2018

A Qualitative Case Study About Online Reflection for Elementary Mathematics Teachers

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
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Walden University
2018

Abstract

A Qualitative Case Study About Online Reflection for

Elementary Mathematics Teachers

by

Michelle McCabe Trofort

MA, New York University, 1999

BS, Western New England College, 1994

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education

Walden University

July 2018

Abstract

Many teachers report that they rarely engage in reflection. Asynchronous forums have been used to foster reflection among prospective teachers, but there is limited research about the allocation of time for reflection in an asynchronous forum for practicing teachers. The purpose of this qualitative case study was to (a) determine teachers' perceptions about the benefits and drawbacks of the use of an online forum to allocate time for reflection and (b) to classify the levels of the teachers' reflections in the forum. A conceptual framework based on select writings by Dewey, Hatton and Smith, and van Manen was used to guide this study. The research questions addressed teachers' perceptions of the benefits, drawbacks, and use of a forum to allocate time to reflect as well as the levels of reflection achieved by the teachers in the forum. Ten online discussions and 2 sets of questionnaires were analyzed and coded using constant comparative data analysis. Seven elementary mathematics teachers completed the study and 52% and 56% of the discussion postings were coded as critical reflections using Hatton and Smith's framework and a summary of van Manen's framework, respectively. The themes pertaining to the benefits of reflecting online were convenience, sharing, and learning. Peer-to-peer interactions, however, were infrequent, and the teachers indicated that time was a factor that limited participation. This study may effect positive social change by advancing knowledge about using online forums to provide teachers with time earmarked for reflection focused on improving mathematics teaching and learning. Furthermore, educators can use information from this study to design online professional development experiences that include opportunities for reflection and reflective practice.

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Dedication

This dissertation is dedicated to my family and close friends. It is not always easy to be determined. It is not always easy to be a change agent and it definitely is not always easy to be fearless. We sometimes see these qualities in people who have made a mark in this world, but we do not always see them in the people closest to us. However, people in my family and friends in my circle are determined, fearless, and agents of change in their own unique way. Despite setbacks, they are still choosing to have faith and dream big. They are still choosing to love, and most importantly, they are choosing to stay in the race. By doing so, they have been a source of encouragement and much more to me. I want to thank them all for their words of encouragement, prayers, and support. I also want to thank my husband for the very timely advice that made it easier to finish. Thank you all for believing in me.

Acknowledgments

I would like to thank Dr. Joanne Stuckey for her patience, guidance, and meticulous feedback through multiple revisions of my dissertation. Thank you for your tireless support during the final years of this journey. Thank you for the conference calls, emails, and Skype sessions to make sure that I was on track. You have an indomitable spirit. I learned a great deal from you about tenacity and willpower. You lead by example.

I must also thank Dr. Christina Dawson for serving as the methodologist on my committee. Thank you for giving me feedback based on your expert knowledge of qualitative methodology. You also contributed to my success. I would also like to thank Dr. Gary Lacy for his feedback as I completed the final revisions of this dissertation.

As an inexperienced researcher, I gratefully acknowledge partial funding from the Don E. Ackerman Research Fellowship in Educational Leadership. I also extend a heartfelt thank you to the instructor of the online professional development course. This dissertation would not have been possible if I did not have access to the course. I would like to say a special thank you to the teachers who participated in this study. Despite having busy schedules, they agreed to take part in this study and share their perspectives.

Last, I would like to thank my husband, nephews, cousin, and peer editors for reviewing this dissertation. Thank you for your encouraging words and helpful feedback. I learned about human potential through this experience. This dissertation experience also jump-started the process of becoming a better researcher and writer. I am grateful and I thank God for what I have learned thus far. This is only the beginning.

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Chapter 1: Introduction to the Study

Reflection is considered an important component in teacher education programs around the world (Beauchamp, 2015; Liu, 2017; Nelson & Sadler, 2013; Zeichner & Liu, 2010). In many school districts, reflection is also included in the teacher observation and evaluation process to promote teaching and learning and professional development for practicing teachers. Reflecting on teaching is also a component on many teacher evaluation systems such as Danielson's (2013) Framework for Teaching Evaluation Instrument. Despite the emphasis on reflection during teacher education, professional practice, and the evaluation process, researchers (Gelter, 2003; Thompson & Pascal, 2012) have reported that reflection is often not common practice among school teachers. Many teachers spend time planning and teaching, but rarely do they set aside time to engage in reflection (Chalikandy, 2014). Becoming skilled at reflection can be difficult for teachers who want to obtain high ratings, if they struggle to find time for reflection. Therefore, it could be beneficial to help teachers become reflective practitioners by providing them with opportunities to engage in reflection after school hours.

The definition of reflection frequently used in the literature is Dewey's (1933) definition of *reflective thought*: "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends" (p. 9). Another important term in the literature pertaining to professional development and reflection is the concept known as *reflective practice*, which stems from Schon's (1983) book, *The Reflective Practitioner: How Professionals Think in Action*. There are many different definitions for reflection and reflective

practice, and the terms are used interchangeably in the literature. In this study, the term *reflective practice* is based on Osterman's (1990) work and is defined as a process whereby individuals utilize reflection to critically analyze actions in order to learn, and consequently develop and improve their craft. The term is used to describe how individuals critically examine their actions as well as how professionals engage in collaborative reflection (Finlay, 2008).

Reflection is known as a key professional competency or standard (National Board for Professional Teaching Standards [NBPTS], 2016; Rodgers, 2002a). In the school district where I work, reflection is considered professional responsibility and teachers receive ratings on their evaluations in the area of reflecting on teaching. There are four ratings in the district's evaluation system: *ineffective, effective developing, effective,* and *highly effective*. In school districts with this type of rating system, reflection is now enforced, whereas before reflection was a desirable, but not a mandated skill for teachers to possess (Glasswell & Ryan, 2017).

Although it has been noted that reflection is beneficial for changes in practice, some researchers (e.g., Dittrich, Pool, Stebick, & Weigler, 2008; Lyons, 2010; Stebick, Dittrich, Pool, & McCoy, 2007) have reported that it is not easy for teachers to develop this skill. This problem has been documented in earlier research as well. According to Valli (1992):

> Proposing that reflection is a "natural disposition" seems foolhardy. Such a proposal suggests that left to their own devises, prospective teachers will spontaneously develop into reflective practitioners or that faculty will

> spontaneously construct programs which develop reflective orientations. And yet we know that even many experienced teachers operate too often out of tradition, habit, and prescription rather than reflective judgment. (p. 215)

Additionally, in more recent studies about levels of teacher reflection, when the contents of the reflections of prospective or practicing teachers are examined or classified using a framework, high levels of reflection were not achieved (Cimer & Palic, 2012; Cohen-Sayag & Fischl, 2012).

Professional development that includes reflection can be beneficial for practicing teachers who need to develop the reflective habits that can improve teaching. Unfortunately, it is sometimes difficult to attend professional development when meetings are at locations outside the schoolhouse. Additionally, due to increasing time pressures for many teachers, having in-house professional development during the day can be challenging as well. According to Wallace, Nesbit, & Newman (2001) reflection is typically not included in staff development. Because reflection is usually not included in most professional development activities, district and school leaders could allocate time for reflection during professional development to help teachers develop this skill.

Although there is research about using asynchronous forums to promote the development of reflection for students and pre-service teachers, there is little research about the use of asynchronous forums to allocate time for practicing teachers to reflect on practice. Because there is very little research about using asynchronous forums to foster reflection for elementary mathematics teachers during professional development, this study was warranted. Furthermore, given the challenges related to cultivating high levels

of reflection, this study was also important because of the focus on determining the levels of the teachers' reflections in the forum.

The information presented in this study could lead to positive social change because understanding how to increase opportunities for reflection could improve the reflective practice of elementary mathematics teachers and lead to improvements in mathematics teaching and learning. In my school district, some elementary teachers teach mathematics as well as other subjects, whereas some only teach mathematics. Therefore, in this study, the term *elementary mathematics teacher* refers to an elementary school teacher who teaches mathematics and other subjects or an elementary school teacher who only teaches only mathematics.

Providing quality mathematics education to all students is a multifaceted issue, and many different solutions have been recommended and considered over the years. Researchers have concluded that mathematics teaching and learning can improve when teachers are given opportunities to engage in effective professional development. According to Gulamhussein (2013), effective professional development needs to be ongoing or sustained over a period of time, focused on content knowledge, and incorporate coaching. Regarding reflection, it has been noted in the research that when time for reflection is included in content-focused professional development, mathematics teaching practices and learning can also improve (Dunst, Bruder, & Hamby, 2015; Saylor & Johnson, 2014). When teachers engage in reflection, they can improve their teaching practices and effect change in that manner. Teachers can also effect change to a greater degree at the organizational level using reflection to address issues outside of their

classroom that are impacting learning in their classroom. Consequently, providing mathematics teachers with time to reflect could lead to systemic improvements in mathematics education and better mathematics education for students.

In this chapter, I present justification for this study and background information about how reflection can benefit elementary mathematics teachers. I also discuss the gap in the literature caused by limited research about online reflection for teachers. The assumptions, scope, delimitations, limitations, significance of the study and social change implications are also included in this chapter, followed by a summary.

Background

To be effective, mathematics teachers "must know and understand deeply the mathematics they are teaching and be able to draw on that knowledge with flexibility in their teaching tasks" (National Council of Teachers of Mathematics, 2000, p. 17). Unfortunately, most elementary school teachers in the United States are trained as generalists (Fennell, 2006; National Research Council, 2010; Wu, 2009), and in their teacher education programs, only a few mathematics courses are required (Fennell, 2006). To help teachers overcome challenges connected to becoming effective mathematics teachers, it is important to provide them with "opportunities to analyze the process of learning, the nature of mathematics, and the kinds of classroom structures that will promote that goal" (Schifter, 1996, p. 4). Teachers should spend time in reflection to think about what supports or hinders learning (Chalikandy, 2014). According to Marzano, Boogren, Heflebower, Kanold-McIntyre, and Pickering (2012), teachers should

participate in reflection activities because reflection is an excellent way to improve their craft.

Researchers have concluded that reflection can be fostered and improved through face-to-face means using tools such as videos, lesson studies, journal writing (Dervent, 2015; Etscheidt, Curran, & Sawyer, 2012), and portfolios (Cotta & Costa, 2016). With the invention of technology such as electronic e-mail, electronic mailing lists, threaded forums, electronic bulletin boards, e-portfolios, and weblogs, researchers eventually began studying how to use technology to foster reflection. There is ample research about using technology to engage students in learning and reflection. There is also a considerable amount of research about using technology to study the reflection of students enrolled in teacher education programs. There is also foundational, as well as more recent theoretical and empirical research (e.g., Garza & Smith, 2015; Harrington & Hathaway, 1994; Hixon & So, 2009; Krutka, Bergman, Flores, Mason, & Jack, 2014; Rose, 2016; Whipp, 2003) about the use of online technology to foster reflection for students or preservice teachers. Although there is a significant amount of research about online reflection for preservice and student teachers, the phenomenon is still of interest to researchers. For example, in recent research, Rose (2016) underscored the need for more studies about how to facilitate reflection for students, specifically in an asynchronous course.

Even though there is interest in studying how to use technology to foster reflection during teacher preparation, according to Burhan-Horasanli and Ortactepe (2016) and Hawkes and Romiszowski (2001), very little research exists about using

online forums to facilitate reflection for practicing teachers. Studies conducted by Burhan-Horasanli and Ortactepe and Hawkes and Romiszowski are representative of studies about online reflection for practicing teachers. Studies by Myers (2003) about practicing and prospective students and Ruan and Griffith's (2011) study involving practicing teachers and a graduate student are also examples of studies about online reflection. As stated previously, there is limited research about online reflection for teachers already in the field. Furthermore, there is also limited research on using online discussion boards to allocate time for elementary mathematics teachers to engage in asynchronous reflection activities.

Although there is value in understanding the research about the online reflections of preservice teachers, studies about preservice teachers are usually conducted in a "highly controlled context of preservice teachers development" (Hawkes & Romiszowski, 2001, p. 289). Therefore, the results from preservice studies may not lead to understanding about the use of technology to facilitate online reflection for practicing teachers. There is therefore a gap in understanding the outcomes of using asynchronous discussion forums to allocate time for reflection for practicing teachers. There is also a knowledge gap pertaining to the levels of reflection that can be achieved when practicing teachers reflect online. The knowledge gap concerning the levels of reflection exists because reflection is sometimes not the outcome, not only in studies involving preservice or student teachers, but also in the limited number of studies about practicing teachers. Therefore, I attempted to address the gaps in the literature by designing this study to explore elementary mathematics teachers' perceptions of the benefits and drawbacks of

using an online forum to allocate time for reflection. I also focused on identifying the levels of the teachers' reflections in this study.

Problem Statement

Reflection is an effective tool for improving teaching because teachers can reflect to consider solutions to day-to-day classroom issues that affect learning or solutions to societal problems. With new accountability systems in place in many school districts, reflection has become mandatory and teachers are evaluated based on their ability to reflect on practice (Glasswell & Ryan, 2017). Unfortunately, because teaching is a busy and demanding profession, many teachers struggle to find time to engage in reflection (Cimer & Palic, 2012; Farrell, 2014; Finlay, 2008; Kempf, 2014; van Manen, 1991).

Although reflection has the potential to build teachers' knowledge and competence in their practice (Marzano et al., 2012; York-Barr, Sommers, Ghere, & Montie, 2006), statements from teachers indicate that finding time for reflection is an especially challenging issue. The following statements or remarks made by teachers in a doctoral seminar represent the thoughts of many teachers about not having time for reflection. For example, in response to a teacher's comment about the importance of reflection during a pedagogical process, one teacher laughed and made the following remark: "'Yeah, right... like we have time for reflection!'" (Rose, 2016, p. vii). The other teachers "chuckled appreciatively" (Rose, 2016, p. vii). The thoughts expressed by the teachers in Rose's seminar about "the impossibility of reflection" (Rose, 2016, p. 97) are not uncommon. Kempf (2014), a kindergarten teacher, also shared concerns about not having time for reflection, especially meaningful reflection. She explained that "it is

sometimes difficult to remember to take time to reflect on the teaching and learning that takes place in our classrooms each day. I have found myself spending little (if any) time on reflection" (Kempf, 2014, p. 527).

Reflection can improve practice; however, time has to be allotted for reflection. Researchers (Khan, 2015; Thompson & Pascal, 2012) have noted that teachers need time to reflect on practice. However, according to Khan (2015) lack of time is a barrier to reflection. Many times, professional development offered to teachers fails to include opportunities for teachers to participate in reflection (Wallace et al., 2001). Furthermore, even when teachers are given the time to reflect, many teachers do not reflect at high levels (Cimer & Palic, 2012).

The concern that teachers need time to engage in reflection and the study of the activities that effectively facilitate reflection and reflective practice is documented in the literature. Although much has been written and many studies have been conducted about the activities, tools, and programs that best foster reflection (Chalikandy, 2014; Dervent, 2015; Hatton & Smith, 1995; Saylor & Johnson, 2014; Valli, 1992), few studies have addressed the issue of limited time for reflective practice. Technology such as asynchronous discussion forums have the potential to reduce the challenge of not having time for reflection. However, asynchronous discussion forums can only be deemed successful if reflection is the outcome. For this reason, I designed this study about an elementary mathematics professional development course in order to determine if elementary teachers would spend time in online reflection and if high levels of reflection would be the outcome.

Purpose of the Study

The purpose of this qualitative case study was to determine participants' perceptions of the benefits and drawbacks of using an online discussion forum to allocate time for reflection and to determine the levels of the teachers' reflections in the forum. Although asynchronous online discussions provide a convenient platform for reflective practice, not many studies have been successful in producing high levels of reflection, such as critical reflection. Furthermore, the majority of studies about online reflection experiences have been about students and student teachers. Therefore, there is a need for more understanding about teacher reflections in an online discussion platform (Burhan-Horasanli & Ortactepe, 2016; Hawkes & Romiszowski, 2001; Romano, 2008). To respond to the call for more research about the facilitation of reflection in an online discussion forum, I designed this study to determine whether practicing teachers would engage in high levels of reflection in an online discussion forum.

Part of the reflective process involves the consideration of possible explanations for a specific problem. In many instances, the solution to the problem is discovered as the individual considers how similar problems were resolved in the past (Dewey, 1933). Consequently, new teachers tend to have difficulty reflecting on teaching because they have limited knowledge and experience (Cohen-Sayag & Fischl, 2012; Dewey, 1933; Garza & Smith, 2015; Mewborn, 1999). For this and other reasons, earlier researchers suggested that training in the process of reflection should begin towards the end of the preservice teacher education program and continue into the early years of teaching (Hatton & Smith, 1995).

It is important to help teachers continue to engage in reflection after completion of teacher preparation programs. Therefore, I sought to contribute to the literature by focusing on the use of online discussions to allocate time for practicing teachers to reflect. It has been argued that organizational, personal issues, and lack of time can hamper opportunities to learn through reflective sharing (Carr & Chambers, 2006a). Therefore, understanding practicing teachers' perceptions about using online discussion forums for reflection may help educators design such forums to increase opportunities for reflection. Furthermore, examining the contents of the reflections to identify the levels of the teachers' reflections could lead to more understanding about the levels of reflection that can be achieved in an online forum.

Research Questions

1. What do teacher participants perceive as the benefits and drawbacks of reflecting in an asynchronous discussion online forum?
2. How do teacher participants perceive and describe their reflection experience when time is allocated for reflection online?
3. What are the levels of the teachers' reflections in the asynchronous discussion forum?

Conceptual Framework

The conceptual framework I used to guide this study is based on the writings by Dewey (1933, 1944), Hatton and Smith (1995), and van Manen (1977). The concept of reflection, especially in the field of education, is often discussed in the literature as an idea formulated by Dewey and described in his book, *How We Think* (Dewey, 1933).

Although Dewey is frequently credited for the origination of the 20th century concept of reflection (Hatton & Smith, 1995; York-Barr et al., 2006), according to Houston (1988) the idea of reflection existed before Dewey and can be traced back to Plato, Aristotle, Confucius, Lao Tzu, Solomon, and Gautama the Buddha. Reflection plays an important role in the process of education because "reflection is a meaning-making process that moves a learner from one experience into the next with deeper understanding of its relationships with and connections to other experiences and ideas" (Rodgers, 2002a, p. 845). Dewey (1944) defined education as "that reconstruction or reorganization of experience which adds to the meaning of experience, and which increases ability to direct the course of subsequent experience" (pp. 89-90). According to Dewey (1944), the purpose of education is to promote the intellectual, social, and moral growth of the individual, thereby creating a strong democratic society. Therefore, as individuals are trained to reflect, they will lead by example using education to build a society of people equipped to critically analyze and solve social problems (Dewey, 1944).

In this study, I used Hatton and Smith's (1995) framework and a summary of van Manen's (1977) framework to measure the levels of reflection of each post in the forum. My summary of van Manen's work was based on Marzano et al. (2012), McDonald and Songer (2000), and Rampersad and Herbert's (2005) interpretations of van Manen's framework. Researchers have used Hatton and Smith's framework, which consists of four levels, and van Manen's framework, consisting of three levels, to determine the levels of teacher reflections. Whipp (2003), for example, used Hatton and Smith's framework to study the reflection levels of prospective teachers. Rampersad and Herbert (2005),

however, used van Manen's framework to study science teachers' reflection levels during a yearlong postgraduate program. Hatton and Smith's and van Manen's framework will be explained in more detail in Chapter 2 and Chapter 4.

Nature of the Study

I used a qualitative case study approach to study the perceptions of seven elementary mathematics teachers who participated in the online component of a blended professional development course. This study was an intrinsic case study (Stake, 1995) designed to focus on the key concept, teacher reflection and the phenomenon that was studied was teacher reflection in an asynchronous online discussion forum. A case study approach was appropriate to explore the perceptions of teachers about reflecting in an online discussion forum. This study was rooted in Crotty's (1998/2015), explanation of constructionism. According to Crotty (1998/2015), "meaning is not discovered, but constructed" (p. 9). Therefore, I did not seek to uncover absolute truth. Instead, I sought to understand the phenomenon through the research process described in this study.

This single case study design followed the typical interpretive nature of qualitative studies because, as the researcher, I was able to observe the occurrences of a situation in the natural setting without manipulating variables or administering a treatment (Denzin & Lincoln, 2018; Merriam & Tisdell, 2016). Of the various qualitative traditions that could have been selected, I chose case study methodology because the online component of the course was a bounded system (Merriam & Tisdell, 2016) that was bounded by time, specifically 8 months.

A brief synopsis of this study's design is provided in this section; however, a more detailed description of the methodology and data acquisition procedures are provided in Chapter 3. I used purposive sampling to select the ten teachers who agreed to participate in this study. Consistent with case study designs, multiple sources of data were used for the purpose of creating a rich description of the phenomenon. The data for this study were obtained from the transcripts of online discussions, and two questionnaires which were read, analyzed, and categorized in search of answers to the three research questions.

Operational Definitions

Asynchronous communication: Computer-based communications such as e-mail or discussion forums in which participants do not need to be online at the same time, but can respond at their own convenience (Maier & Warren, 2012).

Collaboration: A systematic process in which educators work together interdependently to analyze and to impact their professional practice in order to achieve better results for their students, their team, and their school (DuFour, DuFour, Eaker, & Many, 2010).

Computer-mediated communication: Any system that allows communication by means of computers and networks. Examples of these systems include e-mail, bulletin boards, and online discussion forums (Besio, Ott, & Trentin, 1993).

Desire2Learn (D2L): An integrated online learning management system (LMS) that provides synchronous (occurring at the same time) and asynchronous (occurring over time) interaction between students, teachers, and learning content (Fahrni, Rudolph, &

De Schutter, 2004). D2L is a learning management system used in business, K-12, and in higher education (D2L, n.d.).

Discussion forum: A message board that is part of an online LMS that allows participants to post, read, and reply to one another's posts. The asynchronous format allows participants to communicate with one another at their convenience using a computer (also called online forums or message boards) (TeacherStream, LLC., 2009).

Reflection: "Active, persistent, and careful consideration of any belief or supposed form of knowledge in light of the grounds that support it, and the further conclusions to which it tends" (Dewey, 1933, p. 9).

Reflective practice: Reflective practice is a process whereby individuals utilize reflection to critically analyze actions in order to learn, and consequently develop their craft (Osterman, 1990).

Synchronous communication: Communication in which all participants are present at the same time (Maier & Warren, 2012).

Assumptions

A primary assumption in conducting this study was that the participants of the study were either comfortable or would become comfortable with technology before the study and that they knew how to post responses in the discussion forum. A reason for this assumption was that the teachers were trained on every aspect of the discussion forum before they were expected to post online. Additionally, tutorials on all aspects of the course were provided in the LMS for teachers to view if they needed help. The second assumption was that the participants would give serious thought to the discussion topics

and respond to all questions honestly and to the best of their ability. In order to address this assumption, the participants were informed that confidentiality would be preserved in the write-up of the study.

Scope and Delimitations

This study focused on the online component of a blended mathematics course offered by the Office of Mathematics in a large school district in the Northeast United States. The course, due to the focus on reflection, was intended to provide insight into the practice of reflection for elementary mathematics teachers. Because teachers rarely have time for reflection, even though they are evaluated on how they reflect on practice, understanding teachers' perspectives about the use of a forum to allocate time for reflection was important. Specifically, I explored the teachers' perceptions about the benefits, drawbacks, and use of an online forum to allocate time for reflection. In addition, because high levels of reflection are not always the outcome in studies involving prospective or practicing teachers, the contents of the teachers' posts were also of interest in this study. Based on that reason, I examined the teachers' posts to determine the level of the teachers' reflections in the forum. Consequently, the conceptual framework for this study was based on the writings of Dewey (1933,1944), Hatton and Smith (1995), and van Manen (1977). All four writings were useful for understanding reflection and levels of reflection.

The online component of the course was investigated as a bounded system (Merriam & Tisdell, 2016) that was bounded by time, 8 months. There were ten participants in the mathematics course. However only seven participants remained in the

course until the end. The study was about their perceptions about online reflection as well as their reflections about mathematics teaching and learning. The eight teachers in this study were elementary teachers who taught at least one mathematics class. Although this sampling was purposive and led to understanding of online reflection, the results might not be transferable to all elementary mathematics teachers. Still it is hoped that the reader will be able to identify aspects of this study and its findings that can be applied to their situations, thereby employing case-to-case transfer of findings (Merriam & Associates, 2002, p. 29).

Limitations

The findings of this study were limited to the teachers enrolled in the course, all of whom were elementary mathematics teachers entering their second year of teaching. A notification about the course was posted in the district's bulletin by the Office of Mathematics and principals in the district were asked to respond to the notification. Principals were asked to recommend a 2nd-year teacher from their school to participate in the course. The first 10 teachers whose names were received by the instructor of the course were then enrolled in the course. The teachers who participated in the course were recruited and asked to participate in this study. Because the teachers in this study were in a course based on the recommendations of their principals and they were 2nd-year teachers, the results might not be the same for other populations.

Significance of the Study

Reflection can be used to resolve technical problems that occur in the classroom as well as educational problems caused by social, economic, or political issues. However,

despite the benefits of reflection, teachers rarely have time for reflection (Kempf, 2014; Valli, 1997; van Manen, 1991; York-Barr et al., 2006). Asynchronous methods been used in higher education, teacher education courses, and teacher professional development to provide opportunities for individuals to learn, any time of the day, when it is convenient for them (Dash, Magidin de Kramer, O'Dwyer, Masters, & Russell, 2012; Iroaganachi, 2016; Polly, 2013). However, educators who desire to give teachers time for reflection, or aim to improve reflective practice for teachers, cannot rely solely on what has been written about the asynchronous phenomenon because most of the research is about student teachers and preservice teachers.

With knowledge obtained from the results of this study, educators can consider the use of an asynchronous forum as a method that could be used to allocate time for reflection for teachers in a professional development course or other experience. Considering that the online reflection experiences of practicing teachers have not been studied extensively, this study could make a significant contribution to the literature as well as to the field of education. Additionally, focusing on the reflections of the teachers in this study could also provide guidance for the development of more online reflection experiences. For example, the information that follows in Chapter 2 includes studies with findings indicating that participants can reflect at higher levels depending on the design and structure of the online experience. Therefore, as the discussion questions and reflections in this study are examined, it may be possible to determine the type of questions that lead to more meaningful reflection.

Researchers and educators could use the information about fostering levels of reflection in the chapters that follow to provide professional development or support so that teachers can be trained on how to reflect and what to reflect on. Thus, the social change implications of this study include exploring a way to alleviate issues pertaining to the lack of time for reflection during the school day. This study could also potentially provide insight about how to improve online reflection experiences and foster high levels of reflection.

There is a belief in the educational community that better teaching practices can improve the mathematical competencies of students. It is noted in the literature that reflective practice is a method that helps individuals become more skilled at their craft or become better teachers. Considering that improving mathematics education is a problem that still exits, it is possible that reflection could be beneficial. Reflection is a useful tool to uncover causes and solutions to societal problems, and in this case, educational problems related to teaching and learning mathematics. Furthermore, by specifically focusing on mathematics teachers in this study, this study could also benefit society by helping educators to know more about reflection that leads to improved mathematics teaching and learning. Therefore, this study could also contribute to positive social change through the focus on providing elementary mathematics teachers with time to reflect in order to improve instructional practice as well as mathematics instruction.

Summary

In this chapter, I provided justification for this study, which included a summary of the literature that supports the need for opportunities for reflection for elementary

mathematics teachers. I also discussed aspects of the study such as the problem statement, purpose statement, research questions, conceptual framework, nature of the study, and the significance of the study. In Chapter 2, I describe the conceptual framework in greater detail as well as the terms that are important for understanding reflection and levels of reflection. In addition, I also discuss important studies about online reflection and explained why qualitative methodology was chosen for this study.

Chapter 2: Literature Review

The purpose of this qualitative single case study was to determine participants' perceptions of the benefits and drawbacks of using an online discussion forum to allocate time for reflection and to determine the levels of the teachers' reflections in the forum. Consequently, it was necessary to examine the literature about reflection to answer the research questions and gain insight into this phenomenon. In this chapter, I present a review of the literature about reflection, a discussion of the role of reflection in the change process, and the research about the structures needed to foster high levels of reflection online. To answer the research question related to levels of reflection, I also provide definitions and interpretations of Hatton and Smith's (1995) framework and van Manen's (1977) frameworks from the literature. Finally, I conclude the chapter with a discussion about online reflection, highlighting previous studies and identifying gaps in the existing research.

Description of Literature Search

The literature search to understand reflection and online reflection began with the use of Academic Search Premier, ERIC, Education Research Complete, Questia, SAGE Journals Online, and ProQuest Dissertations and Theses Database. I also used several local university libraries to obtain articles pertaining to this study and books about qualitative methodology and methods. Subsequently, to search multiple databases, I used Thoreau, a search tool when it became available on Walden's library website. Keywords used initially to locate studies about teacher reflection and teachers' lack of time for reflection were *reflection, reflective practice, teacher reflection, professional*

development and reflection, no time for teacher reflection, reflection and time constraints, and *hindrances to reflection*.

As the research plan for the study evolved, additional keywords, including *levels of reflection, critical reflection, reflectivity, Dewey, Schon, Hatton and Smith,* and *van Manen,* also yielded literature relevant to the research topic. I located studies about reflection and online reflection using the names of authors who developed frameworks for traditional reflection and names of authors who were cited in studies about online reflection. I combined the names of the author(s) with other terms: *communities of practice, online reflection, online professional development, quality reflection, levels of reflection,* and *discussion forums.* I also included terms such as *mathematics professional development, mathematics teaching and learning, mathematics, teachers, teaching,* and *learning* combined with previously searched keywords to obtain studies pertaining to the use of reflection to improve mathematics instruction. The searches resulted in mostly theoretical literature about reflection or empirical studies about the reflection experiences of students and preservice teachers.

When I found an article that was relevant, but not recent, I searched for additional articles written by that same author or authors to find current research. Sometimes additional articles were found because the topic, reflection, was a specialization or an area of interest for the author. After finding relevant articles, I also performed searches using the cited by link and related articles link in Google Scholar to obtain articles pertaining to this study.

In an attempt to find studies about practicing teachers, I contacted a researcher who had conducted a study about the use of online discussions to scaffold critical reflection for prospective teachers. Her work is significant because it has been referenced over 184 times by other researchers in articles about reflection, online reflection, and online critical reflection. I contacted her because I wanted to know if other studies existed besides what I had found at that time about online reflection for practicing teachers. Unfortunately, she was not aware of any studies about online reflection that involved classroom teachers or practicing teachers.

I also contacted the Supervisor of Library Information Services in the school district where I work because she knew a great deal about technology use in education and provided professional development on topics pertaining to technology education in the classroom. With her help, I located several articles about prospective teachers and a few articles that were specifically about practicing teachers. Telephone conversations and email correspondences with Walden librarians at different times during the study resulted in the discovery of a few more articles. However, those articles were also about preservice or student teachers despite the use of Boolean operators.

When the literature search was expanded to include reflection and combinations of keywords such as *meta-synthesis, meta-analysis, inservice, in-service, elementary teachers, practicing teachers, discussion boards, discussion forums, technology, online discussions, e-communities, online teacher reflections,* and *online professional development,* I found three recent articles that contained summaries of research focused on practicing teachers and reflection. The term in-service is sometimes used to describe

practicing teachers and the term in-service was used to discuss the practicing teachers in all three studies. Two of the articles were about in-service teacher reflection and one was about the online reflection experiences of in-service teachers. I concluded my search by searching in the refereed journal, *Reflective Practice*, as well as other refereed journals about reflection, and in the databases above using the Boolean phrase *NOT preservice* or *-preservice* along with other terms listed above. I also created alerts in Google Scholar to receive notifications about current research. I found articles that were relevant to this study; however, none of the articles found were about online reflection for in-service or practicing teachers. Upon completion of this search process, I discovered that there was a gap in the literature because there was an abundance of studies about online reflection for students and preservice teachers, but not many studies about the online reflection experience of practicing teachers.

Reflection

Reflection is noted in the literature as an important characteristic of good teaching. In some school districts, teachers are evaluated using frameworks for teaching that emphasize reflection. In the NBPTS, the importance of reflection is underscored in Proposition 4. There are five core propositions in the NBPTS. Proposition 4 states that teachers should "think systematically about their practice and learn from experience" (NBPTS, 2016, p. 32). It is emphasized in proposition four that good teachers are committed to lifelong learning and reflection (NBPTS, 2016).

Reflective practice is a process that involves the use of reflection for careful, focused examination of actions and the reasons for the actions (Osterman, 1990).

Reflection is more than the superficial observation and description of an experience or problem. According to Kottkamp (1990), when individuals engage in reflection, they stand back and assume the perspective of an external observer, "paying deliberate, analytical attention to one's own actions in relation to intentions" (Kottkamp, 1990, p. 183). This is accomplished "for the purpose of expanding one's options and making decisions about improved ways of acting in the future, or in the midst of the action itself (Kottkamp, 1990, p.183). Inherent in the reflective process is the deliberate attempt to consider the incident while looking for previously ignored details or explanations. According to Rodgers (2002b), the reflective cycle includes interpreting or "ascribing meaning to what one sees" (p. 238). Bright (1996) explained that understanding a situation "such that professionally designed action in that situation is more likely to produce, effective, relevant action which will facilitate the occurrence of more desired and effective outcomes" (p. 177) is the goal of reflective practice. Engaging in reflective practice provides the individual with the opportunity to recognize and discard erroneous thinking guaranteeing that the best solutions are identified and applied.

Schon (1983) described how incorrect interpretations can lead to incorrect diagnoses using the example of a group of teachers who were asked to observe two boys in a video. One boy was seated in front of "blocks of various colors, shapes, and sizes…arranged in a pattern" (p. 67), and the second was seated in front of blocks not arranged in any order (Schon, 1983). Separated by an opaque screen, the boys could not see each other, but could hear each other (Schon, 1983). The teachers watched as the first boy provided step-by-step instructions to have the second boy arrange his blocks to

duplicate his pattern (Schon, 1983). The first boy incorrectly instructed the second boy to "'take a green square'" (Schon, 1983, p. 67), but because the squares were orange, not green, the second boy had trouble following that first step and consequently all instructions that followed (Schon, 1983).

The teachers observing the interaction between the boys did not notice the instructional error made by the first boy and therefore incorrectly concluded that the second boy had difficulty following directions (Schon, 1983). After the researcher pointed out the error to the teachers, they were quite surprised and were then able to understand why the second boy had trouble (Schon, 1983, p. 67). The experience heightened the teachers' awareness of the need to avoid making rash judgments. In fact, the teachers verbalized the decision to "increasingly challenge themselves to discover the meanings of a child's puzzling behavior" (Schon, 1983, p. 67).

When teachers are exposed to training that leads them to look for alternate meanings for classroom occurrences, they become progressively more proficient in their ability to interpret what they observe on a day-to-day basis in their classrooms. Similar to Schon's (1983) example, Rodgers (2002b) also worked with teachers helping them to slow down their thinking and over time noticed an increased attentiveness to ignored or overlooked details. Using video clips and photographs, Rodgers led the teachers to first make an observation and then to make a determination regarding whether the observation was descriptive or interpretative. Rodgers' work showed that, through reflection, teachers can examine their initial observations, assumptions, and possibly their beliefs.

In schools where reflection is valued, the examination of assumptions is accomplished all the more when reflection occurs in collaborative environments, through "productive public inquiry" (Schon, 1983, p. 336). As teachers open themselves up to public scrutiny, they can be made aware of any incorrect assumptions or beliefs influencing their classroom practices and interactions with students. According to Thompson (1992), there is a bi-directional causal relationship between teacher beliefs and instructional practice, such that beliefs determine classroom practices and classroom experiences influence beliefs. Considering the implications of Thompson's statements, there is certainly a need for teachers to reflect on their beliefs as well as their classroom practices to incorporate the most effective teaching strategies. According to Schon (1983),

> Both ordinary people and professional practitioners often think about what they are doing, sometimes even while doing it. Stimulated by surprise, they turn thought back on action and on the knowing which is implicit in action. They may ask themselves, for example, "What features do I notice when I recognize this thing? What are the criteria by which I make this judgment? What procedures am I enacting when I perform this skill? How am I framing the problem that I am trying to solve?" (p. 50)

As reflective practitioners search for the cause and effect of their actions, they eventually generate meaning or a theory for future action. "This theory guides practice…until it encounters a situation where the theory no longer serves, at which point, through more

reflection, it is either revised, refined, or discarded, and a new theory is born" (Rodgers, 2002a. p. 849).

Issue with Terms and Defining Terms

Despite the importance of reflection in teacher education and teacher professional development, researchers have noted that it is difficult to foster reflection, and many have expressed concern that the concept of reflection is not clearly defined in the literature (e.g., Beauchamp, 2015; Clara, 2015; Collin, Karsenti, & Komis, 2013; Hatton & Smith, 1995; Rodgers, 2002a; Toom, Husu, & Patrikainen, 2015). In like manner, there is also a concern about the lack of agreement with the meanings of other terms such as reflective practice, reflectivity, reflexivity, and critical reflection. Collin et al. (2013) also argued that there is no consistency with the terms used and the meanings assigned to the terms. The problem with no agreement and no consistency with terms in the literature is summarized in many studies.

The fact that many of the terms in the literature about reflection are used interchangeably although they have different meanings is also discussed as a concern. For example, Collin et al. discussed some aspects of that issue and then went on to explain that the term reflective practice used in their article is the same term that other authors refer to as reflexivity, reflection, or reflective analysis. Other researchers (Bassott, 2016; Larrivee & Cooper, 2006; Verberg, Tigelaar, & Verloop, 2015) also wrote about how terms pertaining to reflection are used interchangeably in the literature.

There is no agreed upon definition of reflection in the literature and there remains a lack of consensus about how to define reflection. A good definition of reflection is

necessary to provide teachers, teacher educators, and researchers with a clear understanding of what it means to engage in reflection. The term reflection originates from the Latin word reflectere, meaning "to bend back" (reflectere, n.d.). Without a clear definition of reflection, it is difficult to identify the activities that constitute reflection, assess whether reflection has actually taken place, or study the impact of reflection on teaching and learning (Rodgers, 2002a). For example, teachers needing a framework for reflection would not know if reflection was the outcome if "to bend back" (reflectere, n.d.) was used as the criteria to assess teacher reflection. When researchers use terms to define reflection and identify behaviors or describe activities that constitute reflection in order to provide an explanation of what it means to reflect during professional practice, that will help educators and teachers make sense of the term and its definition. Reflection is not defined using the term "to bend back" in this study. The terms and definitions used in this study to increase understanding of the teacher reflection phenomenon and assess the levels of reflections in this study are explained later in this chapter.

Many researchers have chosen to base their definitions, theories, and research about reflection and reflective practice on Dewey and Schon's definitions (Rose, 2016). Dewey and Schon's work provided the foundation for my understanding of the process of reflection. According to Dewey (1933) reflection

> implies that something is believed in (or disbelieved in), not on its own direct account, but through something else which stands as witness, evidence, proof, voucher, warrant; that is, as ground of belief. (p. 8)

What distinguishes reflection from other kinds of thought is the purposeful or deliberate focus on finding evidence to support a belief. This type of reflective thinking occurs when an individual faces a problem that needs to be resolved. The individual experiences "a state of perplexity, hesitation, [or] doubt" and then performs a "search or investigation directed toward bringing to light further facts which serve to corroborate or to nullify the suggested belief" (Dewey, 1933, p. 9).

According to Rodgers (2002a), the process can also be broken down into phases or steps like the following:

1. an experience;
2. spontaneous interpretation of the experience;
3. naming the problem(s) or the questions(s) that arises out of the experience;
4. generating possible explanations for the problem(s) or question(s) posed;
5. ramifying the explanations into full-blown hypotheses;
6. experimenting or testing the selected hypothesis. (p. 851)

Mewborn (1999), however, identified five phases in Dewey's (1933) process and described the phases as follows:

1. Generating Solutions to Problems
2. Problematizing Situations
3. Generating Hypotheses
4. Reasoning About Hypotheses
5. Testing Hypotheses. (pp. 6-10)

The numbers of steps and words used by Rodgers (2002a) and Mewborn (1999) to describe the phases in Dewey's (1933) description of the reflection or reflective process are different; however, what is consistent in both descriptions is some sort of problem, and then the formation of a hypothesis, followed by the testing of the hypothesis to determine a solution for the problem.

Researchers (Beauchamp, 2015; Danielowich, 2007) who contemplated ways to resolve the issue pertaining to the need for a clear definition of reflection have suggested moving toward presenting reflection as a complex concept that needs to be understood in order to place emphasis on understanding the concept. Nelson and Sadler (2013) also noted that it might be beneficial to consider both theoretical orientations to reflection as well as how reflection is operationalized. Understanding both the reasons for the need for reflection and how reflection is conceptualized in teacher education programs could ensure that the benefits of reflection are experienced.

Reflection-in-Action and Reflection-on-Action

Schon (1983, 1987) expanded on Dewey's work by focusing on reflection-in-action and reflection-on-action. Reflection-in-action refers to reflections that occur in the midst of practice, whereas reflection-on-action are reflections that occur after the experience. Like Dewey, Schon (1983) also indicated that reflection was connected to an individual's attempt to resolve a problem. However, he described the process in the following way:

> There is some puzzling, or troubling, or interesting phenomenon with which the individual is trying to deal. As he tries to make sense of it, he also reflects on the

> understandings which have been implicit in his action, understandings which he surfaces, criticizes, restructures, and embodies in further action. (p. 50)

Schon (1987) described reflection-on-action as "thinking back on what we have done in order to discover how our knowing-in-action may have contributed to an unexpected outcome" (p. 26).

In the field of education, educators in teacher preparation programs frequently provide preservice teachers with opportunities to engage in reflection that is often reflection-on-action. Different activities are used to generate reflection in teacher education programs; however, reflective journal writing is generally the activity that is used most to help preservice teachers reflect on teaching (Abednia, Hovassapian, Teimournezhad, & Ghanbari, 2013). Activities that preservice teachers participate in such as reflective journaling lead to reflection-on-action when journal prompts are focused on what occurred during a lesson. Instead of trying to remember everything that occurred during the lesson, sometimes preservice teachers watch videos of a lesson and then reflect on their experiences (Tavil, 2014). For example, the preservice teachers in Tavil's (2014) study watched video recordings of their teaching and then reflected on management, instruction, and the planning stages of the lesson. Preservice teachers can benefit in different ways when reflection procedures used to critique and analyze videos of their teaching are structured appropriately (Etscheidt et al., 2012).

Videos and journal writing are used as a professional development tool for practicing teachers in schools. However, post observation reflection activities are used more often in schools to facilitate reflection-on-action or reflection after action with

practicing teachers because reflection is required during the observation process. According to Scales, Briddon, and Senior (2012), the process of reflecting after action in teaching is used to make decisions about future planning and that leads to continued improvement. In the school district where I work, teachers are expected to reflect-on-action to improve their practice and teachers receive ratings on their evaluation for the professional practice of reflection. As part of the observation process in one school where I worked, teachers were provided with questions to guide them as they reflect-on-action about their observation lesson. Teachers are then asked to complete a reflection document and bring it to the post observation conference.

Of the two types of reflection, reflection-in-action and reflection-on-action, researchers have found that teachers find it more difficult to engage in reflection-in-action (Kottkamp, 1990; McDuffie, 2004; van Manen, 2008). The challenge reflecting-in-action is due to the nature of the teaching profession, where the practice of responding to multiple situations at the same time is the norm. With the many situations that arise throughout the day, teachers may not be able to reflect-in-action; therefore, it is often more feasible to reflect-on-action after the event (van Manen, 1991).

As discussed previously, reflection-on-action includes stepping back from an occurrence in order to understand what transpired. Consequently, time spent reflecting-on-action has been shown to improve the ability to reflect-in-action because reflecting-on-action helps to slow down the thinking process and better address problems in the midst of action (Rodgers, 2002b; Schon, 1983). Rodgers (2002b) found that as teachers learn and understand how to reflect-on-action, they become more introspective about

their experiences as a teacher. Eventually they begin to reflect-in-action as they become more adept with the process of slowing down their thinking in order to understand the problems they are trying to solve.

Reflection-for-Action

Another type of reflection that also leads to improvements in practice is anticipatory reflection. Anticipatory reflection is used "to deliberate about possible alternatives, decide on courses of action, plan the kinds of things we need to do, and anticipate the experiences we and others may have as a result of unexpected events or of our planned actions" (van Manen, 1991, p. 104). According to van Manen (1991), there are at least two types of anticipatory reflection. The two types are reflection before action and planning. Reflection before action is anticipatory reflection with the intent to consider possible actions to resolve a pedagogical concern, whereas planning is essentially the planning of lessons. Reflection before action is also called reflection-for-action by other researchers (Killion & Todnem, 1991; Olteanu, 2017; Thompson & Thompson, 2008).

Levels of Reflection

Information written about reflection includes concepts described in the sections above pertaining to when reflection takes place as well as descriptions of various types and levels of reflection. There are many different models and frameworks used to describe levels of reflection (Fook, White, & Gardner, 2006; Larrivee & Cooper, 2006). Some researchers such as: Day (1993), Jay & Johnson (2002), and van Manen (1977) developed frameworks that are based on three levels of reflection. However, other

researchers such as Hatton and Smith (1995), Larrivee (2008), Mezirow (1991), and Smyth (1989) devised levels of reflection frameworks that include more than three levels of reflection. Although there are different frameworks in the literature, I selected two frameworks for this study. The examination of levels of reflection was the second focal point of this study and Hatton and Smith's (1995) framework and a summary of van Manen's (1977) framework were used to determine the levels of reflection in the forum. The frameworks were necessary for answering Research Question 3: What are the levels of the teachers' reflections in the asynchronous discussion forum?

Hatton and Smith's framework. The literature was reviewed to determine how Hatton and Smith's (1995) and van Manen's (1977) framework were used to determine the levels of reflection in previous studies. I found two different frameworks in the literature and discussions about Hatton and Smith's framework. Some researchers who wrote about Hatton and Smith's framework discussed the framework as having four levels of reflections. The four levels are known as: descriptive writing, descriptive reflection, dialogic reflection, and critical reflection. Other researchers (Corrall, 2017; Maclellan, 1999) stated that there are five levels in the framework. Hatton and Smith (1995) referred to the works of several authors for their description of the five levels of reflection. The five levels are technical reflection, descriptive reflection, dialogic reflection, critical reflection, and reflection-in-action. Descriptive reflection, dialogic reflection, and critical reflection are considered reflection-on-action (Corrall, 2017). In Hatton and Smith's article, four levels were described in the Criteria for the Recognition of Evidence for Different Types of Reflective Writing Appendix. However, the authors

also presented a table on page 45 of their article that included five levels of reflection. Table 1 below shows Corrall's (2017) summary of Hatton and Smith's framework consisting of five levels, in reverse order.

Table 1

Hatton and Smith's (1995) Framework: (Five Levels)

Reflection type	Nature of reflection
Technical rationality	1. Technical (decision-making about immediate behaviours or skills), drawn from a given research/theory base
Reflection-on-action	2. Descriptive (social efficiency, developmental, personalistic), seeking what is seen as 'best possible' practice
	3. Dialogic (deliberative, cognitive, narrative) weighing competing claims and viewpoints, and then exploring alternative solutions
	4. Critical (social reconstructionist), seeing goals and practices of one's profession as problematic, according to ethical criteria
Reflection-in-action	5. Contextualization of multiple viewpoints drawing on any of the possibilities 1-4 applied to situations as they are actually taking place

Note. From "Crossing the threshold: Reflective practice in information literacy development," by S. Corrall, 2017, *Journal of Information Literacy*, 11, p. 32. Copyright 2017 by Chartered Institute of Library and Information Professionals, Information Literacy Group.

For this study, Hatton and Smith's (1995) framework of the four levels: descriptive writing, descriptive reflection, dialogic reflection, and critical reflection was used to examine the online discussions and determine levels of reflection. According to

Hatton and Smith (1995), descriptive writing is “not reflective.” It includes a “description of events that occurred.” However, no reason or justification is provided. Descriptive reflection, however, is reflective and includes “not only a description of events,” but also a “justification for events and actions” written in a “reportive or descriptive way” based on the individuals or others’ perspectives. Dialogic reflection involves “‘stepping back’ from the events/actions leading to a different level of mulling about, discourse with self and exploring the experience, events, and actions using qualities of judgements and possible alternatives for explaining and hypothesising” (p. 49). Finally, in critical reflections there is evidence that the author is aware that beyond having multiple perspectives, historical or socio-political factors could also be involved (Hatton & Smith, 1995). According to their research, social, political, and/or cultural forces can also be at work (Hatton & Smith, 1995).

van Manen’s framework. In his writing, van Manen (1977) identified three distinct hierarchical levels of reflections. The first level, technical rationality, is “the technical application of educational knowledge and of basic curriculum principles for the purpose of attaining a given end” (p. 226). The second level, practical action, is

> the process of analyzing and clarifying individual and cultural experiences, meanings, perceptions, assumptions, prejudgments, and presuppositions, for the purpose of orienting practical actions.... At this level of the practical, the focus is on an interpretive understanding both of the nature and quality of educational experience, and of making practical choices. (pp. 226-227)

The highest level, critical reflection, refers to deliberations regarding "the worth of knowledge...the nature of the social conditions necessary for raising the question of worthwhileness in the first place. The practical involves a constant critique of domination, of institutions, and of repressive forms of authority" (p. 227).

Researchers who have written about van Manen's (1977) framework do not all have the same interpretations of van Manen's work. What is similar among researchers who write about van Manen's framework is there are three levels of reflection. However, the definitions that are used in the literature to describe the three levels of reflection in van Manen's framework are sometimes different. For example, the way Marzano et al. and other researchers (e.g., Ballard & McBride, 2010; McDonald & Songer, 2000; Rampersad & Herbert, 2005) discussed technical rationality, practical action, and critical reflection is shown in Appendix B.

According to Marzano et al. 2012, teachers focus on issues such as classroom management or teaching the days' lesson at the technical rationality level. McDonald and Songer (2000) identified technical rationality as the description of what was done by an individual during an experience or event (i.e. this is what I did). For practical reflection, researchers sometimes focus on the link between underlying theories, beliefs, and practice. McDonald and Songer for example, described practical action as reflection that includes the reasons why decisions were made.

Some researchers include the reflective ability of the teacher as they discuss technical rationality, practical action, and critical reflection. Taggart and Wilson (2005), for example, in their discussion about technical rationality stated that novice teachers

tend to function at the technical level. They also stated that "practitioners reflecting at the technical level function with minimal schemata from which to draw when dealing with problems" (p. 2). Marzano et al. (2012) also discussed the reflective ability of novice teachers and stated that when new teachers have limited experience they reflect at the technical level.

Although van Manen (1977) framework's is hierarchical, some researchers (Watanabe, 2016) argued that reflection is a recursive process not a linear hierarchical process from technical reflection to practical action to critical reflection. According to Watanabe (2016) and Liu (2013), teachers can benefit when they reflect at the technical as well as the critical reflection level. Stating that critical reflection is important does not mean that the other types, technical and practical reflection, are not as important as critical reflection (Liu, 2013).

The Role of Reflection in Changing Practice

There is consensus in the literature about the importance of reflection in teaching. However, according to Gustafson and Bennett (2002), there is little empirical research or published results to support the theoretical writings about the benefits of reflection. Only a few empirical studies such as a study conducted by Edwards (1994) have shown that reflection can lead to changes in practice. Edwards' study is particularly instrumental in identifying the role of reflection in the adjustment of beliefs and practice. Edward's study can also help educators to understand the process of teacher change and can serve as a framework for efforts intending to change teaching practices. Edwards first developed a cyclic model that showed reflection as a link between dissonance and restructuring. The

data he collected in his study allowed him to conclude that reflection was critical in the process of change and therefore he devised the model below to explain teacher change.

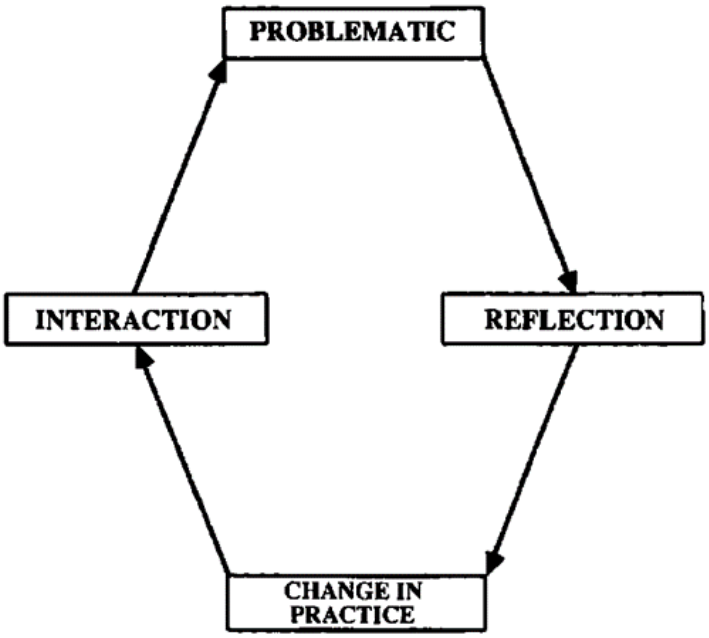

Figure 1. Figure 2: Applying a constructivist model to the problem of teacher change. From "A Reflective Cycle: The Evolution of a Model of Teacher Change," by T. G. Edwards, 1994, p. 8. Reprinted with permission (see Appendix A).

However, as the study progressed, he devised another model and noted that the new model explained the change process much better. The new model was used to depict reflection's role in the process of change. He constructed the new model after he observed how the teachers reflected in his study. According to Edwards (1994), "in this iteration of the model, change is still conceptualized as a cyclic process, but reflection, rather than just one point of the cycle, is viewed as the means by which those points are joined" (p. 9). Interaction, Problematic, and Change were identified as the points in the cycle based on his observations of the mathematics teachers in his study. The teachers were involved in a "curriculum innovation project" (Edwards, 1994, p. 8).

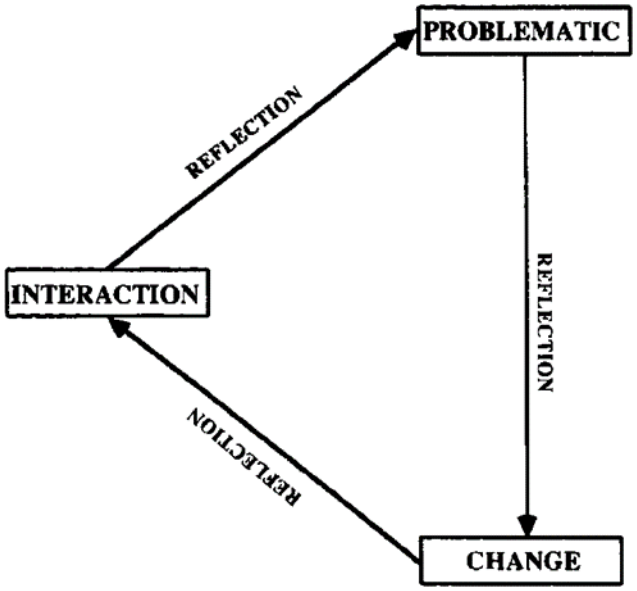

Figure 2. Figure 3: Reflection: The context for a cycle of change. From "A Reflective Cycle: The Evolution of a Model of Teacher Change," by T. G. Edwards, 1994, p. 11. Reprinted with permission (see Appendix A).

The teachers reflected as they interacted with the students, when they experienced problems in their classroom, and as they made changes in practice. Consequently, the new model depicted in figure 2 was developed to show that reflection was integral in the change process. Edwards also developed two other models that was not included in this study. One model showed the role of beliefs in the change process and the other model showed the role of beliefs and metacognition in the change process. Chen (2003) also studied the teacher change cycle and determined that reflection was part of the change process. More specifically, critical reflection was noted to be integral in the change process. Newer research supports that finding. Chi (2010) studied teacher reflection and noted results about the benefits of critical reflection. Chi (2013) also designed a newer study with a research question focused on investigating how critical reflection changes perspectives, practice or beliefs.

Factors that Affect Reflection

The search for better understanding of the reflective process as well as the structures that facilitate meaningful reflection has generated many studies over the years. According to Gustafson and Bennett (2002), the success or failure of these efforts depends on a variety of factors. These factors were grouped into three categories: Learner Characteristics, Environmental Characteristics, and Reflection Task Characteristics and include 11 variables that can affect an individual's ability to reflect. The 11 variables are listed below under the respective category.

Learner Characteristics

1. Learner's skill and experience in reflective thinking
2. Breadth of learner's knowledge of the content area
3. Learner's motivation to complete the reflection task
4. Mental preparation (mental set) of the learner for the reflection task
5. Degree of security felt by the learner in reporting actual reflections versus perceived desired responses

Environmental Characteristics

1. Nature of the physical environment in which reflection is being expected
2. Nature of the interpersonal environment in which reflection is to occur

Reflection Task Characteristics

1. Nature of the stimulus questions, directions, or probes
2. Format required for the learner to report on results of reflecting
3. Quality of the feedback provided the learner following reflection

4. Consequences of Reflection (Gustafson & Bennett, 2002, p. 3).

Multiple Factors at Work

Analyses of studies on reflection indicate that the factors listed above are important for designing reflection activities and experiences. According to Doyle (1990), teachers possess three types of knowledge: personal knowledge (i.e., prior experience, beliefs), craft knowledge (i.e., teaching skill), and propositional knowledge (i.e., research and theory). Mewborn (1999) found that preservice teachers enter their mathematics methods courses having more personal knowledge than craft and propositional knowledge. Therefore, reflection activities focused on instruction, research, or theory might not be effective. To engage in reflection practice, the individual needs sufficient intellectual or experiential knowledge from which to draw upon. Mewborn's findings are consistent with what Dewey (1933) wrote concerning reflection and experience. According to Dewey, when an individual has prior knowledge about a particular situation, that information can be used to generate a solution for new problems that arise (p. 12).

Researchers (Cohen-Sayag & Fischl, 2012; Garza & Smith, 2015) in newer studies also discussed how lack of experience and knowledge hampers reflection. In their studies about preservice teachers, the preservice teachers' writings were at the descriptive writing level. The belief is that with more practice and experience, reflection can improve. Mewborn's (1999) study showed that new teachers become more successful at resolving classroom issues as they gain more craft and propositional knowledge. When the study started, the teachers avoided making suggestions for any problems that arose.

However, over time the teachers started to contribute possible explanations for certain classroom observances. At first, explanations were based on personal knowledge evidenced by comments about their past experiences such as, "'My third-grade teacher used pretzels and pipe cleaners to teach multiplication' or 'In the daycare center where I work, we let the children play with the shapes as much as they want'" (Mewborn, 1999, p. 8). However, as the teachers gained more experience through the methods course and field experience, "they began to generate suggestions that went beyond the bounds of their own experiences, often stating their suggestions tentatively as questions (Mewborn, 1999, p. 8). Finally, by the time they were actually teaching, they were engaged even more in reflection.

Reflection was evidenced as they examined their teaching experiences in order to plan future lessons. For example, one teacher wrote the following in her journal:

> Four lessons on things they already knew was too much and very frustrating. I think I could have done a better job of using the first lesson to find out what they already knew [about Time] and what or where their struggles lay. This would have made the following lessons more interesting, and I would have held their attention if I was doing less of a review and more of a challenging lesson. (Mewborn, 1999, p. 8)

Based on the statements above, it can be noted that Learner characteristic, breadth of learner's knowledge of the content area, was a factor involved in increasing the reflective ability of the teachers in Mewborn's (1999) study. However, other factors might have also contributed to the improvements in the reflective ability of the teachers in

Mewborn's (1999) study. By facilitating a supportive environment, the cooperating teacher and researcher consistently challenged the teachers to reframe questions until they were able to find their own answers. After realizing that the cooperating teacher and researcher were not willing to provide all the answers, the teachers eventually began to function as their own learning community, turning to each other for answers.

Collaboration and Reflection

The examination of Mewborn (1999) and McDuffie's (2004) studies revealed that teachers can be encouraged and supported as they become better reflective thinkers. The activities as well as the support provided can also increase reflective writings (Cohen-Sayag & Fischl, 2012). Gustafson and Bennett's (2002) work also showed that Learner, Environmental, or Reflection Task Characteristics can influence reflection experiences. A review of the literature revealed that other researchers have also acknowledged the influence of specific factors in the promotion of reflection.

One factor repeatedly mentioned in the literature is the notion of collaboration (Edwards & Hensien, 1999; Osterman & Kottkamp, 1993; Rodgers, 2002a; Schon, 1983; Wade, Fauske, & Thompson, 2008; Wenger, 1998). Gustafson and Bennett (2002) did not use the term collaboration, however, they did discuss the benefits of interpersonal or social interactions during reflection in their article. They hypothesized that "environments that require (or at least permit and promote) interpersonal interaction will result in greater reflection" (p. 7). They also concluded that social interaction can lead to deep reflection because when individuals share information with each other, reflection could improve because of the opportunity to consider multiple perspectives. According to

Rodgers (2002a), collaborating with others leads to the sharing of different viewpoints which can lead to more understanding. Gustafson and Bennett (2002) also stated that when interactions are facilitated by someone who has experience leading groups, reflection could be promoted that way as well.

As stated earlier, collaboration is very useful for developing reflective practice. According to Osterman and Kottkamp (1993), although teachers benefit when they reflect independently, they really develop the ability to examine beliefs and practice through the process of sharing and collaboration. "Reflection involves a great deal of introspection, but it also requires some outside prompting and probing, at least in the early stages" (Mewborn, 1999, p. 2). To improve reflection among teachers, teachers can engage in collaboration, hold one another accountable and challenge one another to engage in reflection.

Collaboration can also be fostered online (Burhan-Horasanli & Ortactepe, 2016). In some studies, researchers attempted to facilitate collaboration and sought to determine whether teachers would collaborate online (Coughlin & Kajder, 2009). In other studies, researchers studied voluntary online collaboration in an online community. For example, Seo and Han (2013) studied an online community that was created by teachers.

Cultivating Reflection Online

In their study, Harrington and Hathaway (1994) defined critical reflection as follows:

1. recognizing limitations in sociocultural, epistemic, and psychological assumptions;

2. acknowledging and including multiple perspectives;
3. considering the moral and ethical consequences of choices;
4. clarifying reasoning processes when making and evaluating decisions. (p.544)

Inherent in the critical reflection process is the ability to question and challenge one's belief and assumptions as well as the beliefs and assumptions of others (Wade et al., 2008, p. 401). Harrington and Hathaway (1994) reported that the computer conferencing experience allowed students to post taken-for-granted assumptions and allowed developmentally mature students to reflect critically during the experience. The results of Harrington and Hathaway's study revealed that although the students posted taken-for-granted assumptions in the discussion, assumptions were not discussed. When an assumption was posted, and a developmentally mature person posed a question for the author of the post, the author of the post never responded. Therefore, the taken-for-granted assumptions that were posted in the discussions were never discussed (Harrington & Hathaway, 1994). The posting of assumptions occurred, and assumptions were questioned; however, the assumptions that were questioned were not addressed by the students in the study. Harrington and Hathaway therefore concluded that computer conferencing could eventually provide opportunities for students to not only post assumptions, but to also reflect critically by challenging one another's assumptions.

In a study designed to scaffold critical reflection among prospective teachers, Whipp (2003) was able to elicit critical reflection after employing supports for the students in her class. She utilized the following four supports: (a) tailored questioning, (b) general questioning, (c) use of critical readings, and (d) threads of online discussions at

higher levels of reflection to increase critical reflection in her course. Whipp (2003) reported the following:

> In contrast to the previous semester when half of the students began the semester writing at a nonreflective level, the majority of these students were writing almost from the beginning at a level Hatton and Smith (1995) called descriptive reflection. (p. 10)

The students in the spring class did not display much critical reflection. Critical reflection was more evident among the students in the fall class that same year. Whipp (2003) explained that high levels of reflection occurred when certain tailored questions were asked. She also provided examples of tailored questions that were used in her study and discussed the outcomes. For example, the question "Can White teachers effectively teach African American students?" generated high levels of reflection in both the spring and the fall quarter.

Whipp (2003) also explained the types of general questions used in her study. General questions were questions from the prospective teachers on critical issues and incidents. A question about how to "handle disrespect" and a question about how to "counter gender bias" in the classroom are examples of general questions used in the study (Whipp, 2003 p. 14). For the third support used in her study, use of critical readings, Whipp (2003) used readings such as an article by Anyon (1980), "Social class and the hidden curriculum of work" and "The pedagogy of poverty versus good teaching" by Haberman (1991) to encourage critical discussions. She noticed an increase in the number of critical reflections when she used the critical readings in the course and also

showed the students how to use the readings to analyze their field experiences. Lastly, she discovered that the posts that were identified as critical reflection or the highest level of reflection occurred during a major discussion thread and occurred "most often in response to one or more previous postings" (Whipp, 2003 p. 14).

Whipp (2003) also noted that critical reflection can be scaffolded when students know why they need to reflect at a critical level as well as how to reflect at the critical level. Although this can be accomplished in a variety of ways, Whipp helped students to understand reflection by using an "explicit discussion of Hatton and Smith's (1995) framework for reflection along with samples of student e-mail postings at each level" (p. 15). In addition to providing the students with samples of the type of reflection and what was expected, Whipp (2003) also facilitated improvements in levels of reflection in the following way:

> Instead of simply checking for regular student participation on e-mail, I developed criteria for evaluating the e-mail postings and using this checklist along with a 4-point rating scale, I regularly offered feedback to the students on the quality of their postings (p. 327).

Based on Whipp's (2003) study, when tailored questions and general questions are focused on sociopolitical and other critical issues in a course and students are trained on how to reflect, higher levels of reflection can occur.

Research by Myers (2003) supports Whipp's (2003) findings that instruction can enable participants to reflect at higher levels. In a study that compared the levels of reflection between student teachers and first year teachers in an online community, Myers

discovered that the reflections for both groups were mainly a 4, 5, or 6 based on a rating scale of 1 to 7. The reflections were coded in Myers' study based on the framework (1) No descriptive language, (2) Simple layperson description, (3) Events labeled with appropriate terms, (4) Explanation with tradition or personal preference given as the rationale, (5) Explanation with principle or theory given as the rationale, (6) Explanation with principle/theory and consideration of context factors, (7) Explanation with consideration of ethical, moral, political issues. Both studies, Myers and Whipp indicated that high levels of reflection can be experienced online when participants are provided with training or guidelines for reflection, prior to the experience or during the experience. Therefore, it is possible that instruction on how to reflect could be used as a strategy to rectify low levels of reflection or the lack of meaningful reflection in many online studies. As discussed previously there is also value in helping participants to understand how to reflect and why it is important to reflect.

Training teachers to reflect at more meaningful levels is a worthwhile goal; however, as discussed in Chapter 1, teachers need more opportunities to engage in reflection during professional development. Unfortunately, results from studies focused on teachers and their experience reflecting in online environments seem to indicate that needing time to reflect is an issue for teachers. For example, researchers Carr and Chambers' (2006a, 2006b) noted that although computer-mediated conferencing tools provided time beyond the school day for teachers to engage in reflection in online communities, teachers still had difficulty finding time for reflection. According to Carr and Chambers (2006b), although reflection is possible in asynchronous environments,

individuals must be extremely motivated to make participation in the online community a priority.

Carr and Chambers (2006b) utilized a pilot study to study the online experiences of over 100 Australian teachers from 46 pre-schools and schools who participated in the National Quality Schooling Framework Pilot Project (NQSF). The NQSF Pilot Project was a government-funded web-based initiative designed to support schools in the implementation of school improvement projects. A goal of the project was to research and assist schools in their efforts to foster face-to-face or virtual learning communities. The schools involved in the pilot study "represented a cross-section of schools by sector (government/non-government), stage (Pre-school/Primary/Secondary), geographical diversity (metropolitan & regional/rural, but no remote schools) and socio-economic diversity" (Carr & Chambers, 2006b, p. 147).

Limited Time

Participation and reflections were minimal in Carr and Chambers' pilot study. For example, of the 106 participants, only 27 individuals made online contributions during the 7-month time frame of the study (Carr & Chambers, 2006a). To better understand the reasons for the low participation, Carr and Chambers (2006a, 2006b) conducted an in-depth study of 13 individuals who participated in the pilot study. The 13 individuals selected based on their level of participation in the NSQF Pilot Project included those who participated regularly as well as those who made little or no contribution at all. The participants in the study were teachers and school leaders. Comments from the teachers in the study revealed that the busyness of the teaching profession was still a hindrance to

reflective practice. The comments voiced by teachers who were frequent participants as well as those who contributed less often were as follows:

> People [in schools] are just really busy so unless you're in the sort of job where you can spend time doing that sort of thing your day-to-day issues overpower it. (Primary teacher-more frequent contributor)
>
> The NQSF project was something that was on top of everything else I had to do-I didn't have any spare time. (Secondary teacher-more frequent contributor)
>
> (Carr & Chambers, 2006b, p. 150)

From these comments, it is apparent that the participants viewed lack of time as a barrier to their online participation. In fact, "lack of time was the single biggest reason cited by research subjects as to why they did not make more use of the NQSF online environment" (Carr & Chambers, 2006b, p. 149).

Although the teachers saw lack of time as a hindrance to their online participation, Carr and Chambers (2006b) identified three other factors that could have also contributed to the problem. The three factors were described as:

1. lack of perceived commonality of purpose among participants, which in turn influenced how teachers prioritised their limited time;
2. lack of a culture of shared, critical reflection about practice; and
3. lack of familiarity and experience in using computer-mediated communications tools. (Carr & Chambers, 2006b, p. 155)

Researchers have found that the solution for lack of time for professional learning and reflection is connected to perceived commonality of purpose. For example, Parker

and Bowell (1998) found that online communities are successful when a clear purpose is established up front, therefore allowing participants to determine whether the discussions will center around a topic they find interesting. According to Carr and Chambers (2006b),

> without a clearly identified and shared purpose, online communities are less likely to mature. Teachers have significant demands on their time and are unlikely to allocate that time to activities for which the purpose and benefit to them are unclear. Generic, "one size fits all" online communities, such as [those] ~~that~~ created during the NQSF Pilot Project, are less likely to succeed than online communities that specifically target groups of teachers with common needs and interests. (p. 155)

Participants also stated that when they participate in asynchronous environments, they can take time to reflect and consider their answer before they respond (Carr & Chambers, 2006b; Ruan & Griffith, 2011). Asynchronous environments provide participants with the opportunity to communicate when it is convenient (Hew, Cheung, & Ng, 2010; Duncan-Howell, 2010). Asynchronous technology can extend collaborative reflection beyond the confines of the school day; however, the experience must be meaningful to teachers if they are to spend the limited time they have reflecting online.

Additionally, because time is a major barrier to reflective practice, district or state level initiatives need to be employed to provide teachers with more time for reflection (Fusco, Gehlbach, & Schlager, 2000). Therefore, Fusco et al. (2000) recommended the following:

> Time can be made available through more professional development days, by paying for time over the summer, or by offering credit (which can result in salary increases), but these are things that will need to be considered at the level of school districts and states. (Fusco et al., 2000, p. 5)

Fusco et al. (2000) realized that time was the number one barrier to participation in TAPPED IN, an online community that supported teachers' professional growth through both formal education and professional development programs. With over 345 K-12 teachers participating in their study, the study was ideal for gaining understanding about the online experiences of practicing teachers. Using a 133-question survey, Fusco, et al. collected data on "(a) standard demographics and professional development activities, (b) technology use, and skill rating, and (c) TAPPED IN use, affordances, and barriers" (p. 2).

One way to manage limited time is to prioritize so that the most important things are carried out first. When school leaders emphasize reflection as professional practice, establish a culture of reflective practice, and make reflection a priority, that can lead to more opportunities for teachers to experience reflection as a teaching practice (Hall & Simeral, 2017). In fact, Carr and Chambers (2006b) noted that a cause of limited reflection in their study was reflective practice not being common practice in most schools. Therefore, without much reflection experience, teachers were challenged by this "completely new way of talking about practice" (Carr & Chambers, 2006b, p. 153).

Summary

Prior to the use of computer-mediated communications, traditional methods such as journals, portfolios, and videos were used in attempts to generate reflection among teachers, but many studies were primarily about prospective teachers. The increased interest in technology use in education has produced studies about online reflection for prospective teachers and a limited number of studies about reflection in the online environment for practicing teachers. Only a few researchers have reported high levels of reflection in online reflection studies and provided the methods they employed to generate high levels of reflection. What has been discovered so far is that reflection can be scaffolded and supported through direct instruction on the process of reflection and the use of prompts that elicit critical reflections (Bean & Stevens, 2002; Myers, 2003; Whipp, 2003).

There is still a need for more research about practicing teachers and online reflection. The majority of studies I found about practicing teachers were about their experience participating in an online community of practice. Often in those studies (e.g., Hew & Hara, 2007; Hur & Brush, 2009; Seo & Han, 2013), the purpose of the study was not to develop reflection, increase reflection, or increase the time teachers spend in reflection. Although reflection was discussed in the studies about teachers in a community of practice, reflection was a by-product not the key concept or phenomenon being investigated. Therefore, to gain a better understanding of different ways to increase and improve reflection for practicing teachers using an online forum, studies that

concentrate on exploring how to increase levels of reflections or allocate time for reflection online are needed.

Chapter 3: Research Method

This qualitative case study was designed to determine participants' perceptions of the benefits and drawbacks of using an online forum to allocate time for reflection and to determine the levels of the teachers' reflections in the forum. Provided in this chapter are the research questions, methodology, rationale for selecting case study methodology over other possible methodologies, role of the researcher, issues of trustworthiness, and ethical procedures. The research questions I used to guide this study were as follows:

1. What do teacher participants perceive as the benefits and drawbacks of reflecting in an asynchronous discussion online forum?
2. How do teacher participants perceive and describe their reflection experience when time is allocated for reflection online?
3. What are the levels of the teachers' reflections in the asynchronous discussion forum?

Research Design and Rationale

This single case study was designed to focus on the key concept, online teacher reflection, and the phenomenon I studied was teacher reflection in an asynchronous online discussion forum. Qualitative case study methodology was the chosen methodology for this study because this study was specifically designed to understand reflection in an asynchronous environment. Qualitative research is emergent (Creswell & Poth, 2018; Hatch, 2002); therefore, the researcher can alter or refine the study as necessary, ensuring better understanding of the situation being studied. Although the emergent aspect of qualitative research is significant for exploration and discovery,

qualitative data collection and analysis procedures also lead to knowledge about the unexplored.

When researchers desire to understand an issue, they can use qualitative research procedures. For instance, researchers can utilize in-depth interviews, documents, artifacts, or become a participant and observe the situation from inside (Yin, 2014). Data analysis procedures employed in qualitative studies are also designed to increase understanding. Methods such as member checking, peer review, and triangulation all help to confirm emerging findings (Merriam & Tisdell, 2016). These methods increase understanding when studying complex issues.

Another facet of qualitative methods is the way findings are reported. Qualitative findings are typically reported in a narrative comprised of descriptive data and interpretive commentary designed to help the reader to understand the phenomenon that was studied (Merriam & Tisdell, 2016). Consequently, qualitative methodology was suitable for studying teacher reflection in an asynchronous environment. In the same way that qualitative methodology is chosen based on its merits, selection of a particular qualitative approach is also dependent upon research objectives.

All qualitative approaches can be used to understand phenomena in their natural settings; however, case study, rather than approaches such as narrative research, phenomenology, ethnography, or grounded theory was deemed the most appropriate methodology for this study. A narrative approach is best used to study an individual and the focus is “on the stories told from the individual” (Creswell & Poth, 2018, p. 103). Phenomenological studies are used when the researcher desires to take into consideration

the experiences of all participants in order to identify what is common about their experience (Creswell & Poth, 2018). An ethnographic approach was also not appropriate for this study because there was no emphasis on the sociocultural interpretation of the phenomenon. Researchers use ethnographic studies to study "culture and social regularities of everyday life" (Merriam & Tisdell, 2016, p. 229). Finally, grounded theory methodology was not chosen as the method of inquiry for this study because grounded theory studies are used to devise theory (Creswell & Poth, 2018; Merriam & Tisdell, 2016).

I chose case study methodology for this study because this study involved one case that was bounded by time. "A case study is an in-depth description and analysis of a bounded system" (Merriam & Tisdell, 2016, p. 37). For this study, the online component of the course was the bounded system used to study the key concept, online reflection. Case studies are used to allow researchers to explore complex situations in depth (Creswell & Poth, 2018; Merriam & Tisdell, 2016; Yin, 2014). A case study approach should be considered when the researcher desires to study "a contemporary phenomenon (the 'case') in its real-world context" (Yin, 2014, p. 31). In a case study, the focus could be an individual, program, event, or institution that will be studied for a specific length of time (Creswell & Poth, 2018; Merriam & Tisdell, 2016). Case study research, in particular qualitative case study, is ideal for understanding and interpreting educational phenomena (Merriam, 1998; Merriam & Tisdell, 2016; Yin, 2014).

Role of the Researcher

For most qualitative studies, the researcher is the primary instrument of data collection (Creswell & Poth, 2018; Hatch, 2002; Merriam & Tisdell, 2016). Although the data for this study consisted of data from an online source and I used NVivo10 software for data management and coding, I was the primary instrument for data analysis. Therefore, as the researcher, I employed measures to separate personal biases, assumptions, and feelings during data collection and analysis (Creswell & Poth, 2018; Hatch, 2002). Consequently, an electronic journal of my thoughts, reactions, and biases was maintained throughout the study.

Based on the review of the literature, I became aware that reflection can be used to help teachers become more skilled. In addition, I came to the conclusion that teachers should not only receive training on how to reflect effectively, but they should also be provided with time to reflect on practice. Because asynchronous discussion forums are utilized to allow learning or participation when it is convenient, one belief that I held was that because teachers were reflecting in a forum in this study, they would mention being less concerned about finding time for reflection. Therefore, I had to set aside the bias that the process of reflection was a worthwhile practice and that teachers in this study would state that they reflected more often on practice because they were reflecting in an asynchronous discussion forum. In order to counter this bias, I reviewed the data not from a position of certainty, but with an open mind.

The participants in this study were selected because they were enrolled in a blended professional development course and were reflecting on their experiences

teaching mathematics. Nothing else was known about the participants until after I administered the first questionnaire. At that point I realized that the teachers who participated in this study were 2nd-year teachers who were still relatively new to the profession. It was noted in the literature that new teachers generally do not have the background knowledge needed to reflect on practice. I observed this issue working with new teachers who often looked to me as the expert whenever they were faced with a teaching dilemma. Therefore, the assumption that new teachers may not be able to provide truly reflective responses to discussion prompts was identified as a bias. This was another bias that was set aside as the responses of the teachers in the study were analyzed.

Methodology

This section includes the rationale for the selection of participants for the study, instrumentation, procedures for the recruitment of participants, and issues of trustworthiness. Each section includes information in sufficient detail to provide the reader with the procedures and processes necessary to recreate or extend this study. The section concludes with the data analysis procedures.

Participant Selection

The participants I recruited for this study were elementary mathematics teachers enrolled in a blended professional development course in a large school district in the Northeast region of the United States. The participants were all 2nd-year elementary teachers who taught at least one mathematics class. This study was a single case study about the online component of a course, investigated as a bounded system. The course

was designed to assist elementary mathematics teachers in becoming more competent by providing them with face-to-face and online professional development. The online component of the course included readings and opportunities to reflect. Therefore, the teachers were given time to reflect on mathematics teaching in the online discussion forum.

The participants in this study were selected using purposive sampling, and all 10 teachers enrolled in the course signed consent forms and agreed to participate in the study. Seven of the 10 teachers remained in the study until the course ended, and I was able to study the reflections of the seven elementary mathematics teachers. Because the online component of the course by design provided teachers with the opportunity to reflect on teaching and learning, the teachers enrolled in the course were selected using purposive or purposeful sampling. According to Merriam and Tisdell (2016), "purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (p. 96).

Pilot Study

Pilot studies can be used to guide the development of larger research projects (Thabane et al., 2010). Using a pilot study, researchers can determine whether an intended study is viable. They can also design research questions or an instrument or even collect data in order to plan a larger study (van Teijlingen & Hundley, 2002). According to Hatch (2002), it is always of paramount importance for the researcher to determine if the study will actually supply answers to the research questions. Therefore,

Hatch (2002) suggests that researchers identify the methodological theory bases and use existing literature to formulate their research questions. Otherwise, the researcher may realize later while conducting the study that the questions cannot be answered for a variety of different reasons. Consequently, I conducted a pilot study in order to preview the discussion posts made by teachers in the forum. I was particularly interested in examining the discussion posts to determine whether there was evidence of reflection.

I conducted the pilot study after two discussion prompts were posted. The Walden University Institutional Review Board supplied the IRB approval number 02-05-08-0296846 in order for me to conduct the pilot study. During the pilot study, I gained access to the online forum and was able to read the discussion prompts as well as the participants' responses to the prompts for the first two discussions. By studying the online discussions during the pilot study, I determined that the teachers were reflecting on practice. Based on the discussion prompts and teacher responses posted at that time, I concluded that I would be able to determine the levels of reflections in the forum. Thus, the pilot study was valuable because I was able to collect preliminary data in order to refine the research questions for the full dissertation study.

Instrumentation

To gain a complete understanding of the phenomenon, data were obtained from online discussions and two open-ended questionnaires. According to Baxter and Jack (2008), using a variety of data sources leads to the exploration and understanding of "multiple facets of the phenomenon" (p. 544). Multiple sources of data increase the credibility of the researcher's findings and quality of the study (Merriam & Tisdell, 2016;

Yin, 2014). Additionally, the triangulation of data sources can be used to justify findings and present a more accurate interpretation of the phenomenon being studied (Creswell & Poth, 2018).

Data Collection Procedures

The teachers in the course met once every month for the face-to-face professional development component of the course. For the online component of the course, every month after the face-to-face meeting, the participants responded to the discussion topic for the month in the discussion forum. The online component of the course was supported through courseware, called D2L. D2L is an integrated online LMS that supports synchronous and asynchronous interaction between students, teachers, and the learning content. Communications occur online and are stored within the D2L integrated online LMS. Conversations in D2L are logged and organized into a discussion forum that contains a main post and the related replies. The course was not an informal community of practice; instead, discussion prompts were written and posted by the instructor of the course.

There were a total of 10 discussion threads that were posted in the forum. The topics were as follows: Manipulative Road Show, Emotions Article, Geometry, Thoughts on Special Education, Learning to Calculate: How the Brain Learns Mathematics, Having Number Sense: How the Brain Learns Mathematics, Reviewing the Elements of Learning: How the Brain Learns Mathematics/Working Memory, Reviewing the Elements of Learning: How the Brain Learns Mathematics/Practice, How the Brain Learns Mathematics: Chapters 4 and 5, and Detection and Correction.

For the first discussion, the teachers were asked to reflect on their experiences using manipulatives to teach. For the other months, the discussion prompts were either a question based on the reading from an article or questions based on the reading of specific chapters from David Sousa's book, *How the Brain Learns Mathematics*. The teachers participated in the online forum from October to end of May. The topics and the discussion prompts for all 10 topics are provided in Appendix E.

In order to collect data from the online discussion forum, I was given instructor privileges by the district's Office of Instructional Technology. Therefore, I was able to read the participants comments and also view information pertaining to their level of participation. For example, I could use a feature called user progress to know how many messages each participant authored as well as the number of messages read by each participant. Although I could have chosen to participate in the online discussions as a participant-observer, I chose to be a non-participant observer.

Open-ended questionnaires. Two open-ended questionnaires were used to collect data in this study. Surveys in the form of a questionnaire can be used to collect information about the feelings, preferences, or thoughts of individuals (Fink, 2006). They can also be used to make decisions that are based on attitudes, perceptions, and facts (Harlacher, 2016). Unlike the discussion transcripts, which contained the participants' reflections about mathematics content or teaching, the Reflecting Online Questionnaire was used to collect data from the participants concerning their experiences reflecting online (see Appendix C). The Participant Questionnaire supplied additional information about the participants (see Appendix D). The questionnaires helped to answer the

research questions because the information provided on the questionnaires was different from the information that was extracted from the online forum. However, both questionnaires as well as the discussion transcripts were used to provide descriptive data in the discussion of the findings, thereby providing the reader with information to judge the accuracy of the findings.

To validate the Reflecting Online Questionnaire instrument, a trained teacher mentor with traditional reflection and online reflection experience reviewed the questionnaire. This mentor had over 16 years of experience working with new teachers to progressively develop their ability to reflect on practice. Based on the teacher mentor's suggestions, slight modifications were made to the questionnaire to clarify the directions and questions for the participants. The Reflecting Online Questionnaire was administered in the face-to-face meeting during the sixth month of the study. By this time, the participants were familiar with the procedures for responding to the online reflection prompts and could share their insights about reflecting online. Giving the questionnaire at that point in the study proved to be beneficial because it allowed me to realize that additional questions needed to be asked in order to answer the research questions.

According to Hatch (2002) when the data collection process includes open-ended questions such as what was used on the questionnaires in this study, data analysis may need to begin sooner rather than later. Because qualitative data is emergent (Creswell & Poth, 2018; Merriam & Tisdell, 2016), I analyzed the data early and then decided on the specific data I needed to collect in order to answer the research questions. Prior to data collection, the plan was to use data from the discussions from the online forum and one

questionnaire to understand the reflection experiences of teachers. The first questionnaire, the Reflecting Online Questionnaire was designed to collect data to answer Research Questions 1 and 2. However, after reading some of the postings and considering the questions in the first questionnaire, the second questionnaire was then designed to generate answers that would lead to more understanding of the data. The second questionnaire, the Participant Questionnaire was emailed to the participants during the seventh month of the study. Questions about the type of teacher preparation program they attended, comfort level using technology, the place where responses to the discussion prompts were completed were asked in the email, etc. (see Appendix D).

Data Analysis Plan

It is often common for data collection and data analysis to occur simultaneously in qualitative studies (Merriam & Tisdell, 2016). For this study, it was possible to start data analysis immediately after the online discussion thread was reviewed because the online discussions did not need to be transcribed. Unlike oral conversations, which need to be recorded and transcribed, "new forms of data" (Creswell & Poth, 2018, p. 160) such as online discussion threads are maintained in a form that needs no transcription.

The first phase of data analysis started with the identification of biases that could possibly affect the interpretation of the findings. One of the ways to increase trustworthiness is to disclose personal biases or assumptions that could influence the interpretation of data (Carlson, 2010). Therefore, the following biases were identified as possible threats to the credibility of this study. During the time when this study was conducted, I worked as a mathematics resource teacher in an elementary school. In that

role, I worked with teachers, helping them to plan and teach mathematics lessons. Teachers were only free during their planning period and during their 30-minute lunch break. Whenever I met with teachers during their planning period or lunch time, the entire time was used to discuss mathematics content or teaching strategies for an upcoming lesson or lessons. Unfortunately, we generally did not spend much time reflecting about the previous lesson. Even when teachers stayed after school, the time was still primarily used to review or learn how to teach the mathematics concepts for the next day or days.

Based on that experience, I realized that more time was usually spent learning mathematics content and looking ahead at the upcoming lesson instead of reflecting back on a previous lesson. Therefore, as stated in the Role of the Researcher section of this dissertation, I believed teachers needed more time for reflection and that discussion forums could potentially alleviate this issue. To minimize this bias, I recorded my thoughts and feelings in my research journal throughout the process. This process of recording my thoughts and feelings helped to safeguard against seeking to prove what I expected to find.

In order to obtain answers to research questions about patterns and levels of reflection, researchers have used existing frameworks or developed their own framework to determine levels of reflection. Whipp (2003) used Hatton and Smith's (1995) framework and Rampersad and Herbert (2005) used van Manen's (1977) framework to determine levels of reflection. I used Hatton and Smith's (1995) framework and the summary of van Manen's (1977) work to determine the levels of reflection in this study.

All 10 threaded discussions were copied from the LMS into Word and saved based on the title of the discussion. The 10 online discussion documents were then imported into NVivo 10 and Hatton and Smith's (1995) framework and my summary of van Manen's (1977) framework were used to code the discussions in order to determine the levels of reflection in the forum. I coded using Hatton and Smith's framework first then I coded the discussion again using my summary of van Manen's framework.

The posts were coded based on the four levels of Hatton and Smith's (1995) framework. Hatton and Smith's framework was described in detail in the Levels of Reflection section of Chapter 2. Posts that consisted of only a description of an event or action, but no justification or reason for the event or action were coded as descriptive writing. Posts that included a description of an event or action along with the justification for the event or action were coded as descriptive reflection. Posts were coded as dialogic reflection if it involved actions that included stepping back and engaging in discourse to consider alternative reasons for the event or action. Lastly, posts that included the consideration of historical, socio-political, and/or cultural factors involved were coded as critical reflections.

The following definitions were used to code the levels of reflection based on my summary of Marzano et al. (2012), McDonald and Songer (2000), and Rampersad and Herbert's (2005) interpretations of van Manen's framework. When a teacher posted about an experience and only stated what they did, that post was coded as a technical rationality. At the technical rationality level, teachers reflect about experiences and provide explanations for their actions. Posts were coded as a practical action if the post

included experience(s) and the explanations or underlying theories behind it. At the practical action, the teacher goes beyond the technical level by considering the underlying theories or rationale for current practice. Posts were coded as a critical reflection when a teacher assessed classroom problems while specifically looking for the institutional, social, cultural, or political factors that could be contributing to the problem.

Open-Ended Questionnaires

NVivo 10 was used to identify the themes about teacher's perceptions of their experience reflecting in an online environment. The software was used to code the individual responses. Focusing on the questionnaire for each teacher was profitable because it led to the thorough analysis, documentation, and understanding of the reflection experiences of each participant.

Constant comparative data analysis was used as the method of data analysis for the questionnaires. Open coding was conducted to identify initial concepts in the data. Open coding was used to code the perspective of each participant. I read and reread all responses to both questionnaires line by line to identify possible concepts while assigning codes to the participants' words. Every questionnaire was studied in order to label each passage with an adequate code. In vivo coding or assigning the specific words and phrases from the participants to the data was used to obtain initial codes. Open coding was followed by axial coding in order to group or combine concepts and eliminate categories. Selective coding occurred last in order to choose the themes and further define and refine the categories. After I derived the categories from each data collection method, I then placed the categories into clusters according to the research question.

Issues of Trustworthiness

Qualitative research is emergent (Hatch, 2002; Creswell & Poth, 2018); therefore, researchers can alter or refine their study as necessary as they search for answers to the research questions. Time spent designing and redesigning a study in order to understand phenomena should also include time considering ways to increase the trustworthiness of the study. Trustworthiness is accomplished by explaining the measures taken to assure credibility, transferability, dependability, and confirmability.

Credibility

Credibility or "truth value" is established by presenting a true picture of the phenomenon being studied. Therefore, I used triangulation and member checking to ensure the credibility of the research findings. There are four types of triangulation and they are data triangulation, investigator triangulation, theory triangulation, and methodological triangulation (Denzin, 1989). Data triangulation is the use of different sources of data, at different times, in different places, or from different people. I used multiple sources of data to confirm emerging findings. The triangulation of the data from the online discussions and Questionnaire 1 and Questionnaire 2 helped to support the trustworthiness of the findings.

Transferability

To address transferability, I provided thick descriptions of the findings and included direct quotes from the participants. Transferability in qualitative research means that the results of a study can apply to similar situations. Readers can decide if findings

are transferability when they are provided with clear and detailed information (Lincoln & Guba, 1985; Merriam & Tisdell, 2016).

Dependability

I addressed dependability in this study using member checking and peer debriefing. To increase dependability, I conducted a member check by sharing initial findings with the instructor of the course and participants who attended a face-to-face meeting.

Confirmability

Confirmability is the extent to which the results can be verified or understood by someone else. According to Wahyuni (2012), confirmability is the extent to which others can confirm "that the results reflect the understandings and experiences from observed participants, rather than the researcher's own preferences" (p.77). Confirmability was established in this study through the use of audit trails. An audit trail was kept for the questionnaire data and the data collected from the discussion forum. For the questionnaire data, as I coded the data, I used NVivo10 to organize the statements by participants. The data collected from the discussion forum was saved as a file before it was copied into NVivo10 and coded. I kept an electronic journal and used it to record findings as they emerged, and to set aside feelings and biases that emerged from the findings.

Intra and Intercoder Reliability

Intra and intercoder reliability was utilized to check the accuracy of data analysis and to ensure reliability of the results pertaining to the levels of reflection. Every post

except the posts made by the instructor was coded several different times in order to obtain intra-coder reliability. Inter-coder reliability was also accomplished during the data analysis process for Research Question 3 about the levels of reflections. To accomplish inter-coder reliability for the levels of reflection, the data were coded by a qualitative research consultant who used to be a mathematics teacher before becoming a qualitative research methods professor at the university level. The qualitative consultant and I coded the data separately. When there was a discrepancy, the discussion and review of the definitions of the levels of reflection with a sociology instructor and a social studies teacher led to 100% inter-rater agreement.

Constant comparative data analysis was used to answer Research Questions 1 and 2. Inter-rater reliability was not tested for the codes for Research Questions 1 and 2. A qualitative research specialist and a qualitative associate scientist provided guidance for the coding of the data and helped to devise some codes for the data collected for Research Questions 1 and 2. I then re-coded all of the data in order to identify the themes for Research Question 1 and 2. The other coders did not code all of the data. According to Mouter and Vonk Noordegraaf (2012), intercoder reliability can be tested on a sample of data. However, inter-rater reliability was not tested for the sample of the data that was coded by all coders for Research Questions 1 and 2.

Ethical Procedures

Permission was granted by the Walden University Institutional Review Board (Approval No. 11-03-09-0296846) in order for me to conduct this study. Upon receipt of IRB approval for the study, I contacted the instructor of the course and arranged to visit

one of the face-to-face meetings to introduce the study and obtain consent from the participants. The instructor of the course was an experienced mathematics resource teacher who worked for the Office of Mathematics in the district. Using a prewritten script, I introduced the study to the teachers. I also provided the teachers with copies of the consent form and gave them time to read through the information. Next, I carefully read the consent form aloud, stressing the fact that participation was voluntary and that participants could withdraw from the study at any point. The participants were also informed that anonymity would be preserved in the write up of the study. After giving the participants the opportunity to ask questions and read through the consent form, the participants were told that they could either sign the consent form at that time or email the signed consent form to me.

Although this was a low or no risk study, I saved all data transferred from the LMS onto a password protected computer. Data obtained through this study will be saved for a period of 5 years after the completion of the study. I also ensured confidentiality of all data collected by using pseudonyms instead of real names for each teacher in the write-up of the findings.

Summary

This chapter includes the data collection procedures as well as the measures taken to ensure a valid and ethical study. Chapter 4 includes the participant demographics, data collection, data analysis, and results. Evidence of trustworthiness is also presented in Chapter 4.

Chapter 4: Results

The purpose of this qualitative case study was to determine participants' perceptions of the benefits and drawbacks of using an asynchronous online discussion forum to allocate time for reflection and to determine the levels of the teachers' reflections in the forum. Therefore, I used the following research questions to guide this study:

1. What do teacher participants perceive as the benefits and drawbacks of reflecting in an asynchronous discussion online forum?
2. How do teacher participants perceive and describe their reflection experience when time is allocated for reflection online?
3. What are the levels of the teachers' reflections in the asynchronous discussion forum?

This chapter is organized to present the perceptions of the participants and results of this study.

Descriptions of the Research Participants

Ten teachers were enrolled in the mathematics course when the course started and all ten agreed to participate in the study. Eight out of the ten teachers contributed to the study in the beginning. However, only seven teachers remained in the course and participated in the study until the end. A description of the seven teachers who contributed to the study and remained until the end as well as the teacher who did not stay until the end is provided. All participants were assigned a pseudonym and pseudonyms were used in the descriptions to ensure anonymity. Participants

demographics is also displayed in Appendix F. The results presented in this chapter were from the data collected from seven participants who completed the course and one participant who did not stay until the end.

Maria. Maria was a 24-year-old teacher who graduated from a traditional teacher preparation program. Maria taught Grade 1 during the time of this study. She was very comfortable with technology and had taken several online courses previously through CaseNex. One of the courses that she completed during her first year as a teacher was called Reflective Practices for New Teachers. Maria responded to some discussion questions at school, but most of her postings were completed at home. She preferred to participate in the course when she was home because her home environment was more relaxing than her work environment. While Maria was enrolled in the course, she had other responsibilities because she was taking another online course. She was also involved in softball twice a week and was a babysitter one night each week.

Tremaine. Tremaine was a 23-year-old teacher who also graduated from a traditional elementary preparation program. Tremaine taught Grade 5 during the time of the study. Before she enrolled in the course, Tremaine had never taken any other online course. However, she described her comfort level with technology as a 7 on a scale of 1 to 10, with 10 being the highest. She preferred to do most of the postings for the course at school, in the mornings, before her students arrived. For her, this was the quietest time of the day. During the time Tremaine was a participant in this study, she was planning her wedding. She was also the student council advisor at her school and a member of several

social sports teams. Tremaine had no prior professional development experience or coursework on reflection.

Leah. Leah was a 37-year-old teacher who taught Grade 3. She earned a Special Education degree as well as an Elementary Education degree through a satellite program. Leah received training on reflective practice and also maintained a daily reflective journal during her practicum. Leah was very comfortable using technology and had a variety of computer and computer software experience. She had also taken a few online courses in college. In addition to being a participant in this study, Leah was extremely busy with family responsibilities as a wife and mother. She was also a pilot teacher for the new mathematics curriculum for the district. As a pilot teacher, she implemented selected lessons from the new curriculum and submitted her reflections about her experience teaching those lessons to the curriculum office. It was more convenient for Leah to do the assignments for the course at work during her planning period or lunch break.

Monique. Monique was a 27-year-old teacher who taught social studies, math, and science to students in Grades 4 and 5. She graduated from a traditional teacher preparation program. As part of her coursework, she was required to reflect on lessons in order to improve her teaching. She was quite comfortable with technology and had taken two online courses in college. She preferred to respond to the discussions at home because working at home provided her with the freedom to participate when it was convenient. During the time she was a participant in the course, she also worked a part-time job in addition to her full-time teaching job.

Molly. Molly was a 38-year-old teacher who taught Grade 4. She graduated from a traditional teacher preparation program. Although she had never taken a specific course on reflection or reflective practice, most of her education courses emphasized the practice, and she was frequently given assignments that included opportunities for reflection. She had never taken an online course before and described her experience level with technology as basic. She stated that she did, however, have experience with software such as Excel, Word, and PowerPoint. She completed most of her postings at home because she rarely had extra time at work. For her, the school environment was sometimes distracting and therefore not conducive for reflection activities. During the time she was enrolled in the course, she was enrolled in a graduate course and she also facilitated a before-school math club twice a week.

Mike. Mike was a Grade 5 teacher who was proficient with technology, but was unable to participate in the discussions because he could not access the D2L website at home. He also stated that when he was at work, he spent all of his time doing work related to his teaching job. Mike responded to some of the questions on the Reflecting Online Questionnaire, the first questionnaire that was administered. He also authored one post in Discussion 3: Geometry; however, it was an incomplete post (see Table 3 and Table 4).

Brittany. Brittany was a 24-year-old teacher who taught Grade 1. She graduated from a traditional teacher preparation program. Prior to enrolling in the course, she participated in an online forum that used Blackboard, but she had never taken a completely online course. She was comfortable using technology and preferred to do her

postings at home where she could complete the assignments when it was convenient. During the time she participated in the study, she was a tutor and participated in a kickball league.

Hillary. Hillary was a 25-year-old, fifth grade teacher, who graduated from a traditional teacher preparation program. Hillary was extremely comfortable with technology and had previous experiences participating in online discussions. Those experiences occurred during the time she was taking courses to prepare for her teaching career. Hillary did most of her posting for the course in her school building where she had regular access to a computer. She also indicated that the course was on her mind when she was at work, which was why she tended to log in to the discussion forum while at work. During the time she was enrolled in course, she was also enrolled in a for-credit elementary mathematics course.

Data Collection

To gain understanding about practicing teachers' reflection experience in an asynchronous forum, data were obtained from online discussions and two questionnaires administered at different times during the study. I documented the data collection procedures I used in Chapter 3 and explained the reason for the additional questionnaire that I used to collect data during the data collection phase.

Data Analysis

Data were collected from two questionnaires as well as the online discussions transcripts. Seven participant questionnaires for Questionnaire 1 and eight participant summaries for Questionnaire 2 was imported using NVivo 10, a qualitative data analysis

software. Questionnaire 1 documents were coded to eight “Questionnaire 1” node titles and the Questionnaire 2 summary document 2 were coded to nine “Questionnaire 2” node titles. The codes for the two questionnaires are as follows:

Questionnaire 1

1. Q1-Courses or training on reflection or reflective practice
2. Q2-Like best reflecting online
3. Q3-Like least reflecting online
4. Q4-Online reflection affects the way you teach math
5. Q5-Prefer traditional or online
6. Q6-How online format could increase reflection
7. Q7-How to create more opportunities for reflection
8. Q8-Share thoughts

Questionnaire 2

1. Q1- Name:
2. Q2- Age:
3. Q3- What grade do you teach?
4. Q4- Did you attend a traditional teacher preparation program?
5. Q5- Prior to taking this course, have you taken any other online course?
6. Q6- Prior to taking this course, have you taken any other reflection course?
7. Q7- How comfortable were you with technology prior to the start of the course?
8. Q8- Where did you complete the discussion posts?

9. Q9- Were you involved in any other activities during the time you were enrolled in the course?

The participants shared their perspectives about their experience reflecting online and about the use of the forum to provide them with time for reflection. Four themes were discovered at the end of the data analysis process.

Results of the Study

Several significant findings and themes emerged during the data analysis process. I organized the findings according to the research questions that were used to guide this study. I provided direct quotes from the discussion threads and the questionnaires to present the participants' perceptions of the benefits and drawbacks of online reflection, and use of the online discussion forum to provide teachers with time for reflection. I also used direct quotes from the discussions to share the findings about the levels of reflection evidenced in the forum.

Benefits and Drawbacks

The first research question was as follows: What do teacher participants perceive as the benefits and drawbacks of reflecting in the asynchronous online forum?

When asked to state whether they preferred reflecting online compared to reflecting face-to-face, only six participants responded to the question about their preference. Three out of the six participants stated that they preferred reflecting online compared to reflecting face-to-face. Leah wrote that she preferred online reflection "because you get the benefit of hearing what others think and then you can take time to think about what they said before responding (-vs-face to face)." Leah also mentioned

that she liked the following about online reflection: “Easy access – better to type than to write.”

The following views are from the other two participants who also preferred to reflect online. Molly stated that she preferred to reflect “online because you can be more free with what you say compared to face to face.” Hillary provided a different reason why she preferred to reflect online. She said, “I am a talkative person so any chance I get to share thoughts, and feelings is good for me. I do enjoy having time to write out my thoughts online.” She also described her overall experience reflecting online by saying, “I enjoyed it! I really enjoy feedback on my thoughts.”

One participant, Tremaine, preferred to reflect online and face-to-face. Her preference depended on the reflection activity. She said the following:

> I think reflecting online was good for this type of reflecting (reading the book and highlighting key ideas). I do like the traditional reflection when I reflect upon a lesson taught or created with a co-teacher doing a similar lesson.

The other two participants stated that they preferred to reflect face-to-face. Maria provided an explanation as to why she preferred face-to-face reflection. She wrote “I prefer face-to-face reflection for the immediate feedback that you receive. I often checked on-line to find no new posts or reactions to posts.” Brittany also preferred face-to-face reflection. She wrote that she preferred “face-to-face mainly because of time. Also, questions are cleared up right away when shared face-to-face.”

Although some participants preferred online reflection and some preferred face-to-face reflection, when they responded to questions on questionnaire #1 they all agreed

that there were benefits to online reflection. The themes pertaining to the benefits of reflecting online were convenience, sharing, and learning.

Convenience. Despite the different views about online reflection compared to face-to-face reflection, the participants reported that it was convenient to reflect online. Although Mike answered some questions on the first questionnaire, he did not make any remarks about the convenience of reflecting online. Therefore, his thoughts about convenience were not known. Some participants explained that it was more convenient to post their reflections when they were at home. Others preferred to post at work. For example, Maria stated that "she enjoyed working at home because it was more relaxing for her to work while either sitting on the couch or at the kitchen table." Although she preferred to post at home, Maria also made some of her posts during the day at school. The time stamp of her posts showed that some of her posts were made in the evening and some were during the day. Hillary, however, mostly participated when she was at work. Only a few of her posts were made after school hours. She provided the following reason to explain why she mostly participated during the day. "I thought about the course when I was at work and therefore, I was inclined to log in to the discussion forum while at work."

Others made statements about convenience as it pertains to the time of day they were able to participate. For example, Leah wrote that "Convenient - 24 hr. access" was what she liked best about reflecting online. Molly's response to the question about how online reflection experiences could be used to increase the habit of reflection for teachers

who are not in the habit of reflecting was as follows: She stated that "they could do it at any time and it would help them with their teaching skills, strategies etc."

Sharing. Another theme that emerged from the data related to the benefits of reflecting online was the concept of sharing. The participants shared knowledge, thoughts, ideas, as well as challenges. Mike did not provide any responses pertaining to this theme. However, the other seven participants all wrote about how they benefitted by sharing or reading the posts in the forum. Maria stated the following on questionnaire #1:

> I found it helpful to share my ideas. Articulating those ideas into my post entries helped me to organize my thoughts and caused me to pause and think about new ideas and known ideas and how they applied to my teaching practices.

The following post in Session 9: How the Brain Learns Mathematics is an example of how ideas and thoughts were shared in the forum. The post was written by Maria and she shared some of the ideas from Chapter 4 and 5 of the book used in the course, *How the Brain Learns Mathematics.*

> I also thought that one of the general guidelines to help drive math instruction for pre-k and kindergarten was the fact that you need to have a math friendly room where children can conduct explorations, even if it is not math time they should still be able to during center time be making explorations with math tools (cubes, unit blocks etc.) Also, the guideline that talked about specifically giving the children activities or centers that rely solely on mathematics. This would enable the child to have to explore using some type of math skill. I would like to

> implement some of the guidelines from the book into my classroom to see how it may affect how the students learn math.

Hillary also enjoyed the sharing aspect of the online experience. She said, "I am a talkative person so any chance I get to share thoughts, and feelings is good for me. I do enjoy having time to write out my thoughts online." She also discussed how the forum was a medium for open communication. She said, "I enjoy seeing other people's opinions on our readings. The chance to post and reply to other people's posts really allows for open communication and sharing of ideas and thought." Molly indicated that "getting to see others' insights and discuss difficulties and praises with others" was what she liked best about reflecting online.

Some participants also posted questions or challenges and requested help from the other participants. The following post by Tremaine in Discussion 9 is an example of how the teachers used the discussion forum to ask for help from the other participants.

> My class would also be very motivated to take math outdoors. I once had my students measure the area and perimeter of the 4 square courts in the playground. They had to find a way to work together and find the measurements. It was interesting as some of the students measured each square individually and others figured out that you could just measure one of the squares and multiply by 4 for the area and 8 for perimeter. The students were motivated, and it also allowed them to practice teamwork skills. I would love to do activities like this more often. Does anyone have any other suggestions for taking mathematics outdoors?

In addition to how they personally benefitted from the sharing that took place online, Hillary and Brittany also stated that sharing could be experienced by all teachers. Hillary specifically wrote about how teachers could benefit from the discussions in a forum. If a teacher did not share anything in a post, they could still benefit from reading what other participants wrote. She wrote the following:

> More and more I see teachers who are set in their ways and don't take opportunities to grow. I think all teachers would benefit from forums of reflection and discussions. Even if they don't share and just read other's thoughts it may open new thinking for them.

Sharing could provide teachers with a different perspective and new ways of thinking. Brittany stated that "teachers could share their new and exciting ideas. Plus, it is a chance to learn from one another. I have incorporated some of the ideas shared in the articles and by others who posted reflections." Brittany's response also highlighted how sharing is connected to learning. In the process of sharing online, teachers can learn from each other. Learning was also a theme that emerged from the data.

Learning. The benefit of learning to improve teaching was another theme that emerged from the data. Mike did not respond to any questions related to this theme. However, all of the other participants found that the online forum fostered learning. The participants stated in their responses to the questionnaire that the online forum facilitated learning. Additionally, the content of the posts included information they learned from the article and book used in the course. Some teachers also posted statements throughout the discussion forum about how they were using the information from the readings and

discussions to improve their craft. For example, in Discussion 9: How the Brain Learns Mathematics (Chapters 4 and 5), Hillary wrote about what she learned and made a connection to a classroom practice that she wanted to change based what she learned.

> I liked the part about introducing topics in a meaningful way. In most schools we are told to start any lesson by going over the objective, it's a key part that administrators look for during observations and such. But I think it is much more beneficial to the students to introduce skills and topics with a question or relation that makes it real-life or meaningful to them. I am certainly going to make an effort to do this in my teaching.

Maria also wrote about learning in the online forum. However, she emphasized how the online reflection experience led to deeper learning.

> It does force you to consider what you've learned and formulate your new ideas combined with your experiences. If I had just read the book and not completed the online reflections, I would not have gotten a deeper understanding of the material.

When Leah responded to the question to share any thoughts about reflection in general or specifically about the experience reflecting online, she did not mention the terms *learn* or *learning*, but she did report that reflection impacts teacher growth and development. "Overall, I've always been extremely reflective in every aspect of life. I think it's helpful to the growth process, especially in teaching. Online or traditional reflection could help others develop this behavior." Tremaine explained how reflection activities can be used to help develop the habit of reflection for teachers who are not in the habit of reflecting.

> It makes you take the time to stop and think about how you can improve, modify, or enhance understanding in your lessons. Sometimes we just look at the students who scored poorly on assessments. Yet this reflection requires you to stop and think about how you can improve the lesson for the class as a whole and think about diversity of learners.

Molly also discussed the specific benefits of learning and how reflecting online allowed her to try out new ideas.

> It gave me a lot of insight and an opportunity to gain new ideas and give new ideas and created a new way to learn and talk to peers who are the same as you and then trying those new ideas in the classroom.

She provided the following response to the question, what did you like best about your experience reflecting online?

> The book *How the Brain Learns Mathematics* was very useful. I am enjoying being able to think and reflect upon what I got out of the reading. It helped me to gather my thoughts about which suggestion I can apply to my classroom.

Learning was considered a benefit of the online reflection experience and it was noted that reflection can lead to better teaching. In the following statement by Hillary, she highlighted how reflection improved her teaching practice. “The entire reflection course has definitely affected my teaching and showed me areas I have grown in and areas I want to grow in.”

Limited participation. Just as there are benefits to online reflection, the teachers also stated that there were drawbacks. All participants indicated that time was an issue

that limited participation or could limit participation. Based on the participation reports provided by D2L, I created participation tables for each participant. I noticed that the participants mostly responded to the discussion questions and posted responses to comments made by the instructor. However, they rarely responded to each other. This can be seen in Table 2 which shows Maria's participation.

Table 2

Maria's Participation in the Discussion Forum

Discussion	Responses to the discussion question	Responses to another participant
1. Manipulative road show	0	0
2. Emotions Article	1	0
3. Geometry Part 1 (Article)	1	0
Geometry Part 2 (Jigsaw/whole group)	0	0
4. Thoughts on Special Education	1	0
5. Learning to Calculate	1	0
6. Number Sense	1	0
7. Practice	1	0
8. Working Memory	1	0
9. Primary and Preadolescent brain	2	1
10. Detection and Correction?	1	1

Tremaine was another participant who had limited participation totals. She was the only participant who responded to every question posted by the instruction. For some questions, she responded twice. Yet, she only responded a total of three times to another participant.

Mike, who only posted once during the study indicated that technology was a problem. He noted that on the questionnaire in the following way. "At home I am unable

to use the D2L website, so I was unable to participate." Although he had access to technology at work, he stated that, "My time at school. I spend on school activities." Technology issues can limit participation and another participant, Molly, also mentioned the challenge with technology. For the question on the questionnaire, what do you like least about your experience reflecting online? Molly's answer involved technology. She stated, "finding the time especially during school, being able to connect, different computers, and having enough posts to respond to" was what she liked least about the online reflection experience.

Maria did not mention having issues with technology. However, she did make a comment about low participation in the forum. Maria posted a response to all but two discussion questions: Manipulative road show and Geometry Part 2 (Jigsaw/whole group). The table shows the two discussion questions that Maria did not answer. Geometry Part 2 (Jigsaw/whole group) was a discussion question Maria could not answer on her own because a group answer was required for that question. However, the reason why no post was made by the group was not known.

Maria stated the following about the lack of participation in the forum: "I prefer face to face reflection for the immediate feedback that you receive. I often checked on-line to find no new posts or reactions to posts." From Maria's comments it appears that she wanted to interact with the other participants. However, as can be seen in Table 2, she only posted a response to another participant twice during the entire course. She also stated that there were no new posts. Therefore, it is possible that other participants posted after she had already logged out. Her statement was as follows:

> Most people did not participate. I didn't feel that it was as strong a group effort as it could have been. Also, being a mom and 2nd year teacher didn't give me a lot of time to give on-line reflecting the time it deserved.

Time for Reflection

The second research question was: How do teacher participants perceive and describe their reflection experience when time is allocated for reflection online?

All eight teachers expressed that they had other commitments besides being in the course during the time the course took place. Considering that there were time pressures due to personal and professional commitments in the participants' lives, they were perfect candidates to consider how online forums can foster more time for reflection. Some participants such as Brittany said that it was difficult to find time. "The time required – it was hard to find the time to put up the posts." Brittany also stated that she preferred when reflection occurs face-to-face. She said, "Face to face mainly because of time. Also, questions are cleared up right away when shared face to face." Hillary stated that "it is sometimes hard to find the time, but this is true for everything when you are a teacher." Hillary's statements about reflection revealed that she identified with teachers who struggle to find time for reflection.

Other participants made specific comments about finding time during the day. Molly, for example, stated that it was difficult to post her reflections during the day. "Finding the time especially during school, being able to connect, different computers, and having enough posts to respond to." That was what she like least about the experience reflecting online. Although she acknowledged that finding time was difficult,

she was one of the participants that mentioned that she preferred online reflection more than traditional reflection activities. She was also a participant who reported that she "completed most of her postings at home because she rarely had extra time at work."

Leah also had concerns about time. She stated the following was what she liked least about reflecting online: "Ease to forget to do it. Still need to find the time." Like Hillary, Leah understood that teachers are usually very busy. However, she also understood that meeting face-to-face to reflect was also a challenge. "Teachers are always strapped for time, and we don't always have time to meet face to face to share ideas." Molly thought it was possible to allocate time for reflection and also improve teaching through online means. Molly stated, "They could do it at anytime and it would help them with their teaching skills, strategies etc." in response to the question, Based on your online reflection experiences so far, please explain how this format could help increase the reflective practice of teachers who are not in the habit of reflecting? It was difficult for Molly to find time for online reflection when she was at work and that might have caused her to conclude that online discussion forums could be used to address issues pertaining to no time for reflection during the school day.

Levels of Reflection

The findings in this section are related to Research Question 3: What are the levels of the teachers' reflections in the asynchronous discussion forum? A total of 119 messages were posted by the instructor and the participants in the discussion forum. The instructor posted the initial discussion prompts and the participants responded. Of the 119 messages, 74 were posted by the participants. The 74 messages posted by the participants

included responses to the initial discussion prompts as well as responses to the instructor or each other. Hatton and Smith's (1995) framework and my summary of van Manen's (1977) framework were used to determine the level of the postings. As shown in Table 3, one post out of 74 was an incomplete post and the remaining 73 were coded using both Hatton and Smith's (1995) framework and the summary of van Manen's (1977) framework.

Table 3

Levels of Reflections

Online Discussions	Number of Posts
Hatton and Smith's Framework	
Hatton and Smith -1 Descriptive Writing	0
Hatton and Smith -2 Descriptive Reflection	3
Hatton and Smith -3 Dialogic Reflection	28
Hatton and Smith -4 Critical Reflection	42
Incomplete post	1
van Manen's Framework	
van Manen-1 Technical Rationality	1
van Manen-2 Practical Action	30
van Manen-3 Critical Reflection	42
Incomplete post	1

As shown in Table 3 for Hatton and Smith's (1995) framework, the participants did not engage in non-reflective conversations. Instead 4% (3 out of 73) of their posts were descriptive reflections, 38% (28 out of 73) were dialogic reflections, and 58% (42 out of 73) were critical reflections. Based on the summary of van Manen's (1977) framework, there was one technical rationality post (1 out of 73) or 1%. However, 41% (30 out of 73) of the postings were practical action, and 58% (42 out of 73) were critical

reflections. One participant, Mike, posted one incomplete post and that was also noted in the table. Mike only authored one post in the forum and it was incomplete. He posted in Discussion 3: Geometry Part 1. It was coded as an incomplete post because he did not respond to the question. The following was his post in the discussion: "This is my group article for those people wondering...More to come as I read."

Table 4

Levels of Reflection for the Participants: Hatton and Smith's Framework

Participant	HS-1. Descriptive Writing	HS-2. Descriptive Reflection	HS-3. Dialogic Reflection	HS-4. Critical Reflection	Incomplete Posting
Maria	0	0	4	7	0
Leah	0	1	2	2	0
Molly	0	0	7	13	0
Monique	0	1	3	1	0
Brittany	0	0	2	2	0
Hillary	0	1	3	8	0
Tremaine	0	0	7	9	0
Mike	n/a	n/a	n/a	n/a	1

As shown in Table 4, all participants who posted complete written reflections in the forum engaged in dialogic reflection. Dialogic reflection posts contained actions such as engaging in discourse to consider alternative reasons for an event or action. All participants also engaged in critical reflection. Critical reflections were posts that included the consideration of historical, socio-political, and/or cultural factors. Three

participants reflected at the descriptive level by posting justifications for the event or action. For example, Hillary's post in the Manipulatives discussion thread was coded as a descriptive reflection. The post was coded as a descriptive reflection because there was a description of an event and also a justification written in a "reportive or descriptive way" based on the teacher's perspectives.

> I am putting on a Measurement Fair at my school... In short, the students create measurement activities for the younger grades. They come up with a name for their activity, the directions for the activity, and preparation of materials needed. It is a student run fair and the kids are so excited. All 4 fifth grades will have their stations set up and lower grades were invited to come and rotate through the stations... It is a great way to get the students thinking about all different forms of measurement. Some are using length or width and using rulers or yard sticks to measure. Some students are doing capacity and using measuring cups, quarts, gallons, etc.

The following post by Maria was coded as a dialogic reflection. The post was written in Discussion 6: Having Number Sense: How the Brain Learns Mathematics. Dialogic reflection involves a discourse about possible reasons and the exploration of what was experienced.

> I found when reading in this chapter and how we are supposed to write up our 5-e lessons and when the new information should be introduced is a bit conflicting. As stated in the reading the "prime time" for new information to be obtained and remembered is in the very beginning of the lesson and at the very end of the

> lesson. When writing the 5-e lessons our explanation is right in the middle along with pulling the re-teach and enrichment groups. This very possibly could be a good reason why the students who don't understand the new concept don't understand it because it is not taught during the correct time that the new information is best retained. For those learners who already have a difficult time retaining information it very well could be because it is introduced during this "down time." This will definitely be something I consider next time I write plan for my math lessons :).

The following post by Monique in Discussion 6: Having Number Sense: How the Brain Learns Mathematics was coded as a critical reflection post.

> I enjoyed reading how the English language makes arithmetic harder thus a factor in the difference between American and Asian test scores. This made a great deal of sense! Some of my first graders still have difficulty counting past 30 and to think that Asian children, at the age of four, can count to 40. I do not see in the near future our number system changing. There would be too much affected by this change, although the benefits in the long run may be worth it.

Forty-two of the posts in the forum were coded as critical reflections. This number was the same when Hatton and Smith's (1995) framework and the summary of van Manen's (1977) framework were used to code because the definitions for critical reflection are similar in both frameworks. Posts were coded as critical reflection using Hatton and Smith's framework if the experience was discussed while historical, socio-political, and/or cultural factors were considered.

Using the summary of van Manen's framework, posts that included the experience and the consideration of institutional, social, cultural, or political factors were coded as critical reflection.

The results of the coding for the specific type of reflection for each participant based on the summary of van Manen's (1977) framework are shown below in Table 5.

Table 5

Levels of Reflection for the Participants: van Manen's Framework (Adapted)

Participant	VM-1 Technical rationality	VM-2. Practical action	VM-3. Critical reflection	Incomplete posting
Maria	0	4	7	0
Leah	1	2	2	0
Molly	0	7	13	0
Monique	0	4	1	0
Brittany	0	2	2	0
Hillary	0	4	8	0
Tremaine	0	7	9	0
Mike	n/a	n/a	n/a	1

When a teacher posted about an experience and only stated what they did, the post was coded at a technical rationality level. Leah was the only participant who posted a comment that was coded at the technical rationality level. Her post was a response to a comment made by the instructor of the course. The post made

by the instructor was posted in Discussion 9: How the Brain Learns Mathematics: Chapters 4 and 5.

> I love the idea of outdoor math. You could do measurement skills outside (other than [perimeter] and area) as a treasure hunt where kids have to follow directions and measure to find the "treasure." Some cooperative learning strategies, like Inside Outside Circle" works much better outside as there is room to make the circles. This can be used for review, practicing facts, etc. Each child can have a question to ask others as they go around the circle. Geometry is good outside, too. Get some sidewalk chalk and let them make angles and have others measure them. Just some ideas off the top of my head!

Leah responded by sharing about her experience teaching her class outside. She stated the following:

> I have gone outside for math many times also, with perimeter and area. I like the idea of the sidewalk chalk to draw and measure angles. This year, I have gone outside to practice [multiplication] facts. The class plays "around the world" and [multiplication] Bingo on our court. Sometimes we just take the flashcards that they have made outside and work in groups.

Leah's post was coded as technical rationality because Leah provided examples of times when she taught a math lesson or engaged students in learning outside. The post was not coded as practical action because it did not appear that she used reflection to integrate theory and practice. Technical rationality involves a statement or statements about what

was done, whereas practical action includes the consideration of the explanations or underlying theory behind the action.

Practical action was evident in 41% (30 out of 73) of the postings. The following post by Brittany in Discussion 4: Thoughts on Special Education was considered a practical action reflection post because she explained an instructional strategy she used in her class. She also providing explanations or reasons why she used that strategy.

> In my class, during the time of evaluation, I will pull a small group depending on the needs of students. We meet together to revisit the skill represented that day. Students have the opportunity to have questions answered and receive additional practice with the skill. I feel that is important that each day we are evaluating the needs of students in order for us effectively meet these needs.

In many of the practical action posts, the teachers considered something they learned in the course and how it applied to practice. They linked theory with practice and in many posts they also discussed plans for future action.

The following post by Maria is another example of a practical action post in the forum. Her post was posted in Discussion 6: Having Number Sense: How the Brain Learns Mathematics pertaining to why students lack number sense. Maria discussed a challenge she experienced as a teacher and highlighted how the information from the chapter provided her with insight into as well as possible solution to the problem.

> I found when reading in this chapter and how we are supposed to write up our 5-e lessons and when the new information should be introduced is a bit conflicting. As stated in the reading the "prime time" for new information to be obtained and

> remembered is in the very beginning of the lesson and at the very end of the lesson. When writing the 5-e lessons our explanation is right in the middle along with pulling the re-teach and enrichment groups. This very possibly could be a good reason why the students who don't understand the new concept don't understand it because it is not taught during the correct time that the new information is best retained. For those learners who already have a difficult time retaining information it very well could be because it is introduced during this "down time." This will definitely be something I consider next time I write plan for my math lessons :).

In this example, the information in the reading conflicted with Maria's practices and caused her to consider changing the practice. In the process of providing the explanation for a particular decision, the teachers sometimes identified the theory behind the decision. This application of theory to practice was evident in this post. Considering that there were 30 discussion posts focused on linking theory to practice based on a reading in course, practical action was the second highest level in this study. Critical reflection was the highest level because 42 out of 73 posts were critical reflection posts.

The following post by Monique in Discussion 6: Having Number Sense: How the Brain Learns Mathematics was considered a critical reflection post. As discussed previously, this post and every other post that was coded as a critical reflection using Hatton and Smith's (1995) framework was also identified as a critical reflection using the summary of van Manen's (1977) framework.

> I enjoyed reading how the English language makes arithmetic harder thus a factor in the difference between American and Asian test scores. This made a great deal of sense! Some of my first graders still have difficulty counting past 30 and to think that Asian children, at the age of four, can count to 40. I do not see in the near future our number system changing. There would be too much affected by this change, although the benefits in the long run may be worth it.

Monique's response to the discussion prompt indicates a search for a reason for a current educational issue in the United States. She considered the difference in achievement between the American students she taught and the Asian students she read about and the different number system used in the two countries. This post was coded as critical reflection because she considered how the language of a country impacts how students learn mathematics.

Evidence of Trustworthiness

In Chapter 3, I described the strategies I used to establish credibility, dependability, transferability, and confirmability. In this section, I discussed the implementation of the four issues of trustworthiness and also discussed any adjustments that I made.

To address credibility, I triangulated the online discussion, the two questionnaires, and my researcher notes. The use of multiple sources of data and member checks were also used to corroborate the findings of this study. I utilized member checking during the last month of the course to review initial findings from the data analysis. I contacted the participants of the study and the instructor of the course by e-mail and arranged a face-to-

face meeting to discuss the initial findings. The participants and I decided to meet on the date they chose. Although the majority of the participants responded to my e-mails confirming the date and time of the meeting, Monique was the only participant who attended the meeting. The instructor of the course also attended, and I was able to conduct member checking by sharing initial findings with her and Monique. I provided them with a copy of the tentative findings and we discussed the results of the study. Neither Monique nor the instructor had any concerns with my findings at that time. After the results section of this study was finalized, I also emailed the participants to ensure the accurate presentation of their views in this study.

To address transferability, I provided detailed descriptions of the findings and included direct quotes from the participants. According to Yin (2014), reliability or dependability in case study research increases when the researcher "makes as many steps operational as possible and to conduct research as if someone were always looking over your shoulder" (p. 89). Dependability was ensured in this study using member checking as well as peer debriefing.

As stated in Chapter 3, I used an audit trail to establish confirmability. Using NVivo 10 software, I was able to save the qualitative data analysis. I also exported the NVivo 10 file to Excel in order to have a backup copy of the audit trail. I also utilized peer debriefing in order to review the data and the findings.

Summary

In this chapter, I presented the findings from my data analyses. The data obtained from questionnaires and discussion threads were used to answer the research questions.

In the next chapter, I discuss these findings and how they relate to the existing literature. I also discuss the interpretation of the findings, limitations, recommendations, and implications of the study.

Chapter 5: Discussion, Conclusion, and Recommendations

The purpose of this qualitative case study was to determine participants' perceptions of the benefits and drawbacks of using an online discussion forum to allocate time for reflection and to determine the levels of the teachers' reflections in the forum. In situations, when teacher evaluations include ratings for reflection on practice, but teachers are challenged to find time during the school day for reflection, district and school leaders can support teachers by providing them with time for reflection in an online forum. This study was conducted because asynchronous discussion forums have been used to promote reflection for prospective teachers, but there is not much research about using asynchronous forums to provide practicing teachers with time for reflection. This study, an interpretative case study rooted in constructionism is an attempt to fill that gap. In this chapter, I provide a summary of the findings and interpret the findings with respect to the literature. I also identify the limitations of the study, discuss recommendations for future research and practice, and discuss the potential for social change. constructionism

Summary of the Findings

The findings of the study indicate that an asynchronous discussion forum can be used to allocate time for high levels of reflection. Overall, the teachers reported that the experience reflecting in the online discussion forum was beneficial. Some of the teachers also stated that a similar experience should be offered to other teachers, in order for them to benefit from reflecting online. The themes that emerged from the findings pertaining to the benefits of reflecting online were convenience, sharing, and learning. Despite having

busy schedules and other commitments aside from their full-time jobs as teachers, the teachers in this study engaged in reflection. The levels of reflection were high in this study, and the majority of the participants responded to all of the instructor's posts. Participation among the teachers, however, was minimal as teachers only responded to a small number of the posts written by the other teachers in the forum. In addition, some teachers made statements about being busy and reported that it was hard to find time for reflection, even online reflection. For these reasons, limited participation was identified as a drawback in the study.

As discussed in previous chapters in this study, I used Hatton and Smith's (1995) framework and my summary of van Manen's (1977) framework to code the discussion forum to determine the levels of reflection for the teachers' posts. The majority of posts were coded as critical reflections using both frameworks. The levels and percentages for the levels of reflection achieved in the forum were presented in Chapter 4 and will be discussed in the Levels of Reflection section in this chapter.

Interpretation of the Findings

This section contains my interpretations of the findings that emerged through the data analysis process and a discussion of the findings, including how the findings confirm, disconfirm, and extend existing research about online reflection for practicing teachers. My interpretations of the findings are discussed in relation to the three research questions:

1. What do teacher participants perceive as the benefits and drawbacks of reflecting in an asynchronous discussion online forum?

2. How do teacher participants perceive and describe their reflection experience when time is allocated for reflection online?
3. What are the levels of the teachers' reflections in the asynchronous discussion forum?

Benefits and Drawbacks

The themes identified for Research Question 1 about the participants' perceptions of the benefits of reflecting online were convenience, sharing, and learning, and the drawback was limited participation.

Convenience. Convenience is often mentioned as a benefit when asynchronous discussion forums are used in studies about online learning, and that was also the case in this study about online reflection. The benefit of reflecting online is that teachers can reflect after work when their schedule does not allow time for reflection within the school day. Duncan-Howell (2010) reported similar findings in a study about teachers who participated in an online community. When asked to consider the advantages of participating in an online community as a form of professional development, the teachers who participated in Duncan-Howell's study stated that "the ability to log on and participate according to their own schedule was a clear advantage" (p. 337). Evidenced by the time stamp of some messages in the online forum, many teachers in this study posted their reflections after work. At times, when the participants had a few minutes during the day, they also read and responded to the posts in the online forum.

The teachers in this study mentioned that it was convenient to reflect online, and some stated that the convenience aspect of the forum was what they liked best about the

online reflection experience. The participants in a study about teacher reflection by Ruan and Griffith (2011) also identified convenience as a positive aspect of participating in an asynchronous online discussion forum. The fact that the participants responded at different times of the day and the analysis of the teachers' statements in this study indicated that participants found that it was convenient to reflect online because they could post their reflections after work and even during the day when time permitted.

Sharing. Sharing was also identified as a theme in this study because the online discussion forum provided a platform for the teachers to share knowledge, thoughts, ideas, and challenges with one another. This finding is similar to those of Ruan and Griffith (2011), who reported that knowledge and ideas were shared in the discussion forum in their study. Hew and Hara (2007) and Hur and Brush (2009) also reported that teachers shared knowledge when they participated in online communities. The concept of sharing was noted in their study and the teachers specifically mentioned that sharing was one of the benefits of participating in the online community.

According to Hur and Brush (2009), online communities can be a place for teachers to share knowledge and even emotions. In Hur and Brush's study about teachers in a self-generated online community, the teachers communicated that sharing emotions was one of the reasons why they participated in the community. Hur and Brush explained that teachers might feel more comfortable sharing emotions in self-generated or self-organized communities possibly because they can share honestly when the community involves only teachers. They suggested that when online communities are created by university faculty, teachers might worry that they will be judged or criticized for what

they do not know and therefore may not share openly. Unlike Hur and Brush's study, which involved a community organized by teachers, the teachers in this study were participants in a professional development course created by a district-level resource teacher.

Learning. In this study, there was specific emphasis on readings pertaining to mathematics teaching. The discussion prompts in the course included directions to read specific information, reflect on the information, and then post reflections about what was read. That specific focus led to the sharing of knowledge, and therefore a by-product was learning. As discussed in Chapter 4, a theme that emerged in this study was learning, and that was evidenced in the responses to the questionnaire and in the reflections posted online. Additionally, the statements from Brittany, Hillary, Maria, Molly, and Tremaine indicated that their classroom practices changed because they were learning and engaging in reflection.

Limited participation. Limited participation or limited peer interactions is a common problem or drawback reported in studies about the use of online discussion forums. As was common in other studies, low participation was a drawback for the participants in this study. My findings are consistent with Hammond's (2000) findings. Hammond (2000) reported that the participants in his study were disappointed with the low participation levels. This was also the case in my study, and some participants in this study expressed that they wanted to have more peer interactions. The teachers' participation in this study consisted of providing a reflective response to the discussion prompt. After posting their reflective response for a discussion, many participants read

the posts in the forum, but did not respond to the posts of the other participants. It is possible that because the instructor had a strong presence in the forum, that after questions or comments were addressed by her, the other participants did not see the need to respond. Peer interactions might not be necessary in all cases because researchers have discovered that there is benefit when participants interact with instructors or mentors (Zwozdiak-Myers, 2012)

Time constraints could be another explanation for limited participation. Sometimes participants have time to respond to the discussion question, but do not have time to respond to the comments of the other participants in the forum. In Qian and Tao's (2005) study involving in-service teachers in a graduate course, a teacher explained the dilemma in the following way: "I have not had the opportunity to fully benefit from my classmates' electronic discussions due to a limited amount of time. I only go on the computer to write my response and then sign off" (p. 136). In this study, the totals for the number of responses to the discussion questions were significantly greater than the totals for the number of responses to the other participants. The teachers in this study mentioned being busy or not having enough time; however, no one mentioned why they primarily responded to the discussion question, but not the other posts in the forum.

To gain a better understanding of how to address the issue of no time for reflection using online discussion forum, additional questions could have been posed to the participants in this study. For example, follow-up questions pertaining to the reasons why some participants posted and read postings, but did not respond to postings could have been useful for trying to understand teacher's perspectives in this study.

Understanding the perceptions of teachers could also possibly lead to the design of better online communities or courses with higher teacher participation rates in future studies.

Time for Reflection

Research Question 2: How do teacher participants perceive and describe their reflection experience when time is allocated for reflection online?

Researchers have pointed out that although online means can be used as a platform for online learning or professional development for teachers, participants still report lack of time as a hindrance to participation. For example, the participants in Fusco et al.'s (2000) study about an online community of students, university faculty, school, and district level professionals identified lack of time as the "most significant barrier" to their participation in the online community. Hammond (2000) also reported "lack of time" as a constraint on participation (p. 255) as did Hew and Hara (2007, p. 587).

When hard-working and dedicated teachers are inundated with responsibilities and cannot find time to do all is expected of them, it is crucial that schools eliminate time wasting activities in order for teachers to have time for reflection.

The teachers in this study communicated a willingness to engage in the online experience and made positive comments either about reflection or about online reflection, yet they still reported that time constraints made it difficult for them to participate to greater extent. All seven participants talked about time constraints and either stated that it was difficult to find time to post, or that they could not participate as they wanted because they had other commitments.

Levels of Reflection

Research Question 3: What are the levels of the teachers' reflections in the asynchronous discussion forum?

The participants in this study reflected on teaching and the majority of the posts in the forum were coded at the critical level. A total of 119 messages were posted by the teachers who participated in this study and the instructor in the discussion forum. Of the 119 messages, 74 were posted by the participants. The 74 messages posted by the teachers included original posts by each participant as well as responses to each other. Hatton and Smith's (1995) framework and the summary of van Manen's (1977) framework were used to analyze the content of the 74 messages posted by the teachers in the discussion forum.

Using Hatton and Smith's (1995) framework to code, no post was coded as non-reflective conversations. Instead 4% (3 out of 73) of their posts were descriptive reflections, 38% (28 out of 73) were dialogic reflections, and 58% (42 out of 73) of the posts were critical reflections. Descriptive writing consisted of the description of actions or events, but no justification or reason was provided. Descriptive reflection posts were reflective and included not only a description of action or events, but also a justification of actions or events written in a "reportive or descriptive way." Dialogic reflection involved "stepping back" from the events/actions leading to a different level of mulling about, discourse with self and exploring the experience, events, and actions using qualities of judgements and possible alternatives for explaining and hypothesizing" (Hatton & Smith, 1995, p. 49). Finally, critical reflections included evidence that the

author was aware that historical, socio-political, and/or cultural factors were involved in a particular experience or event (Hatton & Smith, 1995).

Using the summary of van Manen's (1977) framework, one post was coded incomplete, 1% (1 out of 73) was coded a technical rationality post, 41% (30 out of 73) were coded practical action, and 58% (42 out of 73) were coded critical reflections. Posts were coded as a practical action if the post included experience(s) and the explanations or underlying theories behind it. At the practical action, the teacher goes beyond the technical level by considering the underlying theories or rationale for current practice. Critical reflection posts were the contemplation of a problem while specifically looking for the institutional, social, cultural, or political factors that may be contributing to the problem.

Although there are studies about levels of reflection in online discussions, the majority of studies in the literature are about preservice or prospective teachers. Very few studies have been designed to examine the levels of reflection in online discussions for practicing teachers. Myers (2003) studied the levels of reflections preservice and in-service teachers who participated in an online study. High levels of reflection are atypical in many studies about prospective and practicing teachers. However, based on a rating scale of 1 to 7, the levels of reflection for both preservice and in-service teachers in Myers' (2003) study was a 4, 5, or 6. Myers concluded that high levels of reflection could have been attributed to the fact that all participants had prior guided experience reflecting on practice as part of the teacher education program. Many of the teachers in this study had participated in reflection in a previous experience. However, it is not known whether

previous reflection experiences led to high levels of reflection in this study. Because the second focal point of this study was to determine the levels of reflection, I did not seek to determine if specific aspects of the course could lead to high levels of reflection. Future research intended to understand how to design discussion forums that lead to high levels of reflection for practicing teachers would be beneficial.

Rampersad and Herbert (2005) conducted a study about science teachers in an in-service postgraduate program. They examined reflective journals of classroom teachers who were graduate students. Their study was not about online reflection, but they used van Manen (1977) framework to determine levels of reflections in their study. Rampersad and Herbert (2005) reported that the teachers in their study reflected at higher levels. In their study, the ratio used to describe the relationship between the practical, emancipatory or critical, and technical levels of reflection was 4:2:1. The teachers in Rampersad and Herbert's study did not reflect at the technical level as much and the researchers speculated that it could have been because "a lot of the discussion focused more on assumptions and underlying beliefs that guided practice, and on educational theories that informed desirable practices, rather than on technical issues" (p. 19).

Similar to Rampersad and Herbert's study (2005), the teachers in this study also reflected mostly at the practical action and critical reflection levels. Rampersad and Herbert concluded that there were few technical level reflections in their study because the teachers were not novice teachers. Because they were not novice teachers, they might not have been concerned with technical level issues. They also stated as a possibility that the teachers in their study could have been more concerned about things pertaining to

practical or critical level reflections because they no longer had concerns about issues that beginning teachers reflect on at the technical level.

According to Marzano et al. (2012), when teachers reflect at the practical level, they "examine their underlying theories and beliefs about teaching" (p.10). It is possible that the discussion prompts in this study led to reflection at the practical level because in most of the discussion prompts, teachers were asked to reflect upon some educational theory. In 30 of the 74 posts, the teacher included the application of theory to practice into their posts. Those posts were coded as practical action posts.

Limitations of the Study

The primary limitation of this study was the focus on a single case, a professional development course with a concentration on mathematics teachers. This study was limited in time and scope because it was conducted over the course of one school year and the online tool used in this study was asynchronous discussions. Even though this study may lead to understanding of teachers' experiences and perceptions of the benefits and drawbacks of reflecting online and the use of an online discussion forum to provide teachers with time for reflection, the results of this study may not be transferable to another online reflection setting. Additionally, the findings also may not be transferable to a different online discussion forum involving teachers who teach different subjects. Therefore, I provided think descriptions of the data collection and data analysis procedures to allow the reader to determine if the findings could be transfer to their own population or if the study could be replicated in their own setting.

The second limitation to this study is that the teachers were recommended by their principals to participate in the course. Elementary principals were asked to recommend teachers entering their 2nd-year of teaching to participate in the course. Although the results of this study indicate that reflection can be generated in an online discussion forum, the results of this study might be different if teachers were not interested in becoming effective mathematics teacher.

Recommendations for Practice

An online discussion forum for reflection might not be the preferred method to allocate time for reflection in all cases, but it is possible that for a given population of teachers, reflecting online might be beneficial. Teachers are sometimes not enthusiastic about attending professional development sessions during the day. They sometimes find that is difficult to attend professional development when sessions are at locations other than their school. According to (Hunzicker, 2011), many teachers do not feel comfortable leaving their class with a substitute. School districts and educators in schools could use the information presented in this study to design online reflection professional development. They could allocate time for reflection using asynchronous technology and design the discussion prompts to elicit high levels of reflection. They could also facilitate the development of reflection using frameworks such as Hatton and Smith's (1995), van Manen's (1977) framework, or any other framework.

Inexperienced teachers could benefit by reflecting online with other teachers, to receive suggestions from experienced teachers or experts in the field (Blitz, 2013). Experienced or mentor teachers could be invited to participate in the online reflection

professional development experience to support inexperienced teachers or teachers who need to develop the habit of reflection. School leaders or instructors of professional development courses can also design discussion prompts to help teachers focus on reflection that leads to changes in practice. Finally, the online experience could be designed to encourage teachers to improve the quality of mathematics instruction through high levels of reflection.

Recommendations for Further Research

The teachers who participated in this study took part in a blended professional development course. Although the participants found time to post responses to the discussion questions, many did not respond to each other or post follow up comments in the forum. They also expressed concerns about not having enough time due to busy schedules. This study which included both a face-to-face component and online component could also be enhanced to study a greater number of participants or more than one course in order to explore commonalities. Using research to understand teacher preferences and studying online reflections or the format of blended professional courses could lead to more understanding of the ways to foster more time for reflection.

Teachers in this study were asked to consider the following question: Although there are benefits to reflection, many teachers do not make time to reflect. What circumstances and initiatives might create more opportunities for reflective practice (traditional or online)? Teacher's responses to that question could be helpful for future practice. However, more research is still needed. Additional research designed to elicit more in-depth responses from teachers about ways to carve out time for reflection would

be useful for improving online reflection for teachers. Teacher input could lead to understanding of teacher preferences about online reflection and also greater understanding of the best ways to foster more time for reflection when reflection is online. For example, studies could also be used to determine if teachers would reflect at higher levels in the forum if a veteran math resource teacher facilitated the discussions.

Additional studies could be designed to determine if teachers would have more time for reflection, if they were enrolled in a completely online course instead of a blended course. The issue of time limitations for teachers in a blended course is not a new issue. For example, practicing teachers enrolled in a graduate course in Maher and Jacob's (2006) study also mentioned the issue of not having enough time to participate online when they had to attend regular face-to-face meetings as well. Depending on the design of the experience, it is possible that teachers would feel less concerned about limited time for reflection in a completely online experience if they did not have to spend time driving to a location and participating in face-to-face meetings. Because limited participation among teachers is very common in studies about teachers, future studies could be used to determine if teachers would participate more if the experience did not include face-to-face meetings.

Another area for recommended study is the study of levels of reflection and differences in reflection when classroom teachers are asked to read articles or excerpts from a book compared to when they are asked to reflect on a lesson or lessons they taught. Because the levels of reflection in this study were higher than in typical studies, additional studies focused on readings from articles or books are needed to fully

understand if teachers tend to reflect at higher levels when they consider theory while reflecting on practice. It is important to examine the levels of reflection that occur online in future research as well as the perceptions of teachers about the benefits and drawbacks of reflecting online to better understand the phenomena and ensure that reflection experiences are beneficial to teachers.

Implications

As educators and researchers learn about the use of technology for professional development, more research would increase the effectiveness of technology used to improve teaching and learning. The findings of this study indicated that knowledge sharing, learning, and high levels of reflection can occur when teachers participate in an online discussion forum. However, in order for educators to witness the direct impact of these benefits on students, teachers must engage in reflection activities that are geared towards the improvement of practice. Graduate courses or online professional development could be designed to include reflection activities and instructional leaders could consider ways to encourage teachers to participate. For example, teachers could be paid to participate in online reflection activities or they could also receive continued professional development credits as a way to encourage full participation and more experience reflecting on practice.

Positive Social Change

Time spent in critical reflection could help teachers make better decisions about teaching as they collaborate to resolve problems that arise in their classrooms. According to Dinkelman (1999), critical reflection is the: “deliberation about wider social, historical,

political, and cultural contexts of education, and/or deliberation about relationships between educational practice and the construction of a more equitable, justice, and democratic society" (p. 332). The idea is that critically reflective teaching can lead to a better democratic society (Dinkelman, 1999). Because this study was about reflection in an online professional development course, this study contributes to the existing body of literature about online teacher reflection. This study may help the reader to understand teachers' perceptions about the benefits, drawbacks, and use of online reflection to allocate time for reflection and could also lead to understanding about levels of reflections in an online forum. Examining teachers' perceptions of the benefits and drawbacks of online reflection could lead to well-designed asynchronous experiences such that teachers are engaged in high levels of reflection. Well-designed online reflection activities could lead to more discourse about issues such as how to improve mathematics education. Be need for better mathematics education for students in the United States is a long-standing issue, in need of a viable solution. Providing time for reflection can potentially prompt positive social change and improve mathematics education.

Conclusion

The results of this study indicated that there is value in using asynchronous forums to allocate time for high levels of teacher reflection. As technology use continues to gain popularity in K-12 settings, research such as this about online reflection could give educators valuable insight into ways to provide classroom teachers with more opportunities for reflection. Ample research exits about students and preservice teacher

reflection activities; however, more studies are needed to expand upon the results of this study about practicing teachers. Research could be designed to help educators understand more about the issue of time limitations for reflection that was noted in this study. Furthermore, research could also be designed to gain insight from teachers about ways to allocate time for reflection using discussion boards or other asynchronous and synchronous technology. There is much to gain from reflecting on practice; therefore, efforts designed to allocate time for reflection should be studied and improved upon.

In many school districts, teachers are expected to demonstrate the ability to effectively reflect on practice during the observation and evaluation process. Online discussion forums can be accessed 24 hours per day and 7 days per week. Therefore, district or school-based instructional leaders could use online forums to provide teachers with the time or opportunity to become adept at reflection; thereby, creating schools where reflective teaching is the norm. Successfully cultivating learning and reflection in schools could lead to improvements in education. Consequently, any method that can used to increase opportunities for reflection should be considered.

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Appendix A: Permission for Use of Copyrighted Material

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May 23, 2017

Dear Dr. Edwards:

I am a doctoral student currently studying at Walden University. I am in the process of preparing my dissertation for publication. I am seeking permission to include in my publication Figure 2: Applying a Constructivist Model to the Problem of Teacher Change on page 7 and Figure 3: Reflection: The Context for a Cycle of Change on page 10 of your work listed below.

Edwards, T.G. (1994). *A reflective cycle: The evolution of a model of teacher change.* Paper presented at the Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education, Baton Rouge, LA.

The figures will be used in my dissertation that I intend to publish this year.

Please indicate your approval of this request by signing the letter where indicated below and emailing the letter back to me at your convenience. Your signing of this letter will also confirm that you own the copyright to the above-described material.

Sincerely,

Michelle McCabe Trofort

For copyright owner use:

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:

By: (Thomas G. Edwards)

Title: Professor & Assoc. Dean

Date: 30 May 2017

Appendix B: van Manen Levels of Reflection Definition or Descriptors

Table B1

Levels of Reflection Descriptors

Researcher	Descriptors
(McDonald & Songer, 2000, p. 324)	Technical rationality is simply the description of an event (i.e. this is what I did).
	Practical action is a description of an event that includes the practitioner's reasoning behind decisions made during the event (i.e. what I did and why).
	Critical reflection includes a consideration of larger moral or ethical issues that arose [as] part of the events (i.e. how the events were impacted by power relations within or outside the classroom).
(Ballard & McBride, 2010, p. 59)	Technical rationality (TR), consists of responses that deal with the technical application of educational knowledge and basic curriculum principles (e.g., are the students on task?).
	Practical action (PA) occurs when the teacher becomes more concerned with clarifying assumptions and predispositions while assessing the educational consequences (e.g., if and how are goals being met).
	Critical reflection (CR), educators are concerned with the worth of knowledge and social circumstances useful to students apart from the educator's personal bias. One who attains this level asks him/herself questions such as, "What were the lesson strengths, what should be changed, and was the content important to the students?"
(Rampersad & Herbert, 2005, pp. 3-4)	The first level (technical) is concerned with the effective application of skills and technical knowledge in the classroom.
	The second (practical) involves reflection about the assumptions underpinning classroom practice, as well as the purposes and consequences of actions in the classroom.
	The third (critical/theoretical/emancipatory) focuses on the development of emancipatory strategies, and involves the questioning of moral, ethical, and other issues, such as fairness and justice, that relate directly or indirectly to institutional and wider social and political contexts.

(table continues)

Researcher	Descriptors
(Marzano et al., 2012 p. 10)	Technical rationality is the lowest level and is typical of new teachers whose background knowledge about teaching is limited. It involves figuring out how to make it through a lesson or deal with glaring classroom management issues. At this stage, teachers encounter many problems for the first time. Practical action, teachers reflect on the context of their classrooms and examine their underlying theories and beliefs about teaching. A question typical at this stage is, "Why did I do that?" Here, teachers develop "rules of thumb" that will help them handle different types of situations. Critical reflection, teachers look at ethical issues related to education in general. Reflection at this level "involves a constant critique of domination, of institutions, and of repressive forms of authority" (van Manen, 1977, p. 227).

Appendix C: Reflecting Online Questionnaire

Reflecting Online Questionnaire

Gender ☐ Male ☐ Female

Teaching assignment/grade (Check all that apply) ☐ K ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Number of years teaching _____

Degree in mathematics? ☐ Yes ☐ No

Minor in mathematics? ☐ Yes ☐ No

The following questions should be answered based on your experience responding to questions and prompts in the online forum of the course.

1. Have you taken any courses or received any training on reflective practice?

_____

_____

2. What did you like **best** about your experience reflecting online?

_____

_____

3. What did you like **least** about your experience reflecting online?

_____

_____

4. Has your online reflection experiences affected the way you teach mathematics in any way?

_____

_____

Please Turn Over →

5. Traditional reflection activities usually consist of self-reflection or reflecting with colleagues in a face-to-face format. Which means of reflection do you prefer, traditional reflection activities or reflecting online? Please explain.

_____

_____

_____

6. Based on your online reflection experiences so far, please explain how this format could help increase the reflective practice of teachers who are not in the habit of reflecting?

_____

_____

_____

_____

7. Although there are benefits to reflection, many teachers do not make time to reflect. What circumstances and initiatives might create more opportunities for reflective practice (traditional or online)?

_____

_____

_____

_____

8. Please share any other thoughts about reflective practice in general or specifically about your experience reflecting online.

_____

_____

_____

_____

Thanks again for your time and thoughtful responses.

Appendix D: Participant Questionnaire

Thank you for being so willing to participate in this study. In order to understand the process of reflecting online I would like to ask you a few questions about your experiences so far. These questions pertain to reflection in general as well as your experience reflecting in course.

Age:
What grade are you currently assigned to teach?
Did you attend a traditional teacher preparation program or was it online?
Prior to taking the course, have you taken any other online course?
Prior to taking the course, have you taken any other reflection course?
How comfortable are you using technology?
Where did you complete the responses to the discussion topics for this course?
Aside from this course, what other activities were you involved in while enrolled in the course?

Appendix E: Discussion Topics and Prompts

Discussion prompt #1: Manipulative Road Show
After using a new manipulative with your student(s), OR using a manipulative in a new way, please post your reflections.

Discussion prompt #2: Emotions Article (Written in 1955!)
This article was first published in Teaching Mathematics in the Middle School in 1955. It caught my eye because emotions are so connected to learning. When I read it, I was astounded that the main idea had so much relevance to our teaching today. What are your thoughts on this article?

Discussion prompt #3: Geometry Part 1
After reading your assigned article, you will work in your small group to determine the most important aspects of the article. Read your article and discuss important topics with your group. Post your findings on the discussion board. (Each group had a separate thread to respond to and only group members were given access to that particular discussion.)
Group 1 Rectangles article discussion
Group 2 Shape Up article
Group 3 Prisms article

Geometry Part 2: After discussing with their group members they were then asked to participate in the whole group jigsaw discussion.
Jigsaw discussion: Each group will post what they felt was the most important points from their article in this area. Each person should read the other group's summaries and post comments/reflections.

Discussion prompt #4: Thoughts on Special Education.
Nine Ways to Catch Students Up by Marilyn Burns
This article by Marilyn Burns gives nine ways that the author believes will help students who are far behind catch up. After reading the article, post your reflections on the strategies that Ms. Burns offers. Can you apply any to your classroom?

Discussion prompt #5: Learning to Calculate: How the Brain Learns Mathematics
We will be investigating how student learn math by using the book, How the Brain Learns Mathematics. Brain research is fascinating, and this will give us some insights to reflect upon.

"The human brain has serious problems with calculations." What points in this chapter hit home with you? How will you use the information in this chapter in your teaching?

Discussion prompt #6: Having Number Sense: How the Brain Learns Mathematics
Having number sense is a necessary skill in our world. However, as teachers, we see more and more students who "do not have any number sense". Based on your reading, is this true? What "ah-has" about number sense did you discover from reading this chapter? Reflect on the questions posed in the forum description.

Discussion prompt #7: Reviewing the Elements of Learning: How the Brain Learns Mathematics
This chapter discusses the elements of learning --according the brain! It has some very interesting information on memory, learning styles, the use of practice, etc.

Working Memory
"For focus to continue, there must be some change in the way the individual is dealing with the item" (p. 52) How is this reflected in the 5E lesson plan?

Discussion prompt #8: Reviewing the Elements of Learning: How the Brain Learns Mathematics
This chapter discusses the elements of learning --according the brain! It has some very interesting information on memory, learning styles, the use of practice, etc.

Practice
Do you agree with this statement? Why or why not?
" Perfect practice makes perfect"
-Vince Lombardi (p. 62)

Discussion prompt #9: How the Brain Learns Mathematics: Chapters 4 and 5
Chapter 4 is "Teaching Mathematics to the Preschool and Kindergarten Brain" and Chapter 5 is "Teaching Mathematics to the Preadolescent Brain".
Choose ONE of the chapters to read and post your reflections/new learning.

Math and Primary or Preadolescent Brains
What information in the chapter you selected to read impacted your thinking about teaching mathematics? What might you do differently as a result of this information?

Discussion prompt #10: Detection and Correction?
What causes a child to have problems with the learning of mathematics? According to the book, it is a complicated answer as there are several variables that may impact the learning. What ideas from this chapter did you find useful to your situation? What strategies would you like to try?

Appendix F: Demographic Chart of Participants

Table F1

Teacher Participant Demographics

Name (Pseudonym)	Age	Sex	Grade	Teacher Preparation Type	Prior Reflection Coursework or Experience
Maria	24	F	1	Traditional	Yes
Tremaine	23	F	5	Traditional	No
Leah	37	F	3	Satellite	Yes
Monique	27	F	4 and 5	Traditional	Yes
Molly	38	F	4	Traditional	Yes
Mike		M	5		
Brittany	24	F	1	Traditional	Yes
Hillary	25	F	5	Traditional	

Note. No response to a question on the questionnaire is indicated by an empty cell in the table.