Suzie to pause and reflect on herself as an elementary mathematics teacher, impacting her mathematics-related teacher identity. I leveraged a community of practice (CoP) lens to better understand Suzie's experiences during her year of teaching. In the following section, I connect how CoPs are viewed in this study to the theoretical map from Chapter One, discussing the CoPs influence on a mathematics-related teacher identity. Next, I examine the key moments within Suzie's CoPs that impacted her mathematics-related teacher identity. To understand how these moments are impacting Suzie's identities I refer to the different factors from the theoretical map of contributing factors to a mathematics-related teacher identity I created in Chapter One.

Communities of Practice

A community of practice (CoP) can be viewed as a group of individuals who come together and share their thoughts on a specific topic or importance. Through the interactions and participation in a CoP, an individual continues to construct their identity. Following Lave and Wenger's (1991) view of CoPs, Suzie is participating and interacting with three main CoPs. These communities are the parents of her students, her classroom community, and her grade team community. I viewed these as the main CoPs during Suzie's first year of teaching. There was also a unique community of practice, the community Suzie and I created during the times we met. These communities were all spaces where she developed knowledge and shared beliefs that developed growth in becoming an elementary mathematics teacher. In each CoP the importance

(domain), relationships (community), and experiences (practices) varied but each caused Suzie to reflect and adjust what and how she viewed herself as a mathematics teacher.

Lave (1991) explains, through gradual participation in their CoP, the newcomer (Suzie) develops knowledge and forms their identity. The narratives and stories Suzie told me of her experiences with each CoP provided her with the opportunities to make sense of the experience and grow as a member in each community. She also began to learn how to communicate and express her ideas in each CoP, transitioning how she viewed herself as a mathematics teacher. The interactions and participation with members of each community influenced a different aspect of Suzie's mathematics-related teacher identity.

Mathematics-Related Teacher Identity

Identity is a complex web of perception, interactions, and emotions. I discussed, in Chapter One, multiple factors that could influence an individual's mathematical identity, teacher identity, and thus their mathematics-related teacher identity. Some of these factors are confidence, past and present experiences, and how one participates and feels a sense of belonging to different CoPs. This is not an extensive list of factors, nor am I implying that a factor contributes to only one of the identities, but I wanted to provide a visual way to organize the main factors that contribute to a mathematics-related teacher identity. As I continue to discuss key moments during Suzie's first year of teaching, I refer to the different factors in Figure 1.

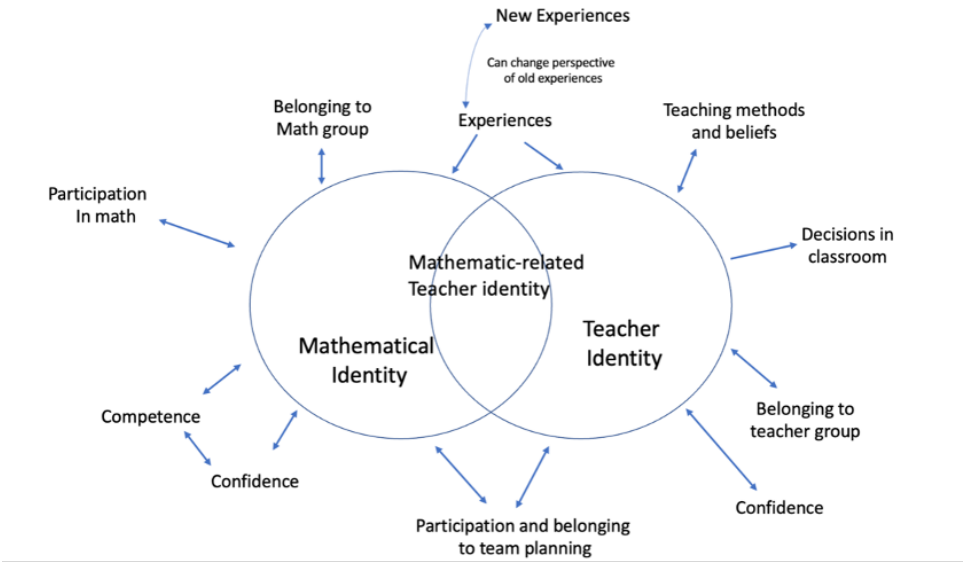

Figure 1:

Theoretical Map of Factors Contributing to a Mathematics-Related Teacher Identity

Suzie's Communities

Here I dive into specific moments Suzie experienced during her first year of teaching, focusing within each CoP. I examined the experience and the effects it had on Suzie's identities and her confidence. Thus, addressing the heart of my research questions, the influences of a teacher's CoPs and confidence on her mathematics-related teacher identity.

Classroom. The classroom provided a mathematics community wherein Suzie created an environment for her students to learn mathematics, make connections to their lives, and support one another. Each student brought their own needs and knowledge into the classroom. The experiences Suzie encountered within her classroom community highlighted a reciprocal relationship between the teacher and students, wherein the students impacted the teacher's decisions, and the students progressed in their learning. Suzie's students both challenged and

encouraged her growth as an elementary mathematics teacher. She experienced a mixture of emotions in her interactions with her students, leading to the adoption of different classroom management techniques, teaching strategies, and views of herself as a teacher.

At the beginning of the school year, Suzie strived to create a classroom environment where her students felt they could participate and were encouraged by one another. “Something I like to do is like bring up one (student) to the whiteboard and have them like solve for the answer, and they’ve been able to do that effectively. And like they’re so eager to want to participate” (October, interview). By creating a role for her students to share their thinking, Suzie felt her students had a stronger desire to learn, and "they're really excited and starting to grasp the concepts of what we’re learning” (October, interview). As Suzie speaks about her students, she often refers to them as her “friends."” This portrays the hope she has for her students to treat one another as friends and with respect. “I'll have them say 'great job', and they all say it, and it just makes them feel good that they were able to solve the problem.” Suzie expresses how proud she is of her students and how “they’re so supportive of each other.”

Even though it seemed Suzie created a classroom environment of respect, Suzie’s class became “very chatty.” “I just have some really defiant ones too, no matter what I do they just continue to talk while I’m talking… and that’s something that’s really frustrating.” The continued talking felt like a disrespect to Suzie and to the other classmates who were quiet and wanted to learn. It came to a point where Suzie was “over it”, and she had to take a mental health day off from school just to get a break. Despite implementing new attention-getters and routine expectations Suzie still struggled to maintain the class’s attention. Suzie even switched to teaching mathematics in the mornings rather than in the afternoons to help students be more engaged in their learning. Suzie explained,

> That's like their biggest issue right now is just knowing when and when not to talk like I can say over and over and over and set my expectations. I have my voice levels. But those are things that are still ignored. And it's kind of like today kind of like hit a breaking point like I was just done. (January interview)

This ultimately escalated to where Suzie was unsure if she wanted to continue teaching, “I even told my mom yesterday, I told her ‘I give this one more year and if this doesn’t get better, I’m done’” (January interview). This tension affected Suzie’s teacher identity and her decisions and beliefs about classroom management. This also had an impact on the way Suzie implemented her mathematics lessons. Before she began the school year, she had envisioned herself using “group conversations, discussions, and make math space collaborative” (Prior interview). Now when asked about mathematical collaboration she explains,

> I haven't, I have a hard time trusting them with talking. If I give them a chance to talk, they're going to talk about other things and it's just like I set the expectation but they still are just one of those groups that are super chatty, and just like you may want to do so it's like it's hard to put that collaborative piece in there because I give them an inch and they take a mile. (January interview)

Even though Suzie came in with the belief that mathematical collaboration and discourse were beneficial she expressed she was not able to use those strategies with this group of students. It was more important to her that she ensured her students were on-task. This created a change in the way Suzie had envisioned herself teaching mathematics, impacting her mathematics-related teacher identity.

With the support of her team, administration and wider circles of support, Suzie persevered in her teaching efforts and was able to reduce some of the off-task talking in her

classroom. During the climax of this talking issue, Suzie and I had a discussion, and she came up with a plan to sit her students down and have a conversation about starting fresh and leading by examples. The next time we spoke Suzie felt things had gotten better, “I just have to keep being consistent with expectations and just reminding them, but I feel like it's gotten better and I feel a lot of the kids have stepped up and are kind of holding each other accountable” (March, interview). Suzie was able to pull her classroom community together to help support her in keeping the classroom expectations. A group of her students were able to “step up to the plate” and “lead by example” to reduce the off task talking. While the talking still wasn't where it should be, a group of Suzie’s students who listened and modeled the expectations encouraged her teacher identity.

Even though Suzie struggled with her students talking over her during lessons, she was also encouraged by her students’ growth. One day in class some of the girls in her class “were comparing the length of their pencil and their objects on their desk and I’m just like, wow, like that really stuck with them… I was really happy.” Seeing her students continue conversations around concepts that had already been taught warmed Suzie's heart and made her realize the impact she was having on her students’ learning. Over the year, her students improved their class average in each mathematics unit.

> I see that they're progressing. So that's making me, it's making me really happy and I had some kids who are, who have really struggled with math get like a 100 on the quiz and I'm just like, oh my goodness, like that is just such a victory. (January interview)

This continual progression encouraged Suzie to continue teaching and give her all to her students even when she was frustrated. In another interview, Suzie just beamed as she praised one of her students. “He is doing so well with math… and he is just such a hard worker and like from the

beginning of the year to now I'm seeing the growth, and I'm really impressed and proud" (March interview). As her students continued to learn, Suzie's confidence increased. She began to realize what she was doing was working. She also realized "I can teach math." These experiences changed Suzie's perspective, and she began to view herself as an elementary mathematics teacher.

When Suzie first began teaching and planning her mathematics lessons she was "inside her own head." Since she had struggled with mathematics as a learner, she often doubted herself and felt the students wouldn't take her seriously. When preparing to teach place value, a topic Suzie had struggled with, she explained,

> That's what I'm really nervous about because I didn't understand it. So, I really need to study this and really grasp my skill on that because I'm going to be teaching them what I don't know. Then they're going to be like, 'Oh, she doesn't know'. It's just not going to go well. (October interview)

Suzie was very nervous about teaching her students the same mathematical content she had struggled with as a learner. It made her second guess her mathematical ability and ability to teach the content. When preparing for another lesson Suzie had struggled with, measurement, she said, "I feel like, I'm like they're screwed with me teaching this like I feel like I'm going to do terrible." (January interview). Suzie felt that her lack of confidence in mathematics would come across to her students and influence their ability to learn mathematics. This fear pushed Suzie to prepare and "study" more to teach these topics. The textbook Suzie's school had adopted had lots of teacher resources that Suzie often used. One resource was videos of other teachers teaching the material.

> Seeing how they teach and how they use verbiage has really helped me in my teaching of place value, and knowing the correct vocabulary, teaching my students and helping them in that way. So that's something that's been comfortable, and it's helped me be more confident in what I'm teaching and something that we've talked about when we've done our meetings is just preparation and how preparation is key. (January reflection)

Suzie's struggles with mathematics impacted how she thought her students would view her relationship with mathematics. It created some tensions in Suzie's mathematical identity which led to some fears teaching the content. This had an interesting impact on Suzie's mathematics-related teacher identity. While she seemed to struggle with her confidence in the content and teaching the content, she then prepared and became more comfortable, gaining confidence in her mathematical ability. She learned how to communicate with her students to help them become more successful, and gave her confidence in her teaching of mathematics.

As the year progressed, Suzie still emphasized preparing her knowledge of the content, but she also considered her student's needs more in her planning. Towards the end of the school year, Suzie relied less on the district lesson plans, "I felt like I could take what I knew they needed help with and really drill it into the lesson instead of depending on the curriculum to speak for me. So, I was able to tailor it to their needs a lot more" (March interview). Through her experiences, Suzie realized she could relearn the mathematical content and how to explain it for her students to understand. This gave her confidence in teaching mathematics.

Suzie had both highs and lows while working with her students. Her teacher identity was challenged as her students continued to talk over her during class. This made Suzie question her classroom decisions lowering her confidence in her initial teaching beliefs. Suzie took time to re-examine the classroom decisions she made and try new classroom management techniques.

Suzie sat down and talked with her class about the disruptions. A group of students listened and took the initiative to lead by example, encouraging Suzie's teacher identity and confidence in her decisions.

The disruptive talking also led to a change in Suzie's teaching beliefs, causing her to limit activities like turn and talks and other collaborative teaching methods. However, as she witnessed her students' continual growth, Suzie felt what she was doing was working, supporting her teaching methods and beliefs, and growing her teacher identity. Not only did Suzie's students influence her teacher identity; they also impacted her mathematical identity. Suzie had initially lacked confidence in her mathematical knowledge due to her own struggles as a learner. She feared this would impact her ability to teach mathematics and affect her students' success. To overcome this, Suzie invested more time in reviewing the mathematical concepts and learning the appropriate vocabulary. This increased her mathematical competence and provided her with confidence in her mathematical identity, enabling her to teach more effectively.

Suzie's story begins to show a connection between confidence and identity. Within her classroom community, when her students challenged her classroom decisions, it lowered her confidence and teacher identity. However, when a group of students listened and assisted in reducing off-task talking, both Suzie's confidence and teacher identity increased. Suzie's mathematical identity and confidence were also intertwined within this community. Suzie came into the school year with low confidence in mathematics creating a low mathematics-related teacher identity. For Suzie, this pushed her to take extra time in preparing her mathematics lessons. As she prepared, she learned the mathematical concepts she struggled with increasing her confidence and mathematical identity. She also learned what to say and how to explain the concepts to her students, further elevating her confidence in teaching mathematics and

reinforcing her mathematics-related teacher identity. Suzie's experiences served as learning opportunities that contributed to the growth of both her confidence and her identities, demonstrating a tandem relationship.

Parents. The role of parents and guardians of students in shaping a teacher's identity is often overlooked. However, for Suzie, they played a large role during her first year of teaching. Within the parent community, Suzie communicated and built relationships with the parents of her students. This was done to provide support for her students to thrive in her class. While Suzie could consider herself an outsider in this community, since she was not a parent, her interactions with parents played a large role in Suzie's first year of teaching.

At the beginning of the school year, Suzie was having difficulty with some parents, "Last week was really rough because I had two parents who, um kind of, I felt like they were ganging up on me and questioning my decisions as a teacher and it was hurtful" (September interview). This experience began a shift in Suzie's teaching experience and the decisions she would make throughout the year. In the beginning, Suzie did not have experience communicating with parents. She realized she didn't know how to respond in the moment. She was fortunate to have a supportive grade team that was "able to guide me through how I can respond to them and how to be as professional as possible." This began Suzie's understanding of how to begin to format emails and provide a line of communication with parents.

This experience also made Suzie self-reflect on the communication she was providing parents about what was happening in her class as well as their child's progress. "That whole situation helped me realize how important it is to communicate. Just so that when that time comes for report cards it's important that they're not surprised" (December interview). This impacted decisions Suzie made while planning her lessons. She began using exit tickets not only

to check for understanding but also to send home with her students to share with their parents. Additionally, she began sending information about each unit that included what they would be learning, how to help their child improve, and the vocabulary they were using in class. This provided parents with the opportunity to understand the learning that was taking place and support Suzie in helping their child succeed in learning mathematics.

When the student talking came to a high the parent involvement also increased. The students would go home and complain if they got in trouble for talking out and then the parents would email Suzie. Suzie felt “it's like I can't do anything. Like I can't give a consequence without me having a consequence which is having an upset parent.” Suzie explained one day the class got really loud so she had everyone put their head on their desk for a few seconds to calm down and that night she had an email from a parent. Each parent felt Suzie should have managed the classroom differently and would message her. Suzie felt “my brain never turns off especially dealing with parents, like even over the weekend. I feel like I can't relax because I'm constantly thinking like, oh what am I going to wake up to on Monday?” The emotions Suzie was experiencing with her students, and their parents would follow her home where she should have been able to relax instead of stressing or fearing if someone was upset. It got to a point where “I have like anxiety coming to work every day.” This emotional pivot affected Suzie’s confidence in her decisions in the classroom. She reflected, “I kind of let parents run this classroom because I just don’t want to hear it, I don’t want anybody to be upset… it’s really rough because they’re very involved here.” Suzie’s desire to appease others made her feel uncertain of her own choices in the class. While the parents did not question what or how concepts were being taught, they were still influencing Suzie's teaching identity by questioning the decisions she was making in the classroom.

During the school year, Suzie continued to communicate with parents and held conferences. Each interaction created time for Suzie to reflect on who she was and was becoming, as a teacher. At the end of the school year, Suzie still had some issues with one parent. This parent's child "was pretty disruptive" and would talk multiple times during a lesson. Suzie had a line of communication with the parent about the behavior in class throughout the school year. However, the parent ended up “blaming my classroom management on him misbehaving instead of taking accountability.” Suzie felt, “I always have to defend myself.” Especially when the parent was “making assumptions based on what their (seven-year-old) child is telling them, but they're not here. It's just like really frustrating. She was saying that I had like pretty much have no control over my classroom” (April interview). This parent began questioning the decisions, and choices Suzie made in the classroom. At first, Suzie wondered if it was her but through her reflections and discussions with her grade team, she realized she couldn’t reconcile every issue or problem.

> At first, I started thinking okay, what are some things that I can do? Or what have I done to make her feel that way? And then I started reflecting and I'm like I don't I'm not sure because I'm not seeing what she's seeing.... (before) I kind of let her slide with the disrespect in the past so I had to really put my foot down this time” (April interview).

Through her reflections and discussions with her team, Suzie gained confidence in her decisions and voiced her decision with confidence to the parent. When Suzie “put her foot down” the parent, “said I was taking it too, personally.” As a first-year teacher, you are still trying to figure out who you are as a teacher. The choices and decisions you make for your class are a reflection of who you are, so how else are you to take that if not personally? Suzie “asked her to a conference so that we could talk about it, but she refused.” Suzie knew this situation had

escalated and wanted the support of a team member or administration to be present in a space where they could talk things out. Ultimately, the administration decided to move the student to a different class. The administrator assured Suzie “It's not a reflection of you or anything about you” but felt this would alleviate the stress on Suzie. Suzie reflected,

> he's a good kid. Just the whole situation. I feel like it could have been dealt with differently. I feel like if we could just put our feelings aside and sit down and I tried to do that (pause) and I offered it to her twice, but she turned me down. Like I can, I can only do as much as I can. (April interview)

Suzie was proud she found her voice and stood up for her decisions in the classroom. She “hates confrontation,” and “it's rare that I have to (stand up for myself).” Through this experience, Suzie became more confident in herself and the decisions she was making in the classroom. She understood the best way for her to manage her classroom, despite what one parent thought. Even though this was an emotional situation where a parent was questioning Suzie’s teaching practices, Suzie was able to grow from this situation and realized, “I think later if this does happen again, just kind of sticking to my guns and being like this is my classroom, and these are the expectations and how I do things.” (April interview)

Parents play a large role in schools. They can also impact a teacher’s decisions on how and what is communicated home, classroom management style, and lesson planning, primarily affecting their teacher identity. The experiences with the parents impacted many aspects of Suzie's mathematics-related teacher identity. For Suzie, the interactions with the parents had a larger impact on her teacher identity. When Suzie was first contacted by parents, she realized she needed to communicate her ideas differently in this community. Learning the professional way to communicate with the parents helped her to have a voice and be a participant in this CoP.

Through these interactions, Suzie adjusted her teaching method and sent work home with students giving parents an update on their students' progress. Parents questioned her classroom management and decisions causing Suzie to reflect on her practice and seek out help from her grade team. Suzie grew through this, and gain confidence in her choices, strengthening her teacher identity.

Taking a closer look, for Suzie, there was a tandem relationship of confidence and identity. When Suzie received her first e-mail from parents, she realized she did not have the knowledge on how to respond. Through these experiences, Suzie began to learn how to communicate with her students' parents using "professional" language. Learning how to communicate effectively with the parents gave Suzie the confidence to communicate and to have a voice in this community. This allowed Suzie to create open lines of communication with parents. Suzie realized she could improve her communication with parents and implemented new ways to share what was being taught and the progress students were making. When Suzie's classroom management was challenged by parents, her confidence and teacher identity were lowered. However, through conversations with other teachers, she gained confidence in her decisions. This confidence in her classroom decisions gave her the strength to 'put her foot down' and express her decisions to her students' parents increasing her teacher identity. Although Suzie faced many challenges in her parent CoP each interaction helped Suzie grow as a teacher. She adjusted her teaching practices and solidified her classroom management beliefs. Her experiences built on one another providing her with the knowledge to handle this type of situation in the future.

Grade Team. Suzie's grade team was a very impactful CoP. This was a place where Suzie and her grade team came together to help one another support their students' learning. For

Suzie, it was a source of knowledge, where she learned many different aspects about being a teacher as well. In this community Suzie was seen as the newcomer, and her fellow teammates helped her navigate what and how to handle different situations from their past experiences. Her grade team community was also a space where Suzie could find support during the times she struggled.

From the very beginning, Suzie emphasized the support of her grade team, “They've been a great support system and I honestly have a fantastic team. I couldn't have asked for anything better.” They took Suzie “under their wing” and helped her navigate everything from the curriculum to communicating with parents. Suzie had positive interactions with her team that allowed her to feel like she belonged and could participate in her community.

Throughout the school year, Suzie encountered many new demands with classroom management and communicating with parents. Her team was there to support her each step of the way. At the beginning of the school year, Suzie realized she didn't have experience communicating with parents and was able to get guidance from her grade team. They were "able to guide me through how I can respond to them and how to be as professional as possible.” The teachers in her grade team were able to share their knowledge about communicating with parents with Suzie. Suzie took this knowledge and learned what and how to communicate with her parents, providing her with the confidence to keep open lines of communication with the parent community. During the year, Suzie’s teacher identity was challenged as her students continued to disrupt lessons. Suzie discussed this issue with her teammates and found they also had an increase in student disruptions. Through conversation with her teammates Suzie listened to and observed new management techniques they were implementing in their classrooms. Suzie “sat in on one of my teammates to see how she handles her behavior”. Suzie tried to implement some of

the same techniques to no avail. Her grade team continued to support her at the peak of her struggle, “Even my mentor teacher, she’s the STEM specials teacher, she said ‘you're not crazy that’s just the group.’” Other teachers shared their previous experiences and told her “Things get better.” Suzie felt the encouragement and support from her team community which strengthened her teacher identity.

In October, Suzie’s school had each grade complete a lesson study where they would work together planning the details of a lesson, focusing on intentional planning. Each grade was allowed the freedom to choose which lesson they would plan. Suzie spoke up and suggested they do a mathematics lesson because she knew it was her weakness. This was a moment where Suzie spoke up in her community and she was embraced and supported.

> During that process, I really felt like I had a voice on my team and that I could really say and contribute equally. Even being the new teacher on the team. I really felt that I could contribute, and I was given that space to say ‘Hey, we should do this activity. And this is what would really work for this type of student.’” (October, interview)

Suzie’s grade team provided her with the opportunity to voice her opinion and was met with welcome. Her team listened to her voice and accepted her ideas, making her feel like part of the community. This acceptance helped Suzie begin to feel like she belonged to her grade team community. Suzie also expressed, “I feel that I'm able to easily contribute and that’s because we're getting to know each other better” (October interview). Through this contribution, Suzie feels her ideas are appreciated and begins to feel the more she shares and gets to know her team the more comfortable she is participating in her community, building her confidence to continue to contribute. “I was really given that space and felt like I was being heard by my team regarding that.” Her team encouraged Suzie’s identity to grow by providing the space and opportunity

where Suzie began to see herself as an elementary mathematics teacher by listening and accepting her contributions. Another aspect that contributed to Suzie participating more in her grade team community was learning the "verbiage" or teacher terminology. "I'm getting more comfortable with my teaching and my verbiage and how I speak with my team. So just being able to participate." With each interaction Suzie began to learn how to communicate with her grade team. Even though Suzie's team was supportive and embraced Suzie as a part of the grade team Suzie still felt as though "I'm holding myself back because I'm too scared of saying the wrong thing" (December interview). She found herself hesitating to participate because she was unsure how to voice her thoughts within this community. However, by the end of the year, Suzie became more confident in herself and was able to ask questions and contribute to her team meetings.

> There's never like a dumb question like a question is a question if you have a question and again, I'm not like afraid to answer them not afraid to contribute anymore because I feel like I, I know what I'm saying now. So that kind of helps. I've gotten a little bit more confidence and like speaking in the group, and sometimes I'm still shy, but I feel like for the most part, I've done a better job of giving my input. (March interview).

Suzie emphasizes now that she knows what she is saying and now has the confidence to speak up and share. This process has allowed Suzie to become more of a participant as Lave (1991) explains growing her mathematics-related teacher identity.

There are many different aspects to being a teacher, it's more than teaching a lesson. Suzie's grade team helped her navigate the complex terrain of being a teaching. During these meetings, Suzie gained new perspectives on teaching and ideas to try in her classroom. They also came together to plan out the pacing of the lessons. During the year, a hurricane hit nearby and

the students were out for a few days. To figure out the best way to adjust for the missing days, the team had a meeting where they "brainstormed ways to make up time" (November interview). They worked together asking each other, "Is there anything that you did differently that we can do" to try to help their students learn the information efficiently. This was not the only time they came together for different strategies. Suzie expressed, "It's like we're able to bounce ideas off of each other and really pick each other's brains." These ideas, that were shared with Suzie, helped her implement some new teaching strategies in all her instruction and some specific strategies for teaching mathematics. During one of their meetings, "one of my teammates was saying how she, with the word problems, would tell the kids to like circle the numbers and the keywords." This was something Suzie felt would help her students "because some of my kids struggle with whether they need to take away or add to." Suzie took this idea from her teammate and implement it to help her students become more successful. This helped Suzie adapt her teaching methods and strategies, increasing her teacher identity.

In another team meeting, Suzie learned how to look over her students' data and figure out what "extra interventions for help" she could implement for her students. As Suzie learned more, "I was able to contribute more and was understanding more, and not just seeing a big blob of color. It actually means something else" (December interview). As Suzie gained this knowledge, her confidence grew. She felt she could now contribute during her grade team discussions surrounding student data. Even though Suzie had gained this knowledge, she still had some self-doubt. She reflected, "I'm starting to understand what the data means. And I think I undermined myself and I'm like, do you really understand? I always second guess myself." Through her reflection Suzie began to realize she does understand her students' data and needs. "Lately, I'm trying to apply (the data), but it's something I'm still working on, but I feel like I'm teaching

better with it." Suzie continued to make strides to improve her teaching. She realized she could use her students' data to make classroom decisions that would benefit their success. Suzie's growth as a teacher continued as she learned new methods to become more effective. Through her interacts with her grade team, she gained knowledge that enhanced her confidence and made her feel like a part of the team. She also learned how to decide what will be implemented in her class and mathematics instruction. This ongoing development continued to build Suzie's mathematics-related teacher identity.

Suzie realized the impact of having a supportive grade team that encouraged her to grow as a teacher and in her mathematics-related teacher identity. There were many times during the year that Suzie relied on the support and encouragement of her team. Through each interaction with her team, Suzie learned how to communicate her ideas and questions within this community. She gained the confidence to speak up and contribute making her feel like an active member of the team. This community helped her gain confidence in teacher identity as well as implementing teaching strategies specific to mathematics. When asked about her team near the end of the year Suzie responded,

> They've just been really helpful with everything, so I can't thank them enough for everything that they helped me with this year because I don't know how I would have made it through and I'm almost finished. (March interview).

Suzie's grade team community provided consistent support throughout the school year. Within this community, there was an ongoing cycle involving confidence, participation, and identity. At the beginning of the school year, Suzie did not have the confidence to participate in this community. She was insecure of her abilities and struggled to see herself as a teacher so felt she could not contribute to her team community. As she sat in on meetings and talked to her

teammates, she learned what to say, giving her confidence to speak up in her team. Her team listened and embraces her voice which increased her confidence more and allowed her to be an active participant on her team increasing her identity. Suzie's team was also there to help her learn other aspects of teaching; intentional planning, understanding student data, communicating with parents, etc. As Suzie learned from her team her confidence increased along with her identities. This also opened paths for her to participate in her other communities, growing her identity. Suzie's team was able to pull her into the grade team community and made her feel like a valued member of the team. This shifted Suzie's perspective to identifying herself as being a part of her grade team community of practice.

Suzie. While this CoP is more subtle and unique to this situation, it represented the community Suzie and I created during the times we shared our stories about mathematics and teaching. This community played a major role in both my understanding and the construction of Suzie's mathematics-related teacher identity. Throughout our interactions, Suzie shared details about what she was teaching and how she was teaching it. Over the course of the year, I gained a glimpse into the evolution of Suzie's excitement for planning and delivering mathematics lessons. Additionally, I observed her develop ownership of the content she was teaching. This space also provided Suzie with time to reflect and learn from her experiences during the year and set goals for her second year of teaching.

At the beginning of the year, Suzie did not take much ownership of what she was teaching, but rather gave credit to her resources. Suzie explains teaching a unit covering subtraction,

> something that I found really interesting with this is that *they're* really encouraging the kids to draw what they read. So, like, with those math problems, it's like helping them

> break it down. And by doing those drawings, it's helping them to, like visualize it. (October, interview)

Suzie projects the 'teacher' aspect of using drawings to understand word problems to *them*, either the district or the textbook her school adopted. This statement undermines her ability to decide and implement teaching strategies. However, she then explains how this strategy helps her students grasp the concept of subtraction. This shows a dynamic in her teacher-identity development where she is not making the instructional decision but is displaying her knowledge of teaching strategy by justifying the use of "draw what they read." She continues to explain,

> Because with word problems I know for myself, it's so much easier when you just break it down and then having them draw, letting them know those key words. 'Hey, it's telling you to', I said this today (to her students), 'It's telling you to take away, are you going to add to it, or are you going to take from?' so like highlighting those like key words for them. (October, interview)

In this part of her explanation, Suzie first positions herself as a learner of mathematics, and makes connections from her struggle and realizes the benefits of having her students draw the word problems. This shows how Suzie is constructing her mathematics-related teacher identity as her past experiences learning mathematics influence her instruction of mathematical concepts. This conversation continues as Suzie explains the upcoming unit that will discuss place value.

> I think a little bit goes into place value as well. So, getting to dive into that and my friend whose mom has been a teacher for 20 years. She told me 'Do not skip over anything with place value'. She's like that is so important. So, I'm making it my goal to really *drill* that into them, so they're successful, but that's like in pretty much all aspects of life. So, I'm like nervous about that, but I'm excited… I'm really nervous about (teaching place value)

> because I didn't understand it. So, I really need to study this and really grasp my skill on that because I'm going to be teaching them what I don't know. Then they're going to be like, Oh, she doesn't know, and it's just not going to go well. (October, interview)

As a learner, Suzie struggled with this concept, and will now have to teach it to her students. Her past experiences gave her a negative mathematical identity, which impacts her teacher identity. Suzie relates her knowledge of the concept to her ability to teach it successfully. This lack of confidence in her mathematical ability reduces her teacher identity. Suzie changes her instructional methods. Instead of using the hands-on approach and visualization she discussed by drawing out the word problems, Suzie now discusses "drilling" the concept into her students' minds. However, she plans to bridge her insecurity of learning place value by studying the concepts. She believes this preparation will assist her in teaching her students in a way they will be successful.

Suzie spent most of her planning time reviewing and preparing for her mathematics lessons. She used the resources her school and grade team provided along with other sources she found on her own. As she reviewed the mathematical content, she realized she "could do it" and her mathematical identity increased. The textbook also provided her with videos of other teachers teaching the content. From this, Suzie learned what to say and how to teach in the best ways for her students. Learning the mathematical vocabulary and ways of explaining mathematical concepts gave Suzie more confidence in her teaching and the feeling she knew what she was saying. As her mathematical identity and teacher identity increased, she felt she could teach mathematics and began implement more of her own teaching methods into her lessons.

As the school year continued, Suzie began to take more ownership of what she was teaching in her mathematics lessons. Suzie explained a lesson and activity she designed covering geometry concepts. As she was talking, I could hear the excitement in her voice, and she wanted to show me her lesson materials she had created.

> what I did before the lesson, I put in, like in my like PowerPoint slides that I use daily, different characteristics, and I would name the characteristic I would say, 'all right, my friends pull out the shape that has three sides and three corners' and I give them a minute to pull out the shape. And of course, they would call it the triangle. And I told them put your hand on your head once you pull out your shape and a lot of them were able to do it. I was very satisfied with what I saw. And the kids were really engaged in that game and really enjoyed it. So, I was really satisfied in that. So, after that, we went into a lesson where we were just talking about 3D shapes. And this is where we actually got to talk about real life objects that are 3D shapes. (February reflection)

In Suzie's explanation, she takes ownership of what and how she is teaching her students. She utilized teaching methods that encouraged her students' mathematical learning. She describes the slides she created and the activities she came up with for her students to engage with the content. In her activity, Suzie provided a space for her and her students to participate in the mathematical learning, building their mathematical identities. Suzie emphasized her students' engagement during the lesson. She was able to gage where her students' learning was and made classroom decisions to where she was "satisfied" with her students' understanding. Suzie was also excited as she explained building the connection of three-dimensional shapes to the real world. Suzie connected her teacher identity through the teaching methods and classroom decisions to the

mathematical content she taught. When she saw the success of her students' understanding of the lesson, Suzie began to see herself as a mathematics teacher.

Suzie came into the school year scared and unsure how well she would be able to teach mathematics. At the end of the school year, she reflected on when she got the position to teach all subjects and how she "was most nervous about teaching math." However, throughout the school year, Suzie gained knowledge and experience which built her confidence, and she began to enjoy teaching mathematics.

> I just shocked myself because I never thought I would like teaching math. So, it's been really cool to see my attitude change toward it. I'm proud of myself and taking that leap and just trusting myself and being like, okay, you can do it, stop saying you can't because then you'll believe you can't, you're not going to be able to. I just feel like having that positive mindset has helped a lot. (March interview)

Suzie expressed she was "glad that I overcame that hurdle" and was able to "overcome that fear" of teaching mathematics. Suzie realized she could have done better, but she did an "okay job." As we talked more, we reflected on the continual progress her students made in their mathematical knowledge. Suzie talked about watching her students' data improving with each unit and "students who were not doing as well in math, they were improving." Seeing those strides in her students' mathematical abilities made her "feel good" and made her realize "they're actually getting something from what I'm teaching." As Suzie and I spoke, I noticed she used language that indicated she underestimated her ability as a mathematics teacher. Suzie expressed herself as "okay" at teaching mathematics, but her students learned and engaged with the mathematical content she taught them, indicating (to me) she did better than "okay."

At the very end of the semester, Suzie and I discussed what she thought some of the greatest impacts were in her mathematics teaching. Suzie shared how learning to "utilize their (textbook) resources" helped her align her lessons to the curriculum. The videos her textbook offered "showed me how to teach and like what verbiage to use" to help her be consistent with what she said and support her students' success. Suzie also said a huge hurdle for her was "trying to get over, 'Oh, I didn't understand this when I was a kid, so how am I going to teach them?'" Suzie's past struggles as a mathematics learner lowered her mathematical identity hindering how she felt she would be as a mathematics teacher. As she went back through the mathematical content, she began to realize "math isn't so bad." She was able to review the mathematical concepts and gain confidence in her understanding allowing her to feel that she could teach those same concepts she had struggled to learn. This impacted how Suzie viewed her mathematics-related teacher identity at the end of her first year of teaching. "I've gotten more confident in my math teaching. And I would say preparation has definitely been key in my math teaching." This shift in Suzie's identity makes her want to share with other pre-service teachers "don't let yourself be guarded because of your own experiences. Go in it (internship) with open eyes, realize when you're a pre-service teacher you're prone to made mistakes. You're not going to be the perfect teacher right off the bat."

During Suzie's first year of teaching, she gained valuable experiences contributing to her mathematics-related teacher identity. Once more, there was a tandem relationship between Suzie's confidence and her identities. Suzie entered the school year with low confidence in her mathematical abilities, resulting in a low mathematics-related teacher identity. When Suzie had to teach the mathematical concepts, she had previously struggled with, she become very nervous and doubted her ability to teach those concepts. However, as she continued, she re-learned the

mathematical concepts she has struggled with, increasing her confidence and strengthening her mathematical identity. During her preparation, she also learned the vocabulary and wording to use while teaching mathematics and how to explain concepts to her students. This preparation, along with her increased mathematical identity, gave her the confidence and enjoyment to teach mathematics, increasing her mathematics-related teacher identity. This growth could be seen throughout the school year as well as within the preparation of a single lesson. I am sharing a found poem I created from Suzie's January self-reflection. This poem captures the thoughts and emotions while planning a lesson that Suzie had struggled with as a learner and how she is able to grow through her preparation.

Place value

My confidence

a five out of 10.

My background with place value

wasn't that great.

I tend to feel

How I'm going to teach

Based on how I absorbed the content

Because I didn't understand it.

But once I dove into the content,

looked into what the kids were being asked to do,

I felt a little bit more comfortable.

The curriculum,

it helps

seeing how they teach

how they use verbiage

knowing the correct vocabulary,

teaching my students and helping them in that way.

It's helped me be more confident.

Preparation is key

When I'm prepared,

I feel more confident in what I'm teaching.

And I come across as more confident

when I'm teaching as well.

After teaching

my confidence has gone up

I have a lot of growing to do

And I'm still learning

but I would say seven and a half is where I'm at

-Found poem from January Self-Reflection

Looking Towards the Future.

(This section is written from Suzie's perspective, so the *I* use corresponds to Suzie)

My first year of teaching was filled with a mixture of emotions where at the end of the year I finally felt like I started to get into my groove, and was finally getting a handle on things. I ended the year filled with more confidence and a better understanding of the multiple aspects it takes to be a teacher. The knowledge I gained during the school year made me began to think about what I want to do differently next year.

I realize I'm still learning things as a first-year teacher and I'm still getting a handle of things but going into my second year I need to have it under control and really have it together. There are some different things I want to implement into my class and other things I've done that I want to keep doing. I feel I really fell short with my classroom management. I think I was just trying to learn everything it fell on the backburner. I was trying to learn the curriculum and trying to learn how to figure out different things about being a teacher. There's so much more than school can prepare you for. Next year, I want to spend the first week on procedures and expectations. I have been watching different videos from other teachers and gathering ideas to implement into my classroom. After listening to what some other teachers have said I think I had too many little rules. I just had like this long list of rules that I wanted but now I will just have a few broad rules. I also want my students to feel like they have a say in the rules so I'll have them brainstorm with me on how to make our rules successful. I also want to improve my communication with parents, especially surrounding student behavior. I'm not going to wait too long until a problem has escalated to the point where both me and the student are at our breaking point. This year I wanted to give my students the opportunity to make changes on their own before notifying their parents. But after everything that happened this year, I want to nip things in the bud and be proactive before emotions and issues escalate. Something I started this year that I will continue to do was creating daily slides to help myself and my students with transitions. I had a welcome slide in the morning that had their to-do list from the morning and reminded them of their morning expectations. I felt this really helped get things going. It also helped me prepare for the lessons. I also had timers on my slides for activities which helped keep us on track. I think the kids really enjoy the slides too.

This next year I will be teaching reading and writing only. When I found out I had a bitter-sweet feeling. I love reading and writing, but I was surprised how much I enjoyed teaching math. Even though I won't be teaching math next year there are things I learned while teaching math that I will use to improve my reading and writing lessons. During math lessons I focused on using correct verbiage and vocabulary and I feel this translates into my reading and writing lessons. There was a connection between the reading and what was being taught in math. Some of the things that we have learned in math go into reading as well. The kids even pointed out when they noticed those similarities. Now I will have that prior knowledge to build connections with my students. I also enjoy making connections between different contents when I can. This next year I will be able to make more connections since I learned all the curriculum last year. I've been thinking about different ways I could connect my reading to math lessons. One idea I came up with was using a clock to depict the different times during a story. This would reinforce their ability to tell time along with the story. This year I connected the plant cycle in their readings to what we learned in science and felt it solidified their understanding. So, I'm hoping if I am able to make more connections it will help all around.

One thing I think I will miss the most about teaching math is how hands-on it is. It just makes the learning more meaningful. I don't think my reading and writing lessons were as engaging for my students. When I taught language, I felt like I had to talk more at them. But this year I want to take that hands-on teaching method and apply it to my reading and writing lessons. For example, I could have them act out the vocabulary. I want to figure out other ways I can get them involved in their language learning. Even though I will not be teaching mathematics in my second year I learned valuable insights from teaching mathematics that I will carry into my

teaching of reading and writing. I have a better understanding of what it means to be a teacher and can take what I have learned this year to continue to grow as an educator.

Conclusion

A teacher's identity is impacted by many different factors, which can create a change in the way they manage their class, structure lessons, and communicate with others. To understand these impacts I started this chapter by providing a holistic story composed from the conversations Suzie and I had during her first year of teaching. These pivotal moments provided a holistic look at Suzie's trajectory in her journey of becoming an elementary teacher.

In the second section, I took a deeper look at some specific moments using a CoP lens. Through the school year Suzie became an active participant in each of her CoPs. Listening to Suzie's stories there were a few ideas that were reverberated in each CoP. Suzie emphasized the need to learn how to communicate within each community to best express her ideas. She realized there was a difference in the way she needed to speak and present herself in each of her CoPs. Once she learned how to communicate in her different communities, she gained more confidence to speak up and share. Confidence played a large role in building Suzie's mathematics-related teacher identity as well. Her confidence impacted how she viewed herself as a teacher, and the choices she made in her classroom. Her confidence in her mathematical ability impacted how she prepared to teach her mathematics lessons and her confidence while teaching the content. As her confidence in mathematics grew, she began to realize she could teach mathematics and began to view herself as an elementary mathematics teacher.

In the third part of this chapter, I highlighted Suzie's reflection on her experiences during her first year in retrospect. We were able to see how she made meaning from her experiences, influencing her identity and shaping her vision of herself continuing on this journey. Suzie

learned much about being a teacher and herself during the school year. She reflected on the events which allowed her to gain confidence in her classroom decisions, mathematical content, and teaching constructing her mathematics-related teacher identity. Although the school year ended, the experiences she gained will continue with her as she continues on her journey to become an elementary teacher.

> It's been really tough, but I feel like I've been getting through. I feel like next year I'll have a better grasp on things because I've just learned so much this year. I've learned what to do and what not to do. So that's kind of help jumping through the hurdles now, so it'll be easier in the future. I'm sure I'll have more hurdles to jump through. But I feel like I'm getting my grounding. (March interview)

Each CoP encouraged or challenged Suzie's mathematics-related teacher identity in different ways. However, through the interactions with each CoP Suzie was able to gain the knowledge to communicate and express her ideas with the members of each community. By listening to Suzie's stories holistically through the eyes of the CoPs, I realized the difficulty of separating the experiences. The experiences in one community influenced interaction in another community. This makes sense because an individual is a compilation of all their communities. What happens in one community will influence how an individual will view or handle a situation in another community. In the next chapter, I discuss the interconnectedness of the CoPs and the common factors, communication and confidence, impacting Suzie's mathematics-related teacher identity. I also connect my findings to the literature regarding Lave and Wenger's (1991) communities of practice and construction of identity.

CHAPTER SIX: DISCUSSION AND IMPLICATIONS

The construction of a mathematics-related teacher identity is a complex web that combines a teacher's mathematical identity and teacher identity. Within communities of practice (CoPs), teachers interact and engage with other members, which affects their identity. Participation in CoPs lead to new experiences that build upon a teacher's existing understanding and knowledge, causing their identity to evolve. This journey can be emotional, and can impact a teacher's understanding of what and how to explain concepts and the choices they make in the classroom. The first year of teaching presents unique challenges and opportunities for growth. No two teachers' experiences will be the same, but there are overlaps in navigating the various aspects of being a teacher and learning how to become a part of their new communities. These new experiences can reshape a teacher's view on instruction and teaching implementation. These experiences can also influence a teacher's ability to participate in their CoPs, contributing to their mathematics-related teacher identity. Many factors impact a teacher's mathematics-related teacher identity, and these factors are deeply intertwined. Suzie's stories illustrate how her participation in different CoPs greatly influenced her mathematics-related teacher identity. The experiences within these different communities of practice can impact teachers' choices and decisions in the classroom, lesson preparation, and implementation. By the end of the school year, Suzie had acquired numerous new experiences from all of her CoPs. Some of the experiences Suzie encountered challenged her thinking. But from the interweaving of her communities, she found support from her grade team who encouraged her to grow from these experiences. Even through moments of struggle and success, Suzie's self-confidence grew

overall. This was evident in her classroom decisions and her mathematical ability, strengthening her mathematics-related teacher identity. Suzie went from a fear of teaching mathematics to discovering she enjoyed teaching mathematics and was able to see herself as an elementary mathematics teacher.

In Chapter Four, I used stories to gain insight into Suzie's participation in each of her CoPs: grade team community, parent community, and classroom community. Although these CoPs may appear separate, through my narrative analysis I was able to see the interplay between the CoPs. In this chapter, I examine the interconnectedness of experiences between Suzie's CoPs. The experiences gained in one community can influence how one interprets interactions in another community. In the following sections, I first examine the interconnectedness of the experiences across CoPs. To do this, I look at the bidirectional interactions of two CoPs at a time. First, I discuss the interconnectedness between the parent CoP and the classroom CoP. Then I examine the experiences between the grade team CoP and parent CoP, and then I look at the interconnectedness between the grade team CoP and classroom CoP. This leads to the common themes found within and across the CoPs. I then present a new way of visualizing the construction of a mathematics-related teacher identity using a gear model. I then recognize some limitations of this study. I discuss the benefits of using a narrative inquiry to understand the influences on a mathematics-related teacher's identity. Additionally, I elaborated upon using a research friend relationship. I end with sharing some implications from this study and directions for future research.

Interconnectedness

In this narrative inquiry, I used a community of practice lens to understand the influences on a first-year teacher's mathematics-related teacher identity. I also focused on the effect

confidence had on a first-year teacher's mathematics-related teacher identity. I followed Suzie's journey from her teacher preparation program through her first year of teaching, providing an in-depth understanding of her experiences. I focused on the stories Suzie shared about her interactions within her CoPs and how these interactions influenced her teacher identity, mathematical identity, and mathematics-related teacher identity. Communities of practice are groups that come together to learn and share their knowledge on a common purpose or importance. Although the purpose of each CoP was slightly different, each was invested in the students' learning. In the previous chapter, I delved into three main CoPs: the parent community, the classroom community, and the grade team community. Each of these CoPs can be seen and understood as separate. However, through my analysis of the stories, it became clear that the CoPs do not work in isolation. Through the storying and restoring, I found that the knowledge and confidence gained in one community impacted the interactions and understanding in another community. In this section, I discuss the interconnectedness of experiences and actions between Suzie's CoPs.

Interconnectedness between Classroom Community of Practice and Parent Community of Practice

Suzie interacted with her students the most. These experiences caused Suzie to realize she needed to increase/change the communication with the parent CoP. At the beginning of the school year, there were two parents who were e-mailing Suzie with concerns. Suzie initially felt the two parents were "ganging up on" her. However, once Suzie was able to reflect on the situation (with the help of her grade team) she realized she could provide the parents with more information to keep them apprised of their children's progress. This created some changes in

Suzie's classroom and the amount of communication she was providing. Suzie began to change her lessons, so her students would have work to take home and share with their parents.

Suzie's class had a 'chatty' group of students who resisted following the classroom expectations. This caused Suzie to pause and reassess the decisions she was making in the classroom challenging her teacher identity. The struggles from these decisions created a trickling effect where parents became more involved. Suzie tried new strategies, but it seemed she could not make all her students happy. For example, one day the class got very loud. Suzie asked all the students to put their heads on their desks, so they could take a minute to calm down. That night Suzie received an e-mail from a parent who disagreed with the decision Suzie made. Each parent had a different opinion about how the classroom should be handled and what the consequences should be. It became a situation where the parents reacted to events they did not witness and only heard the accounts from their seven-year-old child to make a judgment. With each e-mail, Suzie's confidence and teacher identity lowered, to the point Suzie was unsure if she wanted to continue teaching. Suzie felt she was letting the parent CoP make many of the decisions for her classroom. The interaction with the students in the classroom CoP sparked new tensions in parent CoP.

Interconnectedness Between Grade Team Community of Practice and Parent Community of Practice

During the year, Suzie had many interactions with her grade team CoP and her parent CoP. These experiences had trickling effects that seeped into the other community. For Suzie, her grade team offered her a wealth of knowledge and support throughout the year. This community helped her navigate many different aspects of being a teacher and growing her teacher identity. The parent community created emotional challenges for Suzie causing new

actions to occur in her other communities. The experiences within Suzie's parent CoP shifted her perspective and influenced her teacher identity.

At the beginning of the year, it was evident that Suzie was unsure how to present herself to her grade team and parent CoPs. Suzie realized she held herself back from participating and asking questions in her grade team CoP. She was unsure of the teacher terminology and didn't want to appear unknowledgeable within her grade team CoP. However, through her experiences during her team meetings, she began to learn the how to communicate her thoughts and became confident in sharing her ideas and asking questions. This was the first step that enabled her to become an active participant not only in her grade team community but also provided her with the knowledge to have a stronger voice in her other communities. She was able to share ideas for teaching lessons that were accepted, building Suzie's confidence in her teaching beliefs. At the beginning of the school year, a few parents e-mailed Suzie with concerns about their students. Suzie quickly realized she did not know how to respond to the parents. She reached out to her grade team to learn from their experiences. Suzie's team taught her how to communicate with her student's parents (the parent CoP) in a "professional" way. Although Suzie's team did not write her e-mails or tell her what to say to the parents, they provided her with vocabulary and tone to use to actively communicate with her parent community. With the support of her team, Suzie was able to compose emails and communicate with her parent community. From these experiences, Suzie realized she could provide the parents with more information about their child's progression in her class. She implemented an idea she learned from a grade team member of sending home the exit tickets her students completed in class. She also began sending messages to the parents that explained the concepts that were being taught in each unit. Finding new ways to communicate with the parents helped subside some of their concerns.

As the school year progressed, Suzie's students began to become more disruptive throughout the day. Suzie stuck to her rules and expectations, but each parent felt Suzie should be doing something differently in her class. This pushback from the parents lowered her confidence, as a result she accommodated the parent CoP. At one point Suzie felt she was letting the parents, "run the classroom". It wasn't until Suzie began to talk about what was happening with her grade team that she began to reflect on what was being said and how much leeway she had given to some of the parents. Suzie's grade team CoP provided her with a safe space to talk and reflect on the events that were happening in her parent CoP. This allowed her to realize she had been making good decisions and gave her confidence to make her own decisions for her classroom. Even when Suzie was struggling with one parent who blamed her for her son's behavior and told her she was taking things too personally (April interview). Her team supported her and encouraged her in the decisions she was making. With this renewed confidence Suzie was able to find her voice in the parent CoP and communicate her decisions with confidence. Suzie 'put her foot down' by reiterating her expectations and consequences for her classroom and offered to have a face-to-face conference. That would not have been possible without the guidance and support she received from her grade team community.

Interconnectedness between Grade Team Community of Practice and Classroom Community of Practice

Suzie struggled learning mathematics as a student which caused her to cast self-doubt on herself and believed her students would see her mathematical inabilities. This made Suzie doubt her ability to teach mathematics, challenging her mathematics-related teacher identity. Suzie wanted to make sure her students gained the mathematical knowledge they needed to be successful in the future. This led Suzie to voice her concern in her grade team community, where

the team focused their lesson study on a mathematics lesson. The members of Suzie's grade team CoP had been teaching for multiple years and shared the knowledge they had gained over the years with Suzie. Her grade team pushed her to rethink how she was planning and implementing her lessons. Through this experience, Suzie learned the value of intentional planning, leading her to new ways of teaching in her classroom CoP. Suzie's grade team CoP also showed her where to find school resources and gave her guidance to utilize the lesson resources. Suzie's grade team CoP also suggested reaching out to the school's learning design coach, continuing the development of her mathematics-related teacher identity. The lesson resources helped Suzie understand the vocabulary and best explanations to use with her students to effectivly teach the mathematical content. Suzie realized she needed to spend a lot of her time reviewing and preparing for mathematics. Through this preparation Suzie realized she was able to do and understand mathematics, building her confidence and mathematical identity. This confidence in herself carried into the implementation of her lessons in her classroom CoP. Her students were learning and remembering the mathematics she was teaching. As her students continued to progress her confidence continued to grow, building her mathematics-related teacher identity.

Not only was Suzie's grade team CoP there to support Suzie in her mathematical teaching, but they were also there to support her while she struggled with classroom management. Suzie discussed her challenge with students talking during her lessons with her grade team CoP. It seemed all the other teachers in her CoP had struggled with classroom management at some time as well. Together, they discussed different strategies and Suzie even observed another teacher to see how she managed her classroom. These conversations and support helped Suzie realize she was not alone in this challenge and encouraged her to keep trying new methods for classroom management (classroom CoP). This support and space to talk

and reflect grew her confidence and teacher identity. The growth of Suzie's identity within her classroom CoP would not have been as positive if it had not been for her grade team. They guided her and provided her with opportunities to reflect on her experience in the classroom. Suzie's team also directed her to additional teaching resources helping her make good classroom decisions and enhancing her mathematics instruction in her classroom CoP.

Dynamics of Communities of Practice and Identity

In Chapter Four, I explored the impacts of each CoP independently on Suzie's mathematics-related teacher identity. Now, in this section, I discuss the interlinking effects one experience can have across different CoPs. Suzie's grade team helped her understand how to communicate in other communities. She acquired valuable insights into the appropriate ways to communicate within both her parent CoP and classroom CoP, providing her with the knowledge of what and how to express herself in these contexts. This voice provided her with the foundation to be an active participant in her CoPs. Through this participation, Suzie was constructing her mathematics-related teacher identity within each CoP.

A mathematics-related teacher identity combines a teacher's mathematical identity and teacher identity. To understand the construction of a mathematics-related teacher identity, it is essential to delve into both the teacher and the mathematical components. In the next section, I first focus on the teacher identity component and subsequently examine the mathematical identity component to provide a more comprehensive understanding of a mathematics-related teacher identity.

Throughout the school year, there were times when Suzie's parent CoP and classroom CoP challenged the decisions she was making in her classroom. This caused Suzie to question her teacher identity. However, Suzie's grade team CoP provided her with a space where she

could reflect on her concerns and articulate her thoughts. With the support from her grade team community, Suzie built her confidence in her classroom decisions, which she then effectively communicated within her classroom CoP and parent CoP. Each of these experiences presented Suzie with opportunities to grow her teacher identity, paving the way for the construction of a positive mathematics-related teacher identity.

Suzie's past learning experiences with mathematics caused her to have a rocky mathematical identity as she entered the teaching profession. However, both her grade team CoP and classroom CoP encouraged her to build a better relationship with mathematics. Suzie's grade team provided her with access to the resources she needed to grow her mathematical identity. These resources helped Suzie relearn the mathematical concepts she had struggled with as a learner. This contributed to the development of her mathematical identity, and equipped her with the language to effectively convey mathematical ideas within her classroom CoP. This growth in Suzie's mathematical identity, in turn, boosted her confidence in teaching mathematics, thus increasing her mathematic-related teacher identity. As Suzie implemented her mathematical lessons, she was able to see her students' mathematical progression. Together with her growing confidence in her mathematical abilities and her ability to articulate mathematical concepts, Suzie believed she could teach mathematics, building her mathematics-related teacher identity.

Common Themes within and Across Communities of Practice

Suzie's stories illuminated many different aspects of being a teacher. Through listening and re-storying her stories it became clear that communication and confidence were two of the strongest themes that emerged related to identity. This was seen within her CoPs and also in the interactions between the CoPs. These constructs strongly influenced the way she participated and communicated with her CoPs. Her growth in her communication and confidence allowed her to

become an active participant in each community, providing her with the building block to develop her mathematics-related teacher identity. Although confidence and communication were certainly mentioned in the discussion on the interconnectedness of the communities of practice, in this section, I highlight specifically how these concepts impacted Suzie's identity. I first focus on the influence communication had on Suzie's identity. I then explain the impact of Suzie's confidence on her identity. This confidence was seen in her communication, classroom decisions, mathematical ability, and her implementation of lessons. I then relate the findings to the literature surrounding Lave and Wenger's (1991) view of identity and CoPs.

Suzie had to learn the appropriate way to communicate with each CoP. I found it interesting how quickly Suzie realized she needed to speak differently in each of her CoPs. Suzie had some understanding of how to communicate with her team from her experience as a pre-service teacher, but it was different since most of that communication was done with her mentor teacher and not the whole team. Suzie initially held herself back from participating with her grade team. She discussed how she was afraid to say the wrong thing in the meeting because she did not know all the teacher terminology. However, with each meeting and interaction with the members of this community, she gained the experience and knowledge to communicate her ideas. Suzie did not come in with the experience of communicating with her students' parents. She learned the best ways of communicating with parents from the guidance of her team. Her team shared their knowledge from their past experiences communicating with parents to help Suzie learn the language to use to communicate with her parent CoP. Her knowledge continued to grow with each interaction with the parent CoP. Suzie began the year with prior knowledge of communicating ideas with her students. However, she did not have much experience teaching mathematics. Suzie understood that her way of explaining mathematical concepts to her students

would be different than what she had done in reading and language. As she utilized the curriculum resources, she gained the terminology to help her students learn mathematical concepts. Suzie began to learn how and what to say to explain mathematical concepts to her students.

Each of these experiences impacted Suzie's confidence in her communication with her CoPs. As Suzie interacted more with her grade team, she became aware of the safe space they provided her. Suzie became comfortable, building her confidence to share ideas and ask questions. As her confidence grew, she began to participate more, gaining knowledge and building her teacher identity. At the beginning of the school year, Suzie did not have the knowledge or confidence to communicate with the parent community. During the year, there were times Suzie second-guessed her communication with the parent community, lowering her confidence. This then affected how she communicated with the parents. Once Suzie regained her confidence, it was portrayed in her communication with the parent CoP. As Suzie learned the terminology to teach mathematics, it gave her the confidence to implement her mathematics lessons.

Not only did Suzie gain confidence in her ability to communicate in each CoP, but also in her mathematical abilities and teaching implementation. Suzie expressed, she taught how she felt she had learned mathematics. Suzie had struggled as a mathematics learner and that was always in the back of her mind as she planned and prepared. She felt her past struggles with mathematics would be passed along to her students. This fear encouraged Suzie to spend more time preparing for her mathematics lessons. Through this preparation, she learned how and what to say to help guide her students' learning, giving her the confidence to explain the mathematical concepts. She also realized that she was capable of doing and learning the mathematics she had struggled with

as a learner. As she gained confidence in her mathematical identity, it also increased her confidence to teach mathematics to her students. This "new attitude" towards mathematics made Suzie realize she enjoyed teaching mathematics and was further encouraged as her student continued to improve, increasing her mathematics-related teacher identity.

Suzie also gained confidence in her classroom decisions. Throughout the year, she often felt her classroom CoP and parent CoP challenged her classroom decisions. This lowered Suzie's confidence to where she felt she was "letting the parents run the classroom." This tension caused stress on Suzie's teacher identity. It wasn't until Suzie began expressing her struggles with her grade team community that she was able to reflect on the situation. Her grade team was there to support Suzie and she regained her confidence in her classroom decisions. As Suzie built her confidence, she sat down and talked to her students about their behavior and reiterated the rules and expectations to the parents. After that, her students began to "step up" and held one another accountable for their actions. Seeing this caused Suzie's confidence to continue to build.

Wenger (2010) emphasized identity is impacted by experiences participating in an individual's CoPs. Language is used to form an image of who they are in their CoP (Lave, 1991). This knowledge of what to say and how to say it can influence one's ability to communicate and participate within their communities (Lave 1991; Gee 1999). In this study, the 'old-timers' in Suzie's grade team community embraced Suzie and shaped her learning providing her with the knowledge of language for her other communities. However, the knowledge of how to communicate was not the only thing Suzie needed to find her voice in her CoPs. She also needed confidence. Suzie expressed her struggle to speak up at the beginning of the school year. As she gradually learned what to say it gave her the confidence to voice herself and participate in her CoPs. This knowledge of both communication and confidence allowed Suzie to speak up and

have a voice, becoming an active participant and portraying herself as an elementary mathematics teacher.

Suzie spoke often about her confidence and the integral part it played in her identities. Suzie's stories highlight a cycle where confidence, participation, and mathematics-related teacher identity are deeply intertwined. When her confidence in the mathematical content increased her confidence to teach mathematics also increased, impacting her mathematics-related teacher identity. Suzie was able to find support in her grade team community which allowed her on a trajectory to continue "becoming" in each of her CoPs (Wenger, 2010). At the end of the school year, Suzie had learned a lot. However, she realized she still had more to learn and understood that her journey towards becoming an elementary teacher would continue to grow with each new experience.

Gear Model for Identity as Expressed in a Teacher's Communities of Practice

Taking a closer look at the experiences within each CoP, I can see how the experiences in one community caused new actions to happen in another community. These CoPs interacted and influenced one another like gears turning. There are larger gears representing the construction of an individual's identity within each of the communities. Each community consists of smaller integral gears that work together to develop and shape the ability to participate, thus contributing to the construction of their identity within that community. In this study, two of the smaller gears discussed within each CoP are confidence and communication. These are not the only gears to build an individual's identity, but they are significant in Suzie's story. Throughout Suzie's story, she often referred to learning how to communicate in each of her communities, which, in turn, enhanced her confidence to speak up. Figure 7 visually encapsulates this idea. The smaller gears, representing confidence and communication, drive the movement of the larger gears symbolizing

identity in each community. This movement can either facilitate or hinder the development of their identity within that particular CoP. As the smaller gears develop, they could be visualized as turning faster, allowing an individual to become a participant in their community and developing their identity. Events that occur in one community can cause something new to happen in another community. So, if one gear begins to turn, it will cause the other gears to turn and develop like a chain reaction. For example, when Suzie's students became more disruptive, she made a classroom decision. Some students were upset, causing their parents to become involved. When the parents became involved, Suzie received guidance from her team ultimately boosting her confidence in her classroom decision. As that gear builds speed Suzie communicates her ideas with confidence to the parents and students. Thus, building her identity in the parent and class communities as well. The same can also be true if one factor is challenged. Then the gear would slow down and could slow the movement of the other gears. As discussed previously, each CoP impacted a different aspect of Suzie's mathematics-related teacher identity, so as all the gears begin to turn and work together this constructs her mathematics-related teacher identity.

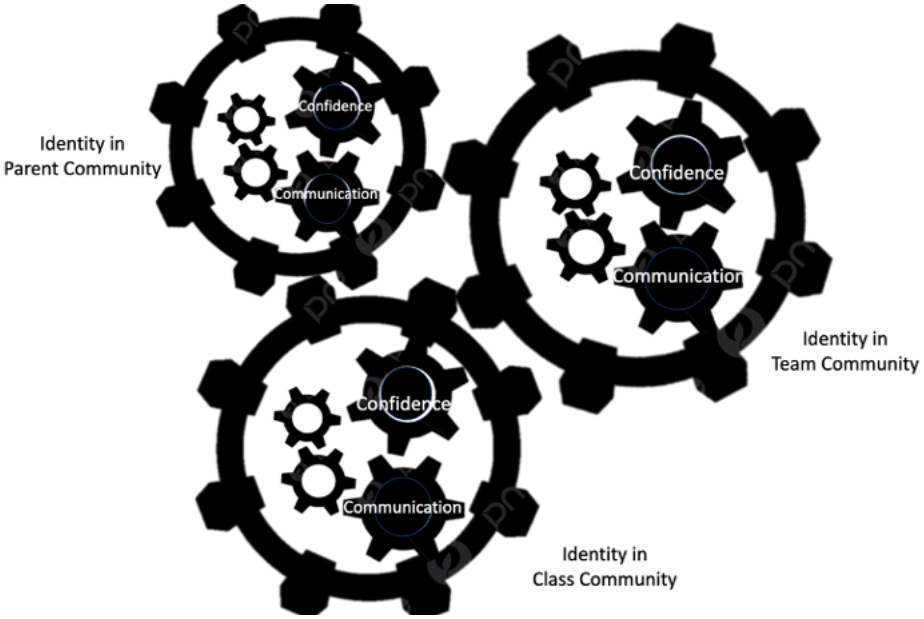

Figure 7:

Gear model of the interconnectedness of a mathematics-related teacher identity within CoPs

Recognition of Limitations

Without a doubt, other factors contributed to the construction of Suzie's mathematics-related teacher identity. There were other CoPs Suzie interacted with that could have been explored in more depth. Other events happened during Suzie's first year of teaching that could have impacted her identity. I believe some events would have been more prevalent if other events had not occurred at the same time. For example, Suzie received new students throughout the school year including two new students in April. These changes create additional stress on teachers and change the dynamics of a classroom. However, at this time Suzie felt more stress from one of the parents in her classroom that this fell on the back burner. I feel this captures the messiness of teaching. There are many different factors at play, you can never capture everything.

Methodological and Ethical Considerations

In some areas of education research, it is advised that researchers not conduct research with people when a prior relationship exists. This can certainly raise ethical considerations when there is a professor-student situation and power differentials exist. However, with a previous relationship, a participant may feel more comfortable sharing personal information of their truer emotions. In this study, I had a prior relationship with my participant, Suzie. I was a university professional who worked with pre-service teachers to pass the mathematics portion of the general knowledge test, GKT. I had worked with Suzie for several months helping her pass the mathematics portion of the GKT. During this time, we began to develop a relationship. As I was considering this study, I realized it was because of the relationship we had developed that I would be able to have genuine conversations and understand what Suzie was going through during her first year of teaching. Although I was not in an evaluative role, I was aware of the potential of a power dynamic. Accounting for this I did not continue with this study until Suzie had passed all her teacher certification exams and graduated from the university. This relationship, however, caused me to reevaluate the term participant because we had already begun to develop a friendship. We had already learned some about each other's past experiences and began to form a caring relationship. I felt the term research friend would better describe our relationship. With this relationship, I also had to consider the implications it would have on this study. I was not meeting with Suzie only to hear her stories during her first year of teaching, but I became part of her story. We had conversations and could relate to one another's experiences. I was a K-12 educator and had similar experiences. While not all our experiences aligned, I was able to hear and relate to Suzie's stories. I feel a major part of this connection was that I had

firsthand experience learning how to communicate with my own team CoP and parent CoP. My experiences teaching helped me to understand what Suzie was going through.

Suzie and I connected on more than our experiences teaching. We had developed a caring relationship. There were times I needed to be there for her as a friend rather than a researcher. During one of our meetings, I initially intended to discuss a lesson she had planned. However, I soon realized it was more important to set that aside and listen to Suzie and provide her with support in her struggle. When you have a research friend relationship, you are not an outside observer; you are a part of the stories being told and an influence on the understanding of experiences. I felt I was a part of Suzie's first year of teaching. I also felt this relationship helped me understand and hear more about what was really happening during her first year. I honestly feel the only reason I learned so much was because of the relationship we had, and by using a narrative inquiry approach.

Suzie and I were able to have open discussions because our relationship was built on trust, care, and openness (Connelly & Clandinin, 1990). Suzie felt through the relationship we already had and continued to build; she was "comfortable being honest with you about my experiences during my first year." Our relationship continued to grow, and our interactions were "a positive and encouraging interchange." Through our conversation, I was able to be a support for Suzie, and we created a space that was "upbuilding and made me (Suzie) more confident in my teaching abilities." These conversations allowed Suzie a time and place to "really stop and reflect." This was a space where she wasn't "just going through the motions of teaching." She was able to think about her lessons and how she "could have done something better" or reflected on how she could have "handled this situation a little better." It was because of our relationship that Suzie felt comfortable sharing. Using a narrative approach, allowed the stories to take shape

naturally and encouraged our relationship to grow. By listening to and being a part of Suzie's stories, I gained a deeper understanding of her experiences. Retelling these stories allowed me to highlight the complexity of being a teacher. The combination of using a narrative while having a research friend relationship enabled me to honor Suzie's perspective.

Researcher Reflexivity

Suzie and I had very different learning and teaching experiences throughout our lives. I enjoyed learning mathematics and felt that was the one class I felt most comfortable in, while Suzie struggled from a young age. I also taught middle and high school mathematics and Suzie taught all subjects in a first-grade classroom. However, during the times that we spoke, I felt myself in her stories, and had similar experiences. Many of the tensions Suzie faced reminded me of my experiences and emotions that I had suppressed. During one of our meetings, we sat and cried together, and I was able to be a source of comfort and compassion. Even as I sat reflecting and writing the overarching story my emotions arose. I feel this is a part of teaching that is not discussed enough, but it is important because it affects how we see ourselves as teachers. Using narratives, I was able to embrace my feelings and connect with Suzie on a deeper level. I am so thankful for this experience working with Suzie this year. It made me reflect on my past experiences and set goals for myself in teaching in preparation programs.

Research Implications

Although there has been emerging research on mathematics-related teacher identity there has been little research on how to facilitate identity growth for teachers. A mathematics-related teacher identity influences a teacher's planning, instruction, and classroom decisions. This study suggests that communication and confidence contribute to the construction of a teacher's mathematics-related teacher identity within their CoPs. Furthermore, the interconnectedness

(interplay) of the experiences between CoPs prompts the question, what can be done to prepare future teachers to leverage the interconnectedness of their CoPs?

There are various opportunities to foster a positive identity throughout a teacher's career. As teachers begin their teaching careers, both teacher preparation programs and teacher induction programs can begin to attend to the growth of a teacher's mathematics-related teacher identity. Identity is continuously constructed through new experiences; thus, it is also important to provide teachers with additional support throughout their careers. Additionally, researchers can continue to explore the intricacies of a teacher's mathematics-related teacher identity.

Teacher Preparation and Teacher Induction Programs

When a teacher begins their teaching career, they have to navigate many aspects. This study highlights that there are multiple communities of practice that teachers need to attend to. The participation within these CoPs contributes to a teacher's identity (Lave, 1991; Lave & Wenger, 1991). This presents an argument for teacher preparation programs to support their pre-service teachers in learning how engage with these different CoPs (Hoaglund et al., 2014). From this study, Suzie recognized the need to learn how to communicate her ideas in her grade team community, parent community, and classroom community. There has been limited discussion surrounding communication with the student's parents/guardians (Merkley, 2006). This is important, so the teacher and parents can work together. Therefore, preparation programs could offer opportunities to practice responding to parent emails and sharing information about the class. Additionally, this study indicated the impact a grade team community can have on a first-year teacher's mathematics-related teacher identity. Thus, preparation programs can leverage this importance by providing opportunities for their pre-service teachers to engage in collaborate experiences that mirror the collaboration they will encounter (Faraha et al., 2015). Providing pre-

service teachers with experiences that will reflect the communication they will need to have with their various communities will provide them with an entry point to be a participant in their future CoPs and build their identities.

Suzie's stories showed how experiences within one community could influence actions and events in another community. Although challenged in her parent community, she found support within her grade team community. Recognition of the interconnectedness of the CoPs can be leveraged in preparation programs to help novice teachers understand they can find support from their other CoPs. This understanding of the interplay among the CoPs could potentially empower teachers to seek assistance during their times of struggle.

In-service Teachers

In this study, Suzie had a very supportive and nurturing grade team community. This community contributed to much of Suzie's growth during the school year. Supportive teams and other teacher communities have the power to shape the learning experiences of new teachers (Arslan et al., 2020; Lave & Wenger, 1991). This raises the question: how can we encourage the development of such supportive team communities? This could be promoted in several ways. School administrations can work towards encouraging positive communities within their schools. Providing time and a space for teachers to reflect on their teaching and collaborate can enhance their teaching methods (Arslan et al. 2020, Lieberman, 2009). Embodying an environment of camaraderie can encourage the formation of communities in which teachers feel comfortable sharing their ideas and challenges they face (Fahara et al., 2015). Suzie's experiences highlighted how her confidence grew as she engaged with her team more frequently. Hence, providing teachers with opportunities to share and discuss could create spaces where teachers feel comfortable and become more willing to participate in their CoPs.

In this study, Suzie's confidence in her mathematical ability had an impact on her lesson planning and implementation. This suggests the importance of providing opportunities to build stronger relationships with mathematical content (Hodgen & Askew, 2007). It is important for teachers to practice and engage with the content to build their confidence in both the subject matter and their ability to teach it effectively (Nanna et al., 2021). This is not only true for novice teachers but also for in-service teachers. Many educators do not teach the same content every year, and even when teachers do, the curriculum may undergo changes. To assist teachers in staying current with the content they teach, schools can provide professional development opportunities that enhance teachers' confidence in their subject matter.

Researchers

In this study, I had a more unique relationship with my participant. A relationship that provided a voice to teachers to share their experiences. I feel this study shows the benefits of using a research friend relationship. Additionally, it helps guide an understanding of the values of having this type of relationship. It also brings to light considerations and impacts on the relationship and the study. Researchers and teachers have the same goals, to find ways to improve teacher instruction and student learning. Teachers don't have much time, or experience, to write about what they are doing and trying in their classrooms. We, as researchers, need to find ways to work with teachers to understand their experiences. Using a research friend relationship can help to create an open environment in which teachers feel they can share without fear of judgment, and researcher can gain a deeper understanding of their experiences.

Future Directions for Research.

Research on identity in mathematics education has looked at many different aspects. However, there has not been much prior research that has illustrated a way to conceptualize this

complex web. This study takes a closer look at some of these factors and begins to visualize this understanding as gears turning. Exploring the innerworkings of a mathematics-related teacher identity will help expand this model. Also, by exploring different factors contributing to a teacher's identity more closely we can find more ways to help support the construction of positive identities.

Suzie's confidence was a central role influencing and being influenced by her identity. While Kaasila et al (2007) stated confidence is a "central role in the formation of a student's view of mathematics" this should be examined more closely with teacher identities. Although confidence has been mentioned in many studies, I have not come across any that examine the relationship between confidence and mathematics-related teacher identity. From Suzie's stories, I learned that as her confidence increased her identity seemed to strengthen. I honestly don't feel I would have seen as many connections with the tandem relationship of confidence and identity if I hadn't been looking. This causes me to wonder more about the relationship between confidence and identity. Is confidence a driving factor in an individual's identity? More research could be conducted to understand this relationship.

This study also shows the role CoPs have in the construction of a mathematics-related teacher identity. One thing that stood out to me was the level of support and inclusivity within Suzie's grade team CoP. They were able to embrace Suzie and provided her with the opportunities to have a voice and become an active participant in their community. This caused me to wonder how these supportive communities are encouraged. Additionally, learning how to communicate within CoPs was another significant factor that emerged from Suzie's stories. She recognized she needed to communicate her ideas differently in each CoP. Additional research could be done to explore the differing discourse used across CoPs.

I discussed some general ideas and will now list some additional wonderings I have after completing this study.

- Does a teacher's confidence in their content influence their participation in their team community?
- What are ways to help teachers build their confidence to become participants in their different CoPs?
- Use a discourse analysis approach to understand the language used within the different communities of practice.
- Is there a connection with teacher dropouts and their ability to feel like they belong to their communities of practice?
- More studies on the team community and identity, to learn how to form supportive communities in building positive identities
- How does a teacher's content (mathematical) identity affect planning and implementation of lessons?
    - Will this impact their willingness to implement new teaching strategies?

Conclusion

In this narrative inquiry, I set out to understand the impacts on a first-year teacher's mathematics-related teacher identity using a CoP lens. A mathematics-related teacher identity in and of itself is complex, combining a teacher's mathematical identity and teacher identity together. It can influence teachers' teaching methods, classroom decision, planning, and implementation of mathematical lessons, among other aspects. By utilizing a narrative methodology, I was able to capture the emotions, pivotal experiences, and complex nature of a teacher's life. Suzie's stories emphasized that each CoP has an impact on various aspects of a

teacher's mathematics-related teacher identity. These stories also revealed two common factors that consistently influence a first-year teacher's mathematics-related teacher identity in all communities: communication and confidence. Within each community, effective communication takes on different forms. Learning how to communicate with the members of each community provides the confidence needed to participate and contributes to the construction of an individual's identity. Confidence was seen in many ways, and also played a key role in the construction of a mathematics-related teacher identity. Confidence could be seen in communicating ideas in each community, mathematical ability, and implementation of lessons. Viewing the stories holistically and then taking an in-depth look at specific moments provided a way of understanding identity as intricate gears nested within one another, working in unison to construct a mathematics-related teacher identity.

This study begins to provide a visual representation of a mathematics-related teacher identity. Understanding what factors influence this construction can offer valuable insights to teacher preparation programs and professional development to nurture positive teacher identities. Examining the construction of a mathematics-related teacher identity within teachers' communities of practice highlights the importance of creating environments where teachers feel comfortable sharing and participating. It also indicates that first-year teachers should learn how to communicate within each of their CoPs. Providing new teachers with experiences to learn how to communicate with each of their CoPs. Providing novice teachers with opportunities to acquire these communication skills can serve as steppingstones toward becoming active participants in their CoPs. Through such active participation, first-year teachers build upon their past understandings, continuing the ongoing process of constructing their mathematics-related teacher identity as they continue their evolving journey of being and becoming mathematics teachers.

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APPENDIX A: IRB APPROVAL LETTER

EXEMPT DETERMINATION

February 15, 2022

Kelly Navas
[redacted]

Dear Kelly Navas:

On 2/11/2022, the IRB reviewed and approved the following protocol:

Application Type:	Initial Study
IRB ID:	STUDY003723
Review Type:	Exempt (2)(iii)
Title:	A Narrative Inquiry into the Experiences of a Novice Teacher's Mathematical Identity through belonging to mathematical communities
Funding:	None
Protocol:	• Experiences of a Novice Teacher's Mathematical Identity (approval doc);

The IRB determined that this protocol meets the criteria for exemption from IRB review.

In conducting this protocol, you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Please note, as per USF policy, once the exempt determination is made, the application is closed in BullsIRB. This does not limit your ability to conduct the research. Any proposed or anticipated change to the study design that was previously declared exempt from IRB oversight must be submitted to the IRB as a new study prior to initiation of the change. However, administrative changes, including changes in research personnel, do not warrant a modification or new application.

Ongoing IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about

APPENDIX B: VOLUNTARY PARTICIPANT CONCENT FORM

Informed Consent to Participate in Research Involving Minimal Risk

Information to Consider Before Taking Part in this Research Study

Title: *Experiences of a Novice Teacher's Mathematical Identity*

Study # 003723

Overview: You are being asked to take part in a research study. The information in this document should help you to decide if you would like to participate. The sections in this Overview provide the basic information about the study. More detailed information is provided in the remainder of the document.

Study Staff: This study is being led by Kelly Navas who is a Graduate Student at/in University of South Florida. This person is called the Principal Investigator. She is being guided in this research by Dr. Sarah Van Ingen-Lauer

Study Details: This study will be conducted at your school of employment during the Fall 2022 semester. The purpose of this study is to discover what influences the mathematical identity of a novice elementary teacher. Education programs work towards encouraging positive identities, but how do the schools support first-year teachers. I wish to observe you in your classroom during mathematics instruction, have conversations about your reflections of lessons and interactions, and will also have three interviews over the fall semester. The interviews will be conducted via Microsoft Teams. The first of the interviews will be done before your school planning (End of July 2022). The second interview will be conducted in the middle of the semester (Mid October 2022). The final interview will be conducted at the end of the Fall 2022 semester (End of December 2022).

Participants: You are being asked to take part because you participated in a previous study, An exploration of pre-service teachers' narratives of mathematical identity (Study#2444).

Voluntary Participation: Your participation is voluntary. You do not have to participate and may stop your participation at any time. There will be no penalties or loss of benefits or opportunities if you do not participate or decide to stop once you start. Your decision to participate or not to participate will not affect your student status, course grade, recommendations, or access to future courses or training opportunities.

Benefits, Compensation, and Risk: We do not know if you will receive any benefit from your participation. This research is considered minimal risk. Minimal risk means that study risks are the same as the risks you face in daily life. The COVID-19 pandemic could still be a

concern at this time. Anytime face-to-face meetings occur the proper face mask will be used to prevent transfer of virus.

Confidentiality: Even if we publish the findings from this study, we will keep your study information private and confidential. Anyone with the authority to look at your records must keep them confidential.

Privacy and Confidentiality

If the findings from this study are published, your information will be kept private and confidential. Anyone with the authority to look at your records must keep them confidential. Your information collected as part of the research, even if identifiers are removed, will NOT be used or distributed for future research studies

Contact Information

If you have any questions, concerns or complaints about this study, call Kelly Navas at [redacted] If you have questions about your rights, complaints, or issues as a person taking part in this study, call the USF IRB at (813) 974-5638 or contact the IRB by email at RSCH-IRB@usf.edu.

We may publish what we learn from this study. If we do, we will not let anyone know your name. We will not publish anything else that would let people know who you are. You can print a copy of this consent form for your records.

I freely give my consent to take part in this study. I understand that by proceeding with this survey, I am agreeing to take part in research and I am 18 years of age or older.