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Common Themes Associated with Teacher-Identified Obstacles to Implementing Change in Mathematics Instruction Attributable to Participation in Mathematics Professional Development

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COMMON THEMES ASSOCIATED WITH TEACHER-IDENTIFIED OBSTACLES TO IMPLEMENTING CHANGE IN MATHEMATICS INSTRUCTION ATTRIBUTABLE TO PARTICIPATION IN MATHEMATICS PROFESSIONAL DEVELOPMENT

by

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ABSTRACT

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by

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Utah State University, 2014

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This study had three purposes: first, explore the phenomenon of secondary mathematics teachers' experience in secondary mathematics professional development (MPD); second, determine the existence of positive changes in teacher attitudes after completing secondary MPD; and third, if a positive change in teacher attitude existed, describe the contents of the shared experiences in secondary MPD to make explicit their structure and meaning that cannot be revealed through ordinary observations. It was the intent of this study to identify positive changes in teacher attitudes, not to measure their magnitude. This study implemented a mixed-methods design using descriptive statistics and categorical analysis on data from pre- and postsurveys to determine the existence of positive change in teacher attitudes and phenomenological data analysis from in-depth interviews of participants of a MPD experience.

The study had two research questions. The first research question was, "Can teachers with initially poor attitudes about MPD gain positive attitudes in one or more of the four areas of MPD through mandated participation in MPD?" The second was, "If a change in teacher attitude is identified, can phenomena associated with that change be categorized within one or more of the four areas of MPD?"

Three instruments were used: electronic versions of the Local Systematic Change Through Teacher Enhancement Mathematics 6-12 Survey referred to as Survey 1 and a self-report survey referred to as Survey 2, and multiple in-depth interviews of select participants of a common MPD.

Analysis of data from Survey 1 identified eight participants as possible candidates to participate in the interview process of which six were supported by data from Survey 2. Four of six possible candidates accepted an invitation to participate in two in-depth interviews each. There was evidence that teachers with initially poor attitudes about MPD can gain positive attitudes in one or more of the four domains of MPD through mandated participation in MPD. However, the answer to the second research question remained unanswered as results from data analysis were inconclusive. Three recurring themes surfaced from the interviews: (a) the need for explicit learning targets, (b) need for professional treatment of participants, and (c) obstacles to the four domains of MPD.

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DEDICATION

I dedicate this work to my friends and family who have sustained me throughout this experience. I am greatly appreciative for your understanding and encouragement. I thank both my parents and my wife's parents for their belief in me and for their examples. I appreciate the patience and love from my children, Dennis, Auralea, Becca, Ashley, and Kohl. I give special thanks to my dear wife, Debbie. I could not succeed without her loving support. She is the reason for the faith that continued to lift me up and allowed me to press forward.

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CHAPTER 1

INTRODUCTION

Public pressure to improve student achievement in mathematics and science has increased consistently due to historical elements such as the launching of Sputnik by the Soviet Union in 1958, the publishing of *A Nation at Risk: The Imperative for Educational Reform* in 1983, and the Final Report of the National Mathematics Advisory Panel in 2008. A study by Carpenter, Fennema, Peterson, Chiang, and Loef (1989) demonstrated professional development (PD) could improve student achievement. PD continues to be employed as one avenue to address concerns about low performance of American students compared to other students from around the world. A key measure of successful PD is the implementation of presented strategies, skills and concepts by the participating teachers (Higgins & Parsons, 2009).

Effective mathematics professional development (MPD) addresses student learning by design; is driven by an understood definition of effective classroom teaching and learning; supports teachers' efforts to develop their expertise; is research based; engages teachers in instructional approaches that will be used in the classroom; provides collaboration opportunities; and is continuously improved through evaluation processes (Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2009). MPD focuses on four areas of emphasis that can be associated with student success in mathematics education: (a) teacher knowledge (Ball, Thames, & Phelps, 2008) (b) sociomathematical norms or the learning environment (Gill & Boote, 2012) (c) use of proper tiered-instruction including response to intervention (Burns, Deno, & Jimerson, 2007), and (d) understanding student

readiness to learn (Borko, 2004).

For those whose participation is the result of a mandate, the implementation of presented strategies within these four areas might occur only if there is a change in attitude related to the value associated with the implementation of the presented strategies. Teachers need to be convinced that presented strategies and concepts are of value to increasing student performance.

The purpose of this study was to explore phenomena associated with changes in teachers' attitudes that can be attributed to participation in MPD. Throughout this document, the abbreviation PD is used when concepts are associated with general professional development as opposed to those that speak specifically to mathematics professional development (MPD).

Background of the Problem

With the vast implementation of MPD for mathematics teachers, multiple studies have been conducted to define elements of effective PD. The current research does not address why some teachers implement MPD strategies and others do not. This study addressed this question. A key measure of success for any PD is based on teacher implementation of the presented strategies in their classroom. Ultimately successful MPD improves student achievement (Kazemi & Hubbard, 2008). Kao, Wu, and Tsai (2011) proposed that teachers' improvement of classroom practice is crucially dependent upon MPD and teachers' attitudes toward that MPD.

Other educational leaders and researchers indicated that successful MPD is based

on teacher self-efficacy, beliefs and attitudes (Banilower, Heck, & Weiss, 2007; Beswick, 2012; Ince, Goodway, & Ward, 2006; Kao et al., 2011; Kuchey, Morrison, & Geer, 2009). Lee (2007) believed that effective teachers know and understand mathematics content as well as pedagogical strategies. Beswick (2012) proposed pressing more attention to teacher-constructed attitudes about the nature of mathematics as a cumulative experience of formal learning as well as from their experience in the teaching profession.

Kao and colleagues (2011) suggested that teacher motivation influences learning, performance and implementation. Teachers with higher self-efficacy tended to have stronger, more about positive attitudes about possible consequences associated with MPD training (Kao et al., 2011). Buczynski and Hansen (2010) identified limited resources, time constraints, mandated curriculum pacing, language learning and classroom management issues as barriers that keep teachers from implementing MPD strategies in their classrooms. Kazemi and Hubbard (2008) argued the existence and need for understanding the multidirectional influences between teachers' participation in MPD and classroom implementation. They suggested the unidirectional approach of looking at the extent of MPD participation influence on classroom practice is not sufficient. They argued for a need to understand the multidirectional influences between PD participation and their classroom practices by examining the relationship between settings over time rather than just assuming evidence of learning being the evidence of implementation. This relationship between contexts over time is necessary to understand why some teachers change their practices and others do not. In order to understand this relationship better, it would be beneficial to identify any phenomena associated with these changes.

Problem Statement

Wayne, Yoon, Zhu, Cronen, and Garet (2008) identified that existing studies did not provide clear guidance to direct PD investments even though many studies had defined successful PD. There is a need to understand teacher attitudes associated with secondary MPD in order to more fully provide guidance for PD implementation. Teachers' positive attitudes towards MPD are intrinsically motivated to participate and are already more likely to change classroom practices (Kao et al., 2011). A teacher possessing a poor attitude concerning MPD will likely be less motivated to fully participate in secondary MPD and is less likely to implement instructional strategies in the classroom. Furthermore, secondary MPD targeting teacher content knowledge is less likely to be attained by participants with poor attitudes (Kazemi & Hubbard, 2008). While some researchers (Beswick, 2012; Desimone, Smith, & Phillips, 2007, Marra et al., 2011) found an association between the intersection of education policy and teachers' participation in PD and the importance of teachers' attitudes, little has been presented on the phenomena that changes teachers' attitudes and belief structures of mathematics instruction.

Significance of the Problem

Effective PD can benefit teachers who have a desire to improve classroom instruction (Hattie, 2008), but even if all elements of effective MPD can be identified, these elements cannot improve student achievement if a teacher does not implement them. However, some unmotivated participants with poor attitudes about MPD experience a

change in their mathematics instruction after participating in MPD. What is it that causes these initial poor attitudes to change? If the phenomena associated with such changes in attitudes can be identified, it is hoped they could be incorporated in MPD planning in order to increase successful participation in MPD. Creating opportunities for such phenomena to exist could then create greater opportunities for positive changes in classroom instruction and improved student achievement in mathematics.

Definition of Terms

The following terms are defined for this study.

Attitude is the term that will be used to condense the terms belief, conception, motivation, perception and perspective frequently associated with literature about PD.

Mathematics Professional Development (MPD) is professional development specifically designed for mathematics instruction.

Motivation is an important factor in the role of learning and classroom performance and includes beliefs and perspectives that generate action (Coleman, Galaczi, & Astruc, 2007).

Professional Development (PD) refers to general professional development that could be used for multiple content areas.

Successful mathematics professional development is characterized by changes in classroom instructional practices (Loucks-Horsley et al., 2009).

Teacher knowledge includes both content knowledge and pedagogical knowledge (Thames & Ball, 2010).

Transformative professional development is successful professional development because it leads to changes in instructional practices in the classroom **(**Loucks-Horsley et al., 2009)

Utah Core Standards for Mathematics. Utah first adopted the Common Core State Standards for Mathematics (CCSSM) in the summer of 2011. However, due to public pressure against the CCSSM, the state of Utah adopted its own version of the CCSSM with a new name, "*Utah State Standards for Mathematics*" referred in this document as The Utah Core Standards for Mathematics.

Purpose of the Study

This study addressed the minimally existent research on the phenomena associated with changing teachers' attitudes concerning mathematics instruction. There were three purposes for the study.

1. Explore any phenomena associated with secondary mathematics teachers' experience in mandatory and voluntary secondary MPD.
2. Determine if there is any change in teacher attitudes after completing secondary MPD.
3. Determine if there is a composite description that describes the essence of changing attitudes in secondary MPD.

Research Questions

To identify and explain phenomena associated with changes in teacher attitudes,

this study implemented a mixed methods design with emphasis on categorical analysis of pre- and postsurvey results from quantitative analysis and the use of phenomenology tools of in-depth multiple interviews from qualitative research. The study had two research questions. The first research question was, “Can teachers with initially poor attitudes about MPD gain positive attitudes in one or more of the four areas of MPD through mandated participation in MPD?” The second research question of the study was, “If a change in teacher attitude is identified, can phenomenon associated with that change be categorized within one or more of the four areas of MPD?”

The quantitative analysis attempted to identify the existence of any positive changes in teacher attitudes about mathematics instruction among participants of an MPD opportunity and the qualitative analysis sought out the phenomena associated with any changes. It is not the intention of this study to measure these changes beyond the identification of their existence.

Assumptions, Delimitations, and Limitations

In reviewing the assumptions, delimitations, and limitations associated with this study, it is important to begin with a disclosure about the relationship between the investigator and the instructor of the MPD connected to this study. The student investigator of this study participated in the planning of the MPD and serve as one of the four daily instructors of the training during each of the four days of the MPD. All participants experienced the same training at the same time during each of the four instructional episodes of each day of the MPD. The changes in instruction only included

the change of instructor for each of the episodes.

Three of the eight districts that participated in the MPD mandated some of their teachers to participate. A small pool of teachers participated in the MPD only because they were mandated to do so. Some teachers who were mandated to participate wanted to receive training, but would not have participated without the mandate for various reasons such as a dislike of missing instructional time with their students. A small pool of teachers came to the MPD with poor attitudes and demonstrated little or no motivation to implement the strategies being presented in the MPD. Because one of the purposes of this study was to explore phenomena associated with any change in teacher attitudes among teachers who participate in a MPD experience whose participation was not prompted by a desire for self-improvement, it was not necessary to measure the amount of change experienced by these participants, rather it was sufficient to just identify the existence of any positive change experienced by any of these participants.

I assumed and it was confirmed that from a MPD opportunity with 60 participants from eight districts there would be some teachers that had a less than positive attitude about the MPD at the beginning of the training. I also assumed and confirmed that after four days of instruction geared toward the four areas of focus centered on curriculum new to the state, a few of these teachers would demonstrate some positive change in attitude. The identification of participants who experienced a positive change in attitude created a pool of possible participants to interview in an attempt to determine if there is a composite description that describes the essence of the change associated with the secondary MPD.

This study was not concerned with selection bias because of the strength associated with purposeful sampling in meeting the intent of research question two of the study. Patton (2001) identified the power of purposeful sampling as finding information-rich cases to illuminate the issues being studied which is the basis for the decision to use purposeful sampling for the observational component of this study.

CHAPTER II

LITERATURE REVIEW

Current literature addresses the role of effective MPD, the definition of effective PD, methods for measuring successful MPD, the role of state and local policy in PD, how teacher motivation affects participation in PD, four focus areas for MPD, and teacher motivation as a necessary link for classroom implementation of MPD strategies. A review of the literature shows a lack of research on changes in participant attitudes and the phenomena associated with those changes this study intends to address.

Conceptual Framework

There is a large resource of literature supporting the need for MPD intended to change teachers' classroom practice (Abell & Lee, 2008; Renninger, Cai, Lewis, Adams, & Ernst, 2011; Sample McMeeking, Orsi, & Cobb, 2012). This is due in part to the sense of urgency in addressing student achievement in mathematics and science after the publication of *A Nation at Risk* by the National Commission on Excellence in Education (1983). A sense of greater urgency in making these changes was felt in the United States due to the 1999 Trends in International Mathematics and Science Study (TIMSS). This study indicated that U.S. students in eighth grade performed significantly lower in mathematics proficiency than their counterparts in other nations. The public outcry against failing public education has continued and professional educators turned to MPD as one source to address the problem.

Ostermeier, Prenzel, and Duit (2010) explained how the TIMSS prompted

Germany to reevaluate their mathematics instruction. Germany is similar to the United States in the fact that there are separate federal states that control the education of the country. There is no central curriculum. Germany's poor showing in the TIMSS caused the country to design a project called SINUS (an abbreviation for the German phrase "Increasing Efficiency in Mathematics and Science Education") to improve the quality of mathematics and science education through a cooperative effort between the German federal government and the individual federal states. Through their research, Ostermeier and colleagues argued that learning related to daily pedagogical challenges in the classroom should be central to initiatives for MPD because of students' interests and motivation. It is through these pedagogical challenges that they witnessed teacher motivation to instigate change in their classroom instruction.

The natural reaction, in both the United States and in Germany has been the implementation of MPD with the intent to change classroom instruction in the hopes that this will improve student-learning outcomes. Bahr, Monroe, Balzotti, and Eggett (2009) found positive effects upon teachers and their students through the use of MPD involving cooperatively studied and applied reform pedagogy. The natural question that arises is: What constitutes MPD that promotes teacher motivation for change?

A review of current literature presents four areas of emphasis for MPD that can be associated with student success in mathematics education. They are: teacher knowledge, sociomathematical norms and the learning environment, use of proper tiered- instruction, and understanding student readiness to learn (Bausmith & Barry, 2011; Boerst, Sleep, Ball, & Bass, 2011; Campbell, 2009; Compton et al., 2012; Fennema, Carpenter, &

Franke, 1996). In order to address student needs MPD must generate change practices within any of these four areas. Teachers need to be motivated to a point where change in classroom instruction can occur. It is motivation that binds teachers' actions to new processes or ways of thinking (Beswick, 2012). The role of MPD and the four areas of emphasis can be viewed in the conceptual framework seen in Figure 1.

Some teachers attend MPD intrinsically motivated to accept instruction that will change their classroom instructional practices or to gain content knowledge. Others attend MPD because their participation is mandated, the have a need to attend because of relicensing requirements or they are seeking movement along a salary schedule. When working with teachers mandated to participate in the MPD, it is the responsibility of

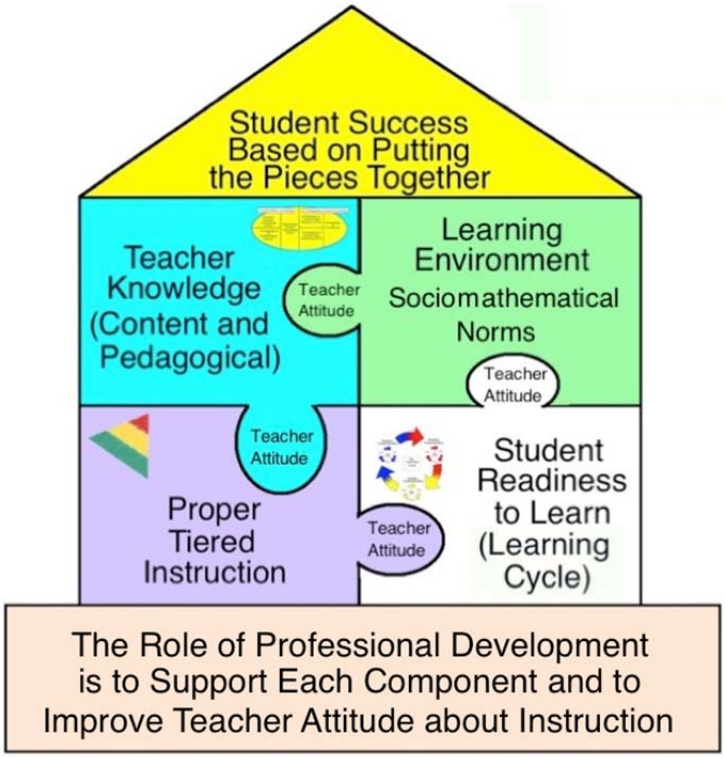

Figure 1. Conceptual framework of teacher attitude and mathematics professional development (MPD).

those presenting MPD to generate motivation for changes in classroom instruction or for obtaining content knowledge. This process is facilitated when teachers can see real value in what is being presented within any one of the four areas. It is anticipated that an awareness of phenomena associated with interest within these areas could facilitate desired changes in teachers' beliefs or perceptions of mathematics instruction. To help clarify this facilitation, professional developers could concentrate on one of four areas of focus represented as the puzzle pieces in the conceptual framework in Figure 1. As seen in the framework, teacher motivation in any one of these areas of focus can be used to link to other areas of focus and increase possible motivation from one area to another. This study sought out changes in participant beliefs or perceptions within these four focus areas of MPD.

Defining Successful Professional Development

Loucks-Horsley and colleagues (2009) referred to this type of PD as transformative and identified five strategies associated with transformative learning experiences. The first strategy is to provide immersion opportunities that allow mathematics and science teachers to gain experience by working with a scientist or mathematician. This strategy addresses the focus area of teacher knowledge. The second strategy is to provide opportunities for teachers to refine curriculum and instructional materials to be used in their classrooms. This strategy speaks to the focus area of proper tiered- instruction. The third strategy associated with transformative PD provides curriculum development opportunities that require teachers to examine student needs and

then create materials to meet those needs referencing the MPD focus area of student readiness to learn. The fourth strategy using examinations of episodes of real classroom instructional practices and the fifth strategy incorporating collaborative work with colleagues and peer coaches or mentors direct efforts towards the PD focus area of sociomathematical norms and the classroom environment.

All four focus areas of MPD are found in the attempt to define effective PD and is found in, *Designing Professional Development for teachers of science and mathematics* (Loucks-Horsley et al., 2009). Their definition of effective PD includes experiences specifically designed to address the needs of students and their learning goals; training that is guided by effective classroom learning and teaching; opportunities for teachers to build their content and pedagogical content knowledge; activities that help teachers with critical self-reflection of their classroom practice; research based teacher instruction; engagement of teachers as adult learners; is a naturally collaborative learning community; is able to provide links to other parts of education; and is continually evaluated for positive impact on classroom effectiveness.

In addition to the four focus areas of MPD, other educational leaders and researchers indicated that successful PD is based on teacher self-efficacy, beliefs and attitudes (Banilower et al., 2007; Beswick, 2012; Ince et al., 2006; Kao et al., 2011; Kuchey et al., 2009). Lee (2007) believed that effective teachers know and understand mathematics content as well as pedagogical strategies. The similarity between the construction of teacher attitudes and teacher knowledge justifies enhanced attention to the construction of teachers' attitudes about the nature of mathematics as both a cumulative

experience of formal learning and as a result from years of involvement as a practicing teacher (Beswick, 2012).

Merrill, Devine, Brown, and Brown (2010) found that some teachers entered PD activities expressing a belief that they would get nothing out of the experience. Their attitudes were grounded in the perceptions that they lacked time to implement the strategies as well as having a lack of background knowledge. And yet, teachers have expressed a rise in self-efficacy through other factors of effective PD including social trust. Fisler and Firestone (2006) suggested that social trust and teacher efficacy related to teacher learning outcomes when participating in PD although these changes made by individual teachers were not seen as being part of a systemic school-wide change.

Zambo and Zambo (2008) found a high association between individual efficacy and teacher attitude that positively affected student achievement. They found teachers who possessed a strong sense of self-efficacy tended to spend more time planning, designing and organizing their instructional material. These teachers were found to possess attitudes more open to new ideas and demonstrated a willingness to try new strategies and even persist through changes where setbacks occurred. Unfortunately, these teachers also continued to believe that there were students they would not be able to affect. These PD opportunities increased participating teachers' beliefs regarding their actions on student learning, but the increase was not significant.

Kuchey and colleagues (2009) posited that PD programs had to carefully consider organizational elements such as policies, available resources, support from leadership and colleagues, and a safe environment for experimentation in order to maximize success.

Banilower and colleagues (2007) found a fairly weak linear relationship between PD and attitudes toward standards-based instruction. The effect on attitudes toward standards-based teaching was very small, but there was a positive relationship between the number of hours of participation in PD and the frequency of implementation. Most of the increase occurred in the first 80 hours of PD, with a subsequent increase after about 160 hours, but more significant was the perception teachers had concerning support from their principal.

Obara and Sloan (2010) believed that successful onsite PD requires that problems are identified and then addressed through teacher-driven sessions allowing for teachers to gain a sense of ownership. Another view of successful PD encourages children's thinking as the focus for interactions in PD (Jacobs, Franke, Carpenter, Levi, & Battey, 2007). They viewed the focus on student thinking as more than noticing student actions during problem solving activities. They included the linking of student approaches with problem solving and with important mathematical ideas and relationships between these ideas.

Kennedy (1998) suggested that successful PD requires evidence of student learning and organized successful PD into four groups: (a) PD that prescribes a set of teaching behaviors that can be applied generally to all school subjects; (b) PD that prescribes generic teaching behaviors for a single school subject; (c) those that give general guidance on curriculum and pedagogy for a single subject with references to how students learn; and (d) those that deal with how students learn a particular subject without giving specific guidance on instructional practices for that subject. Kennedy also stated that differences in the topics presented to teachers were more influential than differences in the formats or structures of the PD programs. In their research, Huffman, Thomas, and

Lawrenz (2003) found that only curriculum development for mathematics teachers was significantly related to student achievement although they conceded that research on the impact of PD on student achievement is limited due to the difficulty, expense, and complexity associated with the link between student achievement and PD.

Desimone and colleagues (2007) identified four activities associated with successful PD. The first activity is to focus on the content of subject matter and how students learn that content. This first activity speaks three of the four focus areas of MPD, student readiness to learn, teacher content knowledge and proper tiered instruction. The remaining three suggested activities do not deal with content as much as they speak to the formal management of the PD. The second activity is to make sure the PD is ongoing and sustained; a one-time fix is not sufficient to qualify for effective PD. The third activity of successful PD is the affirmation of consistency with other activities; teachers do not fare well with conflicting efforts or instructional patterns. The final activity of successful PD is providing opportunities to engage and interact with other teachers concerning curriculum and instruction. Interestingly, Cohen and Hill (2001) identified the California Mathematics Project (CMP) as having the four activities that Desimone and colleagues associated with successful PD projects, but they found no correlation between the topic specific PD activities and student achievement.

Above all, in order for PD to be successful, it was generally agreed that it must lead to a positive change in classroom instruction. Teachers must implement the instruction and strategies they have received in PD and the occurrence of active learning opportunities increase the effect of PD on teachers' instruction (Desimone, Porter, Garet,

Yoon, & Birman, 2002). Banilower and colleagues (2007) found that teachers were much more likely to implement a set of instructional materials if they received training in the use of those materials. Higgins and Parsons (2009) equated the focus on instructional practice to increased teachers' use of those practices in the classroom.

A review of the literature concerning successful PD supports an emphasis on the four areas of focus for MPD as well as the important role of teacher attitudes in bringing about change in instructional practices. However, there is limited literature tying the focus areas of MPD and the cause of changes in teacher attitudes necessary for implementation of MPD content.

Methods for Measuring Successful Professional Development

There have been almost as many ways to measure successful PD as there are definitions of PD. Kramarski and Revach (2009) evaluated teachers participating in a self-regulated learning experience through pre- and posttest comparisons; interviews with participating teachers; and evaluation of videotaped lessons. They also measured student achievement with assessments from the Program for International Student Assessment (PISA) although there was no attempt at connecting student achievement with changes in classroom practice.

Cormas and Barufaldi (2011) measured success with priori and emergent content analyses including rigorous inter- and intrareliability testing. Priori characteristics included items such as, "treats fellows as professionals" and emergent characteristics such as, "has real world application." Marra and colleagues (2011) used data from their

state's Improving Teacher Quality Grants (ITQG) program as well as pre- and postsurveys of participants' perceptions of content knowledge; any perceived changes in their teaching practice; and participation confidence in their content knowledge. They believed that project orientations to MPD could be used to assess the effectiveness of MPD projects based on key design features and their implementation.

In addition to the use of pre- and postsurveys for measuring MPD success, (Renninger et al., 2011) used log files to measure participation rates and workshop artifacts or assessment but found that these were less effective to gauge participant motivation and consequent learning. They also used follow-up interviews. The pre- and posttests used Likert ratings and factor analysis to aggregate responses. Anderson and Hoffmeister (2007) used pre- and posttests as well as an open-ended survey to indicate whether or not teachers held a desire to approach mathematics instruction differently after participating in MPD. Roschelle and colleagues (2010) created their own assessments to measure student gains made across a variety of categories as well as teacher self-reflection tools. Santagata (2009) used videotapes of sixth-grade mathematics lessons and self-evaluation measures completed by teachers as well as field notes, and teacher reflections after instructional episodes. Walker and colleagues (2012) used pre- and postsurveys of student responses instead of surveys of teachers.

A review of the literature did not reveal a predominant method for evaluating the success of MPD projects. However, pre- and postsurveys did occur more often than other methods, but rarely did they stand-alone as a single measure of success. The prominence of pre- and postsurveys and the availability of predesigned surveys intended to measure

teacher attitudes associated with mathematics instruction was the reason for their selection in this study.

The Role of State and Local Policy in Professional Development

Getting teachers to participate in PD involves inherent difficulties and obstacles; one of those is the attitude associated with participation. Mandated participation can fill the seats of MPD opportunities but at a cost of negative attitudes towards the MPD. Phillips, Desimone, and Smith (2011) sought to discover which types of policies are more or less influential in moving teachers to participate in PD that has proven to be effective in improving both teaching and learning.

Phillips and colleagues (2011) found that alignment between state standards and assessment was an essential attribute for state-level policies that would tend to promote teacher participation in high-stakes subject areas such as mathematics. They also listed policies that encourage consistency in the alignment between standards and assessment as possibly the most important type of policy that could be adopted by states to encourage teacher participation in effective PD.

In their final report of the Chicago Teacher Advancement Program (TAP), Glazerman and Seifullah (2012) found that even though each participating teacher received an average stipend of about $1,100, there was no evidence of the program's impact on teacher attitudes or climate. The report further stated there was no overall detectable impact on student scores in mathematics, reading, or science. This seems to indicate that simple financial gain is not sufficient to change teacher attitudes or for real

impact on teacher instruction to occur.

How Teacher's Attitudes Affect Participation in Professional Development

Heck, Banilower, Weiss, and Rosenberg (2008) conducted a 7-year study of 48 National Science Foundation's (NSF) Local Systemic Change Through Enhancement Initiative (LSC) projects. This initiative included several features found in the definition of successful or "high quality" MPD suggested by Loucks-Horsley and colleagues. (2009). Results of the study provided evidence of a positive impact on teacher-reported attitudes toward standards-based teaching, teacher preparedness for standards-based teaching, and teacher practice of standards-based teaching. Corson (1999) stated that teachers' attitudes shape their choices of PD and subsequently their efforts to implement changes associated with PD. Lumpe, Haney, and Czerniak (2000) further stated that the beliefs and attitudes teachers bring to PD experiences will affect how PD strategies will be implemented and these attitudes appear to be stable and sometimes resistant to change. Teacher attitudes can be one of the best indicators of decision making (Bandura, 1993). Hersh (1998) identified the importance of teachers' perceptions by stating: "One's conception of what mathematics is affects one's conception of how it should be presented. One's manner of presenting it is an indication of what one believes to be most essential in it" (p. 13).

Kazemi and Hubbard (2008) found that participants with poor attitudes towards changes in mathematics instruction are less likely to exhibit changes in classroom instruction. Guskey (1986) warned against PD developers' ignoring the process of

teacher change even though the PD is designed with activities intended to initiate change in teachers' beliefs and attitudes. This is however based on the presumption that participating teachers are seeking the change in the first place. Such teachers who are mandated to participate in MPD would then bring little motivation to implement instructional strategies presented in the MPD.

Guskey (1986) posited that teachers' attitudes are derived from their classroom experience and that teachers who have consistently experienced success with their students may own beliefs and attitudes that reject the need for change. Beswick (2012) recognized that teachers own different attitudes about mathematics instruction and suggested this can explain some of the inconsistencies of implementation of classroom instructional practices. A more important point is that MPD sometimes misses the element of teachers' views of mathematics instruction and lacks the ability to address conflicts between belief structures and MPD (Beswick, 2012).

Noting the lack of impact on teacher attitudes, school climate, and student scores, Glazerman and Seifullah (2012) showed that financial compensation is not enough to change motivation to participate in effective PD. In fact, research shows that a participant's goals, interest, and level of prior mathematics courses were more predictive of teacher participation in effective PD (Renninger et al., 2011).

Four Focus Areas for Mathematics Professional Development

Cormas and Barufaldi (2011) suggested the problem with PD programs is that many PD models were based on anecdotal ideas; shallow understanding of student and

teacher learning of mathematics; poor use of evaluation tools; and too often, the models had unclear goals. One suggestion for MPD leaders is to use dependable, research-based texts such as *Designing Professional Development for Science and Mathematics Teachers* by Loucks-Horsely and colleagues (2009).

A review of the literature concerning MPD suggested four important areas that should be addressed. These four areas are the puzzle pieces found in the conceptual framework in Figure 1. A first area that should be explored through MPD is teacher knowledge and should include both the content knowledge and pedagogical knowledge (Thames & Ball, 2010). A second area is the sociomathematical norms or learning environment that allows student discourse (Ball, 1991; Ball & Cohen, 1996). A primary responsibility for any teacher is to protect the learning environment for all students through sociomathematical norms. A third area for consideration in MPD is a proper implementation of the three-tiered model of instruction also known as a model for Response to Intervention (RtI; Campbell, 2009). The proper implementation of instruction includes the appropriate use of student assessment required to guide the instruction. A final area that should be addressed in MPD is student readiness to learn as explained in the Comprehensive Mathematics Instruction (CMI) Framework.

Teacher Content and Pedagogical Knowledge

Teacher mathematical knowledge includes both content knowledge and pedagogical knowledge (Ball et al., 2008, Shulman, 1986). As seen in Figure 2, teacher knowledge focuses on both pedagogical and content knowledge as described by the

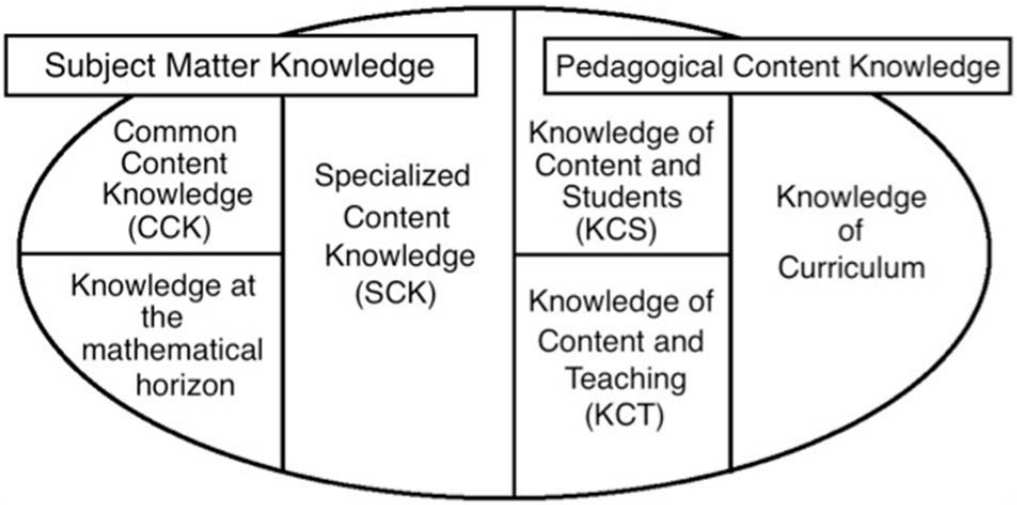

Figure 2. Comparison of Shulman's original category scheme of 1986 and Ball and colleagues' map of domain of content and pedagogical knowledge.

comparison of Shulman's (1986) original category scheme and the map of domains of context and pedagogy offered by Ball and colleagues (2008).

Although Harris, Stevens, and Higgins (2011) did not attempt to design MPD course materials in any direct alignment with Mathematical Knowledge for Teaching (MKT), they did measure MKT outcomes using scales developed by the University of Michigan for number and operations, algebra, and geometry. These assessments focused on mathematical skill rather than the act of teaching. They were able to measure the influence of mathematical content knowledge through paired *t* tests with the assumption that additional knowledge would increase classroom implementation of the strategies from the MPD in classrooms. They were motivated by their attitude concerning the necessity for middle school mathematics teachers to have a deep conceptual understanding of the mathematics they are teaching. Harris and colleagues (2011)

believed that much of the Pedagogical Content Knowledge (PCK) that teachers bring to the classroom consists of practical knowledge such as student learning, student development, and classroom management. They suggest that PD focusing on MKT and PCK should not be limited to a simple 1-day episode limited by time and content because the development of mathematics knowledge for teaching is a process requiring intense study over longer periods of time.

Hill and Ball (2004) suggest a lack of research on whether or when teachers develop mathematical knowledge for teaching. Previous research did not identify the features of MPD that contribute to MKT. Their research attempted to address perceived holes in teacher MKT. The results of their research suggested that teachers who participate in MPD targeting MKT and PCK improved their performance on assessment tools. Another finding was the impact time and program length had on the development of MKT and PCK.

For Singer, Lotter, Feller, and Gates (2011), pedagogical changes included questioning strategies that allow students to participate in open discussion and debate as well as extended processes of inquiry including authentic activities. Anderson and Hoffmeister (2007) offered a mathematics content course to middle school teachers with the intent of increasing their mathematical content knowledge. However, the course was not a typical mathematics course; the change in design reflected their agreement with Hill and Ball (2004) that the teachers' learning experience should be imbedded in order to help teachers make changes in their classroom instruction. They suggested that teachers develop a greater understanding of content through participation in the type of inquiry

that should be implemented in their own classrooms. The imbedding of teacher learning experiences required that teachers not only look at problem solving strategies, but also focus on student thinking. Patel, Franco, Miura, and Boyd (2012) also focused on student thought process but also looked at the curriculum materials of Connected Mathematics being used by middle school teachers. They found that teachers who engaged in the curriculum materials through the use of new pedagogy increased their understanding of mathematics content as well as gaining a familiarity with the curriculum.

Harris and colleagues (2011) stated that MKT contains specialized content knowledge that would be more theoretical and conceptual than traditional procedural knowledge. They identified the ability to identify and rectify students' misconceptions of mathematics as well as students' non-traditional approaches to problem solving in mathematics is part of MKT. Helping teachers analyze and understand student thinking could be a motivating factor for participating in MPD.

While there is ample research addressing the importance of teacher knowledge, there currently exists no link between teacher knowledge and teacher attitude towards mathematics instruction. There is also a lack of an established connection between teacher attitude towards teacher knowledge and implementation of MPD strategies addressing teacher knowledge.

The Learning Environment and Sociomathematical Norms

The notion of sociomathematical norms advanced by Yackel and Cobb (1996) consists of the normative aspects of mathematical discussion specifically tied to student

activity with mathematics. According to Yackel and Cobb, sociomathematical norms had two roles; they regulate argumentation and they influence students' and teachers' opportunities to learn. Through participation within sociomathematical norms, students develop a disposition for mathematics as well as an intellectual autonomy in mathematics. MPD should focus on the process that teachers use to initiate and then guide classroom discussions. The process must include sustainability of classroom micro-cultures that allow students to explain, justify, and argue about mathematics without hindering fellow students.

Singer and colleagues (2011) extended the research on pedagogical and content knowledge by making a connection between pedagogical changes with the use of strategies obtained in PD based on a situated learning environment. Other aspects of learning environment include the use of discourse in the classroom and protecting the learning environment. Students need to feel safe in participating in the classroom activities especially when the activities involve sharing of ideas and explanations of student thinking.

A protected environment does not mean that there does not exist some sort of challenge for the students. According to Lee (2007) effective teaching requires a learning environment that is challenging but also supportive. This type of learning environment must seek continual improvement. Using the knowledge gained in PD opportunities is viewed by Lee as

> ...building a powerful learning environment for mathematics, which includes respecting diversity and being inclusive, valuing authenticity, implementing an integrated curriculum, building dialogue, constructing active, meaningful, and connected knowledge, understanding students, encouraging involvement in

learning cooperation, and believing in empowerment. (p. 140)

These characteristics of student empowerment are necessary for a productive learning environment. Reinhart (2000) recognized a positive impact on his learning when he explained mathematics concepts in front of the class. He came to realize that his students needed to have that opportunity to explain their mathematical thinking if they were ever going to have the same learning benefits. To create this learning environment where students had opportunities to explain and demonstrate understanding he incorporated five rules: (a) never say anything a kid can say (b) ask good questions (c) use more process questions than product questions (d) replace lectures with sets of questions, and (e) be patient, allow time between asking the question and calling for an answer.

Levenson, Tirosh, and Tsamir (2006) indicated that there are both student expectations and teacher expectations associated with an environment that supports student discourse. Students have an expectation of the type of explanation given by the teacher and the teacher holds an expectation of the kind of explanation that will be given to the student. This is an important balance because too much explanation negates the need for student participation and not enough explanation provides too little prompt for discourse. Levenson and colleagues stated that the types of explanations used in the classroom are determined by the expectations and obligations understood by the classroom community. The evaluation of classroom discourse includes implicit rules as well as explicit rules. MPD should help teachers understand the aspects of sociomathematical norms that nourish classroom discourse.

In addition to the concept of interactions between students and the interactions between teacher Fennema and colleagues (1996) examined changes in attitudes and instructional practices of 21 teachers in grades first through third while these teachers participated in 4 years of MPD on Cognitively Guided Instruction (CGI). Seventeen of the 21 teachers came to believe their role was to provide a learning environment that allowed children to develop their knowledge through engagement activities. Students in these classrooms were provided an environment that allowed them to talk or write about how they solved problems while teachers attended carefully to what the children communicated. Student discourse was valued. Teachers came to recognize that classrooms were complex social environments made up of complex individuals with interacting needs. MPD needs to address the natural complexities encountered during discourse.

The existence of strong research about the importance of the learning environment and sociomathematical norms supports the efforts of MPD to address this area of focus. But the lack of a connection between teacher attitude concerning this area of focus and successful implementation of these concepts presented in MPD suggests a need for an exploration for this connection.

Proper-Tiered Instruction and Response to Intervention

Roschelle and colleagues (2010) suggested that teachers should place more emphasis on interventions that deeply integrate PD and curriculum materials in a unified curricular system. The National Resource Council's (Kilpatrick, Swafford, & Findell,

2001) book *Adding it Up: Helping children learn mathematics* identified five strands of proficiency. Conceptual understanding refers to the integration and connection of mathematical ideas. Procedural fluency includes the skills needed to carry out procedures flexibly as well as accurately and efficiently. Strategic competence includes the ability to formulate, represent and solve problems. Adaptive reasoning is the ability to think logically, reflect on mathematical thinking and then being able to explain and justify those thoughts. Productive disposition means a student is able to see mathematics as useful and worthwhile, even when confronting difficult problems. This includes the attitude founded in the belief that diligence will pay off.

Utah's 3-Tier Model of Mathematics Instruction (2009) is a guide based on research and best practices in mathematics instruction, including the five strands of mathematical proficiency. The model provides a framework for delivering high-quality, comprehensive mathematics instruction for all students K-12. Tier 1 instruction guarantees access to the core curriculum for all students. Instructional practices in Tier 1 should include differentiated instruction. Tier-2 instruction is intended to provide specific intervention for concepts and skills that a student did not acquire in Tier 1 instruction. Tier-2 instruction does not replace Tier-1 instruction. Tier-2 instruction most often is direct instruction addressing specific deficits. Tier-3 instruction is more intense, targeted intervention for students who have not responded to Tier-2 instruction. Tier-3 instruction replaces Tier-2 instruction and is usually based on a longer period of time and is very explicit in nature.

Compton and colleagues (2012) warned that the three-tiered model of instruction

might not be beneficial for students that are chronically eligible for Tier-3 instruction as they most often have to wait to fail both Tier-1 and Tier-2 instruction in order to get the help offered in Tier-3 instruction. They developed a screening model for predicting students needing Tier-3 instruction in order to avoid this problem and identify student readiness to learn.

The implementation the three tiers of instruction require proper student assessment at each of the tiers. Assessment is an important component of instruction and should be treated within the instructional domain. To separate assessment from instruction allows teachers to view assessment as something that is done them and their students. Jenkins (2010) identified that formative assessment is needed by both teachers and students in order to know how learning is progressing and that feedback is necessary to improve the students' learning experience. Brown, Bull, and Pendlebury (2013) posited that if you want to change student learning, you must change assessment methods because students take cues from what is assessed instead of what instructors assert is important. Huang (2012) stated that teachers need to know individual student past learning, be able to diagnose student difficulties, recognize common patterns arising from the instruction, probe student thinking and then be able to make real-time decisions and these tasks require appropriate formative assessment.

While existing research supports the focus area of proper-tiered instruction including assessment in MPD, there is no research that ties teachers' attitudes concerning proper-tiered instruction and response to intervention to the concepts presented in MPD.

Student Readiness to Learn

There is not as much literature for student readiness to learn as there are for the other three components that should be addressed in effective MPD as seen in Figure 1. Cohen and Hill (1998) indicated that PD focused on ways students learn has the most promise for change in teachers' instructional practices.

The mechanism of student thinking used to evaluate where students are in their preparation for new learning has more literature available. Chen and She (2012) noted that learning by construction involves changes similar to those found at a construction site where you build on existing structures already existent on a foundation. Their data found students' ability to generate argumentation was not stable across a semester and the rate of preparedness was individually different for each student, but those that were given more preparation and opportunity to create arguments were found to be stronger statistically than those who were not provided opportunities.

Maclellan and Soden (2012) found clear pedagogical intentions are necessary to foster students' critical thinking. They further claimed metacognition required a monitoring of the thinking process along with progress checks and verification of accuracy. Maclellan and Soden stated that the practice of discourse with an emphasis on shared thinking and reasoning about content was an expected response that fosters connections between the abstract content and students' development of those concepts.

The Comprehensive Mathematics Instruction (CMI) Framework was developed as a collaborative effort between Brigham Young University and five surrounding school districts in Utah (Hendrickson, Hilton, & Bahr, 2010). The CMI Framework has an

emphasis on student thinking to guide teacher actions. A major component of the CMI Framework is the Learning Cycle with its explicit teacher moves and student expectations associated with each of the three phases of the cycle. Students' progress through the learning cycle (Figure 3) from Develop Understanding to Solidify Understanding and finally the phase of Practice Understanding. The Learning Cycle is unique to the CMI Framework. It suggests that understanding is progressive and lessons should be geared

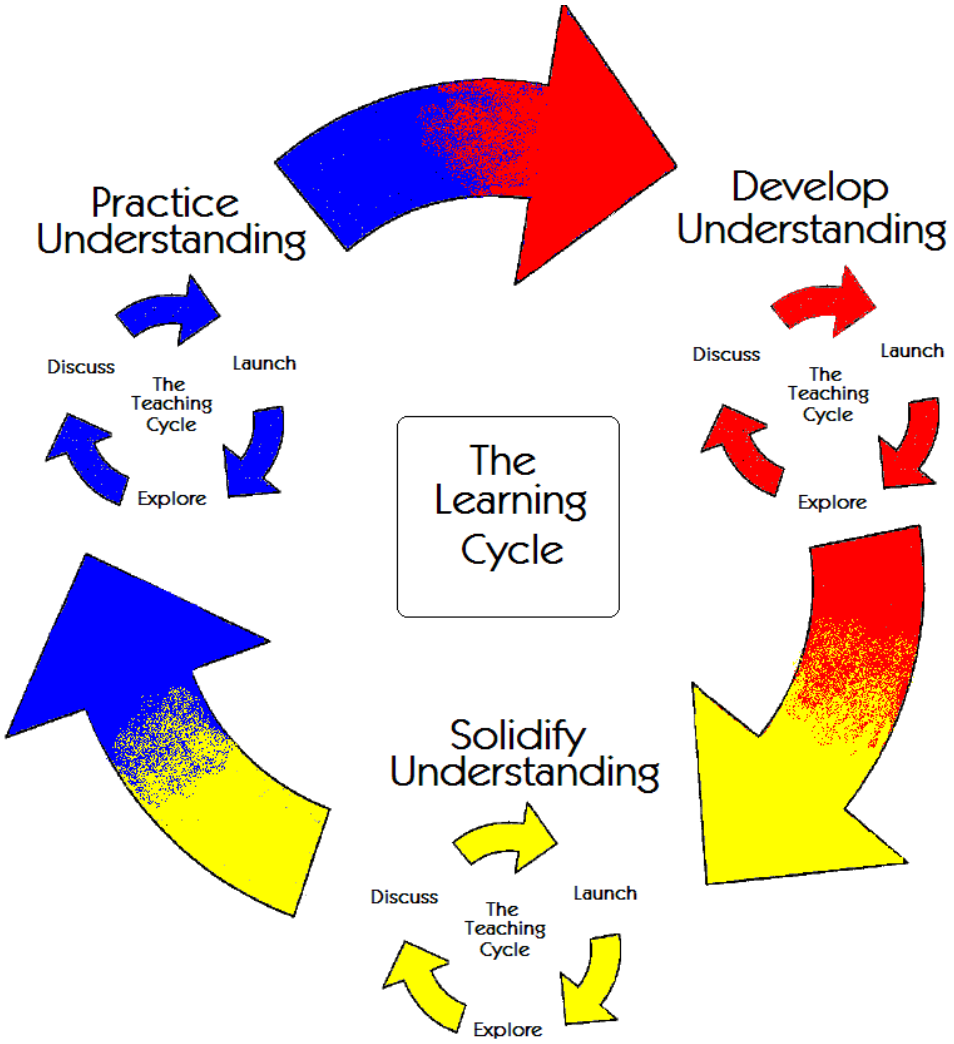

Figure 3. The comprehensive mathematics instruction framework's learning cycle.

toward the location of the student in the cycle. A student in the Develop Understanding phase is not ready for activity in the Practice Understanding phase although traditional mathematics instruction typically moves immediately from Develop Understanding to Practice Understanding without giving the students an opportunity to truly own the concepts and skills being presented.

The Launch in Developing Understanding is broader and allows for students to experience a variety of alternative strategies, while the Launch in the Solidify Understanding phase of the Learning Cycle is less broad and will usually start to focus related problems toward a desired end. The Launch in Practice Understanding is even more specific with the desire to bring about the five strands of proficiency discussed by the National Research Council (2001) upon successful completion of the Learning Cycle. Also notice that the transition between phases is not clearly defined. It is possible to have students in a class spread between two phases.

The CMI Framework was developed to help teachers provide instruction that is more in line with where students are in their learning progression or their readiness to learn. The framework identifies specific roles for both students and teachers within each phase of the Cycle of Learning. Knowing where a student is can help drive the instructional activities. A teacher should always be able to answer the question, “What is the student on the verge of learning?” before attempting any new instruction.

Conclusion

Kao and colleagues (2011) defined motivation as the “process whereby goal-

directed activity is instigated and sustained" (as cited in Schunk, Pintrich, & Meece, 2008) and suggested that teacher attitudes influences learning, performance and implementation. Teachers with higher self-efficacy tended to have more affirmative attitudes about positive consequence associated with PD training (Kao et al., 2011). It appears that teacher motivation is a necessary link between MPD and change in classroom implementation.

As Fennema and colleagues (1996) reported, changes in the implementation of instructional practices were directly related to changes in student achievement. As teachers' attitudes improve, the more they came to believe in what their students were capable of and therefore expectations also increased. As teachers became more masterful in their use of student thinking, the more capable the teacher became in improving students' thinking.

Renninger and colleagues (2011) were able to classify three types of learner motivation profiles: teachers with low interest, high self-efficacy and more mathematics; teachers with low interest, low self-efficacy and less mathematics; and teachers with high interest, high self-efficacy and more mathematics. These profiles could be used as predictors of teacher attitudes and potential learning success in PD but they also provide challenges in designing PD to meet the differing strengths and needs of the teachers. Findings from this study suggest participants' goals, interest and level of prior mathematics courses could be used to predict whether or not a teacher would complete an un-moderated online workshop and then return to use the resources of that workshop.

Referring back to the conceptual framework (Figure 1) of the value of teacher

attitudes towards MPD, teachers will not implement that which they do not see as worthwhile. Without implementation, MPD cannot affect instruction. Each component of Figure 1 is interlocked with each other through teacher attitude and student achievement is dependent upon all four components of MPD.

Heck and colleagues (2008) reported on a 7-year study of 48 NSF projects providing evidence of positive impacts on teacher-reported attitudes toward standards based teaching. The positive impacts were observed even when teachers did not participate in the PD to the extent intended. Part of the reason was attributed to teacher attitudes and teacher preparedness.

Renninger and colleagues (2011) found that continued participation in PD was related to the structure and the content of the PD, not just their predisposition. This is important for professional developers to think about as they attempt to motivate teachers to change. One structure of support from this study was the organizing of participants into heterogeneous groupings. Teachers were assigned according to levels of students taught. Another important structure was the ability of teachers to participate without highlighting differences in ability.

Telese (2012) stated that many teachers view PD as expensive, not valuable because of an inability to meet their needs and is therefore a waste of time and money. Knowing that teachers may approach MPD with these sentiments can help professional developers organize materials that can be considered valuable to the teachers and guard against wasting time. While the study found greater achievement in PD focused on training in curriculum materials, the differences were not significant. Keeping in mind the

need to motivate participating teachers in MPD, the topic of curriculum materials is not a strong motivator for teachers who perceive MPD to be a waste of time. The questions that need to be addressed are: What creates teacher attitudes that will sustain change in classroom instruction? Does a teacher's attitude about one area of MPD lead to changes in attitudes in other areas? How strong are the bonds of attitude between the different areas of MPD? This study will attempt to find some answers to these questions.

CHAPTER III

METHODS

An important task of this chapter is to provide the rationale supporting the use of a phenomenological approach to the study, explain the role of the researcher in socio-cultural theory, and describe the methodological components associated with the phenomenological aspects of this study. The chapter will be divided into three sections; each section addresses a task centered around the two research questions addressed by this study as seen in Table 1.

Table 1

Research Questions Overview, Data Sources, and Techniques for Data Analysis for Project

Research questions	Data sources	Data analysis techniques
RQ1. Can teachers with initially poor attitudes about MPD gain positive attitudes in one or more of the four areas of MPD through mandated participation in MPD?	Multiple choice and Likert scale responses to electronic pre- and postsurveys	Categorical analysis to determine change in attitudes
	In-depth participant interviews	Phenomenological data analysis-statements, general description and development of clusters of meaning
RQ2. If a change in teacher attitude is identified, can phenomenon associated with that change be categorized within one or more of the four areas of MPD?	In-depth participant interviews	Thematic analysis of open-ended response items
		Phenomenological data analysis-statements, general description and development of clusters of meaning
		Descriptive statistics (frequency/percentage of categories)

Rationale for Phenomenology

Merleau-Ponty (1964) identified four important characteristics of phenomenology: (a) the description of phenomena including feelings and thoughts (b) reduction as the process of bracketing the phenomena in order to readdress them later (c) essences which are the core meanings or definitions of a person's experience, and (d) intentionality of consciousness which is described as an individual always being conscious of something. An important purpose of phenomenology is to investigate and describe the contents of shared experiences in order to make explicit the structure and meaning of experiences that cannot be revealed through ordinary observation.

Phenomenology is studied through two possible lenses (Creswell, 2012). The first is through a hermeneutical lens requiring the researcher to focus on consciousness and the interaction of lived experiences in order to posit an interpretation. The cycle of a hermeneutical approach requires the researcher to correct prejudices or set them aside (Moustakas, 1994). The second lens is an empirical one and requires the researcher to focus on lived experience brought to the investigation and thereby provide only the descriptions of the phenomenon encountered without providing an interpretation (Moustakas, 1994).

Other characteristics distinguishing these two lenses are summarily compared by Ehrich (2005). Some of the contrasting characteristics include different aims, outcomes, methods, derivation and approach. In Hermeneutical Phenomenology, the aim is to produce insights into human experience; the outcome is a piece of writing intended to explicate the meaning of human phenomena and understanding the lived structures of

meaning; the methods are less prescriptive; the derivation is not based on inductive empiricism; and the outcome uses a literary and poetic approach. On the other hand, Empirical Phenomenology has the aim of producing accurate descriptions of aspects of human experience; the outcome is a structural statement reflecting the essential structures of the experiences being investigated; the methods follow a fairly strict method of data collection and analysis; its derivation is based on an empirical analytic science; and the outcome uses a psychological approach.

Hein and Austin (2001) stated that the specific method of phenomenological research depends on the purposes of the researcher, the nature of the research question, and the data collected. The second research question of this study sought more than simple descriptions. It was not the intent of the second research question to inductively empirically derive answers. The interest of the study was a reflexive literary approach rather than a psychological approach and therefore, this study used the hermeneutical form of phenomenology.

The study attempted to describe the lived experiences of four participants following MPD delivered to secondary mathematics teachers. According to Creswell (2012), in order to derive a correct understanding of a lived experience, hermeneutic analysis is not just preferred, it is required. Schutz (1967) claimed that human behavior is meaningful and intelligible as it takes place but in a vague and confused way, requiring procedures of taking already meaningful content and clarifying it in terms of substratum experience. Schutz declared it a matter of urgent necessity to clarify complex social relations from an analysis of certain structures of meaning brought to light through

observation. The goal of phenomenology in this study was to clarify the lived experiences of secondary mathematics teachers rather than measuring changes in their experiences.

Role of Researcher in Sociocultural Theory

It was important for me as the researcher to understand that I brought a basic set of beliefs founded on theories, paradigms and perspectives to my inquiry (Guba, 1990). While phenomenology permits the researcher to examine participants' cumulative experience as they relate to a singular moment in time, the researcher must acknowledge that the data will be collected from diverse perspectives and focus on understanding the phenomenon from these perspectives without being distracted by the event itself (Willis, 2007).

Creswell (2012) supported the use of phenomenology as a tool to study and describe the meaning of lived experiences and describes the responsibility of a phenomenologist researcher as he attempts to explain the commonality of participant experiences. The researcher should be aware of seven bonds connected to research models within sociocultural theory.

1. Recognize studies of human experiences are not completely approachable through quantitative approaches.

2. Attempt to focus on the entirety of an experience rather than its parts.

3. Remember the search is for meanings of an experience instead of measurements.

4. Obtain descriptions of an experience through informal and formal

conversations and interviews (see Appendix D).

5. Regard the data collected as necessary for understanding human behavior

6. Formulate questions and prompts that represent the researcher's reflection, interest, involvement, and commitment.

7. Review the relationship of subject and object as well as parts and whole as integrated and inseparable (Creswell, 2012).

The researcher should work to uncover the interrelationship between the direct conscious description of a lived experience and the underlying dynamics associated with that experience. Doing so "provides a central meaning and unity that enables one to understand the substance and essence of the experience" (Creswell, 2012, p. 9), which is one intention of this study. This study focused on bonds 3, 4, and 5 of the seven bonds listed above because of the intent of the second research question's attempt to categorize phenomenon associated with teachers' attitude changes.

There are four underlying assumptions that need to be addressed in any qualitative research. First, phenomena must be viewed holistically. It is inappropriate to reduce complex phenomena into independent factors. Second, qualitative researchers cannot impose their assumptions, limitations, delimitations or definitions into the environment being observed. It is the role of the researcher to record observations from the natural environment. Third, the researcher must understand that the definition of reality is viewed through the lens of the subject not through the eyes of the observer. And finally, a priori conclusions must be avoided so that post hoc conclusions can emerge from the data (Wiersma & Jurs, 2009).

This study adhered to these recommendations through the in-depth interview process that focused on complete descriptions of participant's experiences rather than limiting the description to specific parts. The interview questions, prompts and process afforded four participants the opportunity to describe their view of their experience in the MPD and changes in their attitude toward mathematics instruction in an attempt to identify relationships between the changes of attitudes and the four areas of MPD.

Methodological Approach

The research methods included pre- and postsurveys designed to identify changes in attitudes towards mathematics instruction in order to determine a pool of possible participants for in-depth interviews. I purposefully selected participants for the in-depth interviews from the pool of possible participants with an emphasis on those that appeared to have changed their attitudes and known characteristics of their classroom instruction before the MPD as identified through the two pre- and postsurveys. The surveys were designed to identify desired pre-MPD participation characteristics of classroom instruction including traditional instructional practices of direct explicit instruction with minimal opportunities for guided exploration or discovery, little opportunity for student discourse, and a proclivity for following a book rather than addressing student readiness to learn as revealed through responses to the two pre- and postsurveys.

I obtained other data through two in-depth interviews of each of the four participants who experienced a change in attitude about mathematics instruction. Phenomenological analysis includes the identification of themes known as invariants that

emerge from descriptions obtained in the interviews. These themes were developed in correlated noema necessary for identifying the essence of the experiences associated with the changes in attitude. What is the essence of a shared experience that changes teacher attitudes making it more likely they will apply what they have learned in the MPD? Are the changes in teacher attitudes in one area of MPD able to generate improved attitudes in another area? Can teachers with initially poor attitudes about a mandatory MPD experience changes in attitudes. If attitudes improve through participation in mandatory MPD, can the phenomenon associated with such change be described across participants' shared experiences?

Professional Development Sessions

Following the suggestion that PD be related to standards (Darling-Hammond, 2012, Darling-Hammond & Bransford, 2005), the MPD associated with this study consisted of four full days of instruction during the academic school year related to the new Utah Core Standards for Mathematics. One day each quarter of the school year, an average of 50 participants from seven school districts in Utah came together for instruction on key components of the new Secondary Mathematics 3 course.

Secondary Mathematics 3 is one of three new high school courses implemented by the state of Utah as part of the state's adoption of components of the Common Core State Standards known in Utah as the Utah Core Standards for Mathematics. Utah adopted the integrated sequence of standards for high school mathematics courses to replace the traditional Algebra 1, geometry, and Algebra 2 series.

Several of the participants were mandated to participate in the MPD. Each day of

instruction was divided into four sections, two in the morning and two in the afternoon to model instructional periods of a block schedule familiar to each participant.

Participants and Setting

The training occurred at the Grandview Learning Center, a facility in Provo City School District designed for teacher PD. The central location of the facility provided easier access to the MPD for all participants from the different districts. The room used for the MPD was a former cafetorium (a combination cafeteria and auditorium) of an elementary school. The room was large and had a stage, a large drop-down screen for presentations and was able to accommodate all 59 participants sitting in groups of five or six seated at round tables. The room had wireless Internet access designed to accommodate large numbers of participants to simultaneously gain access to the Internet.

Because the facilities were large enough to accommodate all participants at the same time, all attendees experienced the same training during the four instructional episodes. Also available in the PD facility were four mounted white boards, a built-in speaker system, and a kitchen area with a large commercial refrigerator that was stocked with water, juice and soda for the participants to access during the MPD.

Candidates for the interview process were selected through data generated from the pre- and postresponses to Survey 1 and Survey 2. Candidates would need to demonstrate changes in both surveys. Possible candidates needed to have a minimum total of seven changes in responses within any combination of the five categories or a 5% change in responses in Survey 1 as well as more than a single change in Survey 2. This use of homogenous-purposeful sampling is justified because the study was interested in

phenomenon associated with common incidents and experiences acquired from the MPD rather than a broader pool of all people attending the MPD (Sandelowski, 1995).

Survey 1 contained five categories that addressed teacher attitude toward mathematics teaching; teacher beliefs associated with mathematics teaching; teacher preparedness mathematics teaching; factors associated with successful mathematics teaching; and current teacher practices associated with reformed based mathematics teaching. Survey 1 consisted of five categories with a total of 141 items that teachers responded to. Survey 1 contained eleven items in the category of attitude, thirteen items in the belief category, 39 items each in the preparedness category, factors category, and practices category.

Survey 2 consisted of 20 items designed to measure teacher attitude toward mathematics teaching. It was determined that candidates for the interview process would need to have more than a single change in responses between the pre-and postsurvey. Six of the respondents met the criteria of more than one changed response.

There were eight possible candidates identified by the criteria of Survey 1 and six possible candidates from the criteria of Survey 2. All six possible candidates from Survey 2 were among the eight candidates from Survey 1. These six candidates meeting the criteria from both Survey 1 and Survey 2 were extended invitations to participate in the interview process. Four of the candidates accepted the invitation and participated in the interviews. The remaining two candidates declined the invitation.

The eight participating districts in the MPD represented more than one third of the total student population of the state of Utah. Three participating districts were rural

districts, one district represented a ski resort community and the other four districts were suburban districts. Teachers participating in the MPD held teaching assignments at alternative high schools, traditional comprehensive high schools, and an adult high school within their districts.

Materials

Each participating teacher had access to a laptop computer, iPad, or tablet. The MPD focused on available resources from the Internet for classroom instruction. Additional instructional materials used during the MPD were provided on a wiki page created for the participants. Areas of emphasis for electronic resources included Utah State University's National Library of Virtual Manipulatives (NLVM), National Council of Teachers of Mathematics' (NCTM) Illuminations, LearnZillion, Illustrative Mathematics, Geogebra, Google Docs, and other Web 2.0 resources.

Participants also had access to and instruction on manipulatives (e.g., linking cubes, centimeter cubes, and geoboards) and lab equipment (e.g., water rockets, digital cameras, and cylinders). Emphasis focused on measurement tools (e.g., rulers, timers, Vernier calipers, and micrometers) and their application in teaching the new Secondary Mathematics III course of the Utah Core Standards for Mathematics.

Data Sources

I used three data sources to answer the two research questions of this study as they apply to the four areas of focus for MPD. The data sources included two preexisting pre- and postsurveys used in the MPD to identify changes in teachers' attitudes towards

mathematics instruction. The third data source included in-depth interviews of four participants in order to complete the phenomenological study.

Pre- and postsurveys. Tashakkori and Teddlie (2003) identified some strengths of questionnaires: (a) they are good for measuring participant attitudes; (b) quick turnaround; (c) can be administered to groups; (d) low dross rate for closed-ended questions; and (e) they have moderately high measurement validity. Pre- and postsurveys are able to measure changes in teacher content and pedagogical knowledge which is one of the four areas of focus for MPD. The ability to effectively measure several key targets is a strength of surveys identified by (Desimone & Floch, 2004). Appendix B contains Survey 1 (Adapted Local Systematic Change through Teacher Enhancement 2006 Teacher Questionnaire). The questionnaire was designed by the National Science Foundation with the goal of improving science, mathematics and technology instruction through teacher PD. The questionnaire was initiated in 1995 and revised in 2006 (Banilower, Boyd, Pasley, & Weiss, 2006).

Germuth, Banilower, and Shimkus (2003) found considerable evidence that Survey 1 "is a valid and reliable measure of teachers' attitudes, preparedness, and classroom practices" (p. 5). Survey 1 contained eight composite factors of interests: (a) attitudes toward reform-based teaching; (b) perceptions of pedagogical preparedness; (c) perceptions of mathematics content preparedness; (d) use of traditional teaching practices; (e) use of practices that foster an investigative culture; (f) use of investigative teaching practices; (g) perceptions of principal support; and (h) perceived impact of Local Systemic Change (LSC) program. Questions regarding LSC were omitted in a pilot study

and factor analysis using SPSS was completed, verifying that the other seven composites of interest not directly associated with LSC were not affected by the elimination of these questions. Factors three, four, five, and six directly address research question 1 of this study.

The psychometric testing and properties of the original instrument include factor analysis and reliability analysis; separate exploratory analysis and reliability analysis on four of five identified domains; Cronbach's coefficient alpha to measure future stability for new samples; and principal axis factoring to determine any error in ability to define latent variables (Flora & Panter, 1998; Germuth et al., 2003). Evidence from a pilot of the survey showed the elimination of questions pertaining to specific LSC interaction did not alter the reliability of the instrument as the eliminated questions were within their own domain, and no overlap into other identified domains occurred. This was verified through a factor analysis using SPSS with data from a pilot of the survey. The only other alteration to the survey was the use of an electronic format rather than a paper bubble sheet to collect the data. The wording of all questions remained the same as the original survey. It was determined in a pilot study that the adapted survey still contained seven domains and therefore the psychometric work from the original survey could be relied upon for the electronic version.

Because this is an important aspect of the definition of successful PD includes the implementation of the content presented in the PD, it is important to tie implementation of mathematics instructional strategies to teacher attitudes. Appendix C contains Survey 2 (Teacher Self-Report Survey), which was designed by Ross, McDougall, and Hogaboam-

Gray to determine teachers' implementation of mathematics education reform-based on nine dimensions of standards-based teaching and the reliability of the survey was established with large samples (517 and 2170; Ross, McDougall, Hogaboam-Gray, & LeSage, 2003). The nine dimensions are program scope, student tasks, discovery, teacher's role, manipulatives and tools, student-student interaction, student assessment, teacher's conceptions of mathematics as a discipline, and student confidence. These dimensions are designed to predict a teacher's attitude toward the use of reformed mathematics instruction.

Two studies to evaluate Survey 2 used Cronbach's α to measure internal consistency and to test the reliability of the instrument. The first administration with 517 teachers produced a reliability coefficient $\alpha = 0.81$ with a mean rating of M = 4.48 out of 6 and a standard deviation of 0.53. The second administration of the tool involving 2170 teachers produced similar results with $\alpha = .81$, $M = 4.64$, and standard deviation of 0.20. The similarity of the results of both studies demonstrated the twenty items on the survey were internally consistent, and predictive of validity from scores positively correlated with a mandated performance assessment.

Both Survey 1 and Survey 2 were originally designed as paper and pencil surveys but were adapted as electronic versions for this study. Vadillo and Matute (2011) suggested the lack of experimental control associated with internet-based methods for research does not undermine experimental results and identified quick data collection as a strength of electronic data collection.

Boyer, Olson, Calantone, and Jackson (2002) found that electronic surveys were

generally comparable to traditional hard copy surveys, with a few key advantages as well as some challenges. One strength of electronic surveys mentioned by Boyer and colleagues is that electronic surveys have fewer missing responses than paper surveys. The biggest strength of electronic surveys is the ability to code and manage data more rapidly than paper surveys.

According to Dillman, Smyth, and Christian (2008), internet surveys of a tailored survey design are strong instruments because they invoke multiple social exchange elements that can possibly increase participation. The readiness of access in an internet-survey also provides opportunity for increased participation. Satisficing is a weakness of surveys and includes participant practices such as skipping items, rushing responses, choosing the same answer and quitting early (Barge & Gehlbach, 2012). To eliminate some satisficing practices, participants in this study were encouraged to take breaks when answering the survey. They were told not to shut down the computer, but to drop the survey into the menu bar during their breaks.

The electronic survey was created with Google Docs ® forms. The design of the electronic survey is important because the design can influence the respondent's participation (Dillman et al., 2008). The questions were separated into different pages similar to the different pages of the original hard copy survey. A group of 25 teachers who would not be taking the survey tested three backgrounds for user appeal. The choices were a plain white background, a dark black and blue background with a mathematics theme and a light tan parchment theme. All 25 teachers selected the light tan parchment theme for its appeal.

In-depth participant interviews. Patton (2001) posited skillful interviews entail more than asking questions. In-depth interviews can be used to explore teacher knowledge, one of the four areas of focus in MPD. In-depth interviews are a qualitative source of data that benefit from the fact that the subjects of inquiry can think and talk (Seidman, 2005). Seidman proposed that interviews are important because they provide the opportunity to symbolize an experience center to being human. Another important purpose of these questions is to add to the data in order to determine if there is sufficient description in order to identify similarities among themes (Rossman & Rallis, 2003).

The in-depth interviews utilized the three-interview series suggested by Seidman (2005) and occurred after the fourth and final day of the MPD. The purpose of these interviews was to understand the experience of changing beliefs or attitudes during a MPD opportunity. This purpose of in-depth interviews was supported by Seidman (2005). Moustakas (1994) suggested a sample size of 5 to 25 participants, while Boyd (2001) supported a sample size of 2 to 10 participants for phenomenological research. A purposeful "criterion sampling" (Creswell, 2012) guided the selection of the six possible participants identified as changing their attitude upon completing the common MPD experience. Transcripts of the recordings were made and used for coding and interpreting data. Interview questions addressed teacher perceptions in the areas of teacher knowledge, learning environment, proper-tiered instruction, and student readiness to learn, which are the four areas of MPD.

The interviews were intended to allow participants of the MPD to express their perspectives on changes that might occur in their classrooms due to their experience. The

six participants who demonstrated some change in attitude toward the PD, or mathematics instructional practices generated a pool of six possible interviewees. All six teachers in this pool were invited to participate in the in-depth interviews; four of them accepted the invitation. The interview process included two interviews with each participant (see Table 2).

Both interviews with participant Tony started about a half hour after school. Students were still in the building and there were interruptions by students and the school intercom. These were the first two interviews in the process. Both interviews with participant Bart started at 6:00 pm on a weekday evening. They were completed using Skype and Bart showed signs of fatigue. Interviews five and six were completed with participant Cheryl in the interviewer's office. They both started a little after noon on a weekday while school was in still in session. The final two interviews of the process, interviews seven and eight with participant Bethany were the only interviews held after

Table 2

Sequence and Duration of Interviews

Interview located in Appendix	Participant	Starting time	Duration
G	Tony	3:10 pm	37 minutes 05.47 seconds
H	Tony	3:12 pm	48 minutes 04.39 seconds
I	Bart	6:05 pm	35 minutes 16.98 seconds
J	Bart	6:03 pm	30 minutes 59.12 seconds
K	Cheryl	12:20 pm	41 minutes 25.94 seconds
L	Cheryl	12:15 pm	36 minutes 00.08 seconds
M	Bethany	5:04 pm	36 minutes 50.98 seconds
N	Bethany	5:06 pm	40 minutes 52.43 seconds

the school year had concluded. Both interviews were completed using Skype. There was no need for a third interview with any of the four participants. The interviews were digitally recorded for the analysis process. The digital recordings were securely locked on a password-protected file on a single computer.

Data Collection Procedures

The first procedure for this study was to obtain IRB approval. Appendix A contains the informed consent form and the letter of intent to use data from the surveys of the MPD that were required as part of the IRB process. Following the acquisition of IRB approval, the researcher identified and recruited participants of the study followed by completion of the informed consent form.

In an attempt to describe common experiences for the secondary mathematics teachers participating in this MPD, each participant needed to attend all four full days of common instruction with several weeks between sessions. Each day of instruction started at 8:00 am and end at 4:00 pm. Each day's training began with a breakfast and included a lunch in order to maximize time for participants to engage in the MPD. Each day of instruction was divided into four instructional episodes that replicated a block schedule instructional period, two before lunch and two after lunch. Appendix E contains the dates and topics for the MPD.

The second phase of data collection included the evaluation of the pre-existing data from the pre- and postsurveys associated with the MPD. Participants were expected by the consortium to complete both surveys as part of their participation in the MPD. The presurvey was given made available on line at the beginning of the school year with the

expectation of completion before the end of November 2013. The postsurvey was made available after the final day of MPD on April 23, 2014. These two surveys were used to identify changes in attitudes about classroom instruction. In this phase it was important to identify which teachers experienced a positive change in attitude concerning mathematics instruction in order to explore phenomenon associated with this change. This is an important aspect of phenomenological research (Creswell, 2012). Review of the data from the pre- and postsurveys identified six participants who were invited to participate in the interview process. Four of them responded favorably and appointments were made for two interviews each. The participants were informed that a third in-depth interview might be necessary, but it was determined after the completion of the two interviews that the third interview was not needed for any of the four participants due to the lack of any suggested possible phenomena identified in the two completed interviews. Any additional interview questions would address curiosity generated outside of the two research questions for this study.

The interviews were recorded digitally. The researcher transcribed the digital recordings in a three-step process. The first step was an original transcription of the interview. The second step was a review of the digital recording and a verification of the transcription. The third step was the time stamping of the transcription. The digital recordings and the transcripts of the recordings were stored on a password protected computer file as recommended by Creswell (2012). I was the only person with access to the audio recordings and the transcripts in order to ensure confidentiality. A three-letter code was used in place of the names of the participants in both the transcription and

reporting processes.

Data Analysis and Procedures

Pre- and postsurveys. After the data were collected, I analyzed the data that required the thematic analysis of open-ended response items, phenomenological data analysis of horizonalization and the development of clusters of meaning of the qualitative data gathered from written records and recordings of the in-depth interviews in an attempt to determine if there existed a composite description of the phenomenon associated with the change related to the completed MPD. The final process of a phenomenological study includes the creation of a literary artifact that explicates the meaning of the phenomenon and provides an understanding of the lived structures of meaning encountered in the study with an interest in identifying any relationships between these and the four areas of MPD.

Analysis of the pre- and postsurvey data included categorical analysis to determine the existence of changes in attitudes. An evaluation for maximum likelihood was used for estimating parameters and conducting statistical inference of proportions. Since the variables to be evaluated from the surveys were categorical, methods designed for ordinal variables were not used in the data analysis (Agresti, 2007). The data obtained from the surveys generated multinomial distributions since the responses for the questions had more than one possible outcome. Evaluation of individual teacher change was connected to an assigned participant number provided in the first day and used to fill out the surveys. Candidates for the interview process had to have evidence of changes in attitude in both Survey 1 and Survey 2.

In-depth participant interviews. Each participant was interviewed in two separate sessions. At the conclusion of the first interview, each participant was given some topics to review in preparation for the second interview. The topics included a list of the activities from the 4 days of the MPD, the list of four areas of emphasis for MPD and a list of reform-based mathematics instructional strategies. After completing the two interviews with each participant, it was deemed unnecessary to proceed with a third interview for any of the four participants.

Qualitative data emerged through the course of interviewing the participants. Common themes associated with teacher attitude as well as the four focus areas of MPD: (a) teacher content and pedagogical knowledge (b) learning environment (c) proper-tiered instruction and response to intervention, and (d) student readiness to learn were observed.

Seidman (2005) proposed the creation of profiles and themes to reduce and then shape the data to be shared. Excerpts from the interviews were organized into categories. Connecting threads and patterns among and between the excerpts was sought. When important excerpts were found but did not fit within the categories or the significance was not clear, a memorandum was written about the passage.

Initial analysis of the interview data required the researcher to read and reread the data in an attempt to sort statements into nonrepetitive and not-overlapping sets in order to define existing themes. The next step was the coding of the transcribed interviews with NVivo for Mac (QSR International, 2014). The final step in the data analysis required the researcher to associate the themes to the four domains of MPD. These themes were developed in correlated noema necessary for identifying the essence of the experiences

associated with the changes in attitude. The final step of the study involved the creation of the reflexive literary artifact to describe the essence of a shared experience that changed teacher attitudes.

CHAPTER IV

RESULTS

The results in this chapter are organized in the following way: first, I will review the data from the MPD sessions; second, I will review of the results of Survey 1 followed by a review of the results of Survey 2; I will follow this with a review of the data obtained in the interviews, including common themes, unique themes and the relation of the themes to the framework; and finally, I will answer the research questions.

Data from Mathematics Professional Development Sessions

The original registration numbers for the MPD listed 61 participants but only 58 attended the first day. Their engagement level during the activities the first day is shown in Table 3. There were 59 participants present on the second day and their engagement level is shown in Table 4. We experienced a large drop in the number of participants on the third day of the MPD with 48 in attendance. Part of the low attendance on this third day could be attributed to a travel warning caused by a large snowstorm that morning as several of the participants from distant locations were not at the training. The engagement level for the third day is shown in Table 5. The fourth day saw a further decline as one administrator in a district mandating participation announced that he had taken a job in another district. This could explain why this district's participation dropped with only 35 participants present on the last day. The engagement levels of the participants during the fourth day are shown in Table 6.

Thirty-eight participants completed Survey 1's presurvey and 30 participants

Table 3

Overview of First Day of Mathematics Professional Development: Polynomial Functions

Session	Focus area	Topic	Activity	Engagement rate
1	Teacher pedagogical knowledge	Using manipulatives in a guided practice activity	Concavity through incremental measurement of height of water in vase	94.8%
2	Teacher content knowledge	Polynomials and non-constant rate of change	Walking a graph with motion detectors	89.7%
3	Teacher pedagogical knowledge	Using technology in a guided practice activity	Exploring repeated Roots	86.2%
4	Proper tiered instruction	How to approach instruction of inverse functions	Discussion	Not measured

Table 4

Overview of Second Day of Mathematics Professional Development: Depth of Knowledge and Instruction

Session	Focus Area	Topic	Activity	Engagement rate
1	Proper tiered instruction	Assessment	Explored new state assessment tool	100%
2	Teacher pedagogical knowledge	The 8 practice standards and instructional approaches	Reviewing student work for evidence of practice standards	100%
3	Teacher content knowledge	Logarithms: constraints, asymptotes, justification of answers and common student errors	Discussion	Not measured
4	Teacher pedagogical knowledge	Using manipulatives in a guided practice activity	Application and interpretations of logarithms: Melting snowman and doubling your money activities	91.5% - snowman 79.7% - doubling money

Table 5

Overview of Third Day of Mathematics Professional Development: Circles and Angle Measure Versus Linear Measure

Session	Focus area	Topic	Activity	Engagement rate
1	Teacher pedagogical knowledge	Using manipulatives in a discovery activity	Defining and using radian measures with pizzas	100%
2	Teacher content knowledge	Problem based trigonometric functions activity	Fly on a ceiling fan blade activity	91.3%
3	Teacher pedagogical knowledge	Using technology in a guided practice activity	Exploring trigonometric functions with the unit circle	95.8%
4	Teacher content knowledge	Relationships of inverse trigonometric functions	Direct explicit instruction - Lecture	Not measured

Table 6

Overview of Fourth Day of Mathematics Professional Development: Student Readiness to Learn and Statistics

Session	Focus Area	Topic	Activity	Engagement rate
1	Sociomathematical norms	Importance of changing instructional environment	Discussion activity	Not measured
2	Student readiness to learn	CMI framework for teaching and learning	Guided reading activity and discussion	91.4%
3	Student readiness to learn	Develop understanding phase of CMI Framework	Writing and evaluating appropriate launches for statistics lessons	85.7%
4	Student readiness to learn	Develop and Solidify understanding phases of CMI Framework	Adapting existing statistics activities to the appropriate phase of CMI framework	94.3%

completed the postsurvey. Of the 61 teachers registered for the course, only 35 completed all four days of instruction and of the 35 possible candidates who completed the entire MPD, 29 completed both the pre- and postsurvey versions of Survey 1.

All participants in the MPD taught in schools having a block schedule. Each day of the MPD was therefore divided into four instructional episodes of about 85 minutes each to replicate a block schedule. Sessions that were activity based were measured for participant engagement rates by taking three random, periodic counts of participants on task for each session measured. Sessions that were discussion or lecture oriented were not measured for participant engagement rates.

Review of Survey 1 Results

Responses for pre- and postsurveys were collected on the same Excel worksheet for comparison. When there was a change in response between the presurvey and the postsurvey, the postsurvey response font was color coded to identify the existence of a change. Counts of changed responses were taken for each category addressed in Survey 1. There were a total of eleven questions addressing attitude, thirteen addressing belief and thirty-nine each for preparedness, factors associated with successful mathematics instruction, and instructional practices. From the five categories, there were a total of 141 questions in the electronic survey for each participant with 27 participants responses evaluated in the study for a total 3,807 possible changes between the presurvey and the postsurvey if each response did not represent the highest possible choice.

In the category of attitude there were 297 responses in both the presurvey and the

postsurvey. There were 96 responses in the presurvey that were eliminated as possible indicators of positive change because they were already a 5 out of a maximum reply of 5. That left 201 possible responses in the postsurvey to check for positive change. Upon evaluation, there were a total of five responses that reflected a positive change in the category of attitude.

In the category of belief, there were 13 items for each of the 27 participants to answer giving a total possible 351 changes that could exist. Of the 351 presurvey responses for this category, 86 responded "very important," which was the highest response and could therefore not be used to show increase in the postsurvey, leaving 265 possible responses in the postsurvey that could indicate positive change. Evaluation of the responses between the presurvey and the postsurvey showed 32 positive changes in responses.

In the categories of teacher preparedness, factors, and practices there were 39 items for the 27 participants to answer providing 1,053 possible changes in the pre- and postsurvey responses in each of these categories. Of the 1,053 possible responses for preparedness in the presurvey, 356 were the highest possible response and negated the possibility of measuring a positive change in the postsurvey for those responses. Of the 697 remaining responses in preparedness that could show a positive change in the postsurvey, 20 indicated a positive change.

In the category of factors, there were 701 possible responses of the 1,053 presurvey responses that could show measurement of positive change in the postsurvey after 352 responses in the presurvey were the highest response available. Of the 352

possible responses, 13 indicated a positive change between the pre- survey and the postsurvey.

In the category of practices, 365 presurvey responses were eliminated as possible measures of positive change because they reflected the highest possible responses allowing only 688 remaining presurvey responses that could show positive change in the postsurvey. Of the 688 possible responses, 36 indicated positive changes. This category exhibited the largest positive change of the five categories.

A review of the data from Survey 1 identified eight possible candidates for the interview process of the study as seen in Table 5. Six other participants gave one or two changed responses to practices, but did not have changed responses in any other categories. One participant had a negative change of response in the practice of recording, representing and/or analyzing data with a presurvey response of all or almost all mathematics lessons to rarely.

Review of Survey 2 Results

The second survey used to determine changes in teacher attitude towards mathematics instruction was the Teacher Self Report Survey (see Appendix C). The survey had twenty questions addressing teacher use of reform-based mathematics instructional strategies. There were 41 participants who completed Survey 2's presurvey at the beginning of the course and 28 completed the postsurvey. Only 27 participants completed both the pre- and postsurvey versions of Survey 2 and attended all four days of the MPD. The changes in participant responses to Survey 1 are presented in Table 7.

Table 7

Changes in Responses to Survey 1 Between Presurvey and Postsurvey

Responses addressing positive changes in...	Number of positive changes in responses
Attitudes (*n* = 121 possible responses)	
Students generally learn mathematics best in a class with students of similar abilities	1
I feel supported by colleagues to try out new ideas in teaching mathematics	1
Mathematics teachers in my school have a shared vision of effective mathematics instruction	1
I have adequate access to computers for teaching mathematics	1
I am well informed about the Utah Core Standards for the courses I teach	1
Total number of positive changes	5
Beliefs (*n* = 265 possible responses) The importance of . . .	
Introducing concrete before abstract	1
Developing students' conceptual understanding	3
Taking student prior knowledge into planning instruction	1
Importance of practicing computational skills and algorithms	1
Making connections between mathematics and other disciplines	5
Having students work in cooperative groups	5
Having students participate in hands on activities	3
Engaging students in inquiry oriented activities	3
Having students prepare projects/ labs/ research reports	3
Engaging students in applications of mathematics	4
Performance based assessment	3
Total number of positive changes	32
Teacher (*n* = 265 possible responses) Preparedness to . . .	
Have students participate in hands on activities	1
Engage students in inquiry oriented activities	1
Have students use calculators or computers	1
Use performance based assessment	2
Teach geometry and spatial sense	1
Teach students oral and written communication skills	2
Make connections within mathematics and from mathematics to other disciplines	2
Manage a class of students engaged in hands on/ project based work	2
Help students take responsibility for their own learning	2
Recognize and respond to student diversity	2
Encourage students' interest in mathematics	2

(*table continues*)

Responses addressing positive changes in...	Number of positive changes in responses
Involve parents in the mathematics education of their children	2
Total number of positive changes	20
Factors associated with successful mathematics instruction (n = 701 possible responses)	
My principal encourages me to observe exemplary mathematics teachers	1
The influence of my school's counseling department's policies and practices	1
The influence of college placement tests	2
The quality of available instructional materials	2
Access to calculators for mathematics instruction	1
Access to computers for mathematics instruction	2
Funds for purchasing equipment and supplies for mathematics	2
Time available for teachers to work with other teachers	2
Time available for teacher professional development	2
Total number of positive changes	13
Instructional practices (n = 688 possible responses)	
Arrange seating to facilitate student discussions	2
Use open ended questions	1
Encourage students to explore alternative methods for solutions	1
Participate in student led discussions	2
Have students work in cooperative groups	4
Make formal presentations to the class	2
Practice routine computations/ algorithms	1
Have students share ideas or solve problems with each other in small groups	2
Engage students in hands on mathematical activities	4
Play mathematical games	1
Have students design or implement their own investigation	2
Work on models or simulations	4
Work on extended mathematics investigations or projects (a week or more in durations)	4
Record, represent and/or analyze data	2
Engage students in performance tasks for assessment purposes	4
Total number of positive changes	36

Table 8 identifies eight participants who were candidates for interviews after reviewing data from pre- and postsurvey versions of Survey 1.

Of the 27 participants completing both the pre- and postversions of survey 2, six were identified as having some change in attitude toward mathematics instruction as determined by a change in response between the pre- and postsurvey in more than three of the 20 possible responses of the survey. Ten of the participants completing both the pre- and post- Survey 2 had no changes in their twenty responses. Eleven of the participants had a single change in responses to the questions. The six respondents with a change in responses greater than one were: Kim, Cheryl, and Tony with six changed responses each between the pre- and postsurvey; Wendall and Bethany with five changed responses each between the pre- and postsurveys; and Bart with three responses changed between the pre- and postsurveys.

Table 8

Number of Changed Responses on Survey 1 by Possible Interview Candidates

	Total possible responses per category				
Participants	11 Attitude	13 Belief	39 Preparedness	39 Factors	39 Practices
Bethany[a]	1	5	0	3	1
Tony[a]	1	5	0	1	4
Wendall	0	3	2	0	2
Bart[a]	1	5	0	1	6
Cheryl[a]	0	3	0	0	4
Kerry	1	3	1	0	5
Nathan	1	1	8	7	0
Kim	0	5	1	0	5

[a]Interviewed participant.

The Interviews

Survey 1 identified eight possible candidates for the interview process of the study. The possible candidates were Bethany, Tony, Wendall, Bart, Cheryl, Nathan, and Kim. Of the eight possible candidates identified from Survey 1, six were confirmed as candidates through analysis of Survey 2. The final six candidates for the interview process were Bethany, Tony, Wendall, Bart, Cheryl, and Kim. Survey 2 could not support the other two possible candidates identified from Survey 1 as candidates. Nathan had only one changed response in Survey 2 and Kerry had no changes in responses in Survey 2. The six candidates identified by both surveys for the interview process were contacted and extended invitations to participate in the interviews. Three of the six individuals invited to be interviewed, Tony, Bart, and Cheryl, accepted immediately and their interviews were set for the end of May. After completing the two interviews for each of these three participants, a fourth participant, Bethany accepted the original invitation to be interviewed. The two interviews for this fourth participant occurred at the beginning of June.

The first interview for each respondent was very similar. It was based on the four areas of emphasis for MPD; a review of the four days of instruction of the MPD; and questions involving participant attitude about mathematics instruction. The second interview was more individualized as the questions were developed from the responses provided in the first interview. A common component of each of the second interviews was questions involving aspects of reform-based mathematics instruction.

The order of the interviews was as follows: Tony's first interview (see Appendix

G) was started on a Tuesday afternoon at 3:10 pm. A few days later Tony's second interview (see Appendix H) was started at 3:12 pm and Bart's first interview (see Appendix I) was completed that same day starting at 6:05 pm. Bart's second interview (see Appendix J) was a week later and was started at 6:03 pm. A few days later, Cheryl (see Appendix K) started her first interview at 12:20 pm followed by the second interview (see Appendix L) a couple of days later starting at 12:15 pm. Two weeks later, Bethany completed her two interviews (see Appendices M and N) both starting at about 5:00 pm on two different evenings in the same week.

Overview of Tony's Interviews

Tony is a first year teacher who has been accepted into a doctoral program for mathematics instruction. His participation in the MPD was not mandated, but he felt pressure from the district office to participate with his department, although he felt that he would have participated anyway. He spoke of a desire to implement reform-based instruction in his classroom, but explained that his implementation was limited due to the lack of cooperation from members of his department combined with a sense of his need to cover the new large state mathematics core in a short amount of time.

During his first interview, Tony expressed a great desire to implement reform-based mathematics instruction (see Appendix G, Time stamps 1:25.76-2:11.91 and 17:19.48-18:04.47), but gave four reasons why he did not follow through with his expressed desire. First, he stated that his department was not ready to implement reform-based instructional strategies (see Appendix G, Timestamp 15:09.13–16:03.07). His second reason for not implementing the presented strategies was that his department did

not want to implement changes in instruction because a single teacher created all curriculum for the department and everyone else pretty much did what she wrote (see Appendix G, Timestamp 16:03.85–16:58.70). Tony's third reason for not implementing reform-based instructional strategies came from his explanation that he had attempted implementation of these strategies but found the process took too much time and energy (see Appendix G, Timestamp 17:19.48–18:04.47) and his final reason for not implementing reform-based instructional strategies was his belief that his students were not ready for the activities presented in the MPD (see Appendix G, Timestamp 30:29.40–31:19.74).

Tony remembered most of the activities presented in the MPD fondly and got excited when talking about the experiences he had learning new mathematical content. When pressed about the fact that his students might like the experience also, he reverted back to his position that his students were not ready for the presented activities. Tony found both the hands on activities and the discussions beneficial and claimed he increased his content knowledge through both activities.

When asked about implementation of any of the strategies, Tony stated that the SAGE assessment session was very beneficial since his students had to take the state's end of level test and he was appreciative of the experience within the testing environment so that he could prepare his students for the end of year assessments (see Appendix G, Timestamp 13:29.25–15:07.71).

Tony stated that he was excited to share his experience of using the pizza activity from Day 3 with his class. Unfortunately, he misinterpreted his presentation of the

mathematical content with implementing alternative instructional approaches (see Appendix G, Timestamp 18:16.94–19:24.25). He shared the experience of defining radian measures with the measure of a radius around its circle. He did not give his students manipulatives like those he worked with in the MPD, instead, he drew a circle on the board and led his students in a discussion about how many radii they thought would fit around the circle. Students sat at their seats and watched as he demonstrated how many radii would fit around the circle.

In his interviews, Tony expressed his desire to implement alternative instructional strategies has increased, but the follow through was nonexistent (see Appendix G, Timestamp 17:19.48-18:04.47; Appendix H, Timestamp 14:42.43-16:00.57; Appendix H, Timestamp 23:30.92-25:26.86). There is no connection between Tony's desire to implement and implementation. In his second interview, Tony expressed a concern about the intent of the MPD. He thought the MPD was going to simply provide tasks and materials for the curriculum of the new Secondary Mathematics 3 course and found the presentations unfulfilling since he "didn't come here to learn how to teach" (see Appendix H, Timestamp 12:19.47-12:50.15).

Tony did not recognize the efforts of the presenters to model instructional practices with intentional purposes. Specifically, he did not recognize when tasks were using collaborative groups versus individual investigation (see Appendix H, Timestamp 14:42.43-16:00.57). He had already expressed a belief that his students were not able to do some tasks (see Appendix G, Timestamp 10:11.22-11:00.56). He also failed to see the connection between activities for each day. Even though the activities were selected

along a common theme associated with a state standard and the order was chosen specifically for their relationship with each other, he still expressed a belief that the MPD moved from one activity to another with no connection to each other (see Appendix H, Timestamp 42:40-43:28.19).

One of the main suggestions from Tony was that instructional goals needed to be shared with the participants (see Appendix H, Timestamp 44:36-45:48.27). This suggestion for transparency of instructional intent might have stronger benefits than even Tony anticipates since it would help address the issue of participants not seeing the modeling and teacher moves as intentionally chosen with the intent of changing instructional practices.

Overview of Bart's Interviews

Bart has been teaching high school mathematics for four years. Leadership from his district office mandated his participation in the MPD and he expressed resentment for having to participate. One of the presenters of the MPD, Teddy, was the person who voiced the mandate and Bart's resentment was evident in his evaluations of the presentations made by the presenter from his district. Bart's expressions of displeasure with Teddy's presentations were quite evident in his second interview (see Appendix J, Timestamp 0:28.81-1:34.87).

It was curious that Bart qualified for the interviews because his interviews indicated no real change in attitude or instructional behaviors. However, during his second interview (see Appendix J, Timestamp 18:52.19-19:46.15) he did recall positive experiences involving reform-based mathematics instruction from his preservice

university education and he expressed enthusiasm for having learned more mathematics content through participating in the PD. Some of his changed responses on the survey were interesting (see Table 9).

To explain why Bart did not implement the strategies presented in the MPD, questions from the second interview showed that he lacks confidence in providing these types of opportunities for his students because of his feeling of a lack of ability to create tasks that would work. In addition he expressed a lack of confidence in most tasks presented by others (see Appendix J, Timestamp 20:04.52-22:48.08).

Bart vacillated between excitement for learning new mathematics content and resentment for having to participate. His attitude of resentment associated with mandated participation in the MPD might explain why some of his comments were contradictory in nature (see Table 10).

When asked what he would like to see in professional development, Bart stated that he would like to see the tasks modeled the way they would be implemented in an 84-minute block-schedule of classroom instruction. This comment came after he complained that the 84-minute professional development sessions that were too long (see Appendix I, Timestamp 15:55.91–17:38.81).

Other contradictory statements made by Bart defined his preference for discussions over activities and then complaining statements about the discussions in the MPD. One definite change in Bart's instructional practices was the use of technology in the form of graphing applications on his student's cell phones (see Appendix I, Timestamp 27:24.87–28:27.54).

Table 9

Bart's Survey Responses Showing Changes in Attitude or Practice

Survey item	Presurvey response	Postsurvey response
Survey 1		
Importance of developing students' conceptual understanding	Somewhat important	Fairly important
Importance of making connections between mathematics and other disciplines	Somewhat important	Fairly important
Importance of having students work in cooperative groups	Not important	Somewhat important
Importance of having students participate in hands on activities	Not important	Somewhat important
Importance of engaging students in applications of mathematics	Somewhat important	Fairly important
How often do you arrange seating to facilitate student discussions	Never	Rarely (e.g., a few times a year)
How often do you work in cooperative groups	Never	Rarely (e.g., a few times a year)
How often do you engage in hands on activities	Never	Rarely (e.g., a few times a year)
How often do you play mathematical games	Never	Rarely (e.g., a few times a year)
How often do you work on models or simulations	Never	Rarely (e.g., a few times a year)
How often do you work on extended mathematics investigations or projects (a week or more in duration)	Never	Rarely (e.g., a few times a year)
How often do you engage in performance tasks for assessment purposes	Never	Rarely (e.g., a few times a year)
Survey 2		
I like to use mathematics problems that can be solved in many different ways	No	Yes
I regularly have my students work through real-life mathematics problems that are of interest to them	No	Yes
It is not very productive for students to work together in mathematics class	No	Yes

Table 10

Bart's Contradictory Statements Demonstrating Resentment

Location Appendix, timestamp	Statement	Location Appendix, timestamp	Contradiction
I, 8:46.05	Kind of tuned out of the discussion on inverses	I, 10:30.17	Honestly likes having discussions about stuff, likes conversing with other teachers
I, 9:42.69	I remember liking the information you had from Mattos (need to change instructional practices)	I, 17:39.30	Kids are going to lose interest if you do this
I, 10:58.19	That was a positive (activity)	I, 10:58.19	I wouldn't show it to my kids
I, 11:46.06	I get bored looking at other people's work	I, 17:39.30	Would like to see how other people did a task, present their work
I, 12:00.68	Activities were drawn out, sitting there for 20 minutes	I, 15:55.91	My ideal would be to have the instructors have us mimic a classroom where you have an hour and 20 minutes, would like a full day of where you go through three or four lessons.
		Actual structure of course	4 Sessions each day were designed to last 84 minutes, similar to block schedule. Each session was a model of a classroom instructional episode.
I, 19:51.38	I just want to see stuff that challenges me as a teacher, it helps me to be placed in the same position that my students are placed in.	I, 12:00.68	Complains that activities were drawn out, like the pizza activity that required a lot of work The activity was presented with $\pi/15$ instead of $\pi/2$ or other simple ratio to challenge the participants, but would need to be adapted for students
I, 24:36.99	Sure students would get just as bored if he used other instructional strategies every day	J, 18:52.19	Undergraduate experience with reform-based instruction was phenomenal, it was way fun.

It cannot be determined that the MPD was a factor in the use of technology in his classroom. None of the activities presented in the MPD involved graphing apps on cell phones. The graphing done in the MPD was completed with dynamic geometry software. One of his survey responses that showed a change in attitude or practice was concerned with the frequency of engaging students in hands on activities with a presurvey response of "never" to a postsurvey response of "rarely." Bart expressed his impression that the technology presented in the MPD appeared to be mandated. He believed that the presentations were requiring participants to use the same software in the same manner presented in the MPD. He appeared to be proud of himself for having stepped away from what had been presented in the MPD and creating an instructional method of his own, separate and removed from the MPD. His use of the technology was significant to him.

Overview of Cheryl's Interviews

Cheryl has been a secondary mathematics teacher for sixteen years. Her participation in the professional development was prompted by a need to renew her state teaching license rather than any desire fueled by the content of the MPD. She expressed a desire in her first interview (see Appendix K, Timestamp 16:35.82 and 37:01.56) to implement the instructional strategies presented in the professional development, but felt it was not very likely to occur since she is currently teaching at her district's adult high school.

After completing the four days of professional development, she found instructional strategies she felt were appropriate for her teaching assignment. She shared experiences from her implementation of these strategies including the fact she felt she

lost a student because of her questioning strategies (see Appendix L, Timestamp 32:11.94–34:36.97). Rather than just give answers to one of her students, she would ask questions and give prompts to try and engage the student in working the problems for deeper understanding. The student responded by not returning to the program. Although it bothered her that this one student has terminated participation in the program, she continues to implement the questioning strategies because of the success she has witnessed with her other students in reaching better understanding of the mathematics content she is teaching (see Appendix L, Timestamp 32:11.94-33:10.36).

Cheryl defined the most beneficial MPDs she has attended as those where teachers share their successful experiences (see Appendix K, Timestamp 1:14.31). She felt the accountability associated with a requirement for teachers to come prepared to share experiences from implementing strategies would improve the MPD and expressed a desire for more opportunities for participants to share these experiences with each other (see Appendix K, Timestamp 40:04.50 and Appendix L, Timestamp 0:21.23).

Unlike Tony and Bart, Cheryl approached the activities of the MPD looking for ways to implement the strategies for her students (see Appendix K, Timestamp 7:14.71) even though the content was not what she was teaching her students. Although the activity might not fit her students' needs exactly, she did not view them as totally without value. She also recognized the modeling that took place in the MPD. Her lens was focused on her students, a very different view than that held by Tony and Bart whose lenses were focused more on themselves (see Appendix G, Timestamp 35:17.01, Appendix H, Timestamp 12:12:33 Appendix I, Timestamp 19:51.38 and 28:37.84).

Overview of Bethany's Interviews

Bethany has 9 years' experience in teaching secondary mathematics at the high school level. Her participation in the professional development was not mandated, but there was explicit pressure from her district office for her school's department to participate. Bethany was one of the most outspoken participants during each of the four days of the MPD. Her frequent questions and comments during the MPD demonstrated that she was not afraid to question the practices and procedures presented in the professional development and she was quick to offer her opinion during the whole group discussions. Her comments were not negative nor were they intended as attacks on the instruction provided.

Her participation in the MPD was regarded as very positive by most of the presenters but was viewed as a distraction by one presenter. During her first interview (see Appendix M), Bethany expressed a desire to implement reform-based instruction more but was determined to do so only if successful methods could be determined first (see Appendix M, Timestamp 13:00.93-14:17.70 and 23:35.14-23:54.95). Bethany was very excited about participating in the interview process because she felt a need to share some of her experiences that were both very positive for her and also those that were very negative (see Appendix N, Timestamp 36:35.58-37:12.15). Her expressed desire in her reply email accepting the invitation to the interview process was to help improve professional development opportunities in the future.

Common Themes Encountered in the Interviews

To analyze the interviews, the data were coded with NVivo, a software package used in qualitative data analysis intended to be used with small or large volumes of text data. Common themes were identified using content analysis including time, respect, discussions, activities, and mathematics content (see Appendix F). One of the biggest themes that surfaced in the interviews was the idea that learning objectives of the MPD needed to be more explicitly shared with participants.

All four participants expressed a belief that explicitly shared learning targets in the MPD would improve the experience for participants as shown in Table 11. In addition to the explicit statements requesting shared objectives, several of the comments about participants' reflections hinted that activities would have been better with more explicit instructions, anticipated learning outcomes, or instrucitional objectives. What they were requesting can be summarized as learning targets.

Moss and Brookhart (2012) identified a difference between learning targets and instructional objectives. Learning targets have five key components, first, they precisely describe what the students are going to learn in the lesson; second, they are explicitly presented in language that students can understand; third, they must be framed from the students' persepective; fourth, they must be connected with specific performances of understanding that provide evidence of mastery; and finally, they must include descriptive criteria that can be used by the students in self evaluation of their progress towards completing the learning target. Instructional objectives define what the teacher is going to present and the instructional strategies that will be used to accomplish learning

Table 11

References to Requests for Explicit Learning Targets

Participant	Appendix	Timestamp
Tony	H	32:15.93
Tony	H	33:16.48
Tony	H	44:36.28
Tony	H	45:06.88
Bart	I	19:00.86
Bart	I	19:30.04
Cheryl	L	8:00.10
Cheryl	L	8:45.34
Bethany	M	25:31.25
Bethany	N	7:24.15
Bethany	N	8:12.90

targets. In reviewing the comments generated in the interviews, it is apparent that implementation of Learning Targets would be viewed as a positive change in future MPD.

This difference was noted in the interviews as another common theme that simply modeling an instructional strategy was not sufficient for participants to realize they were being provided an example. In addition to explicitly identifying the learning targets for each session, there seemed to be a need to explicitly identify the content and instructional strategies that were being presented and an explanation of their purpose.

Other themes that surfaced in the interviews included the need to treat participants as professionals as shown in Table 12. Part of the participant's definition of professional treatment included the recognition that MPD participants are professionals who bring

Table 12

References to Attributes of Professional Treatment

Participant	Appendix: Timestamp	Comment
Tony	G: 33:46.56-34:23.14	Felt treated as professional through presentation of content
Tony	H: 46:00.02-46:39.94	Requested more opportunities for participants to share experiences in small groups
Bart	J: 26:56.35-27:38.72	Improve PD by having participants help each other out
Cheryl	K: 1:14.31-1:22.85	Best PD's are those that provide participants opportunities to share expertise
Cheryl	L: 5:57.25-6:12.06	Allow participants to take an activity, adapt it and then share with colleagues
Bethany	M: 25:31.25-26:37.07	Did not feel treated as professional by some comments from a presenter.

experience to the MPD and this experience needs to be more than just acknowledged by the presenters. It was suggested that participant experience and knowledge should be sought out and utilized in the professional development process. It was further suggested that providing MPD participants the opportunity to share their experiences and suggestions with colleagues would improve MPD.

There was no single phenomenon that could be attributed to causing changes in participants' attitudes. However, as participants discussed their reflections of the MPD, their enthusiasm for particular aspects could be noted as well as their disdain for other aspects of the MPD.

For Tony and Bart, the group discussions were the stronger parts of the MPD that excited them (see Appendix I, Timestamp 22:19.29–23:09.23 and Appendix G,

Timestamp 18:16.94–19:24.25) while Cheryl and Behtany expressed greater excitement for the hands-on activities. The hands on activities were seen as a waste of time by Bart even though his excitement was evident when he discussed his past experiences with hands on activities during his undergraduate education (see Appendix J, Timestamp 9:23.23–11:14.82). Tony, Cheryl, and Bethany identified time waiting for transitions between activities as one detrimental aspect of the MPD experience (see Appendix H, Timestamp 43:28.67–44:28.01, Appendix K, Timestamp 15:15.65–15:51.66, and Appendix M, Timestamp 3:22.70–3:58.59).

Bethany and Cheryl both seemed to approach the MPD posessing a lens that sought ways to involve their students in the activities (see Appendix L, Timestamp 17:06.98–17:56.70 and Appendix N, Timestamp 11:28.77–12:29.63). This focus on how to improve sessions of the MPD in order to meet the needs of their students allowed them to see the activities as possible instructional strategies for their students. If they felt the presentation of the activity was not exactly right for their students, they actively sought entry points for their students and attempted to find adaptations in order to meet their students' needs. Contrarily, Bart and Tony approached the MPD with a teacher lens. Their participation was motivated by the question, "What's in this for me?" While they approached the MPD with this lens, they still evaluated the value of the MPD by measruing the ability of the activity to make them a better teacher.

For Bart, the mandate to participate in the MPD seemed to be a huge block to seeing the MPD as valuable (see Appendix I, Timestamp 1:38.71-2:06.60; Appendix I, Timestamp 12.00.68-12.39.02; Appendix J, Timestamp 2:01.94-2:41.68). He was able to

participate in the activities at a higher level when the presenter was not the person who required him to attend the MPD. For the other three participants, any tie between their participation in the activities and the presenter was soley based on the interaction with the presenter. Bethany did not appreciate the consistent condesencion she percieved from one presenter. Bethany participated well with the other three presenters because she felt their interaction with her was more collegial and therefore more professional.

Unique Perspectives and Themes

Both Tony and Bart expressed positive feelings for their own previous undergraduate experiences in reform-based mathematics instructional opportunities but the sociomathematical norms within their own classrooms were not aligned for the implementation of those activities. When addressing the issue of making students responsible for their own learning, Tony stated in his second interview (see Appendix H, Timestamp 23:30.92-25:26.86) that he felt his students had a disposition to wait for him to tell them an answer rather than trying to figure it out on their own. And he expressed remorse about this aspect of his teaching.

At first, Bethany felt pressured to attend the MPD but her enthusiasm for what was presented overshadowed those initial feelings. Any feelings of resentment came from the instruction of one presenter and even these feelings of resentment did not disuade her from seeking entry points to the activities for her students. Bethany appreciated the opportunity to participate in the interview process. She viewed this opportunity as a collegial interaction to improve future MPD experiences (see Appendix N, Timestamp 36:35.58–38:13.34).

Cheryl's initial participation in the MPD was because of a need for credits to renew her teaching license. She became motivated to seek entry points for her students to participate in the presented activities. Unlike Bethany, Cheryl did not have feelings of resentment. Cheryl felt that she had been treated professionally throughout the MPD.

Tony was pressured to participate in the MPD but did not feel initial resentment for that pressure. He did express that he did not participate in the MPD to improve his understanding of teaching, his motivation to participate was driven by a desire to learn what curriculum materials could be used in his classroom (see Appendix H, Timestamp 11:45.20–12:50.15). His previous undergraduate experience with reform-based mathematics instruction was positive and he possessed desires to implement this form of instruction in his classroom (see Appendix G, Timestamp 1:25.76–2:11.91). His participation in the MPD created some level of feelings of guilt for not implementing this type of instruction in his class but he covered up these feelings with explanations about trying to survive his first year of teaching (see Appendix G, Timestamp 17:19.48–18:04.47). However, the guilt was not sufficient motivation to change his instructional practices due mainly to his instructional team back in his school (see Appendix G, Timestamp 15:09.13–16:58.70). He was the new teacher among several experienced teachers and he did not press the issue with them even though he really wanted to try the activities with his students. He protected his position by stating that his students were not ready for activities (see Appendix G, Timestamp 15:09.13–16:03.07). This appears to insulate him against his desires to implement since he did not seek alternative entry points similar to Bethany or Cheryl.

Bart was mandated to participate in the MPD and held strong feelings of resentment for participating in the MPD. He particularly harbored negative feelings towards one of the presenters because the presenter was also the district official that issued the mandate. These feelings of resentment were never really overcome by Bart. Although he participated in the activities and was seen to be enjoying himself during the participation. His interview clearly demonstrated his continued negative feelings for the experience. His lack of desire to share the activities with his students did not need insulation like Tony. His feelings of resentment served as a deterent against any desire to implement the provided strategies of the MPD. The most positive expressions from Bart were that he learned mathematical content that challenged him and thereby made him a better teacher (see Appendix I, Timestamp 19:51.38 –22:18.68).

Relating Themes to the Framework

The list of themes from the interviews includes time, respect, discussions, activities, mathematics content, explicit instruction, anticipated learning outcomes or instructional objectives, teacher knowledge and access points for student inclusion. All four major components of MPD identified by the framework are represented in this list of themes from the interviews. The themes of time, respect, and explicit instructions belong to sociomathematical norms. Student readiness to learn would include the themes of anticipated learning outcomes and access points for student inclusion. Discussions and activities are elements of the proper-tiered instruction domain and teacher content and pedagogical knowledge would include the themes of discussions, activities, mathematics content and teacher knowledge.

Answering the Research Questions

The first research question of this study was, "Can teachers with initially poor attitudes about MPD gain positive attitudes in one or more of the four areas of MPD through mandated participation in MPD?" Positive gains in teacher attitudes were identified for all four areas of MPD. There were 34 positive changes in responses between the presurvey and postsurvey of Survey 1 associated with sociomathematical norms (see Table 13). Six changes were identified between the presurvey and postsurvey concerning sociomathematical norms (see Table 14). Nineteen changes between the presurvey and the postsurvey were found for the MPD area of teacher knowledge (see Table 15). The fourth area of MPD, proper-tiered instruction, had 23 positive changes in responses between the presurvey and the postsurvey (see Table 16).

These results might indicate a greater variety of responses (15 different responses) that displayed a positive change in teacher attitudes in the MPD area of sociomathematical norms than in the other three areas of MPD. The area of student readiness to learn had the least variety of responses indicating a positive change in teacher attitude with only three different responses showing a positive change. These results show that teachers with initially poor attitudes about MPD can gain positive attitudes in any one of the four areas through mandated participation. With 13 items from Survey 1 showing a positive change in teacher attitude concerning sociomathematical norms and 29 respondents produces 435 total possible responses for this area of MPD. Taking 81 responses from the presurvey that were initially the highest possible response left a possible $N = 354$ responses for this area that have the possibility of showing

Table 13

Evidence of Positive Change in Area of Sociomathematical Norms

Changes in sociomathematical norms	Number of changes in responses
Students generally learn mathematics best in a class with students of similar abilities	1
Importance of having students work in cooperative groups	5
Importance of having students participate in hands on activities	3
Importance of performance based assessment	3
Teacher is prepared to have students participate in hands on activities	1
Teacher is prepared to engage students in inquiry oriented activities	1
Teacher is prepared to manage a class of students engaged in hands on or project based work	2
Teacher is prepared to help students take responsibility for their own learning	2
Teacher prepared to encourage students' interest in mathematics	2
Teacher is prepared to encourage student's interest in mathematics	2
Teacher is prepared to involve parents in the mathematics education of their children	2
Arrange seating to facilitate student discussions	2
Encourages participation in student led discussions	2
Has students work in cooperative groups	4
Have students share ideas or solve problems with each other in small groups	2
Total number of positive changes	34

N = 354.

Table 14

Evidence of Positive Change in Area of Student Readiness to Learn

Changes in student readiness to learn	Number of changes in responses
Importance of developing students' conceptual understanding	3
Importance of taking student prior knowledge into planning instruction	1
Teacher prepared to make connections with mathematics to other disciplines	2
Total number of positive changes	6

N = 56.

Table 15

Evidence of Positive Change in Area of Teacher Knowledge

Changes in student readiness to learn	Number of changes in responses
I am well informed about the Utah Core Standards for the courses I teach	1
Importance of engaging students in inquiry oriented activities	3
Importance of having students prepare projects/ labs/ research reports	3
Importance of engaging students in applications of mathematics	4
Teacher prepared to have students participate in hands on activities	1
Teacher prepared to use performance based assessment	2
Teacher prepared to teach geometry and spatial sense	1
Teacher prepared to teach oral and written communication skills	2
Seeks time to work with other teachers	2
Total number of positive changes	19

N = 214.

Table 16

Evidence of Positive Change in Area of Proper-Tiered Instruction

Changes in student readiness to learn	Number of changes in responses
Use open ended questions	1
Teacher is prepared to recognize and respond to student diversity	1
Engages students in hands on mathematical activities	4
Has students play mathematical games	1
Has students design or implement their own investigation	2
Has students work on models or simulations	4
Has students work on extended mathematics investigations or projects	4
Has students record, represent and/or analyze data	2
Engages students in performance tasks for assessment purposes	4
Total number of positive changes	23

N = 272.

positive change. There were 34 total positive changes for this area of MPD.

With only three items in Survey 1 addressing student readiness to learn and 29 respondents to the presurvey and postsurvey, there were 87 possible responses for this area of MPD. Eliminating the 31 responses in the presurvey with responses that could not measure positive growth because they were already at the extreme left 56 possible responses that would be able to show positive change in teacher attitudes.

The MPD area of teacher knowledge was addressed by nine questions in Survey 1. In all, 261 responses were generated for this area of MPD. After eliminating the 47 responses that could not show positive growth due to their representing the extreme position left 214 possible responses to show positive change in teacher attitude for teacher knowledge.

The final area of MPD to evaluate is proper-tiered instruction. There were 10 questions addressing proper-tiered instruction, providing 290 responses to evaluate teacher attitude. Proper-tiered instruction had the fewest presurvey responses eliminated due to the responses already meeting the maximum possible response with 18 responses of the 290 being eliminated leaving, 272 possible responses to show positive change between the presurvey and the postsurvey.

Evaluation of the data identified eight participants as having a positive change in attitude towards mathematics instruction via the pre- and postsurveys. Through the interview process, it was possible to verify that although resentment towards the MPD continued to exist, positive changes in attitudes towards mathematics instruction associated with the four areas of MPD were identified.

Tony's change in attitude towards mathematics instruction was associated with the MPD area of teacher content and pedagogical knowledge. He expressed interest in redesigning his curriculum in the future to match his experience in the MPD because he learned the content better through this form of instruction (see Appendix G, Timestamp 12:41.34-13:23.55). Tony incorporated the lesson on radian measure in his classroom as one example of acting on his desire to change his instruction (see Appendix G, Timestamp 18:16.94-19:24.25). In Tony's opinion, the MPD could have focused more on the area of environment, specifically an environment that facilitates student engagement (see Appendix H, Timestamp 8:04.55-8:51.59).

Bart held the most resentment towards the MPD because of his mandated participation as evidenced by the combination his contradictory and negative statements. However, even with a strong resentment, he expressed improved content knowledge (see Appendix I, Timestamp 9:42-10:57.70) associated with some of the activities and the discussions. Bart remembered his favorable preservice college experience with reform-based mathematics instruction and expressed a desire to implement instructional strategies that would get students to participate in discussions (see Appendix I, Timestamp 19:51.38-23:09.23), but he doubted his own ability to create such tasks and further expressed a lack of confidence in many others' abilities to create such tasks (see Appendix J, Timestamp 20:04.52-21:37.47).

Cheryl really accepted the proper-tiered instruction area of MPD even though she expressed concern that she may have lost a student due to her implementation of proper questioning techniques when helping students with RtI (see Appendix L, Timestamp

32:11.94-33:10.36). Cheryl also expressed a change in attitude toward student readiness to learn when she said, “the students you get are the students you get” (see Appendix K, Timestamp 30:36.92-31:57.03) but went on to say that discussing the students’ readiness and searching for different teaching methods was an important teacher task (see Appendix K, Timestamp 30:36.92-32:45.61).

Bethany mentioned that she did implement several of the tasks and the associated strategies presented in the MPD (see Appendix M, Timestamp 13:00.93-14:17.70). She recognized the instructional strategies as an improvement on her previous teaching methods and expressed a desire to implement this pedagogy more in the future (see Appendix N, Timestamp 16:39.51-17:55.84).

The second research question asks, “If a change in teacher attitude is identified, can phenomenon associated with that change be categorized within one or more of the four areas of MPD?” It was possible to identify specific changes in attitudes for each of the four participants that were interviewed. It was even possible to verify that each of the four areas of MPD were addressed in these changes, but phenomena associated with these changes were not found. The second question remains unanswered since the results of this study could not identify a single phenomenon associated with the identified changes in attitude; there can be no categorization of phenomena. That does not mean that phenomena do not exist. A common theme of treating the participants professionally was indicated via the interviews, but this phenomenon predicted a negative change in attitude rather than a positive one.

CHAPTER V

DISCUSSION

The data gathered from the surveys showed the existence of changes in attitudes of participants who were either mandated to attend the PD or felt pressured to participate. However, the data from the interviews did not reveal a single phenomenon associated with those changes. The study is able to therefore answer the first research question in the affirmative. Teachers with initially poor attitudes can gain positive attitudes in one or more of the four areas of MPD through participation in mandated MPD.

While the second research question remained unanswered, what was revealed was the need to protect participants from obstructive feelings of resentment. Each participant interviewed expressed feelings of resentment in some form. These feelings had different causes and were linked to different aspects of the framework. The level of each participant's ability to overcome these feelings had an impact on their ability to implement the strategies presented in the MPD.

Bart's impediments were based on his strong negative feelings generated toward Teddy as a presenter because Teddy was the district official who issued the mandate to attend the MPD (see Appendix J, Timestamp 0:28.81-1:13.60; 2:01.94-2:41.68). This impediment was so great that Bart's participation was nonexistent when Teddy presented and his participation was minimal in activities led by other presenters. Bart's highest engagement occurred on the day that Teddy was not present.

Bart's complaints about the sessions led by Teddy appear baseless when examined against the evidence. He suggested that the material presented by Teddy

appeared to be something thought up during Teddy's morning shower when the evidence of preparation spoke against this position. Teddy's presentations included a practice assessment requiring the creation of an example classroom with individual participant access to the state's assessment program. In addition to this preparation, Teddy also presented on cooperative learning opportunities with cooperative production software and presented various examples of documents, forms, presentations and spreadsheets with completed examples for each. These examples were not merely existent documents pulled up at the last minute, but were examples created specifically for the MPD session addressing specific topics addressed in the MPD. These examples required extensive preparation that was ignored by Bart in his evaluation. The tone of voice Bart used to describe Teddy's sessions was another indicator of an obstructive attitude.

Bethany exhibited resentment toward Celeste's presentations because she perceived an attitude of superiority exhibited by Celeste towards the participants (see Appendix M, Timestamp 16:54.19-17:59.62). Bethany's perception of Celeste's lack of respect and condescension were particularly bothersome to Bethany but were not as obstructive to Tony or Cheryl and Bart expressed a great deal of respect for Celeste's opinion.

The problem lies in the fact that there was not a single connecting factor between the obstructive feelings expressed by Bart and those expressed by Bethany. Bart began his participation in the MPD with resentment due to the mandate to participate. Bethany developed a sense of resentment during sessions of the MPD. While it is reasonable to anticipate some participants will arrive with obstructive feelings due to a mandate to

participate, it becomes difficult to anticipate exactly what might trigger a sense of these feelings among the participants during their participation. However, it is worth an effort to examine possible sources of obstructive sentiments as they pertain to the areas of focus of MPD found in the framework (see Figure 1). An examination of these obstructive blocks within each of the areas of the MPD will be explored in this discussion. The importance of each interlocking focus area to the success of the MPD is significant. An obstructive sentiment in any one of the four areas could weaken an ability to affect change in other focus areas.

Obstacles to Teacher Content and Pedagogical Knowledge

Teacher content and pedagogical knowledge is the one focus area where feelings of resentment can be developed quickly. Teacher knowledge is the very essence of who the teachers are. They describe themselves by the content they teach. “I am an elementary teacher.” Or “I am a high school math teacher.” The very title of teacher implies the ability to teach, a professional owning deliberate pedagogical skills and distinct content knowledge. MPD designed to improve a participant’s content or pedagogical knowledge could be seen as a personal attack on the participant’s very identity if it is presented in an attitude of trying to “fix” the participating teacher. A better approach would promote an effort to “improve” rather than “fix.” Everyone can benefit from improvement. You only fix something that is broken, implying a sense of lost value until the fix is completed.

Feelings of resentment discovered in this study were associated with a perception that participants were not being valued as professionals, and that their pedagogical skills

and content knowledge were being ignored. Bethany even mentioned that she felt like she was being treated as an imbecile at times (see Appendix M, Timestamp 16:54.19-17:59.62). It is important for developers of MPD to remember that their participants do not arrive at the training without valuable experience and expertise. They are not broken; they are there to improve an existing base of content and pedagogical knowledge. Tapping into their current content and pedagogical knowledge can help eliminate a perception that they are there to be fixed. Tony and Cheryl expressed a desire for opportunities to share thoughts and strategies among the other participants (see Appendix G, Timestamp 26:50.56, Appendix L, Timestamp 0:21.23). They correctly perceive themselves as possible contributors to the process of improving content and pedagogical knowledge.

It is important to remember that developers of MPD do not hold all the answers. They sometimes merely hold the right questions and need to provide the opportunities for participants to address them. It is also important that MPD developers remember that none of the participants arrive with flawless content knowledge or perfect pedagogical skills. There is a need for MPD because participating teachers need an opportunity to improve their content knowledge base, hone currently possessed skills, and acquire new skills. Many participants become uncomfortable in situations where they encounter deficits in content knowledge and many employ defense mechanism when facing facts about limitations in their pedagogical practices.

Simply being aware of these possible contributors to feelings of resentment will not eliminate them from MPD opportunities, but using that awareness to develop MPD

can improve engagement rates of participants. Employing inclusive strategies that tap into the abilities and talents of the participants is not the only tool that can be used to avoid feelings of resentment, but it is an important one.

Obstacles to Sociomathematical Norms

Sociomathematical norms are a focus area that could easily be neglected by developers of MPD. Many PD opportunities are created without ever addressing sociomathematical norms in an explicit way. Attention to sociomathematical norms is capable of guarding against actions that might ignite obstructive feelings by creating a learning environment that addresses the needs of the participants. The developers of the MPD associated with this study did not address anticipated sociomathematical norms for the MPD until their third planning meeting and then two of the presenters did not understand what the term "sociomathematical norms" meant or what its purpose was. Just because MPD developers anticipate certain behaviors or a particular learning climate to exist does not mean they will. Sociomathematical norms that approach the actions of participants as valued additions to the MPD experience can help to minimize resentful sentiments.

The interviews for this study surfaced some sociomathematical norms for the MPD that participants viewed as both beneficial and necessary. Bethany expressed a desire for norms that supported inclusion of collegial engagement, where participants are viewed as professionals with expertise and insights as equally valuable as any shared by the presenters. Cheryl expressed a desire for opportunities of collaboration among

participants. Tony enjoyed the opportunities for discussion among colleagues from other buildings. Bart and Bethany both saw a need for norms that valued their time away from their students. They spoke of a need to improve transition time between sessions and activities.

Obstacles to Proper Tiered Instruction

One of the primary aspects of proper-tiered instruction is the tenant that the teacher is responsible for the success of the instruction. For good Tier 1 instruction to exist, a large majority of the class must successfully meet the intended learning target. If a large majority of the students did not reach the learning target, the fault lies with the teacher, not the students. MPD that approaches this concept must be aware of the natural tendency of participants to raise defense mechanisms associated as a response to the message that the teacher is at fault. At the same time, in order for MPD to improve Tier 1 instruction, teachers must be aware of their responsibility pertaining to the instruction and their inability to pass the blame to their students.

Bart and Tony both claimed that their students were not ready for the activities presented in the MPD associated with this study. This is one way that participants might address this issue. They will simply not employ the teaching strategies and thereby avoid the possibility that their instruction was not appropriate for their students. Bethany and Cheryl approached the strategies and tasks from the MPD looking for entry points, ways that their students might benefit from the activities shared in the MPD.

It could prove beneficial for developers of MPD to realize that some participants

do not naturally seek entry points to activities and strategies presented in the MPD. An important sociomathematical norm for MPD would include the expectation that participants would seek these entry points. Further, developers of MPD should create opportunities for participants to share these entry points as well as set the sociomathematical norms of expected participation during these opportunities. The resentment expressed by the participants was not as explicitly vocalized as seen in the focus area of teacher knowledge. It did manifest itself when participants stated, "When am I ever going to use this with my students?" they could be asking how to properly implement the activity in Tier 1 instruction. Cheryl, Bethany, and Tony wanted evidence of how the tasks could be used with a regular classroom while Bart simply stated his lack of belief in the strategies because the persons presenting were not seen by him as having enough experience to be able to speak to the efficacy of the presented tasks for a regular mathematics class.

Obstacles in Student Readiness to Learn

It is possible that resentful feelings could be stirred when instruction of the MPD bluntly places blame for unsuccessful instruction upon the teacher and not on the student. The instructional approach must be crafted in a way that does not appear to simply place blame, but instead presents suggestions for addressing unsuccessful instruction. Also, emphasis on anticipated student moves and teacher responses based on assessment of student readiness can help the instructional process as teachers learn to diagnose their students' progress on the learning cycle.

The instruction in MPD concerning an emphasis of student progress on the learning cycle needs to be more explicit. Unfortunately, the instruction for student readiness to learn in the MPD associated with this study did not provide the explicit purpose of the instruction. In their interviews, Tony and Bart shared their belief that their students were not ready for the activities and strategies presented in the MPD. Both also spoke positively about their own involvement and the level of enjoyment experienced in the teaching strategies presented in the MPD but neither of them really grasped the intent of the instruction of the fourth day in defining student readiness to learn.

Cheryl and Bethany also identified that the activities and strategies might not be appropriate for their students, but they sought entry points for their students. Their entry points were defined by their understanding of the evaluation strategies of student progress on the learning cycle. This implementation was evidence of an intrinsic student lens found lacking in Tony and Bart. The study might suggest a more explicit approach to this area of focus to help those lacking this lens.

Future Research Possibilities

Tony, Bart, and Cheryl did not realize that the modeling presented in the MPD was deliberately chosen with the intent of helping participants see new instructional approaches. During the interview process, Cheryl became cognizant of the deliberate nature of the teacher moves and mentioned that she approached the MPD looking for entry points for her students. Bethany stated that she could clearly see the crafting of the modeling that took place in the MPD. This suggests that not all participants realized the

method being presented was intentional with specific designs worked out for specific learning goals.

It would be interesting to see how many participants saw the instructional approach as purposeful and intentional. It would also be interesting to explore whether or not an understanding of the purpose behind the modeling encourages greater changes in teacher attitudes or not. This would require a quantifying of the changes in teachers' attitudes that this study did not explore.

The participants in the interviews suggested a necessity for a more explicit approach to the modeling of instructional practices as well as an explicit description of changes that are made to activities in MPD to meet the needs of an audience consisting of teachers. It would be worthwhile to explore the attitudes of participants who complete a MPD model that emphasized the instructional moves and motives explicitly to the participants. It might even be beneficial to compare the attitudes of participants who experience both forms of MPD, one that explicitly identifies teacher moves, instructional objectives and learning targets and one where the teacher moves and modeling is presented in a traditional manner with the expectation that teachers would realize the purpose of the modeling.

Even more important is the apparent need to explicitly identify the intended learning objectives for each of the four focus areas identified in the framework. While participants might recognize and even anticipate that they are going to be presented with content and pedagogical knowledge during the MPD, they may not be as aware of the other three focus areas of MPD. Participants should be provided with explicit intended

learning targets within each of the other domains of MPD. Future research could address the impact of a more explicit approach to each of the focus areas of MPD.

Conclusions

In answer to the first research question of this study, yes it is possible for teachers with initially poor attitudes about MPD to gain positive attitudes in one or more of the four focus areas of MPD even when mandated to participate. Bart is an example of a teacher who experienced a change in attitude about using technology in the classroom (see Appendix J, Timestamp 27:24.87) and began thinking positively about the use of task-based instruction as evidenced by his self-evaluation during his second interview (see Appendix J, Timestamp 14:41.45-15:07.48). He still did not implement the strategies of the MPD and expressed that he probably would not use them in the future partly because he felt that time would factor into his ability to implement the strategies and an added belief that quality tasks for inquiry based instruction were hard to create. He further believed that only a select group of individuals were capable of creating such tasks (see Appendix J, Timestamp 21:44.75).

The second research question concerning an ability to categorizing phenomena associated with changes in teachers' attitudes was not answered by this study. Although changes in attitudes were discovered, no phenomena could be identified. Instead, what were found were possible barriers to successful MPD associated with obstructive attitudes that were either generated during the MPD or were pre-existent to the MPD.

The result of this study was the formation of additional questions. Are participants

aware of their obstructive attitudes? Do these obstructive attitudes prevent participants from changing necessary lenses in MPD? Can MPD developers create opportunities for participants to eliminate obstructive attitudes? Which of the four areas of focus found in the MPD Framework are most affected by obstructive attitudes? Is there an area of focus in the MPD Framework that is more frequently affected by obstructive attitudes?

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APPENDICES

Appendix A

Informed Consent

Informed Consent

PHENOMENA ASSOCIATED WITH TEACHERS' CHANGES IN BELIEF OR PERCEPTIONS OF MATHEMATICS INSTRUCTION ATTRIBUTABLE TO PARTICIPATION IN MATHEMATICS PROFESSIONAL DEVELOPMENT

Dear Secondary Mathematics Teacher:

I am a graduate student in the Doctoral Program in the School of Teacher Education and Leadership at Utah State University. I invite you to participate in a research project about the experience of professional educators participating in professional development in mathematics. I am interested in exploring your experiences as a participant in the four-day professional development experience you completed during this academic school year.

Your participation would include being interviewed twice for 45 minutes to an hour each time. A third interview of the same length may be added if it seems necessary after the first two interviews.

Participation in this research study may involve some added risks or discomforts. These include a possibility that you may be vulnerable to someone determining who you are and what you have said, but I will protect you from this possibility as much as possible.

Information gained from this study may indirectly benefit you through improved professional development opportunities in the future. Another benefit for you might be greater insight into how participation in professional development can improve your classroom instruction.

Your participation in this research is entirely voluntary. I will give you a hard copy of the transcript of each of your interviews. You will be able to make any changes you want to the transcript. You have the right to withdraw from the study any time up until July 30th of 2014. At that point, I will be in the final stages of the writing process and will not be able to remove quotations from the document. You may be withdrawn from this study without your consent by the investigator.

Research records will be kept confidential, consistent with federal and state regulations. The sharing of the data will be restricted to my dissertation committee and other appropriate members of the Utah State University community. To protect your privacy, personal, identifiable information will be removed from study documents and replaced with a study identifier. Identifying information will be stored separately from data and will be kept until the dissertation is complete. The dissertation that results from this work will be published in hard copy housed in the Merrill-Cazier Library on USU's Logan campus.

The Institutional Review Board for the protection of human participants at Utah

State University has approved this research study. If you have questions or concerns about your rights or a research-related injury and would like to contact someone other than the research team, you may contact the IRB Administrator at (435) 797-0567 or email irb@usu.edu to obtain information or to offer input.

You have been given two copies of this Informed Consent. Please sign both copies and keep one for your files.

I appreciate you giving time to this study, which will help me learn more about the effect of participating in secondary mathematics professional development. If you have any questions, please feel free to contact me at 801.362.2652 or by email at ront@provo.edu. You may also contact my committee chairperson, Dr. Amy Brown at amy.brown@usu.edu.

Thank you

Ron Twitchell

I certify that the research study has been explained to the individual, by me or my research staff, and that the individual understands the nature and purpose, the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered.

_____

Ronald A. Twitchell
Principal Investigator
801.362.2652
ront@provo.edu

By signing below, I agree to participate.

_____ _____

Participant's signature Date

Dear Secondary Mathematics Teacher:

This letter is to inform you that data collected by Provo City School District from the pre- and postsurveys associated with the Secondary Math 3 professional development course you completed during the 2013-2014 school year will be accessed for a research study. Dr. Amy Brown in the Department of Teacher Education and Leadership at Utah State University will lead the research study to explore participant experiences in mathematics professional development associated with changes in attitudes toward mathematics instruction. Because you participated in the professional development, data you submitted could be used in this study. You may opt out of the study by contacting Ron Twitchell at Provo City School District by phone at 801-362-2652 or by email at ront@provo.edu by May 1, 2014. You may also contact Ron Twitchell or Dr. Amy Brown at amy.brown@usu.edu if you have any questions concerning this study.

Your participation in this research is entirely voluntary. If you agree to allow your survey results to be used in this research study, the data from your presurvey and postsurvey associated with the professional development will be included in the evaluation and reporting of this study.

Participation in this research study may involve some added risks or discomforts. These include a possibility that you may be vulnerable to someone determining who you are and what you have said, but you will be protected from this possibility as much as possible.

Information gained from this study may indirectly benefit you through improved professional development opportunities in the future. Another benefit for you might be greater insight into how participation in professional development can improve your classroom instruction.

There are no costs to participate in the study, nor is there any compensation for your participation.

Research records will be kept confidential, consistent with federal and state regulations. School administrators will not know whether or not you participate in the study. The sharing of the data will be restricted to Ron Twitchell's dissertation committee and other appropriate members of the Utah State University community. To protect your privacy, personal, identifiable information will be removed from study documents and replaced with a study identifier. Identifying information will be stored separately from data and will be kept until the dissertation is complete. All interview recordings will be destroyed upon completion of the study. The dissertation that results from this work will be published in hard copy housed in the Merrill-Cazier Library on USU's Logan campus.

The Institutional Review Board for the protection of human participants at Utah State University has approved this research study. If you have any questions or concerns about your rights or a research-related injury and would like to contact someone other than the research team, you may contact the IRB Administrator at (435) 797-0567 or email irb@usu.edu to obtain information or to offer input.

Appendix B

Adapted 2006 Local Systemic Change though Teacher Enhancement 2006

Teacher Questionnaire Survey 1

Adapted 2006 Local Systemic Change though Teacher Enhancement 2006
Teacher Questionnaire Survey 1

A. Teacher Opinions and Preparedness

1. Please provide your opinion about each of the following statements (Choose one per line)

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
a. Students generally learn mathematics best in classes with students of similar abilities	(1)	(2)	(3)	(4)	(5)
b. I feel supported by colleagues to try out new ideas in teaching mathematics	(1)	(2)	(3)	(4)	(5)
c. Mathematics teachers in my school have a shared vision of effective math instruction	(1)	(2)	(3)	(4)	(5)
d. Mathematics teachers in my school regularly share ideas and materials related to math	(1)	(2)	(3)	(4)	(5)
e. Mathematics teachers in my school are well-supplied with materials for investigative math instruction.	(1)	(2)	(3)	(4)	(5)
f. I have time during the regular school week to work with my peers on mathematics curriculum and instruction.	(1)	(2)	(3)	(4)	(5)
g. I have adequate access to calculators for teaching mathematics	(1)	(2)	(3)	(4)	(5)
h. I have adequate access to computer for teaching mathematics	(1)	(2)	(3)	(4)	(5)
i. I enjoy teaching mathematics	(1)	(2)	(3)	(4)	(5)
j. I am well-informed about the Utah Core standards for the courses I teach.	(1)	(2)	(3)	(4)	(5)
k. The mathematics program in my school is strongly supported by local organizations, institutions, and/or buisinesses.	(1)	(2)	(3)	(4)	(5)

2a. Please rate each of the following in terms of its IMPORTANCE for effective mathematics instruction.

	Not Important	Somewhat Important	Fairly Important	Very Important
a. Provide concrete experiences before abstract concepts.	(1)	(2)	(3)	(4)
b. Develop student's conceptual understanding of the subject.	(1)	(2)	(3)	(4)
c. Take students' prior understanding of subject matter into account when planning curriculum and instruction.	(1)	(2)	(3)	(4)
d. Make connections to other disciplines.	(1)	(2)	(3)	(4)
e. Have students work in cooperative learning groups.	(1)	(2)	(3)	(4)
f. Have students participate in appropriate hands-on activities.	(1)	(2)	(3)	(4)

2a. Continued.

	Not Important	Somewhat Important	Fairly Important	Very Important
g. Engage students in inquiry-oriented activities	(1)	(2)	(3)	(4)
h. Use calculators.	(1)	(2)	(3)	(4)
i. Use computers.	(1)	(2)	(3)	(4)
j. Engage students in applications of subject matter in a variety of contexts.	(1)	(2)	(3)	(4)
k. Use performance-based assessment.	(1)	(2)	(3)	(4)
l. Use portfolios.	(1)	(2)	(3)	(4)
m. Use informal questioning to assess student understanding.	(1)	(2)	(3)	(4)

2b. Please rate each of the following in terms of your PREPARATION for each.

	Not Important	Somewhat Important	Fairly Important	Very Important
a. Provide concrete experiences before abstract concepts.	(1)	(2)	(3)	(4)
b. Develop student's conceptual understanding of the subject.	(1)	(2)	(3)	(4)
c. Take students' prior understanding of subject matter into account when planning curriculum and instruction.	(1)	(2)	(3)	(4)
d. Make connections to other disciplines.	(1)	(2)	(3)	(4)
e. Have students work in cooperative learning groups.	(1)	(2)	(3)	(4)
f. Have students participate in appropriate hands-on activities.	(1)	(2)	(3)	(4)
g. Engage students in inquiry-oriented activities	(1)	(2)	(3)	(4)
h. Use calculators.	(1)	(2)	(3)	(4)
i. Use computers.	(1)	(2)	(3)	(4)
j. Engage students in applications of subject matter in a variety of contexts.	(1)	(2)	(3)	(4)
k. Use performance-based assessment.	(1)	(2)	(3)	(4)
l. Use portfolios.	(1)	(2)	(3)	(4)
m. Use informal questioning to assess student understanding.	(1)	(2)	(3)	(4)

3. My principal: (choose one for each line)

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
a. Encourages me to select mathematics instructional strategies that address individual students' learning	(1)	(2)	(3)	(4)	(5)
b. Accepts the noise that comes with an interactive classroom	(1)	(2)	(3)	(4)	(5)
c. Encourages the implementation of current national standards in math ed	(1)	(2)	(3)	(4)	(5)

3. continued

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
d. Encourages innovative instructional practices	(1)	(2)	(3)	(4)	(5)
e. Enhances the math program by providing me with needed materials and equipment	(1)	(2)	(3)	(4)	(5)
f. Provides time for teachers to meet and share ideas with one another	(1)	(2)	(3)	(4)	(5)
g. Encourages me to observe exemplary mathematics teachers	(1)	(2)	(3)	(4)	(5)
h. Encourages teachers to make connection across disciplines	(1)	(2)	(3)	(4)	(5)
i. Acts as a buffer between teachers and external pressures (e.g., parents)	(1)	(2)	(3)	(4)	(5)

4. Are you the mathematics department chair for your school? (choose one)

( ) No, continue with question 5
( ) Yes, skip to question 6
( ) Our school does not have a mathematics chair, skip to question 6.

5. My department chair: (choose one per line)

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
a. Encourages me to select mathematics instructional strategies that address individual students' learning	(1)	(2)	(3)	(4)	(5)
b. Accepts the noise that comes with an interactive classroom	(1)	(2)	(3)	(4)	(5)
c. Encourages the implementation of current national standards in math ed	(1)	(2)	(3)	(4)	(5)
d. Encourages innovative instructional practices	(1)	(2)	(3)	(4)	(5)
e. Enhances the math program by providing me with needed materials and equipment	(1)	(2)	(3)	(4)	(5)
f. Provides time for teachers to meet and share ideas with one another	(1)	(2)	(3)	(4)	(5)
g. Encourages me to observe exemplary mathematics teachers	(1)	(2)	(3)	(4)	(5)
h. Encourages teachers to make connections across disciplines	(1)	(2)	(3)	(4)	(5)

6. Many teachers feel better prepared to teach some mathematics topics than others. How well prepared do you feel to teach each of the following topics at the grade levels you teach, whether or not they are currently included in your curriculum? (Choose one per line)

	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
a. Estimation	(1)	(2)	(3)	(4)
b. Measurement	(1)	(2)	(3)	(4)
c. Pre-algebra	(1)	(2)	(3)	(4)

6. Continued

	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
d. Algebra	(1)	(2)	(3)	(4)
e. Patterns and relationships	(1)	(2)	(3)	(4)
f. Geometry and spatial sense	(1)	(2)	(3)	(4)
g. Functions (including trigonometric) and Pre calculus	(1)	(2)	(3)	(4)
h. Data collection and analysis	(1)	(2)	(3)	(4)
i. Probability	(1)	(2)	(3)	(4)
j. Statistics (e.g., hypothesis tests, curve fitting, regression)	(1)	(2)	(3)	(4)
k. Topics from discrete math (e.g.,combinatorics, recursion)	(1)	(2)	(3)	(4)
l. Mathematical structures (e.g., vector space, rings, fields)	(1)	(2)	(3)	(4)
m. Calculus	(1)	(2)	(3)	(4)
n. Technology (calculators, computers) in support of math	(1)	(2)	(3)	(4)

7. Within the arena of mathematical processes, many teachers feel better prepared to guide and help develop student learning in some domains than others. How well prepared do you feel to provide guidance in the following, at the grade levels you teach? (Choose one per line)

	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
a. Problem solving	(1)	(2)	(3)	(4)
b. Reasoning and proof	(1)	(2)	(3)	(4)
c. Communication (written and oral)				
d. Connections within mathematics and from mathematics to other disciplines	(1)	(2)	(3)	(4)
e. Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric)	(1)	(2)	(3)	(4)

8. Please indicate how well prepared you feel to do each of the following (choose one per line)

	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
a. Lead a class of students using investigative strategies	(1)	(2)	(3)	(4)
b. Manage a class of students engaged in hands-on/ project-based work	(1)	(2)	(3)	(4)
c. Help students take responsibility for their own work	(1)	(2)	(3)	(4)
d. Recognize and respond to student diversity	(1)	(2)	(3)	(4)
e. Encourage students' interest in mathematics	(1)	(2)	(3)	(4)
f. Use strategies that specifically encourage participation of females and minorities in mathematics	(1)	(2)	(3)	(4)
g. Involve parents in the mathematics education of their children	(1)	(2)	(3)	(4)

9. Please rate the effect of each of the following on mathematics instruction in your school. (choose one for each line)

	Inhibits effective instruction		Neutral or mixed		Encourages effective instruction
a. State and/or district curriculum frameworks.	(1)	(2)	(3)	(4)	(5)
b. State and/or district testing policies and practices.	(1)	(2)	(3)	(4)	(5)
c. District/school grading policies and practices.	(1)	(2)	(3)	(4)	(5)
d. District/school structures for recognizing and rewarding teachers.	(1)	(2)	(3)	(4)	(5)
e. Counseling department policies and practices.	(1)	(2)	(3)	(4)	(5)
f. College placement tests.	(1)	(2)	(3)	(4)	(5)
g. Quality of available instructional materials.	(1)	(2)	(3)	(4)	(5)
h. Access to calculators for mathematics instruction.	(1)	(2)	(3)	(4)	(5)
i. Access to computers for mathematics instruction.					
j. Time available for teachers to plan and prepare lessons	(1)	(2)	(3)	(4)	(5)
k. Time available for teachers to work with other teachers	(1)	(2)	(3)	(4)	(5)
l. Time available for teacher professional development	(1)	(2)	(3)	(4)	(5)
m. Importance that the school places on math	(1)	(2)	(3)	(4)	(5)
n. Consistency of mathematics reform efforts with other school/district reforms	(1)	(2)	(3)	(4)	(5)
o. Public attitude toward reform	(1)	(2)	(3)	(4)	(5)

10. How many of your students' parents do each of the following? (Choose one per line)

	None	A Few		About ½		Almost All
a. Volunteer to assist with class activities	(0)	(1)	(2)	(3)	(4)	(5)
b. Donate money or materials for classroom instruction	(0)	(1)	(2)	(3)	(4)	(5)
c. Attend parent-teacher conferences	(0)	(1)	(2)	(3)	(4)	(5)
d. Attend school activities such as PTA meetings and Family Math nights	(0)	(1)	(2)	(3)	(4)	(5)
e. Voice support for the use of an investigative approach to mathematics instruction	(0)	(1)	(2)	(3)	(4)	(5)
f. Voice support for traditional approaches to mathematics instruction	(0)	(1)	(2)	(3)	(4)	(5)

B. Your Mathematics Teaching

11. About how often do you do each of the following in your mathematics instruction in this class? (Choose one per line)

	Never	Rarely (a few times a year	Sometimes (once or twice a month	Often (once or twice a week	Almost all lessons
a. Introduce content through formal presentations	(1)	(2)	(3)	(4)	(5)
b. Arrange seating to facilitate student discussion	(1)	(2)	(3)	(4)	(5)
c. Use open-ended questions	(1)	(2)	(3)	(4)	(5)
d. Require students to explain their reasoning when giving an answer	(1)	(2)	(3)	(4)	(5)
e. Encourage students to communicate mathematically	(1)	(2)	(3)	(4)	(5)
f. Encourage students to use multiple representations	(1)	(2)	(3)	(4)	(5)
g. Encourage students to explore alternative methods for solutions	(1)	(2)	(3)	(4)	(5)
h. Allow students to work at their own pace	(1)	(2)	(3)	(4)	(5)
i. Help students see connections between mathematics and other disciplines	(1)	(2)	(3)	(4)	(5)
j. Use assessment to find out what students know before or during a unit	(1)	(2)	(3)	(4)	(5)
k. Embed assessment in regular class activities	(1)	(2)	(3)	(4)	(5)
l. Assign mathematics homework	(1)	(2)	(3)	(4)	(5)
m. Read or comment on the reflections students have written in their notebooks or journals	(1)	(2)	(3)	(4)	(5)

12. About how often do students in this class take part in each of the following types of activities as part of their mathematics instruction? (Choose one per line)

	Never	Rarely (a few times a year	Sometimes (once or twice a month	Often (once or twice a week	Almost all lessons
a. Participate in student-led discussions	(1)	(2)	(3)	(4)	(5)
b. Participate in discussions with the teacher to further mathematical understanding	(1)	(2)	(3)	(4)	(5)
c. Work in cooperative groups	(1)	(2)	(3)	(4)	(5)
d. Make formal presentations to the class	(1)	(2)	(3)	(4)	(5)

12. Continued

	Never	Rarely (a few times a year	Sometimes (once or twice a month	Often (once or twice a week	Almost all lessons
e. Read from a mathematics textbook in class	(1)	(2)	(3)	(4)	(5)
f. Read other (non-textbook) mathematics-related materials in class	(1)	(2)	(3)	(4)	(5)
g. Practice routine computations/ algorithms	(1)	(2)	(3)	(4)	(5)
h. Review homework/worksheet assignments	(1)	(2)	(3)	(4)	(5)
i. Use mathematical concepts to interpret and solve word problems	(1)	(2)	(3)	(4)	(5)
j. Work on solving a real-world problem	(1)	(2)	(3)	(4)	(5)
k. Share ideas or solve problems with each other in small groups	(1)	(2)	(3)	(4)	(5)
l. Engage in hands-on mathematical activities	(1)	(2)	(3)	(4)	(5)
m. Play math games	(1)	(2)	(3)	(4)	(5)
n. Follow specific instructions in an activity or investigation	(1)	(2)	(3)	(4)	(5)
o. Design or implement their own investigation	(1)	(2)	(3)	(4)	(5)
p. Work on models or simulations	(1)	(2)	(3)	(4)	(5)
q. Work on extended mathematics investigations or projects (a week or more in duration)	(1)	(2)	(3)	(4)	(5)
r. Participate in field work	(1)	(2)	(3)	(4)	(5)
s. Record, represent and/or analyze data	(1)	(2)	(3)	(4)	(5)
t. Write a description of a plan, procedure or problem solving process	(1)	(2)	(3)	(4)	(5)
u. Write reflections in a notebook or journal	(1)	(2)	(3)	(4)	(5)
v. Use calculators or computers for learning or practicing skills	(1)	(2)	(3)	(4)	(5)
w. Use calculators or computers to develop conceptual understanding	(1)	(2)	(3)	(4)	(5)
x. Use calculators or computers as a tool (e.g., spreadsheets, data analysis)	(1)	(2)	(3)	(4)	(5)
y. Work on portfolios	(1)	(2)	(3)	(4)	(5)
z. Take shor-answer tests (e.g., multiple choice, true/false)	(1)	(2)	(3)	(4)	(5)

12. Continued

	Never	Rarely (a few times a year	Sometimes (once or twice a month	Often (once or twice a week	Almost all lessons
aa. Take tests requiring open-ended responses (e.g. descriptions, justifications of solutions)	(1)	(2)	(3)	(4)	(5)
bb. Engage in performance tasks for assessment purposes	(1)	(2)	(3)	(4)	(5)

Appendix C

Self-Report Survey

Self-Report Survey

Teacher Name _____

Please mark Yes or No for each item.

Item 1:

I like to use math problems that can be solved in many different ways. **(Yes)** **(No)**

Item 2:

I regularly have my students work through real-life math problems that are of interest to them. **(Yes)** **(No)**

Item 3:

When two students solve the same math problem correctly using two different strategies I have them share the steps they went through with each other. **(Yes)** **(No)**

Item 4:

I tend to integrate multiple strands of mathematics within a single Unit. **(Yes)** **(No)**

Item 5:

I often learn from my students because my students come up with ingenious ways of solving problems that I have never thought of. **(Yes)** **(No)**

Item 6:

It is not very productive for students to work together in math class. **(Yes)** **(No)**

Item 7:

Every child in my room should feel that mathematics is something he/she can do. **(Yes)** **(No)**

Item 8:

I integrate math assessment into most math activities. **(Yes)** **(No)**

Item 9:

In my classes, students learn math best when they can work together to discover mathematical ideas. **(Yes)** **(No)**

Item 10:

I encourage students to use manipulatives to explain their mathematical ideas to other students. **(Yes)** **(No)**

Item 11:

When students are working on math problems, I put more emphasis on getting the correct answer than on the process followed. **(Yes)** **(No)**

Item 12:

Creating rubrics for math is a worthwhile assessment strategy. **(Yes)** **(No)**

Item 13:

In my class it is just as important for students to learn data management and probability as it is to learn multiplication facts. **(Yes)** **(No)**

Item 14:
I don't necessarily answer students' math questions but rather let them puzzle things out for themselves. **(Yes)** **(No)**

Item 15:
A lot of things in math must simply be accepted as true and remembered. **(Yes)** **(No)**

Item 16:
I like my students to master basic mathematical operations before they tackle complex problems. **(Yes)** **(No)**

Item 17:
I teach students how to explain their mathematical ideas. **(Yes)** **(No)**

Item 18:
Using computers to solve math problems distracts students from learning basic math skills. **(Yes)** **(No)**

Item 19:
If students use calculators they won't master the basic math skills they need to know. **(Yes)** **(No)**

Item 20:
You have to study math for a long time before you see how useful it is. **(Yes)** **(No)**

Appendix D

Interview Protocol

Interview Protocol

Interview 1 (approximately 45 minutes long)

1. How long have you taught secondary mathematics?
2. How long have you been at your current school?
3. What is your experience with professional development?
4. What makes a professional development experience good for you?
5. Do you like to participate in professional development?
6. Do you typically find professional development to be helpful to you? If so how, if not, why?
7. What typically motivates you to attend professional development opportunities?
8. Was your participation in the professional development voluntary or mandatory?

You have recently completed a four-day professional development for secondary math 3. Before we start this next part, could you make sure you have a pencil and paper ready? I would like you to jot down notes as we discuss the professional development experience you recently completed.

9. Let me review quickly the concepts discussed in each day.

   The first day was in October and the morning was spent on two areas of emphasis: 1)polynomial functions and 2) concavity. Celeste led an activity designed to challenge perceptions of polynomial functions with the vase activity and provide a discussion about concavity and the height of water in a vase. I then led an activity to further explore concavity associated with walking the graph using CBRs. In the afternoon, Marsha presented an activity with repeated roots and Geogebra's polynomial division and we finished with Celeste's presentation of inverse functions.

   The second day was in November. We started the morning with a discussion of the SAGE assessment item types led by Teddy, I then led an activity on practice standard #2 (reason abstractly and quantitatively), and practice standard #3 (construct viable arguments and critique the reasoning of others). Teachers brought sample student work to illustrate these practice standards. The first afternoon session was led by Celeste exploring logarithms with an emphasis on constraints, common student errors and asymptotes. Marsha then led an activity on the application of logs with the melting snowman activity.

   I started Day 3 with a pizza activity to discuss angle measure v linear perspective of arc length and radians. Celeste then led an activity to further the discussion of angle measure v linear perspective of arc length. I led the first afternoon session on trig functions building on the work we did with the pizzas and Celeste finished the afternoon with inverse trig functions.

I presented the entire Day 4. Starting with the need for changing instructional approaches and Mike Mattos information including the 3-tiered model of instruction. I then introduced the CMI framework and a look at the difference in student thinking at each of three cycles with an emphasis on student readiness to learn. We then practiced writing launches for develop understanding and solidifying understanding with activities from S.ID.4 and two activities 1) SAT math scores and 2) should we send out a certificate. Participants were assigned to place their launces on the wiki page.
As we discuss these four days, please be frank and honest in your replies. Do not worry about offending me with your responses. The purpose of this work is to improve future professional development.

10. As you heard me review the topics from each day, what were some of your thoughts and reflections?
11. What were some of your favorite memories from the professional development?
12. Why were these activities more favorable to you?
13. What were some of your least favorite memories from the professional development?
14. Why were these activities less favorable to you?
15. Have you attempted any of the activities presented in the professional development in your own classes, why or why not?
16. Did anything presented in the four days of professional development have an impact on your classroom instruction?
17. Why did that impact you or why did it not impact you?
18. During the four days of professional development, we focused our efforts on four key areas. Would you please write these down as I list them: 1) increasing teacher content and pedagogical knowledge, 2) improving learning environments and sociomathematical norms, 3) Proper tiered instruction with an emphasis on tier 1 instruction, and 4) student readiness to learn.
19. What aspects of the professional development would you suggest we keep for future professional development opportunities?
20. What aspects of the professional development you recently completed need to be dropped in order to improve future professional development opportunities?
21. What are some topics you would like to see addressed in future professional development?

Interview 2 (approximately 45 minutes long)

1. Before I start with my questions, is there anything you would like to share concerning thoughts you may have had since our last interview?
2. I am going to review a few reform-based mathematics instructional strategies and would like you to consider four questions regarding each: 1) what is your evaluation of your current practice regarding the strategy listed; 2) what is your desire for future implementation of the strategy; 3) did the professional development address the strategy; and 4) did the professional development prompt you to want to implement the strategy more than your current practice?
    a. have students work in cooperative groups
    b. have students participate in hands on activities
    c. engage students in inquiry-oriented activities
    d. use performance-based assessment
    e. use informal questioning to assess student understanding
    f. help students take responsibility for their own learning
    g. provide a concrete experience before abstract concepts
    h. use computers
    i. arrange seating to facilitate student discussion
    j. use open-ended questions
    k. require students to explain their reasoning when giving an answer
    l. encourage students to explore alternative methods for solutions
    m. share ideas to solve problems with each other in small groups
    n. work on models or simulations

Other questions were generated by individual responses from the first interview.

Appendix E

Dates and Topics for Three-Day Professional Development

Dates and Topics for the Three Days of Professional Development

All topics are associated with the new Secondary Math III course being implemented for the first time in the state this year.

Day 1 October 2013

Session 1: Polynomial Functions and Concavity-Volume of water in vase
Session 2: Constraints for functions-Nonlinear functions with motion detectors
Session 3: Repeated roots and polynomial division-Geogebra Activty
Session 4: Inverse Functions-f(y) versus f(x) Discussion

Day 2 November 2013

Session 1: State End of Level Testing-Exploration of Sage Assessment Environment
Session 2: Practice standards 2 and 3-Sample Student Work
Session 3: Logarithms, Constraints, Reasonableness, and Common Errors Discussion
Session 4: Applications of logarithms-Melting Snowman Activity

Day 3 February 19, 2014

Session 1: Angle Measure versus Linear Measure-Pizza Activity
Session 2: Continued work with Angle Measure-Fly on the Fan Activity
Session 3: Trigonometric Functions and Unit Circle-Geogebra Activity
Session 4: Inverse trigonometry functions – Discussion

Day 4 April 23, 2014

Session 1: Need to Change Mathematics Instruction-Proper Tiered Instruction
Session 2: Student Readiness to Learn-CMI Framework
Session 3: Developing versus Solidifying Understanding-SAT Scores Activity
Session 4: Standard SID4, Statistics and Data Analysis-Send a Certificate? Activity

Appendix F

Preliminary List of Categories to Be Used For the Axial Coding of the Qualitative Data

Preliminary List of Categories to Be Used For the Axial Coding of the Qualitative Data

Terms associated with teacher motivation
Attitude
Belief or believe
Perception
View
Opinion
Want or desire
Required
Happy
Excited
Nervous
Sad
Disappointed

Terms associated with four focus areas of MPD

Teacher content and pedagogical knowledge
- Know
- Understand
- Instructional strategy
- Method
- Learned
- Found
- Presented
- Discovered

learning environment
- set up
- norms
- expectations
- organize
- form
- designed
- classroom
- environment

proper-tiered instruction and response to intervention
- instruction
- respond
- taught
- intervention
- verify understanding
- assessment

student readiness to learn

discussion
questions
engaged
participate

Appendix G

Transcript of Tony Interview 1

Transcript of Tony Interview 1

Interview 1, May 13, 2014
3:00 pm

Speaker	Timestamp	Transcript
Interviewer:	0:00.00- 0:04.13	*I really appreciate you taking some time to help me with this. You are really helping me out a great deal.*
Tony:	0:04.13- 0:04.99	Uh huh
Interviewer:	0:04.99- 0:15.77	*I want you to know that as I ask you questions about professional development, especially about the four days we recently completed, please feel free to be brutally honest about your experience and your observations. You are not going to hurt my feelings. I had my feelings removed when I became a high school teacher.*
Tony:	0:15.77- 0:20.85	I hear you there. (chuckles)
Interviewer:	0:20.85- 0:55.05	*I am looking for ways to improve professional development. The worst thing I can do is waste a teacher's time in professional development by taking them out of the classroom, when they could have been with their kids. So that is my motivation.* *Just a couple of preliminary questions. First of all, how long have you been teaching secondary mathematics?*
Tony:	0:55.05- 0:58.84	Ah, just one year, this is my very first year.
Interviewer:	0:58.84- 0:59.95	*This is your first year, how is it going?*
Tony:	0:59.95- 1:24.08	Ah it has been a roller coaster ride (chuckles). Umm, In some ways it feels like I have been just scrambling to put lessons together one day ahead of the kids this year. Umm and so there's been some, some struggles but there's also been some really fun days as well. I have enjoyed teaching math this year, so, yeah a roller coaster ride. (chuckles)
Interviewer:	1:24.08- 1:25.76	*Has it been what you thought it would be?*
Tony:	1:25.76- 2:11.91	Uhh, in some ways yes, in other ways not so much, I guess. Umm, I don't know. I came out from BYU hoping to do a lot of engaging inquiry based instruction and found that the amount of time and resources and support necessary to support that kind of instruction was not here my very first year of teaching. It would take me some years to gradually develop those materials and develop those lessons and develop those structures that enable me to teach that way, so its been kind of a more of a traditional experience this year I would say. Teaching. Which wasn't bad, it kind of gave me an idea of what first year teachers experience. Umm yeah so it was good to go through.
Interviewer:	2:11.91- 2:19.47	*Well, that's good. So was this your first professional development experience, or have you had others during the year?*
Tony:	2:19.47- 2:28.19	Uhh . . . This was the only one for this year, um, I guess, I, so yeah this is the only one I have had this year. Yeah this is really the only professional development I've had, so . . .

Speaker	Timestamp	Transcript
Interviewer:	2:28.19-2:33.52	*So you did not have any professional development for your early year enhancement?*
Tony:	2:33.52-2:34.69	No
Interviewer:	2:34.69-2:45.61	*Does your district provide those opportunities for you so that you can get your level 2 license at the end of your first three years of teaching?*
Tony:	2:45.61-2:47.49	Um, I assume so , but I am not sure. Like, what kind of things are you referring to? I am not that familiar with the whole process.
Interviewer:	2:47.49-3:09.68	*Well, aah, when you get ready to relicense at the end of the first three years, you want to have a certain number of credits or points. You have to have 100 points at the end of your first three years. So what we did with you would represent 32 points for the 32 hours of professional development over 4 days. That works toward your recertification.*
Tony:	3:09.68-3:10.89	Gotch ya.
Interviewer:	3:10.89-3:34.60	*Umm, It shows you are working towards improvement. Some things they have you do are to cover some needs they may have in the district, maybe like ESL endorsement work. Usually the district identifies their needs and then has you take instruction toward those needs, and that helps you get recertified at the end of those first three years.*
Tony:	3:34.60-3:42.30	Gotch ya, We've had an iPad technology training. That would count I assume. And other things like suicide prevention and a couple of other trainings. I haven't gone to all of those. . . but . . . It seems they have offered 3 or 4 things through out the year so . . .
Interviewer:	3:42.30-3:59.82	*OK, um, so what has your experience been like with those activities?*
Tony:	3:59.82-4:23.90	Umm, with the iPad training, that was at the very beginning of the year. That was useful to kind of see how, . . . what I liked was meeting with other teachers and seeing what apps they use and see how they like to use them, rather than just monkeying around and trying and trying to do it on my own. So, . . . just sharing with peers about how to use their iPads was helpful for me there.
Interviewer:	4:23.90-4:27.95	*Um, do you look forward to participating in professional development in the future?*
Tony:	4:27.95-4:40.61	Yeah, I aah, I love professional developments, umm, my plans are actually, to um this next year I'm going to um, I have been accepted into a doctorate program up at the University of Wisconsin in Madison.
Interviewer:	4:40.61-4:41.57	*Oh, wow*
Tony:	4:41.57-4:56.53	So, I aah, I guess that is a really big professional development in a way (chuckles) so aah, yeah, I hope to participate if not only teach future professional developments so I find them very valuable.
Interviewer:	4:56.53-5:01.57	*So that doctoral program, is it in math education or leadership?*

Speaker	Timestamp	Transcript
Tony:	5:01.57-5:07.96	It is math education. A research heavy, research based degree, so . . .
Interviewer:	5:07.96-5:11.14	*You have a lot of fun ahead of you.*
Tony:	5:11.14-5:21.71	I know (chuckles) . . . a big dissertation . . . .uhh . . . yeah
Interviewer:	5:21.71-5:32.31	*What I would like to do real quick is review the four days of professional development we recently completed together. So if you would like to jot these down to help jog you memory of the experience we had together.*
Tony:	5:32.31-5:34.11	Right
Interviewer:	5:34.11-5:52.06	*Let me review quickly the concepts discussed in each day. (Tony takes out a paper and pencil and is ready to take notes)* *On the first day back in October, we spent the morning on two areas of emphasis: first, we explored polynomial functions and then concavity. Celeste led an activity designed to challenge perceptions of polynomial functions with the vase activity to provide a discussion about concavity and the height of water in a vase. I then led an activity to further explore concavity associated with walking the graph using CBRs. In the afternoon, Marsha__ presented an activity with repeated roots and Geogebra's polynomial division and we finished with Celeste's presentation of inverse functions.* *I wait as Tony finishes writing a few notes.*
Tony	5:52.06-5:55.29	Uhh huh . . . I remember that . . . yeah
Interviewer	5:55.29-6:27.61	*The second day was in November. We started the morning with a discussion of the SAGE assessment item types led by Teddy__, I then led an activity on practice standard #2 (reason abstractly and quantitatively), and practice standard #3 (construct viable arguments and critique the reasoning of others). Teachers brought sample student work to illustrate these practice standards. The first afternoon session was led by Celeste exploring logarithms with an emphasis on constraints, common student errors and asymptotes. Umm, Marsha then led an activity on the application of logs with the melting snowman activity.* *Interviewer waits as Tony finishes writing a few notes.* *I started Day 3 with a pizza activity to discuss angle measure v linear perspective of arc length and radians.*
Tony	6:27.61-6:30.02	I remember that one, uhh huh . . .
Interviewer:	6:30.02-8:09.31	*Umm, Celeste then led an activity to further the discussion of angle measure v linear perspective of arc length. I led, aah, the first afternoon session on trig functions building on the work we did with the pizzas and Celeste finished the afternoon with inverse trig functions that day.*

Speaker	Timestamp	Transcript
		Interviewer waits as Tony finishes writing a few notes.
Tony:	8:09.31-8:12.48	And wasn't that trig functions with Geogebra?
Interviewer:	8:12.48-8:12.92	*Yes*
Tony:	8:12.92-8:12.92	Yeah, ok, I remember that. I don't remember much about that inverse functions, err, oh wait a minute, or was that the day with the fly on the fan?
Interviewer:	8:12.92-8:24.86	*Yes, the fly on the fan activity.*
Tony:	8:24.86-8:26.29	Ok . . . got it.
Interviewer:	8:26.29-8:34.41	*I wait as Tony finishes writing a few notes.* *The fourth day that you recently just survived was a really long day since I presented the entire Day 4 by myself because my colleagues were called away unexpectedly for other job related responsibilities.*
Tony:	8:34.41-8:35.72	Uh huh. (chuckles)
Interviewer:	8:35.72-9:58.88	*This was a day that was more heavily traditional instruction since I needed to present concepts and vocabulary associated with the CMI model, umm, that were new to most participants. I started by explaining the need for changing instructional approaches and Mike Mattos information including the 3 tiered model of instruction. I then introduced the CMI framework and a look at the difference in student thinking at each of three cycles with an emphasis on student readiness to learn. We then practiced writing launches for develop understanding and solidifying understanding with activities from the S.ID.4 standard and two activities first SAT math scores and then should we send out a certificate. Participants were assigned to place their launces on the wiki page.* *And, aah, as I, umm, went through these four days, what were some of your thoughts as you reviewed these things from the professional development. What were the ah ha's, uh oh's, and um's that you thought about.*
Tony:	9:58.88-10:10.36	OK, just, um, so you're just kind of asking what's my recollection about things I found valuable and remember more clearly versus things that I don't remember as clearly? Or found to be not as valuable? Something like that?
Interviewer:	10:10.36-10:11.22	*Yes*
Tony:	10:11.22-11:00.56	OK, sure, umm . . . , on the first day, I remember the vase activity and that one stuck out to me because I had seen this problem almost exactly like that or similar to that in my undergrad experience and I felt it was a really meaningful and valuable type of problem to get students to just reason about co-variation and about quantities. . . and understand how a function is you know, a bit . . . can you see, umm, . . . how umm, . . . the amount of water depends on the height of the vase and how those connect

Speaker	Timestamp	Transcript
		together so I really like that activity, however, almost everyone else at my table found it . . . they felt that it would be too difficult for our students and they didn't find value in it and so we never implemented it in our schools or anything. I think it is a really neat problem, but we didn't do anything else with it, which was really kind of too bad
Interviewer:	11:00.56-11:02.83	*Oh*
Tony:	11:02.83-11:27.27	Umm, lets see . . . the concavity part, I do remember the motion detectors in the gym, and my thought on that was, it was kind of fun to play with those, but I don't remember ever taking away a good learning objective from that task. I wasn't sure what we were supposed to look for from that one other than these machines are cool and they might be fun to use in our classroom. (Chuckles)
Interviewer:	11:27.27-11:27.91	*OK*
Tony:	11:27.91-12:04.62	Umm, and then I do remember Marsha's repeated roots thing, showing us how to do those on the calculator, umm, by doing long division on the TI calculators. Umm, on our iPads, we had them on our iPads. And I think she showed us them on Geogebra as well, a few different technologies. And I kind of felt like, I wouldn't have my students do long, ahh, do division of polynomials on the calculators. Umm, but that, ... aah, yeah, I don't know. I don't really remember my thoughts on that, I guess umm, . . . we didn't really apply that either in our classrooms.
Interviewer:	12:04.62-12:04.96	*Ok*
Tony:	12:04.96-12.15.62	Umm, lets see . . . and then that first day. Celeste, . . . inverse functions, let me think what that was . . .
Interviewer:	12.15.62-12:18.27	*This is where they got into an argument about . . .*
Tony:	12:18.27-12:25.14	Ohh, yeah, yeah, whether or not you should switch x and y or leave x and y in place and then solve for x.
Interviewer:	12:25.14-12:25.32	*Right*
Tony:	12:25.32-12.40.56	And then write the equation as a function of y. Yes, I remember that very clearly now. Umm . . . that discussion, umm, the guy that I car pooled with from my school here in umm, Mel Pritchard is his name. He and I discussed that one almost all the way home.
Interviewer:	12.40.56-12:41.30	*Oh really.*
Tony:	12:41.30-13:23.55	At least a big chunk of the way home. We talked a lot about that and we talked about umm . . . yes that approach seems to help students understand it better, but it also is a disconnect with what they are tested on. Cuz on the way they are tested they are not going to see the answer as f(y) = 3 + y, they are going to rechange that y to make it f(x) = 3 + x and we felt like that would be difficult for them. And so even though I felt like that gave me a lot of ideas that I might redesign the curriculum in the future at

Speaker	Timestamp	Transcript
		our school, we didn't do anything with that in our school this year. Which is kind of too bad, but . . . I did feel that I learned from that discussion. I learned mathematics more, . . . uhh, myself, like I understood inverse functions better because of that discussion.
Interviewer:	13:23.55-13:29.25	*Ok, that is good. What about the second day?*
Tony:	13:29.25-13:46.98	Yeah, the second day . . . I liked playing with SAGE. I think as teachers, we were all chomping at the bit, scared and nervous to see what SAGE was like, and we really appreciated getting in, seeing how to log in, seeing what the questions were like. And I felt that like that made, . . . I am actually doing SAGE this week. Just started today.
Interviewer:	13:46.98-13:47.33	*Uh huh*
Tony:	13:47.33-15:07.71	And I didn't feel like it was that hard cuz I had already seen what the software looks like, we had gotten in and played around with it so that was really helpful. Um . . . and in fact a lot of gave practice SAGE tests to our kids. Like Denise Howser came to this training with us, she gave some to her kids as well. So we kind of used that training. It was helpful. Umm . . . and then the practice standards, um . . . and the student work, I do remember a lot of teachers bringing in some neat student work . . . um . . . that we analyzed and honestly, I don't remember how the discussion went as far as looking for the practice standards in that student work, but what I did really like was I saw what tons of other teachers were doing. Sharing their tasks and sharing their homework they were giving. And a lot of them were really cool and I was like, Ohh, I want to so something like this. And I want to do something like that. So that makes me think like maybe having teachers come together and share tasks that they have written or used in their own classroom would be really valuable to continue to do in the future cuz I thought that was super cool to see what everybody else was doing. It kind of got me out of my own little bubble, my own little, . . .here at River High we are this but we are not aware of what's going on elsewhere. So instead of us all recreating the wheel, we could kind of share some things that we're doing.
Interviewer:	15:07.71-15:09.13	*Great*
Tony:	15:09.13-16:03.07	Umm . . .what else from that dat? . . . Logarithms . . . I do remember a pretty nice log task that if I remember was written by . . . I don't remember if Celeste wrote it or Marty Child, whoever the author was, that they had a really nice log task that kind of develops logarithms . . . uhh, we didn't use that this year. We might look at it again and implement it in future years but we just didn't get to it this year. In fact that is kind of a theme for most of the tasks. I feel like we were not ready to use it this year, but maybe we will get back to it and implement it next year or something. . . . umm, And I am not sure why that is, why we felt like we weren't ready to use it, maybe it wasn't aligning with

Speaker	Timestamp	Transcript
		what we had already planned or how we already thought about the mathematics, but . . . ahh, especially in our department, um . . . almost all of our curriculum is written by one teacher.
Interviewer:	16:03.07-16:03.85	*Ohh.*
Tony:	16:03.85-16:23.37	Umm . . . and so we kind of just go with mostly what she does. She does take a little bit of input here and there, but, . . . uh . . . yeah, we haven't uh . . . collaborated so much, . . . it kind of . . . she writes and we take it and so that's made it difficult to implement some of the things we learned this year I think.
Interviewer:	16:23.37-16:23.68	*Was she at the training?*
Tony:	16:23.68-16:58.70	She ahh, yeah she was at the training we were all kind of expected to be there, umm, but she aaahh . . . yeah, I, ahh, she's been teaching for a long time so she already has a lot of materials and already has a lot of set ways of teaching that she is comfortable with so I think . . . especially where our time has been so crunched this year we didn't see a lot of time to explore new ways of teaching. She just kind of wanted to do what she's done in the past and we were just barely keeping our heads above water so we tended to use basically everything she wrote for us as well.
Interviewer:	16:58.70-17:04.78	*Right, A lot of times teachers get into that survivor mode, especially when you have a new core that you are trying to implement.*
Tony:	17:04.78-17:05.75	Yes!
Interviewer:	17:05.75-17:07.75	*Do you have a textbook that you are using?*
Tony:	17:07.75-17:19.03	Ahh . . . Jordan District has a white book that we used off and on. Umm . . . sometimes we were pretty faithful to it, sometimes we departed from it. Ahh most of our assignments were written in Kuta.
Interviewer:	17:19.03-17:19.48	*Oh yeah.*
Tony:	17:19.48-18:04.47	Kuta software. So that's, you know, kind of where we stayed the most at. Mostly drill and kill, traditional (chuckles) . . . the procedures. And you know, kind of as I was telling you earlier, I came in kind of wanting to do a lot of inquiry and a lot of task based teaching, um . . . and so at first, it bothered me the kinds of curriculum materials I was receiving and that we were . . . that most of the other department seemed comfortable using and I was less comfortable with those. . . . As time wore on, and I got exhausted in (chuckles) . . . and I got, you know, just trying to survive the first year. . . I became. . . . I don't love those materials, but I became comfortable using them for this year. Just recognizing that hopefully, in the future we would be able to improve the materials and our curriculum.
Interviewer:	18:04.47-18:07.11	*Well, that's pretty common.*
Tony:	18:07.11-	Mmm mmm (Chuckles)

Speaker	Timestamp	Transcript
	18:10.23	
Interviewer:	18:10.23-18:16.94	*So what about the third day of professional development starting off with the pizza activities with radians and angle measures?*
Tony:	18:16.94-19:24.25	Yeah, ok so I had never really thought about radians the way that it was presented that day, so I learned a lot about radians. I liked that a lot. Uhh, man, that is something that, at least I know and maybe one other person from umm, our school kind of taught it that way. Not really with the task where we handed them the pizza cut outs and let them use the string. But more on the board, we drew the circle on the board and talked about how long was the radius. And if you took the radius around the circle, how many times could it go around the circle and they guessed, . . .oh maybe 5 times or 6 or seven. And it turned out to be a little more than six and then we connected it to the circumference so they could see that its 2π. 2π radiuses go around the circle. And so, then we emphasize that one radius is one radian around the circle. And I haven't really understood radians that well before so I really appreciated that day and that discussion. That helped me teach it in a way that I think made radians less mysterious to our students this year. It just comes from the radius measuring around the circumference of the circle
Interviewer:	19:24.25-19:24.97	*Right*
Tony:	19:24.97-19:45.07	And we kinda looked at how that works no matter what size your circle is. If it is bigger or smaller, the radius gets bigger or smaller with the circle. They kind of saw that, that it . . . uh, one radian will be the same angle measure no matter what your circle was. . . . So that was good. . . .uhh. . . . lets see, what else was that day? Uhh . .
Interviewer:	19:45.07-19:48.28	*This was the day that*
Tony:	19:48.28-19:49.80	Trig functions . . .
Interviewer:	19:49.80-19:52.85	*we had the fly on the fan and . . .*
Tony:	19:52.85-21:15.62	Oh yeah, the fly on the fan.. . . the trig functions . . . I thought that Geogebra document was pretty amazing. It was pretty cool, but I didn't feel ready to give it to students yet. I would have to analyze it and understand it a little bit more myself . . . so umm . . . we as teachers at our table, we were uhh . . . understanding and learning a lot of new things from that because of the way it was organized. We had the unit circle with all these lines drawn and different triangles. And it was pretty significant, difficult work even for me to understand all the ways that you can see sine and cosine, secant and cosecant and tangent in that document. It was kind of big and complex so, . . .I think I would have to do a little more digesting in order to understand that in a way that I can prepare students to lead a discussion with them and analyze that document. So its very . . . its something that I saved and would keep in my library of

Speaker	Timestamp	Transcript
		resources to look at again in the future. And then, the fly on the fan problem. That was also a pretty helpful one. I kind of gave a modified version of that for my classes. . . . uhh when we were developing what sine and cosine looked like. I didn't do that full on task, I kind of borrowed the context of the fly on the fan and we kind of did a whole class all together. Developing the functions using that context. So yeah I used that as well, I liked that.
Interviewer:	21:15.62-21:32.78	*Then I guess we have just the last day to review. It was important to discuss where students are in their learning cycle and their readiness to learn. How did you feel about what was presented that day?*
Tony:	21:32.78-23:29.22	Ahh . . .Yeah . . . lets see . . . so I kind of kept the handouts from that day. That was the most recent day. . . . ummm . . . I hadn't really looked at the CMI framework before so it was helpful to see another, . . . to see a framework of instruction that is a little bit more comprehensive than what I feel like I use. My current first year teacher framework of instruction is ahhh . . . lesson lecture and then work on your homework. Come back the next day, answer homework questions lecture and then do the homework. Umm . . . this gave me ideas about hmm, when the concept is still fragile how can I just launch it initially and get them some access to the problem, and then you know, we develop it a little bit more. Then we solidify it a little bit more after that. So seeing that the instruction doesn't have to be so uniform and umm . . . so homogenous that you can kind of diversify the types of activities and types of instruction that we are doing. . . .So I thought that was interesting . . . and it was useful. I felt like our table struggled to sometimes to actually classify a task as develop or solidify. It felt a little subjective. As well as writing the tasks, we um . . . we struggled to understand what would really distinguish between develop and solidify. Umm I think that packet that was a little more detailed helped. And we analyzed and looked through that and I noticed we spent a lot of time being able to read through those and trying to dissect the bullet points. So I don't know. . . I think the materials were there, but . . . it didn't quite hit home for us at our table. We were kind of lost about the instruction that day kind of applying the instruction to specific tasks, writing them and dissecting them and classifying tasks.
Interviewer:	23:29.22-23:38.04	*OK, but the framework itself seems to kind of resonate with you and the ways of instruction you learned at BYU?*
Tony:	23:38.04-23:49.15	Yeah, it does resonate with what BYU was doing, which I liked . . . In fact I was guessing, was Clifford Hawkins one of the people who contributed to this framework?
Interviewer:	23:49.15-23:50.14	*Yes he is.*
Tony:	23:50.14-23:58.70	That's what I was thinking, ok . . . so . . . (chuckles)
Interviewer:	23:58.70-25:51.06	*We have applied the framework pretty heavily at the elementary level and are just now approaching the introduction to the*

Speaker	Timestamp	Transcript
		secondary level. Typically, the training at the elementary level is a four-day summer workshop with 16 additional training sessions during the school year. So what you received was a very superficial introduction to the concept of where students are in the learning cycle. With the intent of understanding as you said, that student understanding is fragile and we should not just rush into practice when a concept is just being developed. So you were experiencing the develop phase of the learning cycle. *I can tell you that we approached the instruction for the four days of professional development with the intent of addressing four areas. The first is improving content and pedagogical knowledge, another was to improve the classroom environment, where students feel safe to participate and explore and discuss. Another area was the student's readiness to learn which is what we addressed in the last day of the instruction. And the final area was umm, the RTI with an emphasis on proper tiered instruction. As we look at what we did, what are some of the aspects of the professional development, not just the content, but specific aspects of the professional development that we did, that you would recommend we keep, eliminate, or tweak a little bit?*
Tony:	25:51.06-26:49.48	All right, first and foremost, keep breakfast and lunch. They were awesome. (chuckles) yeah, but seriously . . . umm . . . I liked having a mixture of sometimes having us do a hands on activity and other times kind of then having a simple discussion or you know . . . a presentation. We don't need to do an activity for everything but, for some of the most important things, throwing an activity into the mix was nice. I felt like sometimes, our table, we would be working at our table and we would, get a bit lost but maybe we were too shy or a bit embarrassed or what ever to raise our hands to get help so maybe a little more hands on and walking around and engaging with the groups. Umm I felt like, sometimes I felt like we would be working and we would look up and all of the other helpers, all of the other, what do I call you guys, managers? What do I call you?
Interviewer:	26:49.48-26: 50.56	*Just presenters*
Tony:	26: 50.56-	Presenters, there we go. The presenters were just sitting looking at their laptops and sitting down doing their own thing. And the person presenting would be walking around and with such a big group, they would have a hard time getting around to everyone. It wasn't like that all the time, it was just sometimes we would get stuck and we would be a little bit lost. And it wasn't through out the whole thing, most of the time we were ok. If we were a little lost on the task the work would disintegrate . . . and we were kind of just sitting there . . . people started going to their iPad games or (chuckles) I don't know . . . I guess they really didn't do that, it kind of lost the momentum, some of the tasks did, so I'd say some hands on management of the groups . . . ahh, what else was there that I could think of . . . thinking to suggest . . . um . . . . . I guess here's some feedback, before, I came at the beginning, before I knew what to expect, I was

Speaker	Timestamp	Transcript
		expecting a lot more focus on what is the secondary math 3 umm . . . curriculum content and like, here are 10 to 20 different activities and tasks that you could use and so as I look back across the four days, we did get quite a few tasks about some of the main, most important umm . . .concepts from the core, umm . . . but I was expecting a bit more, I guess, just more variety and more tasks that we could take and modify and use in our classrooms. And then kind of building on that, that I already mentioned earlier, but I still think would be a really good idea to have teachers bring materials that they are using and share that with everybody and that kind of creates a nice, a nice way to get a whole bunch of materials all at once for free, so. . . . (chuckles)
Tony:	27:43.87-28:54.96	
Interviewer:	28:54.96-28:56.28	*I understand, yes*
Tony:	28:56.28-29:15.17	Uhhh, lets see, anything else, . .(Long Pause) . . . That's all I can kind of think about now, unless you have any more specific questions
Interviewer:	29:15.17-29:25.70	*Just a couple that came up as you were talking. I took some notes as you responded throughout this interview. And we are almost done.*
Tony:	29:25.70-29:26.76	OK
Interviewer:	29:26.76-29:33.55	*You mentioned the fact that your colleagues didn't want to implement some of the strategies presented in your building.*
Tony:	29:33.55-29:34.60	Uh huh
Interviewer:	29:34.60-29:45.04	*Is there anything that professional development can do to make that change, or is that more within the structure of the school and therefore cannot be approached by professional development?*
Tony:	29:45.04-30:14.65	Uhhh, that's a good question. . . . . I think that there are some things that can be done, but at the same time, you can't totally change the beliefs and systems of a school and of a teacher and for four professional development days. But some things that maybe could help, a lot of times I felt like, uhh . . . the activities that were going on were not resonating with the teachers.
Interviewer:	30:14.65-30:15.27	*OK*
Tony:	30:15.27-30:27.86	Umm and so . . . its kind of the same analogy as we are teaching our math to our students and they are thinking "I would never use this in my real life" and their brains just turn off (chuckles) . . .
Interviewer:	30:27.86-30:29.40	*Yes*
Tony:	30:29.40-31:19.74	I, . . .I noticed just with the discussions I was having with people around me that some of them were already thinking, "when would I ever use this task with my kids?" And as I thought about why their attitude was that way, like I would never use this in my teaching. I was wondering why they were hadn't . . . thinking

Speaker	Timestamp	Transcript
		that way. The things that came to my mind were perhaps they were thinking the tasks were too difficult for their students because they didn't feel students need to be shown explicit procedures in order to learn mathematics and that when you open up a task that is a little more open and ask students to make, . . . do reasoning and sense making and explore, that they weren't comfortable with their students doing that. . . .Umm . . . and so it's a comfort level that would cause them to feel emotionally alienated or they don't even want to try these activities with their own students . . . Umm, what else?
Interviewer:	31:19.74-31:37.34	*Along those same lines, you were talking about the collaboration or the lack of it in your own building. What could we do in professional development to break that ice burg up and get more collaboration involved?*
Tony:	31:37.34-33:46.56	That's a great, that's a great question. Maybe . . . maybe, do one thing, that you could do, is have us design a task together during that day, like ask us to work on something and uh . . . then not just pass it along and say "here you go, if you can think of a way to use this then great, if not there's no accountability" maybe actually ask, "make a task" and make it important enough that we have to do it before a certain day before the next time that we come back together. And then when we come back, we talk about how it went in our classrooms and have a kind of debriefing sharing of what were the results using these activities we learned about in our actual classrooms. That might help. And that will kind of force us in our tables to work together to create something we know we are actually going to use. So we have to . . . we actually have to do the collaboration. Its actually forced on us I guess. I think once you force people to collaborate a little bit they will eventually get better and better at it. . . . Umm . . . because, for example in our school, its probably like other schools, we're starting to have times set apart for collaboration. But what that collaboration tends to look like is . . . ahh . . . mmm. . . what day is. . . . just scheduling, when are you teaching what, are we on the same pace and then just trying to make sure that everybody uses the exact same assessments and the exact same assignments. What happens is I feel like, the work is just shared, like I do this assignment and you write this assignment rather than coming together and saying here's the mathematical content and concepts and uhh. . . . what are different strategies for writing tasks or presenting information in ways that would resonate with the students and help them learn. How can we measure whether that was effective and then try and change it for the next year. That's where it needs to get to, but . . . in our infancy of our collaboration, our department we're no where near that. Our collaboration has been more a work sharing, and like, you write this test, I'll write this one and we'll share. That's kind of all our collaboration's been for the most part. Mostly scheduling.
Interviewer:	33:46.56-34:23.14	*Finally, you mentioned the meals and chuckled about it, but one aspect of our professional development was to make sure the*

Speaker	Timestamp	Transcript
		participants were treated as professionals. Is there anything else we could have done to demonstrate this attitude that you are professionals and should be treated as such?
Tony:	34:23.14-34:57.06	Uh, I do . . . I felt that I was treated as a professional. I would imagine that most teachers participating would respond the same way. Particularly, the information was not presented as "oh you are some dumb for not knowing this" and you are all terrible teachers, but rather, we respect the work you are doing as teachers and we are trying to be of help to you. We are trying to serve you. I felt, I really felt that attitude from all of you presenters.
Interviewer:	34:57.06-34:57.87	*Good*
Tony:	34:57.87-35:06.59	So I think that was effective . . . uh . . . yeah I don't, I didn't see any real concerns there . . .
Interviewer:	35:06.59-35:17.01	*Was your participation mandated, or did you come because you wanted to, or did you feel pressured into participating?*
Tony:	35:17.01-36:01.07	Uh . . . in my case . . . when I . . . at first, I was excited about the professional development, umm . . .the other teachers that came with me from my department were willing, but they didn't necessarily really wanting to come. They didn't necessarily jump up and say pick me, pick me . . . um . . but when . . . then they came and said they needed this many teachers . . . then um, we said, yea we can go if you need us to and they said, yes, we need you to, so go. And we said we will, and so we came. I think they liked it. You know, I think that all of the teachers would say some of the things we found really useful . . . a lot of things we felt like we really wouldn't use in our own teaching or it didn't help us become better teachers . . . I don't know what the percentages would be, different teachers would probably say different percentages of how much was helpful and how much was not, but . . . yeah . . .
Interviewer:	36:01.07-36:09.11	*We have set a second interview date already.*
Tony:	36:09.11-36:10.19	Yes.
Interviewer:	36:10.19-36:59.22	*Would you please take some time between now and then to reflect on the four days of instruction of the professional development. You have written the list of the activities for each of the days that you could use to prompt your memory. Please be ready to respond to questions about the four days of our instruction and then also reflect on the things we have discussed today and maybe write down some ideas as they come to you during your reflection. Especially if you think of anything that you really wish you had said. I appreciate your time talking to me and I look forward to speaking with you in a couple of days.*
Tony:	36:59.22-37:05.02	Ok, great, thanks
Interviewer:	37:05.02-37:05.47	*Thank you, I appreciate you.*

Appendix H

Transcript of Tony Interview 2

Transcript of Tony Interview 2

Interview 2, May 15, 2014
3:00 pm

Speaker	Time Stamp	Transcript
Interviewer:	0:00.00-0:50.67	*Hi Tony, I just have a few questions, uh . . . this afternoon, basically reflecting on what we discussed in the first interview. In that first interview you mentioned two things that kept you from being able to implement what we did in the professional development. First, your colleagues did not want to implement and more importantly their lack of desire to change, and then students not being ready for them. We have briefly discussed your colleague's attitudes, but we have not discussed the student readiness issue. Would it help if we did a video clip with students to show how they respond to the activities? Or is there anything else we might do? How do we address the student readiness issue?*
Tony:	0:50.67-1:35.83	That's a good question and also good idea that you shared. I like that idea of showing video clips of seeing how teaches used it with students . . . umm . . . so that it feels realistic and it, . . . it feels like, oh if they can do it that way, then maybe, . . then see the model and once you've seen the model, its easier to implement the same model. And I think that might also help to model the way the instruction is . . . meant to be . . . done as opposed to seeing the teacher up front just demonstrating everything. Maybe seeing how in a classroom, students might, might . . . uhh . . . you know, work with each otherin groups a little bit more , because group work is pretty sparse if almost not at all existent in our school (chuckles)
Interviewer:	1:35.83-1:36.45	*Right*
Tony:	1:36.45-1:41.64	Kind of seeing how that instruction looks like and see how its done effectively
Interviewer:	1:41.64-1:47.41	*Can you think of anything else that might be done?*
Tony:	1:47.41-2:18.98	Hmm. . . . . I guess, . . .um . . . one thing that I mentioned before, that I still think would be a good idea is to have us take the tasks that were given and actually implement them and bring back some sample student work . . . um . . . from how they answered the questions or how they went through the task and how then compare with the other teachers, you know, what actually happened after we implemented the task. That way you see both the front end and the back end and not just the front end.
Interviewer:	2:18.98-2:20.63	*Right.*
Tony:	2:20.63-2:30.64	Cuz I think we saw a lot of front end, but not much back end. Not so much . . . uh, you know . . . of how you make sense of what happened after you implement some of these tasks and ideas.
Interviewer:	2:30.64-2:54.15	*That makes sense. When we discussed the SAGE testing last time, you got pretty excited about that experience and you mentioned the fact that it helped you with the actual testing this year. Did that have any impact on your instruction? I know it impacted how you went into the testing, but did it have any impact on your instruction?*
Tony:	2:54.15-	Mmm . . . (long pause) . . . I would lean toward not too much.

Speaker	Time Stamp	Transcript
	3:05.54	
Interviewer:	3:05.54-3:06.16	*OK*
Tony:	3:06.16-3:46.15	The reason being, um . . . I . . . even though I saw a few sample questions, umm . . . it was more just familiarizing myself with the format of the test. Knowing . . . . . like if I saw thorough, this is the test, and this is very, very close to what it looks like, and I spent more time analyzing the questions, I think I would be more likely to align my instruction with the kinds of questions they were asking. Where our snapshot was too small. I don't feel it made a sharp enough imprint or a lasting impression strong enough to change anything that I was already doing . . . so . . .
Interviewer:	3:46.15 - 3:50.32	*Right, that makes perfect sense too.*
Tony:	3:50.32-4:14.96	Although I have noticed that, if I can add . . . um . . . a lot of this year. . . now that a lot of us math teachers have um . . .been giving the SAGE and as we just walked around and just glanced at the students' screens and see the kinds of questions they were working on, um . . . I would imagine that we would use that in order to try and make sure that our . . . that next year that we are teaching a little bit closer to what they're assessing on the SAGE.
Interviewer:	4:14.96-4:30.02	*Yeah, were experiencing that in our district as well. A lot of the teachers, now that they have actually seen the questions realize that more depth is involved in the questions in what they have seen in the past. We're experiencing that too.*
Tony:	4:30.02-4:35.81	Truthfully, a lot of teachers are frustrated with a lot of the questions that they are seeing.
Interviewer:	4:35.81-4:36.80	*Oh, really?*
Tony:	4:36.80-4:50.81	And they're, they're probably hoping that the SAGE doesn't look the same next year as it did this year. I think that is the feeling of a lot of teachers that I have talked to so far . . . is some levels of frustration with the sage (chuckles).
Interviewer:	4:50.81-4:54.11	*What is it they are frustrated about specifically?*
Tony:	4:54.11-5:30.50	Ummm . . . actually I don't know. I have not . . . . . I have not asked them that specifically. But I think they felt like, they feel like a lot of the questions are poor questions, I know that much, but I don't know why they felt the were poor. Whether they thought it was too hard, and so . . . um . . . they were just surprised at the level of difficulty or whether they felt it was misaligned with what we taught, I don't know. . . . um . . . but yeah, one thing that we noticed is that there were a lot of statistics and probability and those tended to be the units we saved til the very end. . .
Interviewer:	5:30.50-5:31.25	*Right*
Tony:	5:31.25-5:42.76	Because the amount of questions dealing with those subjects was so high that we probably would spend more time on them or do that sooner in the year rather than at the very end of the year. Next year.
Interviewer:	5:42.76-	*This year they are evaluating all the questions. They are doing an*

Speaker	Time Stamp	Transcript
	6:11.33	*evaluation of the items rather than of the students in order to create the real test for next year.*
Tony:	6:11.33-6:13.27	OK, that's good to know.
Interviewer:	6:13.27-7:00.27	*Also last time, I expressed that we were looking for four major areas in the professional development. I don't know if you have kept notes on the four areas from our last interview, but they were, improve teacher content and pedagogical knowledge, improve classroom environment, proper use of tiered instruction with an emphasis on tier 1 instruction, and student readiness to learn. As you reflect back on those four days of professional development, which of the activities do you feel addressed those four areas and which if any do you feel should have received more attention?*
Tony:	7:00.27-8:03.39	Hmm . . . ok . . . lets see . . . (long pause) . . . for the content and pedagogical knowledge, I think that received . . . uhh . . . a good amount of attention. And I can think particularly about the logarithms tasks, of the . . . ummm . . . lets see . . . radian and dealing with radian measure, umm . . . that was pretty good. . . . the trig functions tasks, so there were quite a few tasks on the content knowledge itself and I liked those a lot. The classroom environment . . . I can't think of anything particularly of any activities that I feel were really directed directly to classroom environment itself. The one that was closest was this day four and the CMI framework.
Interviewer:	8:03.39-8:04.55	*Right*
Tony:	8:04.55-8:28.89	Umm. . . but even then it was more about the activi . . . the . . . uhh . . . it was more about the tasks themselves and less about the environment that the teacher creates as they implement the tasks, so I feel like that one could use more emphasis . . . Is how do you create an environment that's . . . . . I don't know what kind of environment you meant, but . . . an inquiry environment?
Interviewer:	8:28.89-8:29.76	*Right . . .yes.*
Tony:	8:29.76 – 8:51.59	An environment that opens student engagement and things like that. Yeah, that could receive more attention. Ummm . . . student readiness to learn . . . . . can you say a little more about that one again? Maybe identify which activities might have matched to that?
Interviewer:	8:51.59-9:22.67	*Sure, sure, that one was actually addressed on the fourth day also, when we were looking at the CMI framework and we were talking about where the students are on the cycle of learning. Are they developing new concepts, solidifying concepts or are they ready to practice the concepts. So I don't go too fast, I check to see where they are in their progression on the cycle. If they are fragile as you mentioned last time, what do I do to help them progress according to their readiness.*
Tony:	9:22.67 – 10:18.59	Ok, I see . . . yeah that makes sense. So in that case, I agree that fourth day with the RTI framework and umm . . . looking at the stages, the cycle of instruction . . . umm that that addressed that somewhat. I think that if the goal was to as teachers recognize whether our students are ready to learn, and what stage they are

Speaker	Time Stamp	Transcript
		in, we might need more practice looking at samples of student work. We analyzed tasks, but not student responses to tasks or student work in response to . . . you know if we give them this question and they answer it this way it is because they weren't ready for this reason or if they answered it this way it means they were ready and they were successful, and not just comparing at what stage was the task itself on, but also what does a student look like who is in each of those stages. That would help I think.
Interviewer:	10:18.59-10:38.19	*That is some great insight. Of those four areas, do you see a need for all four areas or do you think one of them might not be as important and we could just drop it?*
Tony:	10:38.19-10:39.23	Hmmm. . . .
Interviewer:	10:39.23 – 10:42.97	*Do you need me to go over the four areas again or do you have them written down there?*
Tony:	10:42.97-10:54.92	I've got them written here, the content and pedagogical knowledge, the classroom environment, the student readiness to learn, and then the CMI framework or the RTI Framework?
Interviewer:	10:54.92-11:08.85	*The student readiness to learn is the CMI framework. The fourth one is the proper tiered instruction.*
Tony:	11:08.85-11:12.41	OK so those are the four.
Interviewer:	11:12.41-11:15.86	*Yes*
Tony:	11:15.86-11:17.60	OK . . . umm . . .
Interviewer:	11:17.60-11:32.14	*Do you think we are too broad, or are we focused sufficiently or are we missing something that should be addressed by professional development?*
Tony:	11:32.14-11:36.62	I guess it depends on what the title of the course is.
Interviewer:	11:36.62-11:36.91	*Ok*
Tony:	11:36.91 – 11:43.53	Because the title of the course this year was, "The Secondary 3 Curriculum" right?
Interviewer:	11:43.53-11:45.20	*Well the title was, "essential components for Secondary Math 3"*
Tony:	11:45.20 – 12:09.95	So I thought it was meant to be about curriculum, so I came in with expectations of focusing on curriculum, and now I see these goals that you had were a lot broader than just curriculum so that's how the teaching played out which is fine if that is the goal of the professional development . . . then I think you can keep those four, but you might want to modify the title . . . and the advertising . . . so that . . . . .
Interviewer:	12:09.95 – 12:12.33	*So that teachers know what they are getting into?*
Tony:	12:12.33 – 12:18.68	I think a lot of teachers came in expecting to just be given tasks and materials for the curriculum.
Interviewer:	12:18.68-12:19.47	*Ahhh*

Speaker	Time Stamp	Transcript
Tony:	12:19.47 – 12:50.15	All of this other stuff was like, I really don't see value in that because I didn't come here to learn how to teach, I came here to learn what curriculum materials I can use in my classroom. Like, so I don't have to write everything from scratch. Umm . . . so maybe if the expectations were clearer then the people might resonate more with the activities that were occurring. . . Umm . . . but if your goal is to focus in a little bit more and eliminate some of these and be less broad, then I would be focused on content knowledge and student readiness to learn. I would say those are the most important.
Interviewer:	12:50.15 – 13:03.03	*Ok. Fantastic, umm . . . lets see, you mentioned a desire to implement more reform-based instruction similar to what you experienced and prepared for while at BYU*
Tony:	13:03.03- 13:04.56	Uh huh
Interviewer:	13:04.56- 13:15.43	*I would like to go through a list of items that are associated with reform-based instruction and as I go through them, I would like you to reflect on four questions. And if you would like to write them down . . .*
Tony:	13:15.43- 13:22.34	Ok, lets see . . . ok go ahead
Interviewer:	13:22.34- 13:38.96	*The first one is, "What is your evaluation of your current practices?" I know you haven't done as much as you would like since you expressed this last time, but I would like you to evaluate your current practices.*
Tony:	13:38.96- 13:40.40	Uh huh
Interviewer:	13:40.40- 14:24.80	*Second "Did the professional development address these issues?"* *Interviewer waits as he writes down the questions* *"What is your desire for the future implementation for each of these"* *Interviewer waits as he writes down the questions* *And, "Did the professional development prompt you to want to change any current practices even further than your initial desire?" I know you expressed a desire, but did you look at it and say, "You know what? This reaffirms it." Type of a feeling.* *Interviewer waits as he writes down the questions*
Tony:	14:24.80- 14:27.28	OK
Interviewer:	14:27.28- 14:36.13	*There is just a list here of some of the reform-based items we would look at and say, "If I were observing classroom instruction, I would be looking for these items." Ok?*
Tony:	14:36.13- 14:37.10	Uh huh.
Interviewer:	14:37.10- 14:42.43	*Have students work in cooperative groups*
Tony:	14:42.43-	Ok . . . uhh. . . I started out doing a lot more of that at the beginning

Speaker	Time Stamp	Transcript
	16:00.57	of the year . . . and I found that . . . sometimes when I would put my students in groups that they would . . . become confused and frustrated and it was difficult for me to manage all the groups. So I think as a novice teacher, it became easier for me to just go to a whole class discussion more often. I became a little more reserved . . . or what is the word? . . . hesitant to use uhh group . . . collaborative groups. So I haven't done that as much umm . . . recently. Did the professional development address it? I kind of feel like a lot of the tasks that were presented in the professional development you could take and implement either way, either in whole class or collaborative groups so I don't feel like any part of the professional development was very focused on helping us put students in collaborative groups and help them be successful. So I don't know that the professional development addressed that very much, at least to me. Umm, the desire for future implementation? Is I would love to do way more and I would love to improve my ability to help students feel successful in their groups.
Interviewer:	16:00.57-16:01.15	*Right*
Tony:	16:01.15-16:47.09	And so I think that would just . . . umm . . . come down to practicing using groups more and also having more materials that I could use in the groups. Cuz, I found myself in absence of materials it took a long time for me to write materials that I could let my students use in their groups and so I was getting burned out at the beginning of the year so that kind of fizzled out, and . . . and I stopped writing those extra materials on top of what everyone else in my department was using . . . so . . . umm . . . and then, . . . lets see . . . the fourth question was, "Did the professional development prompt me to change the practices in my classroom further?" I guess for collaborative groups, I don't know that the professional development itself really prompted me any more than the desire I already had to use collaborative groups so . . .
Interviewer:	16:47.09-17:02.62	*I kind of figured that it wouldn't, because you expressed quite a strong desire to begin with. How about having students work on hands on activities? This is closely related to cooperative groups, but this is specifically, hands on activities.*
Tony:	17:02.62-17:16.57	Oh yeah, I can see the difference there. Umm . . I would say that evaluating my current practice, hands on is pretty minimal. Umm . . . did the professional development address that? I would say it did.
Interviewer:	17:16.57-17:17.48	*OK*
Tony:	17:17.48-18:12.29	Cuz it showed me some tools that I wouldn't have thought of on my own. For example, the rate . . . the day we learned about radians we had the actual pizzas we could cut out and make and we also had those wiki sticks, is that what they are called? Umm . . . and those were really neat tools that I had never really heard of so that would be a way to make it more hands on. Because in my. . . going back to my current practice, when I taught that in my classroom, I just drew a circle on the board and had them estimate it visually which is not as powerful and not as memorable as actually taking

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		your wiki stick and measuring and seeing the six. . . ah . . . radii going around the circle. So I feel like the professional development had enough hands on things that it did address that . . . the other thing was the . . . ahumm . . . the calculators with the motion sensors . . .
Interviewer:	18:12.29-18:13.28	*Right*
Tony:	18:13.28-18:27.53	That was another hands on thing that I actually liked. The task itself I didn't really like, when we did that, but just seeing the tool and playing with the tool made me excited about the tool and made me think of ways I might use it in the future
Interviewer:	18:27.53-18:28.60	*Ok*
Tony:	18:28.60-18:52.17	Um . . . so . . . and I also think you can go too far overboard with hands on, and I feel the professional development did not go overboard which is also a good thing. Not everything needs to be hands on . . . Uhh . . . so a desire for future implementation . . . I would love to do more of that and I would say the professional development prompted me to do more of that, so . . . that's good.
Interviewer:	18:52.17-18:58.50	*Umm . . . what about using performance based assessment?*
Tony:	18:58.50-19:21.22	Hmm . . .(long pause) so using performance based assessment . . . what . . . what do you mean by that? Do you mean rather than a summative assessment. . . uh . . . seeing how they perform during a lesson or what do you mean exactly?
Interviewer:	19:21.22 – 19:52.12	*Well, there are times when teachers will do an activity, but they still come back with a paper and pencil test for their assessment of the concept. When I taught volume of a cylinder, my assessment was an activity itself. The assessment was the culminating activity where I gave students a different sized can and measuring devices and then they were required to find the volume of the cylinder. They had to measure the can and then calculate how much water would fit in the can and then I would have them bring their can and calculated volume to the fInterviewert of the room and I would attempt to put the amount of water they indicated into the can while holding it above their head. If they were a little short of the amount of water the can could hold, I had a syringe of water that I would squirt at them and if their calculated volume was too much for the can, I would continue pouring the water into the can until they got a little wet. After this activity, I did not need to go back to a paper and pencil test, they had already shown the level of their understanding through the activity so this became the assessment.*
Tony:	19:52.12-19:59.70	(Laughs) I love it
Interviewer:	19:59.70 – 21:13.47	*So rather than having a worksheet with 10 to 12 problems talking about finding the volumes of a cylinder, I had one activity as a performance based assessment tool. The interesting thing about it was, even if I said their work was good, they would look at it and decide that they wanted to get closer to top and go back, re-measure their can and then come back with a new calculation. My opinion was not needed for validation. They validated their own work. They*

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		took on the evaluation of the assessment. They did not need me to justify whether or not they got it right. Did you see anything we presented that you could look at and say, "you know, that activity would be good enough to give evidence of understanding could be used in place of a paper and pencil test.
Tony:	21:13.47 – 22:33.51	Hmm. . . that is an interesting question. . . so, now that you have given that example, that makes more sense of what you are asking. . . honestly, I would say that my mind set through out the professional development was not on assessment, but rather on . . . umm . . . the instruction phase itself That may have been just me . . . not catching on when we were talking about assessment or when something might be used to assess students . . . but I . . . I guess that throughout almost the whole thing, I wasn't really even thinking about assessment, I was thinking more about the instruction phase itself . . . so umm . . . well to answer you four questions, in my current practice, is I can't think of any performance based assessment that I have given this year. Um . . . although I guess I have been kind of toying with the idea this year of giving a performance based, more like a statistical project where they have to write up a project . . . and that's. . . rather than them sitting down with paper and pencil, they would have to actually turn in a project where they had gone in and collected some data and then give a report. Umm . . . honestly, I don't know that I 'll go through with that, but I have thought about it. (chuckles) It's just cuz it's the end of the year and kind of crunch time and its getting too close, and I don't want to grade all those at the very end. (laughs)
Interviewer:	22:33.51 – 22:34.46	*Yup, that's understandable.*
Tony:	22:34.46 – 22:49.55	But it is in my mind I suppose. Umm . . . So did the professional development address it, well now that I think about it, some of those tasks could be converted into performance based assessments, but I wouldn't have made that connection without you prompting me to think about that.
Interviewer:	22:49.55-22:50-34	*Ok*
Tony:	22:50-34 – 22:58.09	The professional development itself did not really focus me on assessment. Umm . . . so yeah.
Interviewer:	22:58.09-23:11.39	*How about helping students take responsibility for their learning?*
Tony:	23:11.39 – 23:25.53	*Long pause, no response.*
Interviewer:	23:25.53-23:30.92	*So, reform-based instruction says students need to take responsibility for their own learning.*
Tony:	23:30.92-25:26.86	*Long pause* . . . . . Lets see. . . so to evaluate my current practices . . . ummm . . . I feel like, right now . . . my students probably come into the classroom expecting me to get the ball rolling, expecting me to start the discussion, to . . . introduce the concepts and if they don't know something, I feel like they have a disposition to wait for me to tell them rather than trying to figure it out on their own, which is unfortunate, umm . . . you know I recognize that fact, and its something I don't like about my own teaching but . . . so it is a goal I

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		have to improve . . . to . . . to improve on. Umm . . . did the professional development address that . . . ahh . . . umm . . . . . I would say, I would say it did . . . I am trying to think of specific activities that I could connect to that goal . . . umm . . . I think the last day of . . . um . . . talking about the CMI framework and looking at the levels students are at, I feel like that leads me to put it on the students' shoulders and say, were are you, are you just developing or are you solidifying or are you, . . . you feeling really comfortable and are ready to practice. . . umm . . . that framework is a nice one to help develop students to take responsibility for their own learning . . . umm . . . oh, I also like that the tasks were focused on explaining and when students have to explain then they have to recognize what they do and actually don't understand rather than just putting a numerical answer and I feel like that also helps students to take responsibility for their learning, so I'd say although that's not one of the strongest points that came out of professional development, that it . . . it was there.
Interviewer:	25:26.86-25:31.19	*Ok, how about using computers?*
Tony:	25:31.19-26:44.83	. . . . . Hmmm . . . ok . . . (long pause) . . . um to evaluate my own practice . . . I have used computers in the classroom either on the iPad or on my computer to show demonstrations on Geogebra or on . . . umm . . . sketchpad . . . even . . um . . . on a spreadsheet application like, you know . . . numbers or excel . . . umm. . . and I currently am going to have students work with excel and we have had them work with graphing calculators . . . I don't know if you mean technology in general or specifically computers. But we have had them use quite a bit of different technology so I'd say that, that is one of my things I do more often is implement technology in the classroom. And I also feel like the professional development incorporated technology a lot and so I, I felt like that went well. Umm . . . I remember one of the days they showed us, umm . . . websites on line to calculate. . .uhh . . what was it . . . it was, . . . now I have to think, it was . . . oh give me a second, oh yeah, it was creating those vases . . . in different shapes
Interviewer:	26:44.83-26:46.11	*Oh yes*
Tony:	26:46.11-27:00.37	Umm . . . we saw some web sites there. One thing I noticed though is all of us teachers were trying to scramble and write down the websites URLs . . . and I must have missed a couple of characters, cuz I tried it latter and couldn't get on it (chuckles)
Interviewer:	27:00.37 – 27:01.16	*Oh no*
Tony:	27:01.16 – 27:06-22	So one thing that might be helpful is to somehow have them in print somewhere,
Interviewer:	27:06-22-27:08.17	*We do have the resources shared for each activity on our wiki page*
Tony:	27:08.17 – 27:41.64	maybe I missed it on one of the handouts . . . but, having those websites that are used in print so we can go back and . . . umm . . . access those again later. . . um . . . and I also remember another task from the professional development where we brought out

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		Geogebra on our laptops and looked at that trigonometry unit circle figure. That was really useful. So I think that professional development had the right amount of computers in it . . and it . . . it made me you know, want to continue to use computers in the classroom, in my instruction.
Interviewer:	27:41.64 – 27:52.49	*Ok, how about encouraging students to explore alternative methods for solutions?*
Tony:	27:52.49 – 30:36.58	. . . . . hmm . . . (*long pause*). . . ok uhh evaluating my own practice for that one, I'd say I'm neither really good or really, really bad at that one. Kind of in the middle (chuckles) um. . . when I present a problem I'll ask students to try and think of a way that they would do it on their own and you know occasionally, I will have students come up to the board and show their method, and if a student did it a different way, will show a second method or if they do it one way and I feel like there's another Beneficial method, then I will present that method. . .umm. . . but I don't do that as much as I would like to or probably should . . . ahh, a lot of times it just comes down to. . . umm, were in a time crunch, here's the simplest procedure so learn this one and I'm not gonna, I'm not going to open a task for 40 minutes and let you figure it out when I can demonstrate this one way in 10 minutes and we need to move on to the next topic, so sadly, that's kind of what's happened sometimes. Umm . . . as far as how the professional development approached that concept or that topic of . . . ahh . . having students do alternative methods, I would say the professional development offered alter . . . offered us as teachers alternative perspectives on how to teach it to the students. So it seems to me that it was more alternative methods for the teachers' teaching methods and less maybe I saw that less being alternative methods among students . . . um . . . so I don't, . . . I'm trying to think of some of the tasks that were given and I didn't really necessarily see us giving students these tasks and then. . . uhh . . uhh . . . Oh what am I trying to say, . . . I guess I didn't see the task itself as a listing of 4 or 5 different ways to solve the task . . . umm . . . a lot of it was just, a new way to teach it, do it this way, for example, I', going to give an example, in the logarithms day Celeste Young was saying, "you guys teach the students to . . .umm . . ." no not the logarithm, I'm sorry, the inverse functions day. She said, "you teach them to switch x and y where it's more effective to do it this way and so they gave us teachers an alternative way to teach it but that's not really what the students would come up with, its just here, you as teachers just do it in this alternative way. However, as I was sharing that example, I just thought of another example, where I actually do feel the students were encouraged to find alternative solutions. And that was just when on this fourth day when we were talking about, ah . . a normal distributions?
Interviewer:	30:36.58 – 30:36.19	*Right*
Tony:	30:36.19 – 31:05.81	And we had the areas under the curves, umm, tasks and we were talking about how to make those into a develop and solidify and all that, and we kind of looked at and talked about, . . .oh, there are

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		more, many, many ways to calculate these areas under these curves, and so let the students figure out a way, and there may be several different ways or methods to get to the same result. So actually, that is a good example of showing how you might elicit multiple student solutions.
Interviewer:	31:05.81 – 31:06.74	*Ok*
Tony:	31:06.74 – 31:12.53	So I guess there was a little more than I initially thought, in the professional development so it was in there. . . (chuckles)
Interviewer:	31:12.53- 32:15.93	*Yes, well a lot of it has been a while since you experienced it . . . the first day was back in October so its been a while. But there were a couple of times each day, when we had the participants come up to the white boards and share their solutions and then asked if somebody else approached it another way and had them come up and show their alternative method. They came up to the white boards and showed different ways to solve the tasks and then we would discuss those in whole group. Sometimes, I think when we try to model our professional development strategies, and we're not explicit about what we are doing, sometimes its not picked up on by the participants. I am thinking that one of the things we need to do in the professional development is, if we are not explicit about what we are doing at the beginning, at least sometime towards the end we stop and say, "Now this is what we did, and why we did it" and help people recognize, "oh you were modeling a strategy, and I did not recognize it". I think that sometimes we get away from the explicit part of instruction and some participants do not recognize what was modeled.*
Tony:	32:15.93 – 32:56.86	I really agree with that. I think that is a good insight. And to extend that idea, here . . . an example is the very, very first day I remember we were given a task where umm . . . we had, I don't remember it perfectly, but there were like two cities and there was a line, or ah . . . somehow a path between the two cities and then we had to come up with on the graph, . . . and I don't remember whether it was the distance from one city or the other or something like that and we all made them look totally different. And it was really difficult, it was a difficult task. And at the very end, we didn't really even get any resolution on what the right answer was. So we as teachers were left hanging.
Interviewer:	32:56.86 – 32:57.92	*Yeah*
Tony:	32:57.92 – 33:15.76	And, what all, all of the teachers at my table were like, "so what's the answer?" I hate when they do that . . . And . . . and they were like . . . and they were also saying, "this is just too hard for kids." And they will never use this task, and so I think a lot of the value was lost because the teachers didn't see where the value was.
Interviewer:	33:15.76 – 33:16.48	*Ok*
Tony:	33:16.48 – 33:42.54	So that would be a point where you would want to be explicit and say, "ok, this particular task itself, you may or may not use it with your students, but the kinds of . . . the way the task is open, the way that it elicits multiple student solutions, and the way that we had

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		you talk about them and your discussions about them, led a lot of you to think about it deeply and led a lot of you to evaluate your own answers and change and modify your answers trying to improve them, that was really a worth while mathematical activity and that's the kind of activities we would like to see you doing with your students." I think explicating that would have given that activity some more worth for the teachers.
Interviewer:	33:42.54 – 35:05.85	*I think you are right. As I look at it, I think a lot of times we get caught up with the idea of this reform-based instruction and it is almost like we want to avoid direct explicit instruction completely. I think there is some component of explicit instruction that needs to be infused into the professional development in order to help teachers know, "oh by the way, this was our purpose, this is why we selected the activity, this was our intent, and we want to see this in your classroom instruction as well." That's good insight, thank you, I appreciate it. I just have two more questions.* *One is based more on the content of the professional development and one is based on aspects of the professional development. So they might seem similar, but the first question is, "Now that you have had a couple of days to reflect on the professional development since our first interview, what are some of your thoughts you would like to share in order to improve professional developments? Addressing the content of the recent professional development.*
Tony:	35:05.85 – 35:11.48	Ok, so just kind of in general anything that I can think of to help improve professional development?
Interviewer:	35:11.48 – 35:12.31	*Yes*
Tony:	35:12.31 – 35:21.67	Ok . . . uhh . . . I did write a couple of notes down between last time and today. Just let me see if any of those are relevant to that question . . . umm
Interviewer:	35:21.67 – 35:24.16	*Why don't you go ahead and share all of them.*
Tony:	35:24.16 – 35:34.21	Ok, sure . . . um, well . . . so some of them are just little nit picky things or random things. I was just kind of, when ever something popped into my mind, I jotted it down.
Interviewer:	35:34.21 – 35:35.38	*That's good, that is what I want.*
Tony:	35:35.38 – 36:19.13	Umm . . . the first note that popped in my mind is reflecting back on that task when we were creating the volumes of solids by putting a piece of paper on the dowel and spinning it . . . umm . . . that question became . . . it seemed at the outset really, really simple, and then it became extremely complex . . . umm . . . I think even more complex than even the presenters intend the task to be, cuz when you have that skinny little dowel in the center and you account for that dowel, then if you put a triangle, like lets say ahh . . . (*picks up pencil and hold it out in front of himself*) here's my dowel (*draws a triangle in the air next to the pencil*) and here's my triangle here going down like this.
Interviewer:	36:19.13 – 36:19.69	*Right*
Tony:	36:19.69 –	Umm . . . when you spin it, it is not really just a cone. It's a cone

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	37:54.24	with a little hole in it. And furthermore, you can't just find the volume by just finding the volume of the whole cone and then subtracting the cylinder, because the cone doesn't come up to its point. It's missing the point. So what you end up having to do is either find the volume of the whole cone . . . well actually, in order to figure out how far to where the point would be, you have to set up an equation for this line making this triangle, solve for where it would intersect the dowel, find that point so you know how far it is and then take that whole cone and then minus the top cone so that you are just left with what's below . . . anyway . . . my . . . I guess my point in that was just that it started simple and then became overwhelmingly complex to the point that I think that it's beyond what the task was intended. And I also don't know how many teachers recognized that or not. But that's . . . I went to town on that problem and I'm still going crazy to calculate it exactly (chuckles). Anyway, again, some, like I said, some of these are super nitpicky. And I'm not sure they are even helpful, but that was something that I remembered about that task. . . . Umm . . . another thing that I jotted down is, there was . . . ah . . . a teacher on our table from. . . umm, not from my school, but from Valley . . . umm, who said she did implement the vase problem and that it went really well. . . um, she had a good time with it so I thought that was some useful feedback and you might appreciate.
Interviewer:	37:54.24 – 37:55.83	*Good, thank you.*
Tony:	37:55.83 – 38:34.52	Umm . . . particularly because some of those students really struggle . . . um, and so they seem to actually do well with the vase problem that reaffirms the idea that kids can handle some of these tasks that, . . that you're sharing with us. . . umm . . . the task that teachers in my school seemed to like the most, uhh . . from the first day they liked the polynomial task where it led you through looking at . . . umm . . what the degree of a polynomial is and then also looking at the multiplicity of each root and that multiplicity tells you whether it crosses or bounces or . . . buckles?
Interviewer:	38:34.52 – 38:35.59	*Yes, buckles.*
Tony:	38:35.59 – 40:11.25	That was a word I had not heard before and actually none of us even knew, . . . knew that word. So we learned that if the . . . if the root is odd, bigger than one, so if it's three or larger, then the little buckle thing happens and not just crossing straight through and which is something I actually didn't even know. . . umm . . . but we liked that task, and we liked how it kind of led students to discover those things, so that was one that, umm . . . I remember everybody saying, "oh, we'd already passed that by that time." And we all said, lets use that next year. So hopefully they'll use it next year . . . ahh . . . what other things did I jot down? A lot of the activities seems to have a mis . . .umm . . . appropriation of time, so either too much, or . . . a couple of times too little, but a most of the times, too much. Umm . . . I felt like sometimes we would get as far as we could, and then we were stuck, but we were sitting waiting for other groups or waiting for somebody to come help us in that time.

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		It just started to feel that it was dragging and we kind of got tired and not involved and less engaged. . . .So, . . . whether that's our fault or not, I don't know, but that's, probably with some, but probably no, but that's . . . and related to that . . .umm . . . I think occasionally we felt like directions weren't quite as clear enough so we get lost and then we would lose motivation to finish the task. . . . Umm, I can't think of any specific examples when that happened, I probably should have thought about that and written it down, but I didn't . . . but there were a few times when that happened.
Interviewer:	40:11.25 – 40:16.80	*You've already expressed that the activity with the ranger, the motion detectors was one of those situations.*
Tony:	40:16.80 – 40:35.20	Oh yeah. That one, umm . . . was a little bit tricky. . . Uhh . . . what was another one that e got a little bit lost on? . . . Can I look through my papers just for a moment and see if I can find one of them that I felt a little lost on and didn't really finish . . . . ?
Interviewer:	40:35.20 – 40:38.24	*Absolutely. Take your time.*
Tony:	40:38.24 – 41:27.97	I know there were other moments when I felt a little lost. (*shuffles and looks though notes from professional development*, *there is a 2½ minute pause*) . . . uhh, it does seem to be one of those . . . identifying the practice standards and the student work. . . for some reason, that's in my memory, . . . like, one that our group was a little bit confused . . . and we didn't do very good work on that one.
Interviewer:	41:27.97 – 41:28.58	*Ok*
Tony:	41:28.58 – 41:47.05	Umm . . . I also felt like on this one on this most recent day, because there was so much to digest in that CMI Framework. Sometimes we were a little lost as far as whether something was a develop or a solidify . . . I think I already expressed that last time though.
Interviewer:	41:47.05 – 41:47.81	*Yes*
Tony:	41:47.81 – 42:11.51	Umm . . . where was another one? . . . but on the whole that wasn't the case. It was just a cu . . . some of . . . you know, a couple of times we felt that way. (*still shuffling though notes from professional development*) . . . I'm not finding any of the others that . . .that would fit that. . . but . . . we'll just go with them.
Interviewer:	42:11.51 – 42:21.16	*Ok. Um . . . This time I want to talk about the aspects of the professional development, not details of the activities, but different components of the professional development.*
Tony:	42:21.16 – 42:22.08	OK
Interviewer:	42:22.08 – 42:33.90	*What were some of the aspects of the professional development you think should stay in professional development and which things do you believe should be eliminated or tweaked?*
Tony:	42:33.90 – 42:35.43	hmm
Interviewer:	42:35.43 – 42:40.97	*I know that food is one of them.*
Tony:	42:40.97- 43:28.19	Yes, Chuckles (*long pause*) . . . let's see, so a couple of other thoughts I have had are, sometimes I, like um . . . we moved from

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		one activity to another to another with a different presenter, and I . . . um . . it seemed like they were kind of disconnected from each other. And so like, one presenter gave one activity or presentation, and the other presenters seemed to be just, ahh . . . doing their own thing at their own laptops or at their own tables and not really walking around helping us with the other presenter.
Interviewer:	43:28.19 – 43:28.67	*Ok*
Tony:	43:28.67 – 44:28.01	I don't know if that is too bad or not, but sometimes when one person is in charge of that section of the professional development and you have designed it the way that you want to do it, you don't necessarily want three other people stepping in and umm . . you know, creating that confusion or friction I guess . . . while you're explaining it. I did feel like, umm . . . I know that you planned it all together . . . and so your goals were all the same from the planning stage, but I . . . it didn't reflect in the presentation stage . . . that you were all on board with it on everything in the same way . . . I know that, you know, last time you talked about occasionally one of the other presenters would raise a hand and make a comment of some sort, but a lot of the time it felt like you were just one presenter and all of us and the others were kind of sitting there waiting for their turn and it seemed like . . . you know, like their time was not wasted, but not used . . . I don't know.
Interviewer:	44:28.01 – 44:36.28	*That's an important perspective that we need to be aware of so I thank you for sharing it with me.*
Tony:	44:36.28 – 45:06.07	Another thing that I . . . um . . jotted down here that might help is that . . . uh. . . making the goals of the professional development listed at the very beginning. Umm. . . because you mentioned that you had those four goals of the content and pedagogical knowledge, improving the environment, student readiness to learn and the tier 1 instruction, not a lot of us were aware of those goals throughout the professional development
Interviewer:	45:06.07 – 45:06.88	*Ok*
Tony:	45:06.88 – 45:25.65	And so not knowing what the goals were, causes us to not think about or not focus on changing those goals in our own teaching, in our own practice. And knowing what your goals are by making them explicit to us at the very beginning at the outset would help us be on the same page more often I suppose.
Interviewer:	45:25.65 – 45:26.21	*Yes*
Tony:	45:26.21 – 45:48.27	Because, you know. . . for example, if your goal during your presentation is not only to give the teacher a task they could use with their students, but to model what kind of instruction there. . . you know, might look like . . . um . . . then that would help the teacher process what . . . you know, process that activity and that they connect that to their practice later on, so . . .
Interviewer:	45:48.27 – 46:00.02	*I can see that this is definitely something that needs to be added to the professional development and I appreciate you sharing that. Was there anything else that you wanted to share? This is your chance.*
Tony:	46:00.02 –	Let's see . . . Ohh. . . another thing I thought of is . . um . . a lot of the

Speaker	Time Stamp	Transcript
	46:39.94	tables when we came and sat down with our own schools, we kind of stayed in our own schools. We already know each other, we see each other every day. . . um . . . so perhaps, you know, not every time, but occasionally incorporate . . . break up into different groups or break up the tables so we can meet different teachers and share experiences . . . you know so the table is now a cross section of multiple schools and not just an homogenous set of teachers from the same school. Ahh . . .that might . . . ahh . . . create some more interesting discussions and some more interesting experiences for the teachers, I think. That's a small idea that you might try.
Interviewer:	46:39.94 – 47:02.27	*We have tried that in the past and some of the presenters stated they did not want to fight the fight because many teachers do not like to move. And we were aware that a majority of the participants were there through a mandate to participate so they were already upset. We knew we were already dealing with negative attitudes.*
Tony:	47:02.27 – 47:24.13	True, that's true. Some of our school . . . were there with attitudes to begin with. I think that was probably a good choice. I did pick up on some of that attitude.
Interviewer:	47:24.13 – 48:02.61	*But you are correct, it does make for better discussions and a richer experience. Well, I sure appreciate your time. Thank you for your participation and willingness to share your perspective. I hope that when you are ready to complete your dissertation, you find individuals that are willing to share with you. I think Madison Wisconsin will be a great place for you and I hope the experience is a good one. I wish you luck with it*
Tony:	48:02.61 – 48.04.39	Thank you

Appendix I

Transcript of Bart Interview 1

Transcript of Bart Interview 1

Interview 1, May 15, 2014
6:00 pm

Speaker	Time Stamp	Transcription
Interviewer:	0:00.00-0:03.78	*Hi Bart, I have some. . . ah . . . questions here for your concerning the recently completed professional development you participated in this year.*
Bart:	0:03.78-0:04.23	Uh huh . . . Ok
Interviewer:	0:04.23-0:34.12	*My purpose is to review the professional development and I would like you to respond to the questions about an evaluation of the professional development. The questions I am going to present to you are for the purpose of evaluating what we just did. And I would like you to be brutally honest in your responses.*
Bart:	0:34.12-0:34.34	Ok
Interviewer:	0:34.34-0:42.29	*Just a couple of preliminary questions, first though, how long have you taught secondary mathematics?*
Bart:	0:42.29-0:48.38	Ah since, ah . . . since ah . . . this will be my second year, it came out last year, right?
Interviewer:	0:48.38-0:48.94	*Uh huh*
Bart:	0:48.94-0:50.49	So this is my second year.
Interviewer:	0:50.49-0:53.05	*Ok so how long have you taught high school?*
Bart:	0:53.05-0:53.74	Four years
Interviewer:	0:53.74-0:57.06	*Four years, ok. Has it gotten any better?*
Bart:	0:57.06-1:01.35	Ahhh . . . if they would stop changing the curriculum on me, honestly it would be better.
Interviewer:	1:01.35-1:09.53	*So you have been in the profession for four years and you have had a new curriculum every year so far, haven't you?*
Bart:	1:09.53-1:23.82	Yeah, I've never . . . I have always had to prepare for a ne class each year. So that makes it . . . Next year I'm looking forward to having the same schedule next year as I have this year so I don't have to prepare for a new class. I can make my other ones better.
Interviewer:	1:23.82-1:27.79	*That's great. How long have you been at the school you are at right now?*
Bart:	1:27.79-1:29.03	Four years
Interviewer:	1:29.03-1:38.71	*Alright, umm . . . lets see, what's your experience with professional development in the past?*
Bart:	1:38.71-2:06.60	Umm . . . kind of more of a negative, I mean, I feel like I go to ah . . . get the credit . . . but it is usually a waste of time. More often than not, it seems like a waste of time. Usually if I'm . . . if I . . . if it's not a class I'm interested in going to, like . . . its not going be a class I'm going to want to take, it's usually a waste . . . it tends to be a waste of time. Usually it seems like some of the information is useful, but they could of told us that in 30 minutes instead of 3 days, so like

Speaker	Time Stamp	Transcription
		that.
Interviewer:	2:06.60-2:32.61	*Right, I'm glad you responded then, because you have had experience with what I am trying to explore and then avoid. I worry about taking a teacher out of the classroom and away from the students. After over 20 years in the classroom, I know how important time with the kids is. I also know that you spend time writing a lesson plan for the sub and they usually don't do what you expected because the kids talk the sub out of following through*
Bart:	2:32.61-2:34.02	Or the sub talks the kids out of doing it.
Interviewer:	2:34.02-3:06.04	*Exactly, so time away from the kids is valuable and I want to make sure we are not wasting it. So I want to identify what makes professional development worth coming to. So then, typically you are motivated to attend professional development because of the relicense points?*
Bart:	3:06.04-3:09.25	Yeah, and lane change credit.
Interviewer:	3:09.25-3:20.76	*That makes sense. I would like to review the four days of the professional development and it might help if you write down some notes as I go over what we did on those four days.*
Bart:	3:20.76-3:26.39	*(it takes a moment while he takes out paper and pen*) Ok,
Interviewer:	3:26.39-3:32.78	*Ok, The first day was clear back in October.*
Bart:	3:32.78-3:39.24	Yeah, it was a while ago.
Interviewer:	3:39.24-4:14.09	*On the first day in October, we spent the morning on two areas of emphasis, one was polynomial functions . . . (interviewer waits as Bart writes notes) . . .and the second was concavity. (interviewer waits as Bart writes notes) You might remember that Celeste led an activity designed to change or challenge teacher perceptions of polynomial functions with the vase activity.*
Bart:	4:14.09-4:17.71	Oh, that's right, working with vases and filling them with water.
Interviewer:	4:17.71-4:29.25	*Yes, and then I tried to lead a further activity exploring concavity with the um . . . motion detectors and nonlinear graphs in the gym.*
Bart:	4:29.25-4:30.84	Oh um . . . uh huh.
Interviewer:	4:30.84-4:58.75	*And then in the afternoon, Marsha presented an activity with repeated roots and Geogebra's polynomial division. So we worked on the computers that afternoon and then we finished with Celeste's presentation of inverse functions as she talked about changing the y and the x, and we had a debate about that. Do you remember that?*
Bart:	4:58.75-4:59.70	Yes, I do.
Interviewer:	4:59.70-5:30.75	*So that was the first day. The second day was in November and we started with a discussion about SAGE assessment and we explored the assessment environment of that program. Tony lead that activity. And then I led an activity on the practice standards 2 and 3, reason abstractly and quantitatively and critique the arguments of others. This activity used the examples of student work that participants*

Speaker	Time Stamp	Transcription
		brought in.
Bart:	5:30.75-5:31.22	Oh that's right.
Interviewer:	5:31.22-6:07.50	*And then we looked for examples of the um . . . those two practice standards in that student work. (interviewer waits as Bart writes notes) Then that afternoon, Celeste led an exploration of logarithms with an emphasis on the constraints, common student errors and asymptotes. (interviewer waits as Bart writes notes) Then Marsha led us in an activity in application of logs with the melting snowman activity. (interviewer waits as Bart writes notes)*
Bart:	6:07.50-6:14.67	Some of them sound familiar but some of them kind of do, but most of it sounds pretty accurate.
Interviewer:	6:14.67-6:38.58	*And on day three, we started off with the pizza activity and discussed angle measure versus linear perspective of arc length and radians. Uh . . and then Celeste led an activity to further the discussion about angle measure versus linear perspective of arc length. Umm . . . She worked with the activity of the fly on the fan. (interviewer waits as Bart writes notes)*
Bart:	6:38.58-6:39.16	Right
Interviewer:	6:39.16-6:55.01	*Um . . . I led a discussion in the afternoon to build on the morning work with trig functions and the unit circle. (interviewer waits as Bart writes notes)*
Bart:	6:55.01-6:59.69	That's right, you had the Geogebra thing that showed the lengths and stuff
Interviewer:	6:59.69-7:17.47	*Yup, we did that exploration with the Geogebra. And then Celeste finished the afternoon with the inverse trig functions and then said, don't do the unit circle. (interviewer waits as Bart writes notes)*
Bart:	7:17.47-7:24.46	Yeah, that's right. I remember we, we all looked at each other and were like , , , Huh?
Interviewer:	7:24.46-8:20.02	*On the fourth day, we started with a discussion about the need for changing mathematics instructional approaches and talked about Mike Mattos and then we did an introduction of the CMI Framework and the teaching cycle. (interviewer waits as Bart writes notes) And we emphasized the develop and solidify components of the cycle as we looked at the SID4 standard and the SAT math score activity and the "do we send a certificate" activity. So we attempted to incorporate the SID4 standard from |Secondary Math 3 into the discussion of student readiness to learn. (interviewer waits as Bart writes notes) . . . Ok?*
Bart:	8: 20.02-8:20.94	Ok
Interviewer:	8:20.94-8:30.59	*So as I reviewed those activities from the four days, what were some of your thoughts and reflections?*
Bart:	8:30.59-8:45.24	Let's see, starting with day 1 . . . um . . . lets see, I remembered, I always remember arguments that we all had.
Interviewer:	8:45.24 – 8:46.05	*That's fine.*
Bart:	8:46.05 – 9:16.97	The repeated roots . . . I remember somebody was having an argument about whether a root and a zero were the same thing . . . um . . and people were getting into a heated debate about that . . . and . . . um . . . I remember the motion detectors and I remember the

Speaker	Time Stamp	Transcription
		vases . . . I um . . . and I remember the discussion about the inverses, I kind of tuned out because it was the same stuff that was taught in the uh . . . um . . pathways materials, so we had seen all that before so I kind of tuned out on the inverses stuff.
Interviewer:	9:16.97-9:17.58	*Ok*
Bart:	9:17.58-9:41.89	I . . . um . . . and then on two day, the first thing that came to my mind with the SAGE test was that it didn't work . . . um so we just all sat around and um . . . that brings back all sorts of fun stuff about the SAGE test . . . um . . . let's see, I don't remember talking about logs . . . very much, I can vaguely remember the melting snowman.
Interviewer:	9:41.89-9:42.69	*ok*
Bart:	9:42.69-10:18.49	Um . . . And I remember the activities with the pizza and the angular motion and stuff, and like I said, I remember the Geogebra exploration with the trig functions because I had never seen that before. Seeing where those trig functions, showing where . . . how you can show them graphically, that was interesting. Umm . . . day four, I remember liking the information you had from Mattos, . . . um and the SAT math scores stuff was, you know, kind of fun to do. Um . . . I remember being really, really bored with the frame work and the develop and solidify stuff. I just let Amber do all the work for us.
Interviewer:	10:18.49-10:30.17	*Alright, um . . . so were any of those memories as you think about them, were any of them favorable to you?*
Bart:	10:30.17-10:57.70	Well . . . I like, honestly . . . I like having the discussions about stuff, because it helps me learn. So . . .we had to have, for example, the SAT math scores stuff, that was . . .umm . . . probability stuff which we just never get around to teaching. So we had to kind of teach ourselves, so we had to have discussions about what does this mean, what does that mean, so I liked doing that. It was helpful to me, you know, because I like conversing with other teachers about math and not always have someone say, "oh this is how you do it. . . . da, da, da, da, da . . ." We had to work through it.
Interviewer:	10:57.70-10:58.19	*Right*
Bart:	10:58.19-11:16.69	Umm . . . So. . . so that was a positive one . . . but like I said, I . . . I like the uhh . . . as a teacher . . . I wouldn't show it to my kids, but as a teacher, I like that Geogebra stuff with the trig functions . . . um . . . so those were some of the things that were positive.
Interviewer:	11:16.69-11:22.43	*Ok . . . what were some of your least favorite?*
Bart:	11:22.43-11:45.44	I didn't like doing the CMI Framework. That was really boring. . . uh . . . um, the SAGE test . . .um . . . I don't really quite remember all that happened that day . . . but since I've looked at it since then I . . . so I get those memories mixed up . . .um . . . so I didn't really . . . but it was interesting to talk about the SAGE test, but it would've worked better if it actually worked that day.
Interviewer:	11:45.44-11:46.06	*Right*
Bart:	11:46.06-	Umm . . . The students samples work . . . um . . . once again, I . . . I get

Speaker	Time Stamp	Transcription
	12:00.17	kind of bored looking at other people's work, other students, other people's students' work. I don't even like to look at my student's work. But looking at other people's student work, I just didn't like that.
Interviewer:	12:00.17-12:00.68	*OK*
Bart:	12:00.68-12:39.02	Um . . . and then . . . lets see . . . and then, you know, just things in general, I remember the uh . . . activities being really drawn out. You know, you finish the problem, and then you're just like, sitting there for 20 minutes until we get back in the game and do something. I don't remember which activities those were. But I think the . . . the pizza activity was one of them . . . um . . . I remember we were working a lot on the . . . the vases one. We . . . we were doing that for a long time. . . . Um . . . I don't remember the melting snowman very well. . . .but . . .
Interviewer:	12:39.02 – 12:46.62	*Umm . . . Have you attempted any of the activities presented in this professional development in your class?*
Bart:	12:46.62 – 12:49.80	Ah . . . no. . . I don't think so.
Interviewer:	12:49.80-12:50.85	*Would you?*
Bart:	12:50.85-13:22.49	Well, usually we learn . . . like . . . when we went over it in the class. . . it was when we already had talked about it in school. Does that make sense? So if I were to use it, it would be next year but . . . you know, a year's gone by and I probably will forget every single thing that we talked about at this conference. . . so . . . that was one thing, like . . . every . . . we had just finished teaching the stuff that you guys would talk about . . . or we were in the middle of teaching it. . . and um . . . when we went to the conference, that I do remember.
Interviewer:	13:22.49 – 13:26.35	*So if it was more timely, it would be more Beneficial to you?*
Bart:	13:26.35-13:27.50	Yeah, probably
Interviewer:	13:27.50 – 13:40.22	*Ok . . . So . . . you would say nothing in the professional development you participated in had any impact on your classroom instruction then?*
Bart	13:40.22 – 14:05.93	Um . . . I . . .uh . . . I think there was something you said in the Mike Mattos thing that I tried to implement for a couple of days, I can't remember what it was though, but I feel like there was something, so if I saw your slide show presentation thing, I'm sure there was something in there that . . . um . . . I can't remember what it was but I feel there was something there that I tried to implement in my . . . just in my, in my . . . myself that I taught, but I can't remember what it was.
Interviewer:	14:05.93-15:27.27	*Ok, um . . . if we were to look at future professional development to try and meet your needs, so its not just getting credit and moving along the salary schedule, but trying to help you in your classroom, um . . . I've got four areas that you might respond to. One is increasing teacher pedagogical and content knowledge . . . um, the second one would be . . . improving the learning environment, a third one is*

Speaker	Time Stamp	Transcription
		student readiness to learn, so that they are better prepared to receive the information, and the fourth area is proper tiered instruction. I didn't understand math well in high school, and when I did not understand the teacher's instruction and would ask for help, the teacher almost always gave the same lecture he had already presented and then I would go home where my dad was a high school teacher and he would answer me as though he had mental telepathy and used the same wording as my teacher had.
Bart:	15:27.27 – 15:28.76	Yeah (chuckles) using the same wording.
Interviewer:	15:28.76- 15:55.91	*It didn't make it any better hearing it the third time. So we want to make the tier 2 and tier 3 instruction different from the tier 1 instruction. Those are the four areas that mathematics professional development could focus on: teacher content and pedagogical knowledge, student readiness to learn, learning environment and proper tiered instruction. Do any of those sound of value to you?*
Bart:	15:55.91 – 17:16.87	Um the one that I would lean the most toward on would be the first one . . . umm . . . like . . . I was thinking when you asked if I would volunteer for this thing I was thinking of what I might say, and I . . . I think my ideal . . . um . . . umm . . . conference or something . . . would be where the instructors has us sit down and basically mimics a classroom. . . like you would want to see . . . happen, and I'm . . . I . . . like, like mimic it like, you know, you've got an hour and 20 minutes, not lets do this for 45 minutes and then take a 20 minute break. . . unless that's what you're going to do in the classroom. You know. . . because . . .a lot, a lot of the problems that we talk about . . . um as teachers in our little group . . . where, you know . . . we're just discussing activities and stuff, and its. . . yeah it's great but where am I going to find time to do this over four, you know, where can I find . . . where can I spend 4 days going . . . you know . . . making . . . putting water down a . . . ah . . . a vase or something like that. . . you know . . . spending a lot of time and . . . so I think I, I . . . I would, what I would to attend is a meeting where . . . um . . . over the course of like a full day, you'd basically go through three or four lessons that are each an hour and twenty minutes, you know an hour and twenty minute lesson, and then you could take your 20 minute break and talk to your colleagues and stuff.
Interviewer:	17:16.87 – 17:17.16	*Right*
Bart:	17:17.16 – 17:38.81	But have the instructor, you or Celeste or whoever was leading the discussion, treat it like it was an actual classroom. . . um . . . and I don't even want to do the . . . necessarily do the math that my kids are going to do, because that's too easy for me and it's not gonna fill like a real classroom. Um I want to learn the way that . . . the . . . that the core is trying to get our kids to learn, you know what I mean?
Interviewer:	17:38.81 – 17:39.30	*Right*
Bart:	17:39.30 – 18:39.10	So, like, you know, if it was some more abstract algebra kind of stuff, you'd get from college, have them teach that to us, you know it could still relate to the math 3 or the math 2 context, so a little more stuff for our, for the teachers to get a better . . .um . . . well rounded

Speaker	Time Stamp	Transcription
		feeling about the subject. But something that we'll struggle with so that we, we're feeling just like the students are feeling, does that make sense. I mean, they, they try to do that and I can see you guys trying to do that but at the same time, it. . . there's no time limit, there's just, just . . . we'll do it and when everybody's ready to move on, we'll move on and that's not how it is in the classroom. If . . . if I want to do a lesson, I've got to do it basically in one day because of . . . I wait . . . I try to do it over the space of two days, the kids are going to lose interest in it really fast. So I would want to see how was that . . . how was the . . you know . . . showing . . . how many kids were put together in a group and then having them present their ideas and having a classroom wide discussion. How do you cram that all in, into your tight time limit whether it's 70 minutes or an hour and 20 minutes. . . . That kind of thing, you know what I mean?
Interviewer:	18:39.10 – 19:00.86	*Right . . . Um . . . as we tried to model the classroom activities, we tried to keep them within the time frame of a block schedule you would have in the class itself, knowing that all participants were teaching in a block schedule. So we kept the activities within the 84 minutes that are typically available in block schedule for each presentation or lesson activity. Would it have helped if we had explicitly identified that we were modeling a single class activity each time?*
Bart:	19:00.86 – 19:24.81	Probably, yeah . . . it would have helped if you even had a clock on the wall or something to time it . . . or just something to keep the teachers knowing that hey this is going to end in . . . you know . . . 84 minutes or whatever it is, just so we know that's exactly what you guys are trying to do, cuz it doesn't seem like that. It just seems like we're just going to keep going with this topic untillllllll . . . . we're done talking about this topic. It could go the whole rest of the day or extend into the next meeting in three months, you know . . . we had no idea what's going on.
Interviewer:	19:24.81 – 19:30.04	*So being more explicit on our goals and intentions would have been beneficial?*
Bart:	19:30.04 – 19:31.00	I think so.
Interviewer:	19:31.00 – 19:37.96	*Ok, um . . . what aspects of the professional development would you suggest that we do keep for future professional developments?*
Bart:	19:37.96 – 19:42.61	Of the particular professional development that we had?
Interviewer:	19:42.61 – 19:51.38	*Yes, not of the specific activities, but the components or aspects of the professional development. As you look at it you say you like this kind of a thing. What would you say we should keep?*
Bart:	19:51.38 – 22:18.68	. . . Well, I do like working on tasks . . . you know . . . one thing I struggle with are computer based tasks or. . . um . . . tasks that involve . . . um . . . electronical equipment that my students don't have. It's all wonderful and great, but . . . when everyone in our group brings a laptop with Geogebra on it, but when I give my. . . it does me no good . . . cuz my students don't have Geogebra. They don't have computers, let alone Geogebra, you know what I mean? . . .Um . . . I did a professional development class over in Phoenix Arizona over last summer . . . and . . . we basically did the same thing, he had a magic little calculator that was more of a . . .

Speaker	Time Stamp	Transcription
		um . . . it was more of a . . . almost a computer programming calculator. You set your functions and so the . . . um . . . variables and stuff like that, and he played around with it, and it was pretty fascinating, it was pretty cool. And I am sure it would work pretty neat if you had everybody . . . every single student had a computer with this program on it and they had some sort of knowledge about programming . . . but it does me absolutely no good as a teacher, cuz my students don't have that kind of equipment . . . so . . it would be nice if they did some day, but they don't and uh . . . so like I . . . they . . . as cool as it is to do stuff on iPads and . . . computers . . . and stuff, it doesn't do me any good doing those activities, because my kids don't have that, . . .that you know . . . we don't have those kind of materials in school. So I . . . I like the group based stuff . . . um . . . especially the ones that challenge us as teachers, so we don't have to actually do the same stuff our kids would do . . . I just want to see stuff that would challenge me as a teacher because that helps me . . . I don't know . . . it helps me I think be a better teacher when I see . . . when I'm placed in the same position that um . . my students are placed in. So I like that . . .ah . . . I like group discussions, when there actually are group discussions so . . . um . . . you know. . .um . . . . it's a . . . like. . . ah . . . you know sitting in the groups at different tables is great for group discussion, like small group discussions, but when you turn it over to ah . . . over to ah . . . whole room discussion, then everybody at the back with their back were actually . . . everybody facing the teacher is playing games on their laptop and everybody with their back to the teacher has their head down so there's . . . it's only the people on the sides of the table that really. . . really somewhat, kind of paying attention. . . um . . . so I mean, like I've seen people do group discussions in more of a circle or horse shoe shape, but seems to work out a little bit better. Cuz that makes everybody be on the front row, nobody's on the back row. Nobody can watch their little you tube videos and stuff like that.
Interviewer:	22:18.68 – 22:19.29	*Right*
Bart:	22:19.29 – 23:09.23	Um . . . so I do, I do like those kind of group discussions, especially if you actually can get people to actively participate, because I know you struggled on that fourth day getting people to actually participate in the group discussions. So you were leading a lot of the group discussion, but . . . um . . so yeah, so those are the things I like, I do like, and I like, I like, ah . . . the group discussions where there's not necessarily a right answer. You know . . . I . . . um . . . I like actually discussing stuff, not . . . um . . . ah . . . you know, how do you solve . . ah . . this log problem, but, you know, like . . . what could possibly be. . . you know, when you start talking about, you know. . . what, you know those open ended questions that teachers give so students can answer. I can't think of any off the top of my head. But it would actually be. . . start asking each other questions and following up on each other's thoughts and stuff like that, I like those kind of discussions.
Interviewer:	23:09.23 – 23:09.93	*Right.*

Speaker	Time Stamp	Transcription
Bart:	23:09.93 – 23:24.71	Um. . . lets see, what else? . . . um . . . . . that takes basically, um. . . yeah, and just, just . . . the technological , well I mean, I like technology, I love technology, it's stuff I just don't have . . . technology in my classroom.
Interviewer:	23:24.71 – 23:26.86	*What technology do you have in your classroom?*
Bart:	23:26.86 – 23:51.67	Ah . . . I've got an overhead projector that's hooked up to my computer at the back of my classroom, I have a wireless mouse so I can control it from the fInterviewert and I have a . . . ah . . document camera. If it's a calculus class, they almost all have Ti calculators or a smart phone that has graphing capability. But if it is a lower level course like a sophomore class 2 . . .um . . . they got nothin.
Interviewer:	23:51.67 – 23:53.84	*So you have no classroom sets of calculators.*
Bart:	23:53.84 – 23:55.48	No classroom sets of calculators, no.
Interviewer:	23:55.48 – 23:55.96	*Ok*
Bart:	23:55.96 – 24:00.17	I don't think anybody in our school has a classroom set of calculators.
Interviewer:	24:00.17 – 24:06.29	*When you use your computer and the overhead projector, have you used Geogebra to demonstrate concepts to your students as a demonstration or a model for your kids?*
Bart:	24:06.29 – 24:10.26	I haven't used Geogebra, I've used Geometer's Sketchpad
Interviewer:	24:10.26 – 24:11.33	*Ok, Geometer's Sketchpad is similar to Geogebra, Ok*
Bart:	24:11.33 – 24:21.85	Yeah, I use Geometer's Sketchpad because I am more familiar with it. Geogebra's a new thing for me. I even downloaded the Geogebra app on my. . . my iPod, but I haven't ever played around with it yet.
Interviewer:	24:21.85 – 24:36.99	*Right, the only reason we used Geogebra is because it is free and therefore all teachers could use it. I am more familiar with the Geometer's Sketchpad myself, um . . . so I . . . but they are so similar, that I am able to use them both. How do the kids respond when you use the computer and projector to model with Geometer's Sketchpad?*
Bart:	24:36.99 – 25:09.26	Ah . . . I don't use it very often . . . um . . . in fact I don't think I use it all that much since . . . I use it, I use it when I talk about trig functions . . . um . . . and ah . . . but . . . you know, it's just . . . I guess they kind of like it because it is something different, If I did it every day they probably would think it was stupid, but . . . you know, throwing up a presentation or something using Geometer's Sketchpad or Geogebra . . . occasionally, keeps them a little more interested because it's something new, but if I did it every day, I am sure they would be just as bored as if I were up there talking the whole time.
Interviewer:	25:09.26 – 25:40.30	*Um, the reason why I ask, is we actually have the kids come up and run the program while the class watches. And while I may not have a computer for every kid, they are going to get a chance to work the program and so they pay attention to how the program works when someone else is using it. So they can get excited about what the technology can do during the discussion.*

Speaker	Time Stamp	Transcription
Bart:	25:40.30 – 26:23.76	I mean, you know, we have a math computer lab that's got, I think they all have Geometer's Sketchpad on them and I've seen, . . . like . . . Cathy Gledstone, she also teaches at Pleasant High, she's had some . . . ah . . . activities that are like a piece of paper that runs down, click by click what you're supposed to do . . . you know. . . click on the file button . . . and then click the add arrow button . . . and it is sooo . . . I have never tried doing it because it is so, it is just so, to me it is stupid that it just. . . I'm not going to follow all of these stupid little instructions, so it would be nice if they actually knew how to play around with it . . . but . . . in order to get them to play around with it . . .you would actually have to dedicate some time and have the computer lab and teach them how to use it . . . but if I'm only going to use it once or twice a year it's kind of pointless just to do that.
Interviewer:	26:23.76 – 27:14.73	*I didn't have a smart board in my classroom when I taught nor did I have a computer lab, but I did have a computer and a projector set up like your classroom and I was able to use the Geometer's sketchpad on a nearly daily basis and the students did not tire of it. Um . . . In fact, it helped increase student participation, because I only called on student who were actively engaged to come to the board and run the program, and they learned to use it pretty quick. Uh . . . And it helped facilitate concepts such as families of graphs and their translations, students could determine quickly where the zeros were after having graphed several related functions in rapid order. Would something like that be worthwhile in a professional development, showing how to do that?*
Bart:	27:14.73 – 27:14.73	Um . . . You mean like using, using like what tools, like Geogebra thing or Geometer's Sketchpad?
Interviewer:	27:14.73 – 27:24.87	*Well, like presenting how to use limited technology in whole class.*
Bart:	27:24.87 – 28:27.54	See, I . . . I don't . . . I don't know cus . . . like I do something similar, like . . . most of them have smart phones, I don't know how they can't afford ta . . . ah . . . ah . . . pencil, but they can afford a smart phone . . . so I, I . . . I spent a lot of time this year getting them used to their smart phone graphing calculator, they could down load a free graphing calculator and there are various ones, so we would do a lot of stuff because they could get that instant feedback and stuff like that . . . it's just like . . . if . . . I feel like a professional development places . . . you have to use Geogebra to do this activity . . . and . . . so I don't know, it's just . . . I guess . . . I don't know . . . I . . . if you can . . . if you can . . . what am I trying to say . . . um . . . make it work for more classrooms . . . than just one specifically . . . you know what I mean? Like . . . here's the general idea of what we're trying to do, and you can use Geogebra or Geometer's Sketchpad, you can use a graph, you can use excel or whatever it is. I think that would be more advantageous than, ok, here's how you do it in Geogebra. You have to go up here and you know . . . does that make sense?
Interviewer:	28:27.54 – 28:34.87	*I understand what you are saying. . . um . . . What are some topic you would like to see addressed in future professional development opportunities?*
Bart:	28:34.87 –	Like mathematical topics?

Speaker	Time Stamp	Transcription
	38:37.41	
Interviewer:	38:37.41 28:37.84	*yes*
Bart:	28:37.84 – 30:52.18	Umm . . . so probably some stuff like that . . . Umm, I don't know exactly what, probably more of what does the core want us to with all that stuff. Um . . . probability is always good, because we never get to it so it's always, so it's always new stuff for us teachers when we go over it. Umm . . . let's see . . . rate of change is always good to talk about. Like ah . . . to hear how other people refer or talk about rate of change and stuff like that, because in the back, like, you know, when I went to school it was all slope. Slope everything, slope this, slope that and now with the new core they are trying to get over to rate of change which makes sense for calculus and stuff. Which is really nice, but I would like to see how other people talk about rate of change and stuff like that. Umm . . . so that would be . . . that would be nice. Um . . . and especially . . . more than just talking about rate of change of a line, I don't care about rate of change of a line. Let's talk about . . . um . . . um rates of change that actually change. You now, when you have some concavity and stuff like that. Ah . . . that kind of thing, I don't know, so mostly probably math 3 stuff. Um . . . the math 2 stuff that's . . . that probably I could probably use some more . . . ah . . . info on the . . . um . . . . . I can't think of anything . . . (long pause) . . . I was about to say similarity, but I am so tired of talking about similarity. It seems we're always talking about similarity. So I think that would be it. So it would be mostly about that math 3 stuff. It seems more than half of the new core is talking about compare and contrast these different kinds of functions. Through tables, graphs, equations stuff like that. And just talking about it and what works and what doesn't work.
Interviewer:	30:52.18 – 31:03.19	*Well, it sounds a professional development you would be interested in more than just for the lane change credit would be professional development centered on content area specific for you*
Bart:	31:03.19 – 32:58.33	Yeah, I would say content area . . . um . . .like, just, um . . . like . . . like . . . um . . . in other areas other than just math content, I am always interested in better ways to um . . . manage my classes . . . not manage like the kids, but manage like the grades and stuff like that. Like coming up with different ways of grading systems, like I have attended conferences where . . . ah . . . there's people who do . . . their grades solely based on testing, you know . . . solely based on stuff like that and any um . . . subjective grades are not part of the, you know, grades, I love to have chats about that with people more about that and have a discussion about that kind of stuff and what would work. And um . . . using canvas . . . I've never used canvas before and I have been playing around with that recently. Umm . . . so a kind of on line management system, class management system, you know . . . some things like that, that kind of classroom management system, not like how do I keep kids under control. How to manage the inner workings of my classes.
Interviewer:	32:58.33 – 33:34.69	*Yes, that touches more along the fourth area of the classroom environment. So you would like to see a Learning Management System like Canvas or Blackboard that allows access for students to*

Speaker	Time Stamp	Transcription
		the core and the ability to communicate with parents and students in a variety of ways. What I would like you do between now and the next time which is a week away.
Bart:	33:34.69 – 33:35.38	Yes. Next Thursday.
Interviewer:	33:35.38 – 35:04.20	*Would you do me the favor of reviewing the four days of instruction again, and the four areas of emphasis of professional development and be ready to respond to questions concerning those. You have shown a real interest in the content area, but do any of the other areas hold any interest for you? Also, I will be asking some questions associated with reform-based instruction. I really appreciate your willingness to be interviewed and your candid responses to my questions.*
Bart:	35:04.20 – 35:06.22	Ok,
Interviewer:	35:06.22 – 35:11.95	*Oh, I forgot, to ask, were you mandated to be at the professional development or did you attend voluntarily?*
Bart:	35:11.95 – 35:13.66	We were mandated to attend.
Interviewer:	35:13.66 – 35:16.01	*Well thank you for talking with me and we will get together next week*
Bart:	35:16.01 – 35:16.98	Ok, we'll see you.

Appendix J

Transcript of Bart Interview 2

Transcript of Bart Interview 2

Interview 2, May 22, 2014
6:00 pm

Speaker	**Time Stamp**	***Transcription***
Interviewer:	0:00.00 – 0:06.55	*Well, Bart, I appreciate your willingness to speak with me again about your experience with the recent professional development.*
Bart:	0:06.55 – 0:07.84	Not a problem
Interviewer:	0:07.84 – 0:28.81	*It um . . . means a lot to me so thank you. Last week, at the end of the first interview, I asked you to consider the four days of the professional development as well as the four areas of focus for mathematics professional development and then be ready to share any thoughts you might have had. Have you thought about these items over the past week?*
Bart:	0:28.81 – 0:36.34	Yes, um . . . do you remember Teddy's presentation about how to use . . . um . . . was it forms, on google docs?
Interviewer:	0:36.34 – 0:36.34	*Yes*
Bart:	0:36.34 – 1:13.60	Yeah, I mean . . . I thought that would have been, like a fun activity for people to learn, but it just wasn't well prepared, it was like, here's the forms thing, now go and make a form, I don't know, it just doesn't seem like it was really well put together and uh . . . I feel like that's how it is a lot of times at these professional development things, it's like . . . what? . . . it's like they just came up with the idea an hour before hand and just kind of threw it together . . . so . . . you know, just a little bit more preparation on some of the presenters. Umm . . . you know we're there to learn, and sometimes it just feels like they were not very prepared.
Interviewer:	1:13.60 – 1:14.59	*Ok*
Bart:	1:14.59 – 1:17:18	So anyway, that's the only thing that I really thought of.
Interviewer:	1:17:18 – 1:24.24	*Is that a general statement towards all professional developments or for the four days you mainly participated in this one?*
Bart:	1:24.24 – 1:34.87	Um . . . I'm, I'm sure it's for all professional developments. Teddy's, that presentation was one that I noted because I've taken a class before, like another professional development class
Interviewer:	1:34.87 – 1:35.46	*Uh huh*
Bart:	1:35.46 – 1:54.59	You know we spent a whole day on those forms and here we spent 20 minutes on it and like . . . you know, play around with it . . . and have fun with it for 20 minutes, I don't know, it's like . . . what's the point of even introducing it if we're not even going into actually why they would be valuable and that kind of thing, you know, I mean . . .
Interviewer:	1:54.59 – 1:59.65	*So you think there needed to be more direction, more of a purpose in mind? That would have helped?*
Bart:	1:59.65 – 2:01.24	Yeah I think so
Interviewer:	2:01.24 – 2:01.94	*Ok*
Bart:	2:01.94 –	And um, an especially the more direction, like . . . um . . I, I, I'm all for

Speaker	Time Stamp	*Transcription*
	2:41.68	the forms, play around and mess around with it . . . but . . . he didn't even go over how to use half of the things, so there was just like . . . I don't know, there just could have been more of a . . . yeah some sort of activity or something where you know. . . not let's send it all to everybody here and everybody take their own, and everybody else's survey, and I'll just make up a survey with three questions and everybody has to take it, so you can see how the answers are reported, what kind of questions you'd ask, you know, more of an activity that gets the . . . uh . . . participants understanding a little bit more about the idea, and I, I, I'm not just singling Teddy out, it's just
Interviewer:	2:41.68 – 3:03.73	*Uh . . . no . . . I am glad you are sharing this. It is important . . . It seems to me that there's a theme I'm hearing, this idea that if I share the expected . . . uh . . . instructional outcomes at the beginning it would increase the involvement in the professional development.*
Bart:	3:03.73 – 3:28.93	I agree, I, I, I think, I think that's . . . uh . . . in fact, oh another thing that I wrote down . . . um . . . and once again this is with all professional development, but more transparency in like a course description. Like, I've seen some really, really horrible written course descriptions that are just like . . . we're going to learn about secondary math 3, you know and that's the end of the course description. No . . . so what about it . . . no . . .um . . . and uh . . . the more the merrier. The more in the description as possible, I think that would allow you um . . . to get the people who are actually interested in that kind of stuff to your professional development. And it won't be so disappointing to those that thought they were going to be doing one thing when it turned out to be something completely different
Interviewer:	3:28.93 – 4:19.55	*Ok, um . . . reflecting on the professional development, what were some of your thoughts about the conversations of the professional development, like the extreme statement, "I would never use a unit circle to teach math"*
Bart:	4:19.55 – 4:52.75	I remember we all looked at each other and we were just like . . . well how else could you do it. And I think, if I remember right, I think it was Celeste who said that. And I . . . I'm . . . I wasn't really paying attention and I came to the conclusion that she was talking about something else, I could be wrong, uh . . . I don't know. I don't see how else you are going to do it without, teaching the unit circle . . . um . . . I don't know. Ah . . . maybe it was, she was thinking you don't call it the unit circle. I don't really remember the context of the situation, I just remember we all looked at each other with raised eyebrows and like ok, if that's what you want to do.
Interviewer:	4:52.75 – 5:00.40	*Did any of that cause you to have conversations with your partners outside of the professional development? Those kinds of comments?*
Bart:	5:00.40 – 5:35.39	Yeah, and in fact that brings up an interesting, that, that particular example, in fact, I asked my um . . . uh . . . other math folks at lunch uh . . . the other day about, you know, their thoughts about the professional development and stuff and um . . . I think, um . . . you know that comment was made more of ah, as a running joke rather than you know . . . an actual discussion, but it was just, you know the funny things that happen at . . . the weird interesting ideas that some people will have and that um you know someone else,

Speaker	Time Stamp	*Transcription*
		someone will probably say in a couple of months, oh I 'm going to teach the unit circle again. (chuckles) that sort of thing.
Interviewer:	5:35.39 – 5:44.23	*So, um . . .when comments are made like that, though and it generates conversation, do you think that it has any benefit in your instruction?*
Bart:	5:44.23 – 6:55.30	I think, I think it has a great benefit just in, maybe . . . not in instruction for teaching kids, um students, but at least for my own benefit as an instructor, you know, when you critically look at something and like the unit circle and say, hey is this really valuable that my kids need to learn, learn this, and you have a discussion about is it valuable or is it not, then I think you can come to . . . a better . . . uh . . . be a little bit more sure of yourself whether it is of value or if it's not of value . . . um. . . I have done the same thing in before, with completing the square, I've asked the ah . . . um . . . some of the other teachers on my . . . cuz to me ah . . . completing the squares is . . . I just find it a waste of time, I'd just rather use the quadratic formula because to me it's just easier. And so you know, I almost wanted to, uh . . in fact I think in my first year I never even taught completing the square, but then after discussing it with my coworkers, um . . . Tami mentioned that like ah . . . in ah . . . ah . . 1050 they need to use completing the square for uh . . . you know, writing things in vertex form you know . . . um you know . . . and it's like, oh ok, yeah I didn't think about that and so I actually, if I hadn't had that discussion, I would have totally stopped completing the square because I never used it for um . . . solving, but I didn't think of other purposes of what it could be used for.
Interviewer:	6:55.30 – 7:23.81	*So . . . if we are looking at the possibility of outside discourse being helpful, would something like, um . . . if we could come up with a good question . . . or . . . statement as a prompt at the end of the course . . . or . . . the end of the day such as an exit card be beneficial?*
Bart:	7:23.81 – 8:04.35	Um . . . yeah I think it could be, it depends on how it's handled. Um . . . I think as just as a piece of paper, if like, a prompt that you receive as you walk out the door, probably . . . wouldn't be sooo effective because people would probably just put it in their bags and forget about it, um . . . but, if you can, I have never really been a big fan of this, um maybe its just because I have never really seen it work really well, but I know people do those on line . . . um . . . like chats, chat rooms, you know those on line discussions um, I think that could be of value because that could, then you could have real time, semi real time, conversations outside of class about um . . . a discussion board is what they are called.
Interviewer:	8:04.35 – 8:04.53	*Right*
Bart:	8:04.53 – 8:29.96	Um . . . about uh, about the topic. Um, uh . . . now I have, I have never been a really big fan of that especially when using for my actual students . . . um but maybe, you know as a professional development type thing where you're um being able to talk to people outside of your little group that, ah, or your math people in your own building I think, I think that could be valuable if done correctly
Interviewer:	8:29.96 – 9:16.04	*Ok, um . . . again, it sounds like if we had transparency and identified the motive for doing something like that, it would be beneficial for*

Speaker	Time Stamp	*Transcription*
		participants. Bringing them on board. We were hoping to prompt further discussion. Especially when we were trying to model an instructional technique. It might make us look more prepared if we shared what we were attempting.
Bart:	9:16.04 – 9:19.11	Yes I think so.
	9:19.11 – 9:21.96	*It might make us look more prepared if we were actually explaining why we were doing something.*
	9:21.96 – 9:23.43	I . . I agree.
Interviewer:	9:23.43 – 9:23.23	*What motivated you to become a high school math teacher?*
Bart:	9:23.23 – 11:14.82	Um . . . . . well to be brutally honest (chuckles) . . . one of, one of the things that, and this is uh . . . a thing I struggle with, but uh . . . but it's uh, I can do it better than you can type thing. So you know, going through school I just had crappy teachers sometimes and it's like, you know, I could, I think I could do this better than you could and . . . then so that, that kind of got . . . and then at the same time, I had some wonderful teachers that, like wow . . . I want to be like, . . . I want to do what you do, you know, and be like . . . but you also have those people who, you like, you know I could do your job a lot better than you could, so there's that little prideful aspect to it. Umm . . . it took me a little while to finally decide on doing math teaching, but I took ah . . . so I had been at BYU for about a year and a half and I had taken a lot engineering intro courses, cuz I figured I like math so I figured I would do engineering and then one summer I did, I took the intro to ah . . . math education and I just ah, I loved it, I fell in love with it, it was, there was only five of us in the classes in the summer term and ah . . . it was just burning about fractions and how people think, how. . . how people think about fractions and you know there's . . . you can think about is as um . . . you know, splitting it into groups, um or there's division. So that fractions, it's like, you can think of it as like um . . . three fourths is being like, three iterations of one fourth, or you can think of it as the whole being split up into four pieces and you want three of those, and . . . I don't know, it was just really interesting to see, to actually delve more into the, . . . how people think about mathematics rather than you know, just computational mathematics, but actually how people think about it and I, I liked it a lot and uh . . . um so that's kind of what you know hooked the line and I thought, yeah I want to become a math teacher. I really liked those education classes at BYU.
Interviewer:	11:14.82 – 11:40.55	*ow when you are talking about your past experiences with those teachers you had in high school, you said you had crappy teachers and you had good teachers, if you reflect on those good teachers, did they provide those kind of opportunities for you in your math classes, where you looked at different ways of looking at fractions like you just explained? Can you describe what made them good or bad?*
Bart:	11:40.55 – 12:34.28	Um . . . I think, I think about the good ones, it wasn't so much about content, it was more about just how they interacted with the students, the ones that you know, um . . . took their class, whatever

Speaker	Time Stamp	*Transcription*
		it was, whether it was math, English, science or whatever, they took their class seriously and took your education seriously and then you had the teachers who, who you know would . . . um . . . I don't know, put up a power point that they've been using for, well not a power point, because they haven't been using those very long . . . but like ah . . . an overhead projection that they have had for the past 15 years, and you just pop on the overhead and copy down the notes, pop on a new overhead and you know, just these teachers are going through the motions, or they will give you an A if you just sit there and be quiet, you know that kind of thing, those are the . . . the ones that I would consider as bad teachers, the ones that I said, you know what, I could probably do this job better than you and I don't even know anything about ree . . , English or science.
Interviewer:	12:34.28 – 12:37.46	*So, what kind of a student were you in high school?*
Bart:	12:37.46 – 12:43.52	Oh I was a . . . always do your homework kind of . . . very academic . . . ah . . . guy
Interviewer:	12:43.52 – 13:03.68	*Ok . . . um . . . I'm going to go through a list of some different aspects of reform-based instruction, did you get a chance to look up what that means?*
Bart:	13:03.68 – 13:06.50	Yeah, I know what inquiry based instruction is.
Interviewer:	13:06.50 – 13:28.37	*Ok, if you could think about your current instructional practices as I go through this list using a four point scale. The bottom of the scale is "not important" and the top is "very important"*
Bart:	13:28.37 – 13:33.65	The scale is one through four?
Interviewer:	13:33.65 – 13:51.40	*Yes, uh . . huh. Not important is one and very important is four, and respond to 8 aspects of reform-based instruction as they relate to your current instruction of mathematics. Ok? As you think about your desire to be a successful mathematics teacher, is this important or not important to my success. Ok?*
Bart:	13:51.40 – 13:53.52	Ok
Interviewer:	13:53.52 – 13:51.77	*So number one, providing concrete experiences before an abstract concept.*
Bart:	13:51.77 – 13:58.88	What do you mean by that?
Interviewer:	13:58.88 – 14:39.37	*Um . . . the idea of . . . maybe, lets go back to the idea of fractions that you spoke about earlier. Rather than talking about the abstract idea of what dividing by a fraction is, you give them an experience where they can take something like a problem where I have one and a half pounds of hamburger, how many quarter pound hamburgers can I make? The quantities of one and a half and one quarter can be modeled with a manipulative or drawing and students are able to practice and demonstrate understanding of the division by a fraction before you begin talking about the abstract idea of dividing by a fraction and any procedures or algorithms. It's more of a concrete experience where I am thinking about partitioning a quantity before I start talking about the algorithm.*
Bart:	14:39.37 –	Ok . . . then, so say the question one more time.

Speaker	Time Stamp	*Transcription*
	14:41.45	
Interviewer:	14:41.45 – 14:39.10	*What is the importance of providing concrete experiences before abstract concepts in your current instructional practices.*
Bart:	14:39.10 – 14:47.74	I'd say a four.
Interviewer:	14:47.74 – 14:53.61	*Ok. How about developing students' conceptual understanding of mathematics.*
Bart:	14:53.61 – 15:01.13	Um. I don't . . . um . . . this is how important I think it is in my teaching?
Interviewer:	15:01.13 – 15:01.72	*Yes*
Bart:	15:01.72 – 15:07.48	. . . . . ideally, it would be a four, but it is probably more of a three.
Interviewer:	15:07.48 – 15:15.53	*Ok . . . ok, taking students' prior understanding into account when planning curriculum and instruction.*
Bart:	15:15.53 – 15:17.91	Uh . . . a four
Interviewer:	15:17.91 – 15:22.09	*Ok . . . um, practice computational skills and algorithms.*
Bart:	15:22.09 – 15:23.08	Three
Interviewer:	15:23.08 – 15:26.86	*Ok, having students work in cooperative learning groups.*
Bart:	15:26.86 – 15:33.88	. . . . . (makes sound that seems to be a sign of exasperation) . . . so once again, is this ideally, or is this what I do right now?
Interviewer:	15:33.88 – 15:38.55	*This is what you do right now, what you put into practice.*
Bart:	15:38.55 – 15:42.82	This is what I put into practice . . . Ok . . . um, probably a one.
Interviewer:	15:42.82 – 15:48.18	*Ok . . . engage students in inquiry oriented activities.*
Bart:	15:48.18 – 15:50.96	Ah . . . a two
Interviewer:	15:50.96 – 15:55.04	*Have students participate in appropriate hands on activities*
Bart:	15:55.04 – 15:56.13	Two
Interviewer:	15:56.13 – 15:58.83	*And use performance based assessment.*
Bart:	15:58.83 – 16:06.69	. . . . . um . . . performance based assessment . . . being . . . I don't . . . define performance based assessment.
Interviewer:	16:06.69 – 17:14.11	*Ok . . . um . . . when I taught volume of a cylinder, when I first started teaching, I would have a traditional test with about ten questions on it. They would have a little drawing of a cylinder with the height and radius or diameter marked with values and students were to demonstrate understanding of volume of a cylinder with that instrument. Later, I developed a culminating activity which became my assessment for volume of a cylinder where I would give each student their own tin can of varying sizes and a measuring tool and they were required to calculate the volume of the cylinder. They*

Speaker	Time Stamp	*Transcription*
		would then bring their cylinder to me with the calculated volume. I would have them sit in a seat in front of the class and hold the can over their head as I poured the amount of water they told me could fit in the can. If there was not enough water in the can I had a little syringe with water in it and I would squirt them with it, if there was too much water I would keep pouring until a little fell out on them. If they remained dry, I would tell them to get up carefully and they would look at the can and water. Many times, after I had said it was ok, they would be back in a few minutes with a new value because they were not satisfied with their result. I was no longer the one that validated their work. They knew for themselves how good their answer was. That's a performance based, I do not need any other assessment because I know after the activity what their understanding of the concept was.
Bart:	17:14.11 – 17:17.95	Ok, I'd say a one then, I've never done anything like that, it sounds like fun, but I have not done that.
Interviewer:	17:17.95 – 18:52.19	*Well, it really is . . . On a regular test, they would come and ask me why they got a problem wrong and I would have to explain what the error was and you would attempt to talk about precision, accuracy and tolerance and they did not understand . . . In a performance-based activity . . . they know for themselves what the outcome was and they didn't need me to validate what was correct and what was not correct. I did not have to explain . . . Um . . . both assessment techniques confirm if they understand the assessed concept . . . uh . . .how would you have responded in a classroom that had more group activity, hands on activities, or inquiry based activities like that?*
Bart:	18:52.19 – 19:46.15	Um . . . I've actually had a class like that before, I took a calculus at BYU and it was an honors math class, and they used the whole . . . and I took, I took it for . . . ah . . . calc 1, calc 2 and both semesters it was all inquiry based, and it was really, it was quite, it was way fun . . . um the teachers hardly taught anything, it was just, it was just so well prepared on their end with the tasks that they had us do . . . um . . . it was phenomenal, it was like, you know, when I think about inquiry based, or um that kind of instruction, that's my go to thought, um you know, those two classes and um . . . just how neat it was to actually work as a team and um . . . think through um . . . the different problems and try different thing out, I thought it was really fun.
Interviewer:	19:46.15 – 20:04.52	*What could we do in a professional development to help you implement that kind of a classroom instruction for your students? Maybe not every day, but so that students have an opportunity to do some inquiry, some discovery, some discussion with each other, some group work?*
Bart:	20:04.52 – 21:37.47	I think . . . the thing that keeps me from like going down that path and trying to do more of that stuff . . . um . . . is, I don't know how to create that good of a task where its . . . ah . . . you know those low entry high ceiling tasks. Where they can actually work through it and achieve something valuable, um . . . ah . . . from the task, and you know . . . kind of work, and just . . . and without being spoon fed everything, actually, you know, just discover the stuff they are

Speaker	Time Stamp	*Transcription*
		supposed to find, you know? That kind of stuff . . . ah . . I'm just, I . . I don't know how to write those kind of tasks . . . and I know in the past, some other, um . . . um . . . professional development courses I've taken, not . . . not this one, not your guys's one, but some other ones. They say, "Oh we'er all going to create tasks and then we'll put them on line and then you guys can access them and, but in my head, I'm like . . . ah . . . I know I don't have any training in creating these kind of tasks, like these deep, you know, reaching . . . ah . . . you know . . . these deep level tasks, I don't think my peers do either. So why do I care about their, you know, about their tasks, yeah they might come up with an ok task, but, I . . . I think that I . . . just in my head, I think . . . I wanna . . . a um . . . a series of tasks that build upon one another, not . . . and not a . . . you know . . . I . . I kind of want a curriculum of it, not just, you know . . . piece meal task here and a piece meal task there, that I got form this other place, I almost want it to be a tried and tested method of . . . um . . . an assortment of tasks. Does that make sense?
Interviewer:	21:37.47 – 21:44.75	*Yeah, it almost sounds like you would like to learn how to create the task itself rather than be given the tasks like we did in this professional development.*
Bart:	21:44.75 – 22:48.08	If I'm giv . . . I'm . . . um . . . well I prefer to be given the tasks, but I prefer to be given them by an organization that I have trust and faith in, that they've actually tested out those, you know . . . ah those tasks and that they actually do allow students to . . . um . . . you know . . . achieve the desired ends, it's not just something that somebody came up with in the morning while they were taking a shower and they threw it together and it worked great . . . and . . . for their students . . . and because they liked it. I, I want more of a . . . um . . . you know, I , I want it to like . . . ah . . . like for example, I haven't actually looked at them, but the um . . . oh what's it called. The uh . . . it's uh . . . a curriculum that I know a couple of people from BYU helped on and some other people . . . and I can't remember what it's called.
Interviewer:	22:48.08 – 22:50.66	*The MVP project?*
Bart:	22:50.66 – 23:47.63	Yeah, that . . . yeah, the mvp project . . . I haven't looked into it that much . . . um . . . but I know that Dr. Hawkins, he's a BYU professor . . . and I've looked at some of the tasks and I feel like they've gone through . . . um . . . and actually, and the same thing, um . . . the pathways curriculum out of Arizona . . . ah . . that Celeste Young works with. I feel like those people have gone through, connected tasks together, so there's not just one single task that helps you get through one, something but they're tasks that are linked together somehow, to kind of bridge the whole . . . concept . . . uh . . . create that conceptual understanding rather than, ok today we're going to play with blocks and ok, now next time we're going to play with dice, and there's two completely different um . . . tasks, but still try to get the same, I don't know, I don't know . . . I don't know what I am trying to say . . .
Interviewer:	23:47.63 – 24:58.00	*No . . . I do, and it . . . it is kind of frustrating to me because I look at what we did on the day we worked on the circles . . . and we had the*

Speaker	Time Stamp	*Transcription*
		pizza activity, and then the fly on the fan activity, we had actually taken those activities from experiences where we knew they worked in the classroom, they were related, just as you have expressed a desire that they be related . . . and we tried to present those in a developed, thematic schedule for that day so that one would build upon the other and we modeled them so that participants would see how they could use those in their classrooms. And it doesn't sound like it . . . ah . . . got across to the participants. So apparently if we were a little more transparent and identified how those activities were linked together and that they had been tried in classrooms and proven to be successful, and were intentionally interwoven in their sequence of presentation, it might have benefited the instruction to participants?
Bart:	24:58.00-25:01.37	. . . um . . . I think so.
Interviewer:	25:01.37 – 25:10.11	*It sounds like it came across as disjointed, unpurposeful and kind of just thrown at you. Is that a correct interpretation?*
Bart:	25:10.11 – 25:39.80	Yeah, I think it came more . . . like . . . um . . . I didn't feel like there was much, like you said there was . . . ah . . . um . . . I felt like all the presenters were all doing their own little thing. Even if they had the same topic. It was their own little thing. I didn't see . . . I didn't feel . . . like there was any . . . um . . . goal of connecting any . . . um . . . any of the activities that we did. It just seemed they were all pretty much individual.
Interviewer:	25:39.80 – 26:25.85	*Ok . . . um . . . that is important to know, that what we attempted to do, did not get portrayed. Because we did meet together and the tasks were intentionally chosen and the sequence was also intentional. Our actions were very purposeful and completed together, not individually. That's too bad . . . we intended . . . and we missed the mark.*
Bart:	26:25.85 – 26:32.39	Only with me, you might have hit it with some other people, they saw it. That's kinda, kinda . . . yeah . . . I didn't feel like it.
Interviewer:	26:32.39 – 26:56.35	*No, that's ok. We need to know this in order to improve professional development. If we didn't hit the mark with you, that is important to know, because we don't want to waste any participant's time. So what I am learning here is going to be beneficial, as we attempt to improve what we do for professional development . . . so as we finish up here . . . . can a mandated professional development become beneficial to the participants?*
Bart:	26:56.35 – 27:38.72	. . . I think so . . . I . . I mean . . . um . . . I think it's harder . . . to be beneficial to everybody cuz everybody is forced to be there . . . um . . . but I still think . . . you know . . . they can get . . . uh . . . you know . . . yeah . . . I don't . . . see why it couldn't be . . . it's just . . . if they are willing to take from things . . . um . . . but um . . . it will just be a bit harder if they are mandated . . . . because um . . . unlike an optional type . . .um . . . professional development.
Interviewer:	27:38.72-27:53.12	*Ok, If I were to look for the one thing that might a mandated professional development successful, um . . . what would you say it would be? Any ideas?*
Bart:	27:53.12 – 28:33.04	Ah . . . well, one thing I've found . . . when I asked everybody at lunch . . . you know . . . what they think a good professional development . . . what their ideal professional development looked

Speaker	Time Stamp	*Transcription*
		like . . . actually um . . . what that would be . . . um . . . actually . . . everybody had a different answer. And some of their answers were like . . . what I found boring . . . I just thought . . . your ideal, ideal professional development sounds real, real boring . . . so I think . . . um . . . maybe if you were to ask at the beginning . . . what do . . . and I think you guys did this . . . I think you asked this, what kinds of things do you want . . . what kind of . . ah . . . what kind of questions do you have on math three core? Didn't you guys ask that at the beginning? What do you want to get out of this?
Interviewer:	28:33.04 – 28:33.99	*Yes*
Bart:	28:33.99 – 29:33.99	. . . Um . . . and once again, . . . actually that kind of question is good . . . um . . . and once again, with the whole transparency thing . . . bring those up and say, hey this is what . . . you know . . . 50% of the people, this is what they hoped to get out of this, so lets ponder about . . . so you know . . . gosh . . . we're talking about it right now, we're talking about what you wanted us to talk about. What you felt would be helpful . . . um . . . and not just to kind a . . . sneak it in there somehow where you assume that they're question gets answered. But actually, all flush . . . and do you know . . . 50% wanted and the other 50% never thought of this, but it is something interesting, but you might not find it interesting, but you know, participate and help each other out . . . and you know . . . cuz I don't think you can create a . . . ah . . . professional development that everybody is going to love, because, we all worry about different things, we all have our strengths and we all have our weaknesses and they're not all the same thing . . . so . . . so . . . yeah
Interviewer:	29:33.99 – 30:53.09	*Ok, well I appreciate you giving me some insight and it helps as we proceed to make future professional development opportunities. And thank you for you willingness to sit and talk with me during these interviews.* *Was there anything else you wanted to share before we conclude?*
Bart:	30:53.09 – 30.53.34	Uh . . . No, I don't think so.
Interviewer:	30.53.34 – 30:59.03	*Thank you for being honest with me. It is really appreciated. And good luck to you in the future.*
Bart:	30:59.03 – 30:59.12	You're welcome.

Appendix K

Transcript of Cheryl Interview 1

Transcript of Cheryl Interview 1

Interview 1, May 23, 2014
12:30 pm

Speaker	Time stamp	Transcript
Interviewer	0:00.00 – 0:03.38	*I have given you a paper*
Cheryl	0:03.38 – 0:03.52	Ok
Interviewer	0:03.52 – 0:12.47	*and pencil there so you can record things and I really appreciate you being here for this. Um . . . the . . uh . . . first couple of questions are fairly simple.*
Cheryl	0:12.47 – 0:12.53	Ok
Interviewer	0:12.53 – 0:13.71	*How long have you been teaching?*
Cheryl	0:13.71 – 0:21.06	Oh . . . boy . . . oh . . . since . . . 99, so . . . so what, sixteen years?
Interviewer	0:21.06 – 0:21.87	*Sixteen years*
Cheryl	0:21.87 – 0:21.99	Yeah
Interviewer	0:21.99 – 0:25.33	*Ok . . . and ah . . . how long have you been at your current school?*
Cheryl	0:25.33 – 0:26.72	Um . . . ten and a half
Interviewer	0:26.72 – 0:31.98	*Ten and a half . . . . . and your experience with professional development, have you attended very many?*
Cheryl	0:31.98 – 0:47.39	Um . . . just since I've been in Provo School District. So my position before, I, I didn't because I didn't want to be away from my class, and so I had a hard time doing that, but I can see the value of it and I enjoy going to them and I learn a lot from them, so I think they are very beneficial, yes.
Interviewer	0:47.39 – 0:48.18	*So ok*
Cheryl	0:48.18 – 0:48.78	Yes
Interviewer	0:48.78 – 0:55.53	*So some of the questions we are going to review are about all general . . . um professional development experiences*
Cheryl	0:55.53 – 0:56.14	Ok
Interviewer	0:56.14 – 1:02.71	*So you do like participating in professional development*
Cheryl	1:02.71 – 1:00.79	Yes
Interviewer	1:00.79 – 1:08.34	*Ok . . .and do you typically find professional development to be helpful to you?*
Cheryl	1:08.34 – 1:10.13	Yes, for the most part, yes.

Speaker	Time stamp	Transcript
Interviewer	1:10.13 – 1:14.31	*And the ones that are beneficial, can you identify any key factors that make it so ?*
Cheryl	1:14.31 – 1:22.85	I think that, I , I, I think that the ones where other teachers share experiences that work for them, or things that didn't work for them, that is most helpful.
Interviewer	1:22.85 – 1:28.21	*Ok, and those that weren't as helpful to you, those professional developments, what were some of the things that . .*
Cheryl	1:28.21 – 1:38.64	Um . . . I think when it was just somebody talking and not . . . not . . . as much . . . like it didn't pertain to me as much, then I, I was just kind of zoned out for a little bit.
Interviewer	1:38.64 – 1:43.00	*And have you been mandated to participate in any professional developments?*
Cheryl	1:43.00 – 1:43.22	No
Interviewer	1:43.22 – 1:46.59	*So all of the professional developments that you have gone to, you have gone to because you wanted to go?*
Cheryl	1:46.59 – 1:53.69	Well . . . yes because, ah . .yes . . because I have wanted to go . . . yes, but I'd go because I wanted to keep up my certificate too
Interviewer	1:53.69 – 1:55.47	*Ok, so that is the big motivator to keep up your certificate?*
Cheryl	1:55.47 – 1:56.97	Yes . . . yes
Interviewer	1:56.97 – 2:04.58	*Ok, so you recently completed a four-day professional development for secondary math 3. I am going to review the four days*
Cheryl	2:04.58 – 2:04.67	Ok
Interviewer	2:04.67 – 2:06.11	*So if you want to write these down to remember what we did*
Cheryl	2:06.11 – 2:06.70	Ok
Interviewer	2:06.70 – 2:10.58	*I'm just going to try and give you some prompts. Day one was back in October . .*
Cheryl	2:10.58 – 2:11.86	Yes
Interviewer	2:11.86 – 2:14.55	*And we started with polynomial functions*
Cheryl	2:14.55 – 2:14.95	Ok
Interviewer	2:14.95 – 2:23.58	*and concavity. You might remember that Celeste led an activity to challenge our perceptions of concavity with the vase activity.*
Cheryl	2:23.58 – 2:24.28	Yes
Interviewer	2:24.28 – 2:43.86	*And then I led an activity with the . . . uh, motion detectors out in the gym to explore nonlinear graphs. And then in the afternoon, Marsha presented an activity with repeated roots with Geogebra*
Cheryl	2:43.86 –	Ok

Speaker	Time stamp	Transcript
	2:45.15	
Interviewer	2:45.15 – 3:01.04	*And . . . polynomial division. And then we finished with Celeste's presentation on inverse functions, where we had a discussion the . . . on whether or not you wanted to switch the x and y in f(y) instead of f(x).*
Cheryl	3:01.04 – 3:02.04	Uh huh
Interviewer	3:02.04 – 3:04.02	*It got into a kind of heated discussion*
Cheryl	3:04.02 – 3:04.72	Yes
Interviewer	3:04.72 – 3:28.66	*Then day 2 was in November and we started the morning with a discussion of the SAGE assessment and that was led by Teddy. And then I led an activity on practice standards 2 and 3, the reason abstractly and quantitatively, and construct viable arguments and critique the reasoning of others.*
Cheryl	3:28.66 – 3:30.94	Wait, what was that again?
Interviewer	3:30.94 – 3:42.37	*It was reason abstractly was practice standard 2 and standard 3 was construct viable arguments. . . . And teachers brought examples of student work . . . to work with that . . . and we were looking for evidence of these two practice standards in the student work.*
Cheryl	3:42.37 – 3:43.13	Ok
Interviewer	3:43.13 – 4:00.15	*for that activity . . . (interviewer waits for Cheryl to finish writing notes)*
Cheryl	4:00.15– 4:00.32	Ok
Interviewer	4:00.32 – 4:19.07	*And then Celeste did some explorations with logarithms with an emphasis on constraints and common errors. . . (interviewer waits for Cheryl to finish writing notes) . . . And then Marsha did application of logarithms with the melting snowman activity.*
Cheryl	4:19.07 – 4:19.28	Ok
Interviewer	4:19.28 – 4:48.76	*. . . (interviewer waits for Cheryl to finish writing notes) . . . On day 3, I started with the pizza activity where we looked at linear measures, radian measure and angle measurement. . . (interviewer waits for Cheryl to finish writing notes) . . . And then Celeste led an activity to further that discussion with arc length. (interviewer waits for Cheryl to finish writing notes) She had those little waxie strings.*
Cheryl	4:48.76 – 4:50.17	Yes . . . yes, ok
Interviewer	4:50.17 – 6:46.89	*And then that afternoon, I led a discussion on trig functions with the Geogebra and the unit circle. Where we identified where the sine, cosine, tangent, secant and all those lines were associated with that unit circle. . . . (interviewer waits for Cheryl to finish writing notes). . . And then, uh . . . Celeste*

Speaker	Time stamp	Transcript
		finished the afternoon with the fly on the fan activity for inverse trig functions. . . (ingterviewer waits for Cheryl to finish writing notes.) . . . Day four, I got to do the whole presentation, I started with the argument for the need to change instructional approaches using information from Mike Mattos information . . . . (interviewer waits for Cheryl to finish writing notes) . . . and his three tiered model of insturction. . . and then I introduced the CMI Framework and the teaching cycle . . . and identified where students were readiness to learn. If they were developing, solidifying or practicing. . . (ingterviewer waits for Cheryl to finish writing notes.) . . . And then we then did some practice writing of launches for both the develop and solidify. And we looked at the standard SID4 from Secondary 3 . . . with the two activities, the SAT math scores and do we send out a certificate activity.
Cheryl	6:46.89 – 6:47.49	Ok
Interviewer	6:47.49 – 7:14.71	*. . . (interviewer waits for Cheryl to finish writing notes) . . . So . . as we discuss these four days specifically . . . as you reflected over the topics as we went through them . . . what were some of the ones that popped out at you and what were your thoughts behind them?*
Cheryl	7:14.71 – 8:07.54	Um . . . just any of the real hands on activities I think for, for the student . . . cuz I'm always thinking of how are the students going to take this and sooo like, the different vase ones . . I just really think . . . a really good hands on, the different sized vases and I like the . . . actually the pizza activity with the . . . um . . . what ever those things are called, I can't think, my kids have them and they can get stuck in the carpet so I kind of hate them . . . um . . (chuckles). So that one and um . . . and . . . oh what else? . . . I think even the, like the . . . the day four just talking about . . . um . . . as a group, talking about different ways to engage the students and, and launch activities and things with them . . . and . .I, I don't . . don't . . . there, there just was something there everyday that I was like . . . ooh this . . . this will be good, this will be helpful for the students . . . so . . .
Interviewer	8:07.54 – 8:14.39	*So you were looking at it as applying it to the students. Did you look at it as applying it the way it was presented to you?*
Cheryl	8:14.39- 8:15.58	Yeah.
Interviewer	8:15.58 – 8:30.78	*Because as I've interviewed other participants, they were saying their kids were not ready for it so they adapted the activity back to a whole group discussion where the teacher did it at the board type of a thing. . . Have you tried any of these activities?*
Cheryl	8:30.78 – 8:49.95	No, because I'm not teaching this, yeah . . . so I, I would like to . . . but I, I've really tried over the last few years to just try to have more of a . . . just class discussion, not just me at the board, just . . . them discussing what . . . you know . . . so . . . ok

Speaker	Time stamp	Transcript
		you guys work on this and let's see what answers we come up with.
Interviewer	8:49.95 – 8:54.13	*Do you see that modeled in the professional development you recently participated in?*
Cheryl	8:54.13 – 9:03.27	Yeah . . . this, this last one, yes. . . . But we are all teachers so . . . (chuckles)
Interviewer	9:03.27 – 9:20.25	*Right, and it's kind of hard to try to model that with the teachers and have them understand that we're modeling it.*
Cheryl	9:20.25 – 9:24.93	Well, I mean, we discussed it as tables and then we . . . then we all shared that way too . . . so . . .
Interviewer	9:24.93 – 9:36.15	*Um . . . What were some of your thoughts as you went through that list where you went ugh . . or maybe you don't even remember them because they weren't all that exciting or . . .*
Cheryl	9:36.15 – 9:39.87	That I thought . . . wait . . . that . . . I'm not sure of the question.
Interviewer	9:39.87 – 9:46.82	*From the list you created as we went through the four days, was there anything on there where you thought, "that is not quite so much something I would like to try"?*
Cheryl	9:46.82 – 10:36.39	Um . . . (long pause) . . . not, there . . . well, ok . . . sooo my . . . with technology, like the Geogebra, not that I wasn't excited . . . but when I did teach . . . I was frustrated because I learned with Geometer's Sketchpad . . . and I was excited to use that in the classroom and then I . . . get to my position and I . . . like, oh we don't have it, and you can't use the computer lab . . . so . . . so the Geogebra, kind of . . . if . . . it, you know, if I knew that I would have access to it and the students could play with it and manipulate it and do their own things with it, then I would be more excited about it. But I was just disappointed to not be able to . . . I was told, "you can't require the students to have a graphing calculator, so you can't . . . " yeah so I . . .
Interviewer	10:36.39 – 10:37.88	*So where are you at?*
Cheryl	10:37.88 – 10:41.06	At this one, I was at Alta High School.
Interviewer	10:41.06 – 10:44.93	*And where are you at currently?*
Cheryl	10:44.93 – 10:47.22	Provo adult education, so . . .
Interviewer	10:47.22 – 10:49.70	*And do you have any technology at all in your classroom?*
Cheryl	10:49.70 – 10:54.87	I, we just barely got a . . ah . . document camera and we're supposed to be getting a smartboard
Interviewer	10:54.87 – 10:57.05	*So you do have a projector then?*
Cheryl	10:57.05 – 10:57.65	Yes
Interviewer	10:57.65 – 11:01.72	*Ok, and you have a computer that you can hook up and use?*
Cheryl	11:01.72-	Ummm . . . I think I can check out a laptop

Speaker	Time stamp	Transcript
	11:05.49	
Interviewer	11:05.49 – 11:06.29	*A projector without a computer is very not useful*
Cheryl	11:06.29 – 11:06.89	(chuckles) . . . yes
Interviewer	11:06.89 – 11:08.28	*So they haven't given you a laptop*
Cheryl	11:08.28 – 11:22.78	No, no . . . we're the last to get funding . . . so . . . yeah, in my trailer we don't even have a bathroom so . . . (chuckles)
Interviewer	11:22.78 – 11:28.15	*But you are possibly looking at getting a smart board in the future?*
Cheryl	11:28.15 – 11:41.16	Oh . . . who is it . . . Gene Burns . . . he's come and evaluated me a couple of times and he's, he's been like . . . what technology . . we'll get you a smart board and I was like, great . . . get me a smart board . . . so I was like . . . if I fought for it . . . so probably if I fought for it . . .
Interviewer	11:41.16 – 11:48.12	*Well, a smart board without a computer is of no value, the whole purpose of the smart board is to control software on your computer from the front of the classroom*
Cheryl	11:48.12 – 12:01.23	Ok . . . and so, you know, I'm just there. . . . so um . . . so they're probably . . . if we could keep one in the room or something . . . or if us teachers . . . could share it, that would be good, I mean . . . and I actually do have a bank of computers against a wall in my room . . . yeah
Interviewer	12:01.23 – 12:03.12	*Do they have internet access?*
Cheryl	12:03.12 – 12:05.01	Yes, they do
Interviewer	12:05.01 – 12:06.69	*So they could access Geogebra on them?*
Cheryl	12:06.69 – 12:07.03	Yes
Interviewer	12:07.03 – 12:09.48	*And you could use the Geogebra on the smart board when you get one?*
Cheryl	12:09.48 – 12:10.67	Yes
Interviewer	12:10.67 – 12:16.72	*Ok . . . um . . . did anything that was presented in the four days of professional development have any positive impact on your classroom instruction? That you could say, "That really changed my thoughts on this concept"?*
Cheryl	12:16.72 – 12:54.72	I . . I liked the one . . the, what . . the inverse trig functions . . . that made me really go . . . oh, ok that's . . . instead of just switching the x and y . . . let's, let's discover things more and, and I thought ok, that would be something valuable for the students . . . I, cuz my whole goal is always just to . . ok what can I do to get them to remember it? Not remember a formula . . . is to, when they leave here, what, how are they going to remember how to do this. They need to be able to do it on their own.
Interviewer	12:54.72 –	*Right, so you are hitting the essential of concepts in math. . .*

Speaker	Time stamp	Transcript
	12:58.29	
Cheryl	12:58.29 – 12:59.29	Yeah
Interviewer	12:59.29 – 13:18.36	*Reflecting back on other professional developments you have participated in, has there been anything there that you look back on and say, "that experience changed my professional practices" ?*
Cheryl	13:18.36 – 14:13.72	Um . . . a few years ago . . . it was the, either I think the algebra academy or the pre-algebra academy . . . one of the teachers show . . . it was . . um . . . it was either just solving equations or . . . was it um . . . . . was it like the . . . three variables with three equations . . where he just . . he printed out a worksheet for them to do and he gave them the answers . . and he said . . I don't . . I don't . . . I want you to get the right answer . . but I want to see the work, that's what's important to me . . . and that's kind of how I feel . . I . . I'm like . . I want ya . . I, I assign you the odds because I want you to check your answer, because I want you to make sure you are doing it right. Not so you can get a right answer, where . . I, I just get so frustrated when I help neighbors that come over and they say, can you help me with this? And they have all the odd ones done, because they just took the answers from the back of the book, and I'm like, that's cheating . . . that's not the point.
Interviewer	14:13.72 – 14:14.51	*Yeah*
Cheryl	14:14.51 – 14:17.30	And they just want help with the even ones.
Interviewer	14:17.30 – 14:20.57	*So do you do that now, do you make sure your students have the answers and when they work?*
Cheryl	14:20.57 – 14:40.60	Well . . . um . . it's uh . . . cuz my students are working individually and sooo . . . like my GED students, I have some . . um . . packets that they work on, where I leave the answers in , cuz they're doing . . they're studying to better themselves, and my credit students, I don't give them the answers, I correct their work and then if they're doing the process wrong, they have to redo the page . . and so . .
Interviewer	14:40.60 – 15:15.65	*Not, not just thinking about the specific activities that we did in the recent professional development, I want you to think about the general make-up of the professional development. Um . . we had individual work, group work, discussions and those kind of activities, as you look at the components of the professional development, including the location and the time frames, what aspects of the professional development would you suggest that we keep in future professional developments?*
Cheryl	15:15.65 – 15:51.66	Um . . . what to keep? . . . I, I think the set up is good, with the, the . . . you know, with the breaks, the breakfast and lunch . . . and, ah . . I think that's good . . and just maybeee have . . . more activities short, and maybe less time on each activity because I think that . . ah, some of the activities I think stretched out for so long that . . . I kind of zoned out . . but . .

Speaker	Time stamp	Transcript
		(chuckles) . . so, so that . . that's . . but I think that I like the format and the set up of it and so . . .
Interviewer	15:51.66 – 16:11.07	*That's interesting that you mention that, because there were times when we had tables that had got right into the task and were nearly completed with it, and then at the same time we had tables that had not started the tasks and were not interested in even attempting, and then we also had tables that were attempting the task, but were not even close to finishing the task and we had to evaluate whether or not to go on.*
Cheryl	16:11.07 – 16:13.28	It's kind of like a regular class, yeah . . yeah
Interviewer	16:13.28 – 16:35.82	*So . . what are some of the aspects of professional development generally, that you have seen, that have really made you glad to see in a professional development?*
Cheryl	16:35.82 – 17:35.29	Um . . . I . . . the, well a few years ago, one that I really liked, that . . um . . that I thought ok, I love this immediate feedback was the remotes . . . the . . . being able to give your students a quiz or test with the remotes so they have that immediate feedback, right there that they know, and . . and, being able to have that class discussion where you . . . you know, you give them the question one . . and, then you, you know, everybody puts in their answer and then you score it and then you discuss it with them, go over, go over it right then instead of waiting for the teacher to correct the test and then hand it back and go over it. To go over that question right then and say ok, a bunch of people missed this, let's review it and then the next, the students have the potential of getting the next correct because you've hopefully fixed that block or what ever the students, the missing information that the students had. And so I just think that is such a valuable thing, but it is such an expensive thing, and it takes a lot of set up to get it going, but I think that once you have it set up and stuff, it would, it's a great tool to get that instant feedback
Interviewer	17:35.29 – 17:38.37	*And do you think that would be beneficial for other professional developments?*
Cheryl	17:38.37 – 17:42.82	Oh . . . no (chuckles) . . . it's just helpful in the classroom . . . yeah
Interviewer	17:42.82 – 17:47.67	*Ok, because what I am looking for are those aspects from professional*
Cheryl	17:47.67 – 17:53.86	Well . . . actually, then that would be a quick way to see who's paying attention and yeah! Yeah! Then that, that could be helpful, yeah
Interviewer	17:53.86 – 17:55.06	*When you come to a professional development, what are the things that when you sit down and you see something being prepared for the day, you think to yourself, "alright, we are going to do . . .this" or you look at it and you think, oh . . no, not that"? In general, what are some of the those kinds of aspects of professional development?*
Cheryl	17:55.06 – 18:36.58	I think as teachers, we don't want to participate . . (laughs) . . . . and so I, I just think . . ah . . . we actually have to

Speaker	Time stamp	Transcript
		work and think . . . cuz I just think we're just so tired and you, you just want to go . . . and just like . . it be a tv or something that you don't have to participate or do anything . . . just absorb it like a tv show. And it's, it's just . . .
Interviewer	18:36.58 – 19:40.08	*So how do we get past that bump then? For example, in the pizza activity which received a lot of positive responses from participants was an activity that, from their experience in the activity, participants learned many new things about circles and radian measures that they did not previously know. How do we get them to enjoy something like that and get excited about it, because not everyone participated in the activity, and those who did not engage in the activity did not see the benefit of the activity, in fact, they complained about it.*
Cheryl	19:40.08-20:17.70	I know . . and well, that's so . . . and it's not, so . . . it's just cuz it's, I think we're just lazy as a society . . . (chuckles) . . . I think it's just we want to go . . . it's just like our students, they just want to go and be entertained and not have to do any work. But I . . I think if . . if I was teaching this course, it would be great to say, "Oh I'm teaching this next week." And that's probably how it was for a lot of people. I'm going to be teaching this in a month, I'm going to use this, and so that, If I were teaching this, that would a lot more . . . then that would . . . I would be more excited, yeah . . . I would be, like, oh good this will work, and that would be good. And I think if all of us had to present, then we would be more on our toes . . . to pay attention . . . cuz nobody wants to make a fool of themselves . . .
Interviewer	20:17.70 – 20:23.17	*No . . . So, do you like presenting at professional developments?*
Cheryl	20:23.17 – 20:24.96	NO . . . (chuckles) . . .
Interviewer	20:24.96 – 20:31.38	*But it does get you involved . . . it does get them to experience what their students experience.*
Cheryl	20:31.38 – 20:31.61	Yes
Interviewer	20:31.61 – 20:39.88	*What are some things we can do that could get participants past that grudge of having to do an activity?*
Cheryl	20:39.88 – 21:40.92	Yeah . . . I, I think I would . . . be more excited . . . just more excited about it if I knew, "Oh this will help me when I teach this next week." Yeah or next month, orrr . . . this will a great way to test, I mean, I always like different ways of testing them instead of just taking the test too. So it was like, "Hey this is a great way to test your students." You could use this like a hands on activity, to ya know, to . . . see what they are doing or, you know, e . . . even like um . . . Carla, . . . I uh . . from Timpview if she's still there, shee . . . I mean, I'm always . . . was always so impressed with her . . . all her hands on activities she would do with the students and . . . um . . . like . . . I think it was an angle, angle one that she like . . . cutting up an index card and it was something, it was

Speaker	Time stamp	Transcript
		something in geometry . . . and . . . you know that could be, that, what they're making is like their notes for their next test . . . of . . . I'm trying to . . . they had to make a triangle and label it, label the sides . . . and more than one shape and stuff . . . and so that, I'm like that's great for notes . . .
Interviewer	21:40.92 – 22:26.47	*So, there's nothing other than the hands on activities that you will be soon using in your class that can motivate your participation . . . you can't think of anything else. But when you have seen activities in professional development and you thought, "oh I don't want to do that." Can you think of when you had that attitude, what caused you to change that attitude in the professional development?*
Cheryl	22:26.47-22:27.19	To change my attitude?
Interviewer	22:27.19 – 22:27.30	*Uh huh*
Cheryl	22:27.30-22:38.33	Yeah, pretty much every activity I changed my mind. It's just, you just go in and you're just like, Uhh, when's this going to be over? You know? I just (chuckles) . . .
Interviewer	22:38.33 – 23:23.64	*I understand, you are not going to offend me, so don't worry about that. I am specifically looking at how do we change an attitude of a participant that does not want to be at the professional development so that they can benefit from being there. A lot of the teachers at this professional development were mandated to be there or felt pressured to be there because they needed recertification points. Not many were there because they were interested in what the course was going to present. Some of the participants got caught up in the activities and changed their minds. Some didn't and so I am looking for what it was that made the difference.*
Cheryl	23:23.64-24:09.48	I, I don't . . . I think, for me, if, if it applies to me even, it's going to make, it's going to make more sense . . . and so that's why I'm all . . . I'm always making up story problems on the fly. . . like, ok . . . how can this pertain to you? And so, they, they don't always work out quite right . . . cuz I'm just, you know . . . cuz my numbers . . . I'm always trying to make them come out evenly, but they don't always . . . and so . . . I, that's just why I always try to even things that happen to me, I just try to make up a story problem, this happened to me the other day . . . this could happen to you and they're like, Oh . . ok" and "that's why I need to know this" and so I hope that I'm making that connection with my students. And so, if it applies, when it applies to me and it's going to help me teach my students better, then, then I get more, then I'm excited about it
Interviewer	24:09.48 – 24:19.71	*Right . . . um . . one of the activities we did was not so much content, it was the SAGE activity where we explored the state's end of year testing environment. Do your students have to take the SAGE?*
Cheryl	24:19.65 –	No

Speaker	Time stamp	Transcript
	24:19.71	
Interviewer	24:19.71 – 24.20.99	*None of them have to take it?*
Cheryl	24.20.99 – 24:27.95	No . . . my children do . . . so that's why I was invested in that, because my kids are taking it . . . having to take it.
Interviewer	24:27.95 – 24:31.03	*What did you think of the experience?*
Cheryl	24:31.03 – 25:05.76	Um . . . one of the questions that ah . . . kinda . . . I, I'm . . I love that it is hands on and I like the open endedness of it and my kids' school even sent home notes about how to get on the website and, and have their students, my kids, get on and practice it, so I like that. But yes, so my worry is, this is the benchmark and this is such a new test for the students, it, that benchmark is not going to be very high, because they're not going to do well on it. Cuz it's such a new test. I, I . . I'm just figuring . . that next year . . when they're use to the core, to the test, their going to improve and that's going to be good (chuckles) . . .
Interviewer	25:05.76 – 25:09.63	*It will improve according to each student since it is based on individual student growth.*
Cheryl	25:09.63 – 25:40.89	But you know how the schools are scored and stuff? So as a school, I think that the scores are going to go up higher and stuff. And so I like that it's individualized like the . . . new . . .uh . . test is individualized so it would test them in different areas, I , I like that about it. But, one or two of the questions that we looked at, I was, this is kinda, this is worded kind of . . . the wording . . . I know they were still kind of working on the test, but I was kinda . . . it was like, this . . . I'm confused by this question, so my elementary student is going to be confused by this question.
Interviewer	25:40.89 – 25:43.57	*What kind of assessments do your students have to take, that they are responsible for?*
Cheryl	25:43.57 – 25:49.43	Um . . . TABE . . . just the TABE test
Interviewer	25:49.43 – 25:54.49	*How does that drive your instruction?*
Cheryl	25:54.49 – 27:07.64	Um . . . we talk it . . . so when our students enroll at our school, they have to take the TABE test so I have . . . um . . and it's grade level . . . so when they come and I see like, a 3 point 5, I'm like . . . uh . . . ok . . and I just flat out ask them, what did you have a hard time on the test? Can you add and subtract? Can you multiply? . . Nope . . . ok so let's have you start multiplying . . . and so . . . I just talk to them about what they had a hard time with and a lot of them will say, "I haven't been in school in years and I've forgotten how to do this. And so . . . ah . . I just . . . try to help them build their skills so that they can prove the next time the take the test, cuz every forty hours of they're in class we have . . . we retest 'em, or the office does. So that, so that kind of drives them to want to improve. Cuz some of them are like, oh just give me

Speaker	Time stamp	Transcript
		something easy so I can earn my credit. But . . . but then I talk to them, and I say, "what are you planning on doing after here? Are you gonna go to college?" Yes, and then I tell 'em, "ok we're really cheap so you can stay here and get you skills up or you can go to college and pay thousands of dollars for a below 100 level class that won't count towards a degree." And they go, "oh . ." So I get students, not always, but here and there that actually earn extra credit. Not extra points for a better grade, , , , extra credit towards their credit diploma.
Interviewer	27:07.64 – 27:30.90	*That's good and again, it comes back to motivation, and what's in it for them. Do you think that in a professional development were more explicit about the goals and their intentions in that same way, might catch some of those teachers who are there begrudgingly?*
Cheryl	27:30.90 – 28:08.55	I . . . I think they have a poor attitude, so they're not gonna . . . (Chuckles) . . Like even, just some of my friends, my colleagues that I taught with, I'm like, come to this workshop so we can hangout together. And they're . . . my one colleague, I mean, she's already retired and then she's taken another teaching position and is going to teach for another year or two, she's like, "Why? I don't need to, I'm tenured or what ever, I'm just . . . I don't need it." But I'm like, your teaching this, it could help you. And she's like, "Naw, I don't have time for it, I'm worn out from this new core and getting everything ready." And I . . . I was like uh . . . ok, so . . . I was like, so even to hang out with me? You wouldn't . . . (chuckles).
Interviewer	28:08.55 – 28:27.23	*That's one of the things we're looking at. How do we get them to understand? When we looked at this professional development, we looked at four areas: the first was improving content and pedagogical knowledge; a second . .*
Cheryl	28:27.23 – 28:28.50	Wait, what is pedagogical knowledge?
Interviewer	28:28.50 – 28:32.08	*Pedagogical knowledge guides instructional methods. It is knowledge about best practices and methods or approaches to instruction.*
Cheryl	28:32.08 – 28:32.86	Ok
Interviewer	28:32.86 – 30:36.92	*A second area was improving the learning environment or sociomathematical norms of the classroom; and then you have the 3-tiered model of instruction and proper instruction, and the fourth area was student readiness to learn. So those four areas. As I reviewed those four areas, did you see any of those four as more important than the others or less important than the others?*
Cheryl	30:36.92 – 31:57.03	It being . . . wait . . . so . . . less important to a begrudging, you know a teacher that does not want to be there? . . . (long pause) . . . um . . I mean, cuz, student ga . . . maybe, I mean, student readiness . . . cuz, the students you get are the students you get so . . . you can't . . . I mean . . as a department you can try to work together and talk about, and, and when I

Speaker	Time stamp	Transcript
		did teach full time, we would try to . . . the women worked well together, the men kinda . . you know they just have, no . . I 'm just going to do my own thing and so us women would be like ok . . . this class, like my, my teacher next door, she taught the class after mine . . . um . . so she was like, if you can cover conic sections better because, . . . er spend more time on them in Algebra 2, that will help me out next year. And so we, we kinda all worked together. And it would have been great if we had gone to the middle school and said, "hey could you focus on these things, cuz we're getting these students and they're having . . . and this is ah, uh . . a weak spot that they're having. And so . . . cuz that's something out of . . . that you know, I don't think that can be fixed in a workshop, it is something that needs to be fixed in your department.
Interviewer	31:57.03 – 32:37.62	*Good, As you look at these four days of this specific instruction . . . Do you see where we tried to meet needs from all four of these areas? Were they addressed?*
Cheryl	32:37.62 – 32:45.61	Um . . . Yeah, yeah, I think yeah. Just talking about the readiness and just different ways to approach things and different teaching methods. Yeah . . .
Interviewer	32:45.61 – 33:22.42	*We've found that when addressing content knowledge, you have to be careful so you do not offend them, because they have their degree and they're supposed to be the math specialist in their classroom and pedagogical knowledge is an area that has a lot of emotion. How do you suggest we approach these two concepts?*
Cheryl	33:22.42 – 33:38.92	Gall, as more seasoned teachers, they . . . are more set in their ways, and so I think that's harder. I think younger educators are more willing or more open to new ideas and changing their practices and their ways.
Interviewer	33:38.92 – 33:41.41	*Well, see . . . you're an experienced teacher.*
Cheryl	33:41.41 – 33:46.17	So I still see myself as a new teacher (laughs)
Interviewer	33:46.17 – 34:03.90	*You can't think of yourself as a new teacher with 16 years experience under your belt. You know, so how is it that you approach it when something is brought to you concerning content and you're not defensive when it comes to the pedagogical knowledge?*
Cheryl	34:03.90 – 34:55.61	Um . . . I just, it's . . . I'm in a situation where I, . . . my students . . . I'm almost like a therapist, so my students . . . they have just got horrible . . . like the reason they didn't graduate in the first place is . . . a horrible home life. And so, you know, they just didn't have that family support, and so . . . um . . when I . . I can't . . . when I . . . my one approach doesn't work, then I try to come in with a different approach and come up with a different story . . . or some, some . . some other way to get them to understand it because you know, I have got some . . . a lot of dyslexic and that's why they didn't do well in school . . . and you know . . . ADHD

Speaker	Time stamp	Transcript
		students . . that you know . . . I have the whole gambit of why they weren't successful in the first place . . and so, I just . . I just have them modify things and try . . ah . . to tailer things for every student and I have just had to learn to do that over the years.
Interviewer	34:55.61 – 35:08.22	*So it sounds to me like it is an intrinsic attitude that you've got, where you want to help the students. And some of these teacher do not seem to have that desire . . .*
Cheryl	35:08.22 – 35:24.14	And you know, if I had 140 students and I was trying to see them three or four classes a day, I would probably . . . that would be harder for me, but where I . . . you know . . . had at the most 40 students in a term, but they don't all come. And so I can focus on them.
Interviewer	35:24.14 – 35:30.49	*But when you were in the traditional classroom, you still sought out ways to meet their needs, right?*
Cheryl	35:30.49 – 36:19.87	I . . I . . but I did get burned out though too . . so I, I wish when I started out, and I made a goal that before I had my oldest, my last year, I made a goal that I would call at least one parent a night. Good or bad. And try to be proactive if I see a student going down, that's failing? I'm going to call them and try to . . . try to get this fixed now it's not parent teacher conference and they're like . . . why, why didn't you tell me sooner? Or why didn't . . . you know . . . even that they have access to their student's grades and see that they haven't come to class and stuff . . . I, I was trying to call em and say, "I'm worried about your student" and what's going on, and the parents didn't help out, they didn't care, and sometimes they were a bit attentive and they got on their student and changed them around. . . so it wasn't, I didn't . . . there weren't . . . they weren't all successes.
Interviewer	36:19.87 – 36:20.66	*Right*
Cheryl	36:20.66 – 36:32.59	So if I had 200 students, I . . . that would be . . . different
Interviewer	36:32.59 – 37:01.56	*Yes, and I understand where they are coming from. What I am trying to do is help them because, next year they are going to have 200 students again. It's not going to change.*
Cheryl	37:01.56 – 37:32.45	So if I had a traditional class, I would love to have an open classroom cuz I love what I'm doing now. I would like to ask them what they are having a hard time with? What is it you do not understand how to do? And that's what we're going to work on. We're going to get you . . . you know . . . being able to multiply . . . add, subtract, multiply and divide fractions. So that when you're solving an equation that has fractions in it, you're not going to freak out because there is a fraction in the equation. You're going to know how to work with that fraction and manipulate it so that you can work the equation.
Interviewer	37:32.45 – 37:37.22	*What I am hearing is a student centered focus.*
	37:37.22 –	Yeah

Speaker	Time stamp	Transcript
	37:37.72	
Interviewer	37:37.72 – 38:02.71	*The teachers that have the bad attitudes are mostly content centered focus. They are worried about how much they have to get through, how much time they have to get done and you don't really hear the kind of conversation that I just heard from you. There is a difference there. I mean, you took this professional development even though you do not teach the subject. You stated your primary purpose was to get lane change credit, but your participation while in the course was motivated by a desire to help students.*
Cheryl	38:02.71 – 38:03.32	Yeah, and it's hard too.
	38:03.32 – 38:18.81	*You have given me several things to think about from our discussion today. I would ask you to reflect on the notes you took here about the four days of instruction and the four areas of emphasis of professional development and think about them between now and when we meet again. I will develop some questions from what you have shared today.*
Cheryl	38:18.81 – 38:21.20	Oh . . . yeah, could you remind me of the four areas again?
Interviewer	38:21.20 – 38:28.36	*Yes, content and pedagogical knowledge is one (interviewer waits as she writes notes) student readiness to learn is the second one (interviewer waits as she writes notes), proper tiered instruction is the third one (interviewer waits as she writes notes), and the classroom environment or sociomathematical norms. (interviewer waits as she writes notes)*
Cheryl	38:28.36 – 38:28.51	Ok
Interviewer	38:28.51 – 39:30.35	*Ok, think about those and I think we set the next date for next Thursday.*
Cheryl	39:30.35 – 39:33.33	Yes, around noon.
Interviewer	39:33.33 – 40:04.50	*Think about components of professional development generally that you like and specifically about the recent four days we completed. Is there anything right now that has come to mind, anything else you want to share before we stop today?*
Cheryl	40:04.50 – 40:52.50	Umm . . I. . . I think there's more accountability when everybody has to share . . . and so . . . everybody's respectful because I'm going to be next or I've already gone . . . and so I need to . . . and even just in a regular classroom . . . when everybody has to share, it's not just a volunteer basis who answers the question when everybody has to . . . and so . . . I think, just back to the algebra and geometry academies, I think those, where we all had to bring, bring something and, and share and put everybody on the spot . . . but I also think it's good when they have to share an activity or project and then . . . you know . . . take turns sharing. But you put a team leader up to share and not everybody has to share and so . . . (chuckles)

Speaker	Time stamp	Transcript
Interviewer	40:52.50 – 41:23.36	*I thank you for your participation in this interview and if you would just think about the four days of instruction and the four areas of emphasis. I'll also ask about some components of reform-based mathematics instruction. They may or may not apply to your current students, but they may address your theory of instruction as you think about going back into a traditional classroom. I appreciate you doing this.*
Cheryl	41:23.36 – 41:25.94	I can do that, alright.

Appendix L

Transcript of Cheryl Interview 2

Transcript of Cheryl Interview 2

Interview 2, May 25, 2014
12:15 pm

Speaker	Time Stamp	Transcription
Interviewer:	0:00.00 – 0:03.57	*Once again, I thank you for your willingness to be interviewed.*
Cheryl:	0:03.57- 0:03.67	(Chuckles) It's ok
Interviewer:	0:03.67 – 0:07.89	*Well, last time we reviewed the four days of professional development and the four areas of emphasis on professional development.*
Cheryl:	0:07.89 – 0:08.38	Yes
Interviewer:	0:08.38 – 0:21.23	*Um . . . have you had any thoughts since our last time together that you would like to share before we begin with the questions I have prepared?*
Cheryl:	0:21.23 – 1:09.45	About . . . about workshops in general? . . . um, I just, am . . . my thoughts were kind of like, it would be great to just, all of us watch a classroom, but I, that's not really practical, so . . . um . . maybe just actual discussion time about . . . how do . . each teacher's classroom, how do they think they will react to um . . . an activity. Or how they will receive it. Or . . . what, what each teacher can do to tweak it to make it work for their own class and share with everyone. I mean, we, we did do some sharing of that, but maybe . . . just more sharing of . . . um, ideas . . . um, maybe you know, I tried this . . . and this went over well . . . or I, I did this but I had to tweak it this way to make it work in my class. . . just, just to share those ideas with everyone.
Interviewer:	1:09.45 – 1:15.88	*Ok. As you were saying it, you were talking more in the future tense. You said, "I would anticipate what I would do." Type of a thing.*
Cheryl:	1:15.88 – 1:16.22	Yeah
Interviewer:	1:16.22 – 1:22.14	*And now you are talking about actually what I did to make it successful.*
Cheryl:	1:22.14 – 1:37.12	If, if it, yeah, so maybe if an activity from the day one . . . um, if every . . . people implemented it and then in day two . . . have sharing time on that, so both, or . . . some anticipation and then how it worked or what , or how . . yeah
Interviewer:	1:37.12 – 1:40.39	*Ok. Um . . . any other ideas?*
Cheryl:	1:40.39 – 2:20.45	. . . Um . . . I don't, cuz I've been thinking the last couple of days . . . um . . I . . I think just, just discussing how, you know, how well it will go over. And also another thing too is just in our department, in your department in your school . . . yeah, um . . if a school says, "you know at our school, we all work well together . . . where we talk about math . . um . . . .um . . Secondary Math 1, this is what we do to prepare for Secondary Math 2. And, and you need to work together as, as the feeder schools and as a department to . . . and that goes along with the student readiness to learn.
Interviewer:	2:20.45 –	*Ok, um . . . with the next questions, we will be talking about . . . I*

Speaker	Time Stamp	Transcription
	2:32.27	*would like you to think about both the specific professional development you recently completed.*
Cheryl:	2:32.27-2:32.98	Ok
Interviewer:	2:32.98 – 2:43.50	*And also professional development in general. And as you answer, would you please identify which of the two you are addressing in your answers. The recent professional development or professional development generally.*
Cheryl:	2:43.50 – 2:44.01	Ok
Interviewer:	2:44.01 – 2:58.69	*Um . . . have you seen the following items addressed in professional development: cooperative learning groups?*
Cheryl:	2:58.69 – 3:10.21	Yes, in the last professional development . . . what was it? Secondary Math 3 that we just did? Yes. . . and I have seen it in other workshops that I've been to too.
Interviewer:	3:10.21 – 3:22.73	*Did you recognize that they were being modeled at the time you experienced them in this last professional development? Or did you, upon reflection, realize, "Oh, they modeled that"?*
Cheryl:	3:22.73 – 3:28.19	I . . . I knew, I could tell it was being modeled without it being spelled out that it was being modeled.
Interviewer:	3:28.19 – 3:41.11	*Ok . . . I know that question may seem a little weird, but other participants did not recognize that we were modeling an instructional approach.*
Cheryl:	3:41.11 – 3:41.62	(chuckles)
Interviewer:	3:41.62 – 3:46.19	*Ok, what about using manipulatives?*
Cheryl:	3:46.19 – 3:54.69	Um . . . I', not . . they . . . yes there were hands on manipulatives at the workshop, are we talking technology or just hands on?
Interviewer:	3:54.69 – 3:54.98	*Just hands on.*
Cheryl:	3:54.98-4:01.13	Yeah, oh yeah. Yes there were hands on manipulatives at this last workshop and then there were hands on manipulatives at previous workshops that I have been to.
Interviewer:	4:01.13 – 4:23.71	*Were you picking up items that were specific for the task you were participating in, or were you picking up ideas generally that you could use in your classroom?*
Cheryl:	4:23.71 – 4:24.19	Uh . . . . .(long pause)
Interviewer:	4:24.19 – 4:25.64	*Do you understand what I am asking?*
Cheryl:	4:25.64-4:31.55	Uh . . . no, I'm not . . . so, is so . . .
Interviewer:	4:31.55 – 4:35.89	*Ok, so you recognized that you were using hands on manipulatives. It was pretty obvious . . .*
Cheryl:	4:35.89 – 4:36.01	Yes
Interviewer:	4:36.01 – 4:39.77	*You had vases in front of you, pizzas in front of you, and melting snowmen.*
Cheryl:	4:39.77 –	Yes

Speaker	Time Stamp	Transcription
	4:39.89	
Interviewer:	4:39.89 – 5:00.14	*As you were working with them, were you gleaning from those experiences, hints only of um, things that you would do with those specific tasks if you were to try them in your class or were you gleaning information about how to use manipulatives generally in you classroom?*
Cheryl:	5:00.14 – 5:06.96	Both, I was thinking, ok . . . if I do this in the classroom, then I'll use this, but then I would also think, "I can use this for another activity too."
Interviewer:	5:06.96 – 5:23.76	*Would it have been beneficial to you, for us to have specifically identified, generic principles associated with using hands on manipulatives rather than just giving them as presented?*
Cheryl:	5:23.76 – 5:56.45	Um . . . yeah, there was enough information for us to . . . the, the specific activity, but it probably would have been good to have us . . . give . . . as an assignment while we were there to come up other ways to do the activity . . to . . to . . uh . . work for . . . um . . . you know, to make ways to tie into other aspects that we are trying to teach, so . . not, not just that specific . . . um . . why can I not think of it . . . the, like the core, man, why can I not think of . . . what are the things in the core, the . . .
Interviewer:	5:56.45 – 5:57.25	*Standards?*
Cheryl:	5:57.25 – 6:12.06	Standards, yeah! To follow that specific standard, and maybe brainstorming and asking how can this be used for another standard, or to take this activity and build on it for, you know, a month from now, a week from now, a day from now. . . to build on it and then share with everyone.
Interviewer:	6:12.06 – 6:18.01	*Ok. What about seeking alternative methods for solutions?*
Cheryl:	6:18.01 – 6:30.69	. . . um . . . is, just from our, us . . . as we were working on it? Coming up with alternative solutions?
Interviewer:	6:30.69 – 6:43.76	*Did you notice that there was a concerted effort to seek after alternative solutions being modeled in the professional development?*
Cheryl:	6:43.76 – 6:59.91	Um, I think they just happened . . . I didn't notice that there was alternate solutions, but it just happened. Because everybody, you know did everything a little bit differently. Which is I am assuming you were anticipating that, but I (chuckles)
Interviewer:	6:59.91 – 7:14.43	*Um . . . this goes back again to whether or not you were aware that we were intentionally modeling an aspect of reform instruction of mathematics. There were particular moments when we, by design, had people come to the white board and present their solutions and then we specifically turned around and asked if anybody had done it a different way and invited them to come and share an alternative method.*
Cheryl:	7:14.43 – 7:14:69	Yes
Interviewer:	7:14:69 – 7:19.72	*And we did not explicitly say, "we are modeling, seeking alternative methods to solve the problem"*
Cheryl:	7:19.72 – 7:20.29	yes

Speaker	Time Stamp	Transcription
Interviewer:	7:20.29 – 7:23.63	*We were trying to model what we would like to see you do in the classroom. And I am wondering if you actually saw those and thought, "Oh, they're seeking alternative methods" or it was glossed over and it takes some time to reflect and think that we did that.*
Cheryl:	7:23.63 – 7:45.51	I think now . . . well, now thinking back, yeah . . . yeah, you did, the instruction did have that alternative methods.
Interviewer:	7:45.51 – 7:44.49	*But it wasn't explicit to you and you were not aware of it when you were doing it.*
Cheryl:	7:44.49 – 7:51.04	I didn't think . . . I didn't . . . yeah.
Interviewer:	7:51.04 – 7:53.12	*You were not aware of a modeled strategy being provided intentionally.*
Cheryl:	7:53.12 – 8:00.10	I guess . . . well . . . yeah, I wasn't thinking of it at the time. I, I wasn't.
Interviewer:	8:00.10 – 8:40.54	*But upon reflection, you can see it. You see, for me, as I try and look at ways to improve professional development, it seems to me that one of the components we are missing is that explicit, "by the way, we just modeled this." How did you feel about it? What do you think worked well with it? Did you like this activity? What could we have done differently? We didn't say, "by the way, this is a strategy we would like you to incorporate into your classroom instruction." We modeled it with the hope that people would get excited about enough that they would model it in their own classrooms. Does that make sense?*
Cheryl:	8:40.54 – 8:41.07	Yeah.
Interviewer:	8:41.07 – 8:45.34	*So I am wondering if we need to be a little more explicit in those situations.*
Cheryl:	8:45.34 – 9:10.48	Yeah, well that's hopefully what the point is . . . so, so that, oh this group, I like how they did it so I might try to give more directed instruction to guide my students that way as opposed to the way my group did it.
Interviewer:	9:10.48 – 9:14.56	*Right, um . . . what about inquiry based tasks?*
Cheryl:	9:14.56 – 9:17.55	. . . From . . from the workshop?
Interviewer:	9:17.55 – 9:18.26	*yes*
Cheryl:	9:18.26 – 9:24.91	Um . . . what, just, what . . . (chuckles) what about them?
Interviewer:	9:24.91 – 10:03.14	*The difference from a hands on activity and an inquiry based activity, a hands on activity can very directed in the way it is completed. I can give a step by step approach to the activity. You are going to do this, then this and then this and I am watching those in the room and then I tell them to do this next. And then we can open it up to discussion, but the activity was very structured in the completion of the task. In the inquiry based activity, I could have more of an open question with the manipulatives and you are allowed to explore different approaches. Does that make sense?*
Cheryl:	10:03.14 – 10:03.37	yeah

Speaker	Time Stamp	Transcription
Interviewer:	10:03.37 – 10.16.17	*So a hands on activity might seem to always be an inquiry based activity, but I could be using very direct explicit instruction. It is whether or not the participants get to do any exploration.*
Cheryl:	10.16.17 – 10:37.55	Yeah, . . . There were some inquiry based activities where it was more exploring than the activities that were just general questions that were not so specific. . . and when we had the different shaped vases too . . . we couldn't really compare with other people as much because their shape was different, so they are going to be doing things just a little bit differently.
Interviewer:	10:37.55 – 11:36.29	*If you compare that to with the pizza activity, the part where you found the center of the circle, I led a very step-by-step procedure to find the center. At the end of that activity, everyone knew how to find the center of the circle, so they learned through that, but it wasn't really inquiry based. Once everyone had found the center, the next activity was more inquiry based as you explored the relationship of the radius of the circle to the other measures of the circle such as arc length and circumference. As you think back on other professional developments, can you identify when tasks were chosen intentionally for the method of instruction?*
Cheryl:	11:36.29 – 11:51.83	. . . Um . . . probably from . . . oh, I am trying to think . . . probably when in Secondary Math 2, that I went to a year ago. Cuz I know that we did similar activities there for that class.
Interviewer:	11:51.83 – 11:59.96	*Uh . . . What about students taking responsibility for their own learning?*
Cheryl:	11:59.96 – 12:14.33	. . . my . . . my students do (chuckles) . . . they, because they've realized that they didn't take responsibility before, and so . . . I . . . uh . . um . . I'm not . . .
Interviewer:	12:14.33 – 12:26.16	*I'm thinking about whether or not you recognize this as part of the professional development. Can you think back to any activity in the professional development where we might have been trying to seek opportunities for the participants to take responsibility for their own learning?*
Cheryl:	12:26.16 – 13:06.04	. . . (long pause) . . . Well I think that if when you assigned . . . if when you were doing an activity when there was a specific um . . . job that each person had so they were responsible, so like the way where you have said you set up your labs, is . . . um, everyone has their own job, so it's not just the two kids talking and the one kid doing it by himself . . . and you have to, you know, you have to walk through the room and make sure everybody's participating . . . it's not just one person doing all the work by themselves and make, specifically, hey I'm going to be partners with Joe cuz he'll do all the work and I can sit and text on my phone (chuckles) while he's doing all the work.
Interviewer:	13:06.04 – 14:04.21	*See, this is another one where I think that if we had been a little more explicit in pointing out the strategy employed in the professional development, you might have been able to give an example from the recently completed course. There was a time during the fourth day when I modeled a specific task that emphasized participants taking responsibility for their learning. I modeled actions that would not allow participants to get off the hook. But I never explicitly said, "by the way, I just modeled how you*

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		make students take responsibility for their learning. You were responsible for your learning, not just for participating in the activity, but for your learning." They were prompted to evaluate their learning process and the effectiveness of their learning in the activity. It might have been a little better if I had been more explicit about the activity and it's purposes.
Cheryl:	14:04.21 – 14:16.01	That . . . I guess I just . . . it just was . . . for me, it was common sense. (laughs) so . . . yes
Interviewer:	14:16.01 – 14:44.02	*So . . . thinking of those four areas of emphasis in professional development again, were you aware that the instructional activities were chosen intentionally, not just the strategy for the activity, but also the activities had a major focus. Or was it taken for granted that there was a focus for the activity?*
Cheryl:	14:44.02 – 14:45.30	It was taken for granted
Interviewer:	14:45.30 – 14:50.89	*Thinking of the four areas of focus, were you aware of their existence while you were in the professional development?*
Cheryl:	14:50.89 – 15:09.96	That they were being used on us? . . . No I wasn't even thinking . . . no (chukles) . . . no I wasn't.
Interviewer:	15:09.96 – 15:29.20	*Ok . . . in looking at increasing teachers' content knowledge, it was obvious to us that in almost every activity, we were attempting to increase content knowledge, but if that was not coming across then . . .*
Cheryl:	15:29.20 – 15:36.25	No, now thinking back, like . . Yes . . . but at the time, I wasn't even thinking . . . no . . . no
Interviewer:	15:36.25 – 16:56.12	*And then along those lines, as you are learning something new about mathematics in a professional development, and you think, "oh my gosh, I never thought of it that way." We, as professional development presenters did not think, "they are not ready to handle this." We always looked at it as, "this is the content, how can we address that content in a way they may not have seen it before?" So we would pick an activity like the radians in the pizza activity. But I am finding that teachers who participated in the training are looking at the activities and saying, "it was a great activity, but my students are not ready for that." How would you suggest we get past that? Because we never looked at it that way, and it wasn't because they were college graduates, we intentionally looked for activities that would stretch them and make them grow. How do we get past the teachers saying, "my kids aren't ready for it?"*
Cheryl:	16:56.12 – 17:03.71	Then you need to take a step back from that . . . idea and get them ready so that you can do it.
Interviewer:	17:03.71 – 17:06.98	*So what can we do in a professional development to facilitate that?*
Cheryl:	17:06.98 – 17:56.70	Well, you've always been great at saying how you have done . . . run labs and activities in your classroom so that's a great, great start . . . so you have to just start (chuckles) you just have to get your students used to doing activities. That it's not just the teacher at the board the whole time. That there is going to be in a math class, you can have class discussions and you can just discuss things and . . . ack . . . huh . . . that's . . . uh . . . that's, I don't . . . cuz there have been activities where I've said, man, when I was

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		teaching, when I thought my students wouldn't have been able to handle this. But, there's . . . so . . right . . if I jumped in tomorrow and did this activity tomorrow, when I go back to my classroom, they wouldn't be able to handle it. So I need to do some . . . um . . . preliminary activities or some preliminary things to get them ready for it. To do an exploratory activity.
Interviewer:	17:56.70-18:24.32	*So . . . thinking back on the activities, and you have your list there in front of you. Just scan over those for a moment. Are there any of them that you look at and think, "that is readily available to be applied to my students"? Are there any of them that you look at and think, "there needs to be some preparation before they can be used"? And it would be beneficial if the professional development provided hints on how to prepare for them?*
Cheryl:	18:24.32 – 19:36.51	Well, I'm just thinking like . . . the . . . like the motion detectors, that would probably . . . cuz . . . cuz that would take time to just teach them how to use those . . . so, yes . . . so hints on that, how to use them. Cuz I didn't know how to use it . . . but . . so . . and for me that would be . . . I don't like to . . . I don't like to do things with my students unless I'm totally . . . feel comfortable doing it. And so . . . uh . . . and so if I didn't know how to use them, especially if there are different models, so if I didn't know how to get all of them working . . . then I would be a little bit nervous to do that. Um . . . and . . . I don't . . . and then the, like uh . . . Geogebra, unless every student had access to it, unless I was just showing it to them myself, but if I wanted them to all be doing stuff up on Geogebra, then there would need to be some prep time to teach, you know going into a computer lab or . . . I don't know, do students now have, do they bring iPads to school? Can you get Geogebra on an iPad? I don't know.
Interviewer:	19:36.51 – 19:43.96	*Yes, you can get Geogebra or a version of Sketchpad on several different devices.*
Cheryl:	19:43.96 – 19:47.99	Ok.
Interviewer:	19:47.99 – 20:04.38	*So, I am trying to evaluate why some teachers say that the activities we presented were good, but they would never use them in their classroom. So I am seeking what we could do to facilitate their use. What can we do in professional developments that would encourage teachers to at least attempt these activities? I understand about the technology aspect, but what about the other tasks?*
Cheryl:	20:04.38 – 20:20.26	Oh yeah, and that's something I can have my students bring their own vase, but oh no that is the vase one, but the snowman one, yeah.
Interviewer:	20:20.26 – 20:26.88	*Some of these activities were not technology based and some of the teachers said they would not use them, it was a great activity, but their students couldn't do it.*
Cheryl:	20:26.88 – 20:58.63	Uh . . .they, I mean . . . the, the . . . pizza activity would be just the work of cutting and hopefully I'd have an aide that could do it . . . cuz what else are they going to do? (chuckles) so that, I mean that's just something . . . just have my students bring supplies from home, especially if you are doing it as a group, so you'd only need a handful of them . . . um . . but, yeah, the only thing is just

Speaker	Time Stamp	Transcription
		technology. All of the . . . all these, the rest of them are just doable, there's something that can be done.
Interviewer:	20:58.63 – 21:37.44	*Again, your perspective is a little different from the other's because um . . . the others, when asked why they would not try to do the activities, say "my kids just aren't ready for it. So what can we do to change that, because in my mind, it isn't the kids, it's the teacher.*
Cheryl:	21:37.44 – 22:40.02	No, and it . . it is more work for you as the teacher, it is. It's a lot easier just to say, "look at example one in chapter 5 point 1, let's look at example one and say, "ok this is how . . " I mean, that's how . . . that's easier, but, you know, only the top ten percent are grasping it, and getting a good handle on it. . . .and so I . . I . . I'm kind of . . . for me . . I need a story to remember how something works . . .and so that's how, how I learn so that's how I associate with things . . . and so . . that's what I try to do with my students, is I try to give 'em a story or something that is going to relate to them so that they are going to remember how to do it. Not memorize a formula, but understand how it works, so that they can do it. And so, I mean, yeah, . . . the pizza activity, it's just a little bit of prep time with cutting it out. But I mean, years ago, I did an ellipse activity where they were . . . they made their two foci, am I saying that right?
Interviewer:	22:40.02 – 22:40.44	*Uh huh.*
Cheryl:	22:40.44 – 22:49.19	And put string on it and drew their ellipse. And . . . um . . . so they understood what an ellipse was better.
Interviewer:	22:49.19 – 22:54.48	*So it appears that you have already climbed that hurtle . . .*
Cheryl:	22:54.48 – 22:57.36	But not everyday . . .no . . .no . . no
Interviewer:	22:57.36 – 23:22.35	*But you're not looking at an activity and thinking, ok, that's difficult. It has a lot of things to deal with so I won't use it. You are evaluating the task as something that could boost the concept, where others look at the activity and proclaim it too hard for their students.*
Cheryl:	23:22.35 – 23:41.13	I mean, you have to start . . . you have to . . . yeah, so if you, if it's fourth quarter and you've never done one activity with your kids . . . with your students, they're going to be like, "what are we doing? Where is the . . . I'm going to just tune out for . . . you know, the twenty minutes . . . and sit at my desk and pretend to work, you know? (chuckles)
Interviewer:	23:41.13 – 24:17.69	*So I guess what I am looking for is any advice you can give us to help us improve professional developments and get teachers over that hurtle. What can we do to get teachers to realize that it's worth it. Because obviously, just providing activities even those that have 100% engagement is not enough to get teachers to buy into at least attempting the activities with their students.*
Cheryl:	24:17.69 – 24:29.70	I don't know if it would be good to just video an actual classroom and show it. I don't know. Or just say, this is what I did, cuz you cut out all of those pizzas yourself.
Interviewer:	24:29.70 – 24:30.29	*yup*
Cheryl:	24:30.29 –	Ohh . . . I mean, a lot of teachers have student aids that could help, I

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	24:54.32	mean, they hardly do anything anyways. . . so that could be . . something to say, use your student aides or just, just . . . this is how I was able to accomplish this in my class. This is how I was able to . . . cuz I mean you are usually busy correcting and planning and preparing and stuff, and so . . .
Interviewer:	24:54.32 – 26:36.28	*I understand because as we discussed the tasks in preparation for the course, I took this task on and said I would cut out the pizza's and paste them on cardboard backing and my colleagues shook their heads at me because I had a week and a half to make 55 individual sized pizzas and then one 6-piece pizza for 11 groups so that was 55 individual pizzas and 66 slices that needed to be glued to cardboard and then cut out. But I did so because I knew that working with these would be better than just trying to describe to the participants what it would be like to use them. I remember part way through the cutting, I wondered if it was really worth it. And then I led the activity with the participants and it proved to be very worth my time to have prepared these manipulative for the participants. Several of the participants stated that they had never looked at radian measures that way.*
Cheryl:	26:36.28 – 26:39.65	Yeah . . . yeah . . . I hadn't.
Interviewer:	26:39.65 – 26:46.33	*And yet, several of the participants who enjoyed the activity did not provide that opportunity for their students.*
Cheryl:	26:46.33 – 26:52.06	And I don't know if the other thing could be that they had already taught that to their students. I don't know.
Interviewer:	26:52.06 – 27:13.32	*Well, one teacher had not taught it yet, but deemed his students unready for the activity so he just drew a circle on the board and talked about what he had discovered in the activity. And so was not your experience enough to prompt you to try and get your kids to do it also?*
Cheryl:	27:13.32 – 27:28.95	No, I would totally want to use that activity if I'm teaching this class. I definitely think I will want to. And I don't know, I might just print them out and not use cardboard, I don't know, maybe print them on cardstock just to make it a little easier on me, I don't know.
Interviewer:	27:28.95 – 28:07.38	*Yes, I kind of played with that myself. I tried paper and it would not work with the string very well. Again, I know what the teachers are feeling because I experienced it myself when I had to prepare for that activity in the professional development. But the reward of that activity was so high because the enthusiasm was so thick and the participation was so complete, that I thought for sure the teachers would want to replicate it in their classrooms having experienced the model.*
Cheryl:	28:07.38 – 28:32.94	Especially where it's a new . . . new ahm . . . class, you know what I mean? I mean it's . . . so they're not so set in their ways that they can say, "well this is how I taught it for years, I'm going to stick with it " . . . Yeah, this is . . so, yeah . . . I don't know why they wouldn't . . . because that's something that's not, . . . it doesn't require tech . . . it doesn't require all this technology . . . it's all something you can do, so I don't know . . . cuz I definitely want to do this activity.

Speaker	Time Stamp	Transcription
Interviewer:	28:32.94 – 28:43.95	*So I'll ask it just one other way, what is it that has taken you past the block of using something like this in your instruction?*
Cheryl:	28:43.95 – 28:54.95	Um . . . I think I just will see a lot of . . . it's rewarding to see a light bulb go off in your classroom. To see that click . . .
Interviewer:	28:54.95 – 28:59.83	*You've tried it before and seen the success and that's you motivation?*
Cheryl:	28:59.83 – 29:11:12	Oh yeah. That's it, it is just satisfying to see they get it, oh they really understand it. They didn't just guess right. (chuckles) They really have a grasp of what . . . of the concept
Interviewer:	29:11:12 – 29:44.88	*Your suggestion of videotaping a classroom, I think or wonder if that would even get some of these teachers past the block of thinking their students are not ready.*
Cheryl:	29:44.88 – 30:08.99	I don't know. Yeah, I don't know why . . . yeah, unless it's just a time thing. They just didn't have time to do it, that's . . . cuz I get it. When my family would say, "quit giving tests." (laughs) It's like, I spend so much time correcting quizzes and tests, that they say, "well just stop giving them." Because they, like, want to go do something and I'm like, well I have tests to correct. And, yeah . . . my husband too, "stop giving tests."
Interviewer:	30:08.99-30:11.66	*Yes, I have heard that from my wife, "just stop giving tests then."*
Cheryl:	30:11.66 – 30:17.02	I know, I know. But you just . . . keep . . . you, you, you have to.
Interviewer:	30:17.02 – 30:41.34	*I guess there are just some things that we are not going to be able to address with professional development. But being explicit, like after a high engagement activity, pointing out to the teachers, "look at the experience you had, the enjoument you had, the learning experience you just had. Why would you not want that experience for your students?" I don't know how else we can get it across.*
Cheryl:	30:41.34 – 31:25.50	Yeah . . . and well, and then, . . . I don't know if . . . um. . . wikki string isn't hard to find, it may . . . and that's the supplies are mostly at your school too. You print them and . . . I don't know, I . . . and I . . . years ago, we had like a circular cutter thing and I don't . . . there's a product my husband was trying to sell, that they had need of a circular label and so they were cutting out like the sticker, and had . . . so we had a circular cutter thing . . . I don't know if it would go through the cardboard., but so even like, something like that, you can buy this blade that's circular to cut out your cardboard . . . I don't know. I you found a shortcut in cutting them out, I . . . (laughs)
Interviewer:	31:25.50 – 31:52.46	*To be honest, we chose the activities we thought would prompt them to want to make a change. . . but it wasn't enough. I think we need to be a little more explicit about the changes we want to make, and then question them, "why would you not want your students to have the experience you just had?"*
Cheryl:	31:52.46 – 31:56.04	Yeah . . . yeah . . . exactly.
Interviewer:	31:56.04 – 32:11.94	*Is there anything else about the professional development that you would like to tell us to either keep or get rid of?*
Cheryl:	32:11.94 – 33:10.36	Um . . . I really tried to implement asking the students better questions that you had talked about before. About not doing it for

Speaker	Time Stamp	Transcription
		them. And I think I lost a student, I . . . I have volunteers that come in and help, and I had a kid that would come in and he'd . . . he was working on fractions and he would just . . . my volunteers or I would help him and he'd be like, "I forgot how to do this again." And so my volunteers were working out the problems for him. And so I was like, I'm not going to do that. And so I was . . . I asked him, "so what do you think you should do next?" and he was, "I don't know, I don't remember how to do this at all. Will you just do it for me?" And I'm like, No . . . I can't do it for you. And he was uncomfortable . . . and I just sat and stood there and . . . asked him what do you think you should do next, and he just . . . I don't know . . . I don't know, you tell me . . . and I said, we need to get a common denominator, and we need to do this and he was uncomfortable and I was like . . . and we haven't seen him again.
Interviewer:	33:10.36-33:16.03	*He hasn't been back?*
Cheryl:	33:16.03 – 34:36.97	No, and he wasn't that consistent in his attendance but . . . the rest of my students, they have got used to that now. So they know that I'm not just going to give it to them and I'll tell them . . . I'll tell them . . . I'll ask them, "what do you think you should do next and why?" And so we . . . so that . . . I've implemented that a lot. Where I was even just reviewing adding and subtracting decimals and I had em . . . and I wrote them side-by-side cuz I wanted them to line up the decimal. So I gave them the problem and I had them do it and we can compare answers. And I have two students who have the same incorrect answer, so just put everybody's answer on the board. And I just had them discuss it. And I said, hey you two, you have the same answer, so what did you do? And then both of them are like, well I did this, and they didn't line up the decimal right . . . and they just . . and so I said, ok, so you did this . . . so let me make sure I got this right . . . this is what you did? And they like yeah, and then they went . . .aahh . . . "I didn't do . . . I added the tenths place with the hundredths place" and then they were like, . . . oh, ours is wrong. And they, and they figured it out themselves. And that was like . . . ohh. . . YES! And the other students were like, "Oh I did mine right." This is. . .it was just like . . . it was one of . . . you know, one of those satisfying moments where they figured out their mistake and they learned from it. And so that's just something that I've tried to implement a lot more.
Interviewer:	34:36.97 – 34:47.08	*Ok . . . well, I appreciate your feedback for what we are trying to do. We want to make sure the professional development is a success for the teachers and trying to improve instruction.*
Cheryl:	34:47.08 – 34:54.80	Yeah . . . and I guess too . . . it would be nice to kind of know how it worked in a real classroom too.
Interviewer:	34:54.80 – 34:55.38	*Right*
Cheryl:	34:55.38 – 35:12.41	That would be . . . you know . . . you'd say, "this went over like a lead balloon" , "this did not go well" , "but then I tweaked it and did it in another class and it went over better when I did this" . . . I don't know, I think . . . I would like to know that information.
Interviewer:	35:12.41 –	*Right, and you're not the first one to voice that. To have the chance*

Speaker	Time Stamp	Transcription
	35:34.79	*to work with things that really work well. We'll take those into consideration as we prepare future professional development .*
Cheryl:	35:34.79 – 35:55.66	I don't understand it. They need to keep up and yet, going to professional development just doesn't cut it. My brother-in-law was a principal in a small town in Idaho and his next-door neighbor was a teacher and coach in his building and would not go to professional development. He would say, " I went to school already to learn to teach, I don't need to learn this." But he wasn't any good in the classroom and needed to improve. So I understand the frustration, but really? . . . They need to improve and it goes back to the universities, they need to teach future teachers that learning is a lifelong process. . . I didn't want to go to professional development at first. Getting ready for a sub is a lot of work and I would think . . ."I don't want to go" But then I went and part of the experience for that professional development changed my attitude . . . . when I got excited about what I had just experienced and I then wanted to go more.
Interviewer:	35:55.66 – 35:59.14	*Well, thank you for sharing your thoughts and reflections with me. I really appreciate your time and effort.*
Cheryl:	35:59.14 – 36:00.08	You're welcome. I hope you get everything done that you need to.

Appendix M

Transcript of Bethany Interview 1

Transcript of Bethany Interview 1

Interview 1, Jun 9, 2014
5:00 pm

Speaker	Time stamp	Transcript
Interviewer	0:0:00-0:0:3.51	*I really appreciate you taking time to do this.*
Bethany	0:3.51-0:4.58	Oh no problems
Interviewer	0:4.58-0:15.29	*I'm going to go through some fairly simple questions. Some of the questions you can refer to . . the recently . . completed professional development we did together*
Bethany	0:15.29-0:15.95	Uh huh
Interviewer	0:15.95-0:22.84	*And um . . . but there will also be times when you can also answer generally for other professional developments you may have attended too.*
Bethany	0:22.84-0:23.71	OK
Interviewer	0:23.71-0:27.09	*So how long have you taught secondary mathematics?*
Bethany	0:27.09-0:29.76	Um. . . two years now
Interviewer	0:29.76-0:30.99	*Two years?*
Bethany	0:30.99-0:33.69	Oh wait, secondary mathematics in general?
Interviewer	0:33.69-0:34.46	*Yeah*
Bethany	0:34.46-0:35.89	Sorry. . . yes, nine years
Interviewer	0:35.89-0:38.48	*Nine years . . . ok, I thought maybe you had more experience than that.*
Bethany	0:38.48-0:39.83	Yeah . . yeah . . yeah,yeah
Interviewer	0:39.83-0:40.81	*Ok . . . and how long have you been at the school you are currently at?*
Bethany	0:40.81-0:45.13	Three years
Interviewer	0:45.13-0:47.82	*Three years. Where were you at before that?*
Bethany	0:47.82-0:55:45	I was at charter schools in Davis County. And then one year at a public, traditional public . . in um . . West Valley, in Kearns.
Interviewer	0:55:45-0:57.50	*In Kearns? Where was that at?*
Bethany	0:57.50-0:59.56	At Thomas Jefferson Jr. High
Interviewer	0:59.56-1:02.44	*I'm very familiar. . I taught at Kearns High School for awhile*
Bethany	1:02.44-1:03.09	Oh. . . nice

Interviewer	1:03.09-1:05.17	*So I'm very familiar with that area.*
Bethany	1:05.17-1:09.12	Yep . . yep . . and those kids
Interviewer	1:09.12-1:12.67	*Ok . . um . . so have you attended very many professional developments in the past?*
Bethany	1:12.67-1:28.22	I try to. I haven't done anything this intensive where I get out of school to go to it, but I have done professional development stuff, training stuff . . so . . .
Interviewer	1:28.22-1:36.71	*Ok, And were you mandated or did you feel pressured to attend this one or did you just hear about it and decided you wanted to come?*
Bethany	1:36.71-1:47.44	Oh well, somebody, they wanted us, somebody from our school to go . . . and I heard about it and we all think it's a great idea to get more . . more ideas for how to teach the sec . . the new core
Interviewer	1:47.44-1:53.52	*And have you ever been mandated to attend a professional development or felt pressured to attend one?*
Bethany	1:53.52-1:55.47	Um . . .no . . .
Interviewer	1:55.47-1:55.96	*No?*
Bethany	1:55.96-2:00.25	Well, I mean like other than just in our, like what we need to recertify
Interviewer	2:00.25-2:00.68	*Right*
Bethany	2:00.68-2:25.34	So like the hours we need to get in . . but as far at the content and what we need to get and how you have to go to this one . . no. . . I mean . . . maybe if it was set out . . like time set apart . . .preschool . . . you know what I mean, before school starts but not like . . . yeah . . generally speaking, I would rather go to a training and find out more than having to be mandated
Interviewer	2:25.34-2:32.85	*Ok, that's good . . . so what makes a professional development experience good for you?*
Bethany	2:32.85-3:09.17	Useful information, useful practices, useful activities. . .just like the um . . . specifically, being a teacher obviously like . . . I analyze teaching and so when I'm (chuckles) . . and so I, it's watching, not only the content of what they teach, but how they teach it and how they come across it, and so watching their time management versus ours because. . especially in a situation like in Provo . . . like, if we don't have . . . if our time is not managed wisely, then why am I out of school for that? You know what I mean?
Interviewer	3:09.17-3:11.26	*No, I really do.*
Bethany	3:11.26-3:12.07	Yeah
Interviewer	3:12.07-3:22.70	*So . . um . . . so what typically makes a professional development . . um . . unhelpful then? Where you've sat there and thought, "oh my goodnes"?*
Bethany	3:22.70-3:58.58	(chuckles) um there were times when . . there are, there have been times in professional development things when . . . um . . there was a huge transition time, for me personally . . . those

		transition times have . . . often happen because people were not up to par with what was going on. Other people in the training were, bless their harts, trying their hardest to get it, but they, we, we all had to wait for them to try and catch up. . . so the kinds of transitions with technology or what ever, were other reasons to make them slower.
Interviewer	3:58.58-4:04.56	*Ok . . . Well, I would like to take a moment and review the four days of instruction that we went through together.*
Bethany	4:04.56-4:04.56	Ok
Interviewer	4:04.56-4:18.40	*It's been a while since you were at the first one so you might not remember them all. And so . . . I'm going to go through them and you can either jot them down or remember what we were doing then.*
Bethany	4:18.40-4:20.35	Right, let me grab a . . . grab a pencil or something.
Interviewer	4:20.35-4:20.93	*Ok*
Bethany	4:20.93-4:23.58	Just to make it more efficient
Interviewer	4:23.58-4:26.52	*Yes, that way you can refer to it.*
Bethany	4:26.52-4:29.17	Right. . . right . . ok.
Interviewer	4:29.17-4:41.11	*Ok, on Day 1 back in October, we started out with the polynomial functions and concavity. And that was with the vase activity.*
Bethany	4:41.11-4:43.41	Oh right . . . yeah
Interviewer	4:43.41-5:01.37	*Ok. And later that morning we went into another activity for concavity with the motion detectors into the gym. So we worked with the nonlinear graphs in there and we talked about concavity and did the activity with the motion detectors.*
Bethany	5:01.37-5:03-15	Right
Interviewer	5:03-15-5:14.18	*After lunch, we came back and Marsha presented an activity with repeated roots and Geogebra and polynomial division.*
Bethany	5:14.18-5:16.09	Right
Interviewer	5:16.09-5:24.67	*And then in, at the second half of the afternoon, Celeste presented on inverse functions.*
Bethany	5:24.67-5:26.45	Ok
Interviewer	5:26.45-5:31.13	*And we had the discussion about the f(y) instead of the f(x). You might*
Bethany	5:31.13-5:31.62	Right (chuckles)
Interviewer	5:31.62-5:33.11	*remember that (chuckles)*
Bethany	5:33.11-5:36-46	Oh that day (chuckles)
Interviewer	5:36-46-	*Ok. Day 2 was uh, in November and we started the morning with a*

	5:43.94	*discussion on SAGE, the assessment environment.*
Bethany	5:43.94-5:44.81	Hmm hmm.
Interviewer	5:44.81-6:03.51	*And then I uh, started an activity with the practice standards, number two and three, the reason abstractly and quantitatively, and we had teachers bring in student work. Where we looked for those two practice standards, evidence of those practice standards in the student work.*
Bethany	6:03.51-6:04.50	Hmm hmm.
Interviewer	6:04.50-6:18.56	*Um . . . and then in the afternoon, Celeste started an exploration with logarithms . . . uh . . identifying the constraints, common student errors and asymptotes was the discussion that she led.*
Bethany	6:18.56-6:19.23	Hmm hmm.
Interviewer	6:19.23-6:27.25	*And then Marsha lead an activity uh, with the application with uh, the melting snowman activity.*
Bethany	6:27.25-6:28.66	Ok
Interviewer	6:28.66-7:02.06	*So that was an application of logarithms. On Day 3, um . . . I started with the pizza activity . . . and we found the center of the circle . . . and then from there we identified the radius, and then we used that as a discussion for linear measurement and angle measurements. So we talked about angle measurement and the arc length and we talked about radians and we used the wikki stix with the pizza pieces, uh,*
Bethany	7:02.06-7:02.70	Hmm hmm.
Interviewer	7:02.70-7:13.59	*And then uh, Celeste led an activity . . . to further the discussion of angle measure versus linear perspective in our arc length after that.*
Bethany	7:13.59-7:13.88	Ok
Interviewer	7:13.88-7:33.27	*In the afternoon, I led a, a discussion on trig functions with the unit circle. And we identified where the different trig functions were in relation to that with Geogebra. So as we moved the . . . the point on the circle around, you could actually see lengths of line segments*
Bethany	7:33.27-7:33.80	Hmm hmm.
Interviewer	7:33.80-7:35.54	*and how they related to each other.*
Bethany	7:35.54-7:36.35	Right
Interviewer	7:36.35-7:47.19	*And uh, . . . the importance of the unit circle. And then Celeste led a discussion about not using the unit circle and the fly on the fan activity.*
Bethany	7:47.19-7:48.29	Hmm hmm.
Interviewer	7:48.29-7:53.26	*. . . and the inverse trig functions also . . . then*
Bethany	7:53.26-7:55.77	Ok

Interviewer	7:55.77-8:01.30	*And then on Day 4 . . . I was so lucky, I got to present all by myself.*
Bethany	8:01.30-8:03.63	I know you did a good job too (laughs)
Interviewer	8:03.63-8:59.79	*I felt so bad, I thought these people are going to be so tired of hearing from me. Um, we started with the . . . the discussion of the need for change . . . with the Mike Mattos information and the RTI three tier model of instruction, and talked about tier one instruction. . . we then went into the CMI Framework and discussed the three cycles of teaching and learning and student readiness to learn. Whether they were developing, solidifying or practicing. . . And we then brought in the SID4 standard from the Secondary Math 3 . . . and talked about the SAT scores and should we send out the certificate . . . those two activities. As we tried to incorporate student learning with the CMI Framework and the standards for the Secondary Math 3.*
Bethany	8:59.79-9:00.64	Right
Interviewer	9:00.64-9:11.21	*So . . as we go through those four days, first of all, I want you to know that you're not going to offend me with any of your responses.*
Bethany	9:11.21-9:12.78	(chuckles) . . ok
Interviewer	9:12.78-9:24.46	*And I was excited that you were willing to . . . do this interview because you showed a willingness to honestly share your feelings in the professional development.*
Bethany	9:24.46-9:30.37	(chuckles) sometimes to offend, but I didn't mean to offend, I was just like, "what is this?" It didn't make sense, and so yeah.
Interviewer	9:30.37-9:45.74	*And that . . that's, that's very important . . . you know, anytime we have an environment for learning, we have to have those social norms that say, "it's alright to say what we need to say in order to get and understand what is going on".*
Bethany	9:45.74-9:46.82	Right
Interviewer	9:46.82-9:50.78	*So be aware that I am looking for that honesty here, ok?*
Bethany	9:50.78-9:52.03	Ok (Chuckels)
Interviewer	9:52.03-9:59.22	*So, as you heard me review the topics for each day, what were some of your thoughts and reflections that popped into your head?*
Bethany	9:59.22-10:11.68	. . Umm . . well so the first, just starting with Day 1, um . . . the inverse functions . . . I, I that one was the one that started the big urrr, whatever,
Interviewer	10:11.68-10:12.18	*Hmm hmm*
Bethany	10:12.18-10:53.98	But um . . . I liked the points that she was making in just saying that it's, it is a different beast basically and, and it is. I, like, even in teaching, cuz even in teaching the inverse functions there is a confusion between, what x is. So I see the purpose that she was saying, I feel like the vehicle to get there was the wrong vehicle. And um . . . it was confusing. I think that just in general with these trainings that, there were some very good solid ideas. I

		often felt like when Celeste was presenting, she was so concerned with being special BYU that she didn't . . um, and I went to BYU
Interviewer	10:53.98-10:55.46	*That's ok, that's ok*
Bethany	10:55.46-11:49.37	Um . . . she was so concerned about being special BYU, thinking about everything differently that . . . it lost a lot of meaning to the students, and I think there was a lot of frustration that I, as a teacher, knowing what my students go through, I know that my students would get completely lost. And be more frustrated with anything she was doing, and give up, before they would say, "oh boy, we're looking at things differently. This is so exciting." You know what I mean? And I . . . and again like, for her, like that, that concept in particular, there was . . . there is some great advantages in teaching it in a different way. . . .
Interviewer	11:49.37-11:44.17	*. . . hold on just a second,*
Bethany	11:44.17-11:46.11	Yeah, sorry, there was a phone call that came in
Interviewer	11:46.11-11:47.01	*Oh ok*
Bethany	11:47.01-11:50.07	From me so I just had to hung, hang up, are you good?
Interviewer	11:50.07-11:52.25	*I'm good. . . ok go ahead.*
Bethany	11:52.25-12:31.87	Ok, so there's the um . . . so and, and there were some other concepts throughout the, and I can't remember the speci, that one was the one that was really (chuckles) . . wrrr. . . um, but just where the approach . . . oh and another thing that Celeste did, with like the fly on the fan, and then just create, and I think this is one that good trainings do, good professional development, is they set good norms up. Saying like, "If you don't understand something, ask it". And one thing that I, one bone that I have to pick with some people's approaches to teaching the new way, is you do want students to discover things.
Interviewer	12:31.87-12:32.31	*Right*
Bethany	12:32.31	But you need, they need enough of a framework, enough of a foundation to go from before we can dive into this, let's think about math differently thing. And I think that is one sad thing . . . that . . . I have felt with some of these trainings and I even did like the . . . Common Core . . . thing that was at Murray High School. . . um . . .
Interviewer	12:57.52-12:59.16	*Core Academy?*
Bethany	12:59.16-12:59.73	Huh?
Interviewer	12:59.73-13:00.93	*The Core Academy?*
Bethany	13:00.93-14:17.70	Yeah, the Core Academy, I did the Core Academy and I liked that, but the same problem with that is that sometimes there was so little frame work . . . that they told us as teachers, and we knew

		where they wanted us to go with it, but again, like from a student point of view . . . they would have so little framework to base everything off of that the frustration threshold was higher than . . the endurance threshold. So, but I there is a point though that we need to as teachers, let go, and let them do it. So it was good to see with these activities that we did at the Provo training . . . um . . so like the uh, fly on the ceiling fan or . . . the fly on the fan or . . . with anything to take them, cuz some 'em, some of the activities I thought were perfect and I tried to use those exact same things in class and it was great. Other things I could say, "that was really frustrating for me." I think it was helpful though so I'm going to start from this point and move on from there with my students. And I found that to be more effective for my students and me . . . and, but that I feel like with that they still had ownership of their ideas . . . just minus the huge amounts of frustration (chuckles).
Interviewer	14:17.70-14:19.81	*No, but that's important, I mean,*
Bethany	14:19.81-14:20.60	Huh huh
Interviewer	14:20.60-14:29.83	*If they're frustrated . . . they get to a point where they, they're going to shut down. What's in it for me? There's no real reward here so I'm just going to quit this.*
Bethany	14:29.83-14:29.27	Right
Interviewer	14:29.27-14:35.51	*So that, that makes perfect sense. What are some of the things that you did try from the professional development in your classroom?*
Bethany	14:35.51-14:53.39	Um . . . so . . . I did, let's see . . . let's see . . . we talked of, a, what one did I try? I'm trying to remember, cuz we did the concavity thing, oh with the repeated roots, I liked the repeated roots one.
Interviewer	14:53.39-14:53.99	*Hmm hmm*
Bethany	14:53.99-15:00.35	When we talked about um . . . uh was it this class that we did the odd, the even, neither . . .
Interviewer	15:00.35-15:01.02	*Yes*
Bethany	15:01.02-15:21.31	That thing with . . . And uh, my . . . with that from that from that thing was for my students, they, they've got it. Like we took quizzes on it and they aced those quizzes, they understood that so well. And then on the test they did fine with it. Some of them forgot by the time we took the test because, you know, it was two days later. That's way too long to expect them to remember. (Chuckles)
Interviewer	15:21.31-15:21.96	*Yeah*
Bethany	15:21.96-16:13.14	But that one was a really good one, um . . . I, I liked, uh, jut the day four, I'v learned those day four, like the develop, solidify, practice thing, I did that at the con . . academy thing, but reminding myself of that and looking at all the activities I'm doing . . . ok . . where are we at on this and can I go sooo they can really solidify this? Really practice this and . . . and um . . heh, really like toward the end of the year . . . you know like, I know

		we're not going to get this solidified. But, you know, at least we have to develop it somehow. So I did anyways. Cram it in by the time the end is there . . . um . . . I've . . been really emphasizing the difference between linear measure and angular measure . . . That one was good, I gone, I taught that lesson before in a different way, but I took aspects of what you taught and
Interviewer	16:13.14-16:13.47	*Hmm hmm*
Bethany	16:13.47-16:25.66	. . tweaked it and fit it for my class and it was, it was good, so those are the things I can think of . . . oh and then . . . the . . . the Geogebra one, showing the difference between sine, cosine and tangent. . .
Interviewer	16:25.66-16:26.34	*Hmm hmm*
Bethany	16:26.34-16:37.51	I . . I meant to and I, the day that I taught that I was frazzled, but then I hurried and did a search and found something on line that did that thing, cuz I couldn't remember if we had that in Geogebra
Interviewer	16:35.45-16:3586	*Oh yeah*
Bethany	16:35.86-16:41.68	on there . . . on the . . . wikis . . no what is it that we have?
Interviewer	16:41.68-16:42.94	*The wiki page, right.*
Bethany	16:42.94-16:48.61	Yeah, the wiki page and so . . . anyway, but . . . that was, that was a good one too.
Interviewer	16:48.61-16:54.19	*OK . . UM . . . What were some of your least favorite memories from the professional development?*
Bethany	16:54.19-17:59.62	. . . Umm (chuckles) . . . again, the time (chuckles) . . . the long time, but that again, that, that's not . . . . I mean that's something you kind of have to do with other teachers who should know math, who are stuck on math concepts. But, . . . what ever (chuckles) . . um, and then I didn't like how . . . I, I didn't like . . . some of Celeste's . . . approaches to things that she is all wise, and all knowing and we're all imbeciles trying to . . . to . . eat off of . . out of her hand . . . or what ever and I refused, I (chuckles) I had a hard time with that (laughs).
Interviewer	17:59.62 – 18:11.74	*Well . . . I, I had a hard time myself because . . . I have a hard time anytime I hear somebody give me an extreme comment like "always" of "never" . . .*
Bethany	18:11.74 – 18:12.83	Right
Interviewer	18:12.83 – 18:21.67	*And I'm thinking . . . wait a minute . . . what . . . what value have you placed on this, now that you've said, "I'd never do this" or "I'd always do this"*
Bethany	18:21.67 – 18:23.16	Right
Interviewer	18:23.16 – 18:37.37	*For me . . . teaching should be . . . I look at what the student is on the verge of learning . . . and then finding the best vehicle for the to get it, sometimes it might be inquiry based, sometimes it might be discovery, sometimes it's going to be direct explicit instruction.*
Bethany	18:37.37 –	Yeah well, and see . . . and I took, when I was at BYU, I took a

	18:46.71	class from . . . do you know all the BYU professors fairly well?
Interviewer	18:46.71 – 18:46.95	*Hmm mmm*
Bethany	18:46.95 – 18:49.04	Patty Castle , do you know Patty Castle ?
Interviewer	18:49.04 – 18:49.17	*Hmm mmm*
Bethany	18:49.17 – 19:24.99	And, and I, those, that class had the same type of thing, some frustration with what we were doing. I liked the idea of what you're doing when you're focusing on the big mathematical ideas, the big main concepts. . . And then, what are you going to do to get them there? . . . But . . . I think that sometimes with Celeste's approach, it was more like . . . you can, you imbeciles can try what ever you're going to try, but my way is the best. (clears throat) . . so . . . anyway, I, I felt like there was a little too much pride in what she was trying to present rather than this is um, our goal is to teach the students not to . . . hemhem . . .
Interviewer	19:24.99 – 19:39.60	*And, and that is an important piece because . . as we went through our professional development, we were concentrating on four areas of emphasis . . . one of them was increasing teacher content and pedagogical knowledge.*
Bethany	19:39.60 – 19:40.30	Hmm mmm
Interviewer	19:40.30 – 19:49.14	*And so we picked activities that concentrated on content and pedagogical knowledge . . . we were actually modeling things intentionally.*
Bethany	19:49.14 – 19:49.74	Hmm mmm
Interviewer	19:49.74 – 19:56.30	*Um . . . a second area was . . . the . . . student readiness to learn.*
Bethany	19:56.30 – 19:57.94	Hmm mmm Hmm mmm
Interviewer	19:57.94 – 20:24.16	*And then we had the . . um, sociomathematical norms, the environment, and that should be an environment where you feel comfortable to talk and . . . I expect students to talk in my class. I expect them to participate in the activities. And what is the environment for them, the learning environment?*
Bethany	20:24.16 – 20:25.15	Right
Interviewer	20:25.15 – 20:42.19	*And then the um . . . the last one is the . . . proper tiered instruction, so . . . Tier 1, Tier 2, Tier 3, and my responsibility for Tier 1 instruction. If you don't get it, then it was my fault.*
Bethany	20:42.19 – 20:43.08	Right
Interviewer	20:43.08 – 20:52.25	*Um, so those are the four areas that we concentrated on. And one of them, like I said, the first one is that concept and pedagogical knowledge*
Bethany	20:52.25 – 20:52.85	Hmm mmm
Interviewer	20:52.85 – 21:02.98	*Um, sometimes . . . as we try to help teachers learn the content or how to teach something in a new way . . . um, it can be done in a way that looks like I'm trying to fix you.*

Bethany	21:02.98 – 21:04.27	Right, right
Interviewer	21:04.27 – 21:20.07	*It's not looking at where are the participants at, similar to what we are doing with the students, where are they at and what do they need next . . . this is . . . important that we treat them as professionals and recognize, you know what, they bring an awful lot to the table.*
Bethany	21:20.07 – 21:21.16	Hmm mmm
Interviewer	21:21.16 – 21:30.10	*And uh . . . so . . . were there moments where you felt like you were being treated like a professional during that professional, during those four days?*
Bethany	21:30.10 – 21:32.29	Oh . . Yeah . . .
Interviewer	21:32.29 – 21:49.08	*And what were the kind of things that would, you would say, "that's what I want to see in a professional development"? That's how I want to be treated. . . . What were the things you say, "you know what, that was wrong and I don't want to be treated that way and I don't want to see it in professional development again."*
Bethany	21:49.08 – 22:01.38	. . . Umm . . . um, mostly I can talk about the way I felt . . . Because that's kind of what I'm hearing you're saying . . and more about mm . . . less about the content in those situations but I can say
Interviewer	22:01.38 – 22:03.26	*That's exactly what I am looking for.*
Bethany	22:03.26 – 22:52.25	. . . Yeah, when, when you were presenting . . . I felt like, ok, like he has good experience, I've heard your stories . . .and they're great and I, I'm like, ok I can relate to that, I can use that . . . and that was good. Marsha , when she presented, she's so very factual . . . Um and I, I really, I like the things she says because in her mind they are, I mean . . . There's not a lot of room for feeling or you don't need to stroke her pride . . . (Chuckles) . . . and so . . . her ego, whatever, like um . . . she's fine. Celeste, I felt like she was very demeaning to all of us . . . I mean very rarely did I feel like she . . . she um . . . felt like I brought anything to the . . . to the discussion. You know what I mean? Other than just me being . . . "Um, I don't think that works" you know, I mean, my . . my input. Um . . . And then what's his name from Nebo ?
Interviewer	22:52.25 – 22:52.67	*Teddy*
Bethany	22:52.67 – 23:33.25	Teddy . . . Teddy has his moments (chuckles) when, sometimes I think he's great, sometimes I think he loves to hear himself talk . . . Um . . . But uh . . . yeah . . . Like, I didn't, he didn't teach as much. He wasn't as involved this . . whole thing, as much as he was last year anyway. Umm . . . but, so that's really what I can talk to is like . . . the, so the things that you did, or the things that went, like I liked the things that Marsha did. She wasn't saying you have to teach this way, but how she taught it was so convincing, like, oh clearly that's going to be a great way. Does that make sense?
Interviewer	23:33.25 – 23:35.14	*That's exactly right, yes.*
Bethany	23:35.14 –	She, she just simply modeled it. And the same with you, you

	23:54.95	engaged us in it and simply modeled it. And then with Celeste, she engaged us in it, there was some confusion, like is this how it's suppose to work, is that how it's supposed to work, well just figure it out. You know what I mean? And I'm like, aaaarg, there needs to be a little more guidance here and I don't really see what's supposed to happen. . . .
Interviewer	23:54.95 – 23:56.04	*chuckles*
Bethany	23:56.04- 24:28.62	. . . and . . .so . . . yeah . . . and then uh . . and then . . . rather than accepting that we already knew what to do, it was, oh . . . hmph . . . let me tell you. You know what I mean? And so, ack . . . I kind of, and I have had that feeling from other BYU things. You know what I mean? Because I went there. But there were other . . . there's other . . . yeah . . . there are, there are other professors that were better (laughs) better suited for not making me feel like an idiot. So . . .
Interviewer	24:28.62 – 24:58.53	*And that's what I'm looking for . . . the activities themselves were great . . . in, in my opinion, I looked at it and thought, we really planned these out. We got together, and said, ok, here's our thing for the day. How are we going to develop these activities so that they build upon each other? And we're going to want to model them. And your comment about you being sold on them by the modeling was good because a couple of people I have interviewed didn't recognize that we were modeling ways that we wanted them to teach.*
Bethany	24:58.53 – 24:59.59	Hmm hmm
Interviewer	24:59.59 – 25:31.25	*They didn't see the modeling, all they saw was the activity . . . they didn't try to implement it and they just kind of brushed it off. I'm trying to find out, what are the components of the professional development, not the specific activities but the components of the professional development that would make you say, "That was successful. I want to see more of that. That helps me. That doesn't help me. I don't want to see more of that. That was a waste of my time."*
Bethany	25:31.25 – 26:37.07	Right . . . well I think of . . . and . . . I think I've made it clear, like them making me feel like an idiot is a definite no-no . . . um . . . but . . . for me . . . I liked, one thing I liked it when we were just . . . engaged and in something that maybe we already knew it, for example when we did the 3-D spinning things, you know? I had it, like, I knew what our basic, what, thing was and I was like, "Well I'm going to make this more challenging for myself". So I don't know if you remember my 3-D thing. It was the star (chuckles) Just because I knew it was going to be something interesting for me. So . . . I could take it, that was an activity . . . where you read the guidelines . . . and I knew because of my experience that I could go further with it to make it interesting for myself . . . so in other words, give us . . . enough structure that I know what our goal is . . . but enough freedom that if I decide to make a star . . . it's totally up to me. (Chuckles) And it's ok and totally recognizing my professionality also . . . so . . . and my knowledge . . .

Interviewer	26:37.07 – 26:37.87	*Right*
Bethany	26:37.87 – 26:40.15	Right so . . .
Interviewer	26:40.15 – 26:49.19	*Um . . . was there anything as you saw us preparing for the day or during the day where you looked at it and thought, "Oh my goodness, not this. I don't want to do that."?*
Bethany	26:49.19 – 26:58.44	. . . heh . . umm . . . the main thing was just waiting when other people were catching up, and bless their harts, they were trying . . . that was . . yeah . . .
Interviewer	26:58.44 – 27:20.54	*We hear that quite a bit and . . . boy, I wish I knew how to fix that problem because as I look at it, there were those who were engaged and like you say, bless their harts, they were trying to get there and I didn't want to squelch that. I think maybe what we need to do is maybe have some extension activities, kind of like you would do in your own classroom. And model that.*
Bethany	27:20.54 – 27:21.24	Hmm hmm . . . right
Interviewer	27:21.24 – 27:31.68	*I think back on it and you know, having that many people sitting there waiting for those who are truly trying, are really putting forth effort. There were those who were not doing it , and were you know . . .*
Bethany	27:31.68 – 27:33.37	What ever, yeah . . . they were checked out
Interviewer	27:33.37 – 27:36.25	*They were checked out . . . because there were a lot of them that were mandated to be there.*
Bethany	27:36.25 – 27:37.45	Hmm hmm
Interviewer	27:37.45 – 27:48.71	*And you could tell. . . but for those that were there and really trying, I didn't want to squelch that. But at the same time we had people who were sitting there with such valuable time sitting there and not doing something.*
Bethany	27:48.71 – 27:49.47	Right
Interviewer	27:49.47 – 27:52.45	*So I think we need to address that and make sure they have an opportunity*
Bethany	27:52.45 – 27:56.92	Yeah if there could be a way to . . . differentiate the instruction,
Interviewer	27:56.92 – 27:58.01	*Yeah*
Bethany	27:58.01 – 28:28.74	. . .and I don't know. . . that's one think I struggle with in my own classroom. I know there are kids that totally understand it and get it and they should be able to just go along and I try to do that and I . . ok, I've taught the basic stuff, if you understand it, start doing the homework. (chuckles) If you don't . . . ask questions. But then everybody gets caught up in asking the questions or what ever and other people are still just checked out and what do I do? And so . . . yeah, that's I think (chuckles) an eternal teaching question. (Laughs) . . . when you figure that out, let me know (laughs)
Interviewer	28:28.74 – 28:33.81	*(laughs) . . . well, I think we should at least try to attempt to model that.*

Bethany	28:33.81 – 28:35.00	Yeah
Interviewer	28:35.00 – 28:42.35	*Cuz like I said, one thing I really worry about is wasting teachers' time. You've got so few days with those kids.*
Bethany	28:42.35 – 28:48.02	Hmm hmm, and you take four away from them when it's already . . . yeah.
Interviewer	28:48.02 – 28:52.85	*They talk about 180 days, we both know it's closer to 150, probably 140.*
Bethany	28:52.85 – 28:53.38	Right
Interviewer	28:53.38 – 28:54.47	*I mean of instruction days, so . . .*
Bethany	28:54.47 – 28:55.07	Right
Interviewer	28:55.07 – 29:07.88	*To take those four days, that is something we need to be aware of . . . um . . so uh . . . what type, what kind of topics would you like to see addressed in future professional development?*
Bethany	29:07.88 – 29:29.51	Well on thing I really liked about the topics we talked about, like we focused on Secondary 2 last year and Secondary 3 this year . . . I like those les, I like those lessons. One thing like . . . um . . . with, we, I was really hoping that in day four that we were going to get more about statistics. Because we kind of had no idea of what to do with the statistics stuff.
Interviewer	29:29.51 – 29:30.20	*Ahh*
Bethany	29:30.20 –	I hadn't done, I don't even remember, I am sure I was taught, but I don't remember for example, um . . . comparing two treatments . . . I just skipped that part because we had a few days to choose from and I'm like ahh I'm not really sure . . . we're skipping over it, so . . . which I felt bad, but at the same time, what can I do when I'm not sure myself and I didn't want to be like . . . uh, then there were like two different . . . theory, like, our statistics, our AP statistics teacher looked at the stuff compared to the stuff that Marsha put together in our, the, the book that we have, have you seen that book that she put together? Which is great, but it's totally different and she's like, "I wouldn't do it that way at all." (Chuckles) . . . So um . . I, I just avoided it and other things, like yeah anyways, so I was hopeful, wanting to get more statistics stuff in . . I think that, you, you had the list you gave us that list of the essentials for the Secondary 2 I think it was . . . and you gave it to us, I think it was on Day 1 or something like that. Because we were saying it was soo big. And it is, it's huge
Interviewer	30:43.62 – 30:44.22	*Yes*
Bethany	30:44.22 – 30: 48.29	Um . . . like what are the essentials, but then you look at that list . . . and I don't see anything on there . . . that's not in everything else. Does that make sense? I don't know what was cut out, like I don't know what . . . I couldn't see anything
Interviewer	30: 48.29 – 30:52.37	*Well, we've actually taken that list and cut it down just last week.*
Bethany	30:52.37 – 30:53.46	Oh did you?

Interviewer	30:53.46 – 30:53.86	*Yeah*
Bethany	30:53.86 – 31.09.99	Good . . yeah, well and then the SAGE testing . . . Oh my goodness, I felt so bad for our students. (chuckles) That was, That was a nightmare. And I know this is the big slime year, so I just said, "just answer something." So, and . . . just because there were questions on there that . . .
Interviewer	31.09.99 – 31:32.99	*Oh, I know, I 've been up in Ogden, looking at the test questions. Two weeks ago we went through 129 questions looking at 45 student responses to each question to see how they responded to them. I saw what some of the kids were doing with them and I thought, "Oh my goodness." Then we're doing it again this week, going through all the questions, the rest of the questions this week.*
Bethany	31:32.99- 31:33.58	Uuughh
Interviewer	31:33.58 – 31:37.55	*And looking at actual student responses on those . . . so . . .*
Bethany	31:37.55 – 31:38.85	Yeah
Interviewer	31:38.85 – 31:42.62	*I know what you are talking about. I look at them and think, "Oh I know what this kid was thinking . . .*
Bethany	31:42.62 – 31:54.56	Well, and you can tell, I am sure you can see answers that they weren't thinking at at, they're just, I don't know . . . cuz, we had students that were finished . . . the test in ten minutes.
Interviewer	31:54.56 – 31:55.64	*Oohh.*
Bethany	31:55.64 – 32:25.47	They didn't want to do that. They didn't want to waste their time. And then I had a student, one of my students that had to go to another teacher's room and he didn't want to, he doesn't like that teacher. And so he finished the whole thing in like five minutes. And I'm like . . . Oh . . . well, that's good . . . (laughs) People are not going to take their time to go through you answers and find out what . . . anyway. But um . . . like, things on the test that I noticed is they would say . . . and I'm going to a SAGE writing thing on, in . . ah June, here. Like in June here, at the end of this month.
Interviewer	32:25.47 – 32:26.56	*The 23rd.*
Bethany	32:26.56- 32:44.05	Yeah, up in Provo. . . Because, things that bothered me about the test that I understood were different, like in the core, is my understanding, it would say things like, "use the unit circle to blah, blah, blah" which to me means, they need the unit circle.
Interviewer	32:44.05 – 32:44.64	*Yeah*
Bethany	32:44.64 – 33:09.66	Cuz if you're going to use it, you have to have it, right? And so they didn't have it, and then other things where they were supposed to find the volume of a like, you know, volume of what ever crazy shape . . . and um . . . they didn't give them any volume formulas. . . in which I felt like if that was if they're . . .you know . . . are you testing the memorization of the formulas, or are you testing the memorization of the unit circle?
Interviewer	33:09.66 –	*How do you use them? Yeah, no, I agree. I am glad you are going to*

	33:13.13	*be there for that.*
Bethany	33:13.13 – 33:13.63	Yeah
Interviewer	33:13.63 – 34:43.70	*But I am glad that you are going to be there. . . um . . . as we wrap up here, uh, I'm going to give you an assignment for the next time that we meet. Um . . . what I would like you to do is think about those four days. You've written your notes down. Um . . . also, I've explained the four areas of focus that we were trying to work on . . . if you could look at those and think of the components and say, " This is what would make a really good professional development." . . . um . . . "This would make a poor professional development, avoid these." . . . (Waits while she writes notes) . . . Look at the modeling that was done, and identify, was the modeling appropriate? (Waits while she writes notes) Um, what are some things we could have done, that we could have modeled better than what we had chosen. . . (Waits while she writes notes) . . . And also generally, so not just what we did this last time, but generally, look at professional development. What have you seen, that you recognize that modeling, I liked how they did it. What they did is what I want to do in my classroom. So that we can make suggestions for improvement for professional development when we offer it again. (Waits while she writes notes) Um, But if you could look at those areas and also, I'm going to be asking some questions concerning the . . . they call it constructivist, but it is reform math instruction movement, you know the reform instruction.*
Bethany	34:43.70 – 34:44.58	Yeah
Interviewer	34:44.58 – 34:58.99	*I'm going to be asking about components of that and how you feel about those. And . . . whether or not you recognized whether or not if we did it appropriately as we tried to model those. So you might want to think a little about the reform movement.*
Bethany	34:58.99 – 35:00.39	Ok
Interviewer	35:00.39 – 35:04.86	*And you have already expressed some of your feelings at BYU with that,*
Bethany	35:04.86 – 35:05.56	Hmm hmmm
Interviewer	35:05.56 – 35:13.70	*And I want you to be just as honest as you go through that and express those concerns. And the things that you like and the things that you don't like.*
Bethany	35:13.70 – 35:15.07	Alright.
Interviewer	35:15.07 – 35:20.14	*But we are looking for what we can improve on for the professional development. OK?*
Bethany	35:20.14 – 35:23.91	Ok, Will you go over those four, your four goals again?
Interviewer	35:23.91 – 36:06.95	*Absolutely. There's no specific order, but um . . . the first one was, let's see . . increasing teacher content and pedagogical knowledge. Ok? (waits while she writes notes)* *Um . . the second one is improving the learning environment, that's the sociomathematical norms. So not so much neat bulletin boards*

		and things, but what is the environment that would encourage students to participate in the math? . . .(waits while she writes notes) *Ok, um and the third one is the proper tiered instruction.* *So we identified what is proper tiered instruction and the fact that I'm going to differentiate the instruction and those kinds of things. (waits while she writes notes) . . . um, and then we have the student readiness to learn.*
Bethany	36:06.95 – 36:07.65	Ok
Interviewer	36:07.65 – 36:11.36	*Ok, so those are the four areas . . .(waits while she writes notes)*
Bethany	36:11.36 – 36:12.65	Alright, good.
Interviewer	36:12.65 – 36:13.75	*Does that make sense?*
Bethany	36:13.75 – 36:22.39	Yes, I just wanted to make sure I had those down so that was . . . cuz we talked about it and I remembered, you know what I mean, and it's all familiar, but I wouldn't be able to say, these are the four things so . . .
Interviewer	36:22.39 – 36:23.19	*No that's good.*
Bethany	36:23.19 – 36:23.88	Ok.
Interviewer	36:23.88 – 36:33.02	*Um . . . and then as you're thinking about it between now and then, ah, anything that pops into your head and you think, oh I really wish I could just say this to them . . .*
Bethany	36:33.02 – 36:35.00	Ok Ok . . . alright
Interviewer	36:35.00 – 36:40.47	*And any of those comments that you would like to share with us that you think would improve what we're trying to do.*
Bethany	36:40.47 – 36:41.66	Right
Interviewer	36:41.66 – 36:41.79	*Ok?*
Bethany	36:41.79 – 36:42.10	Ok, that sounds good
Interviewer	36:42.10 – 36:43.49	*Do you have any questions for me then?*
Bethany	36:43.49 – 36:44.98	Nope, I'm good.
Interviewer	36:44.98 – 36:45.57	*Alright*
Bethany	36:45.57 – 36:46.67	I asked the question that I had. . . so
Interviewer	36:46.67 – 36:50.64	*That's great, hey, thank you so much again for your willingness to do this.*
Bethany	36:50.64 – 36:50.98	No problem

Appendix N

Transcript of Bethany Interview 2

Transcript of Bethany Interview 2

Interview 2, Jun 11, 2014
5:00 pm

Speaker	Time stamp	Transcript
Interviewer	0:00.00 – 0:12.90	*Well, um, before we start with any of my questions, um, are there any thoughts that you've had as you've reflected since the last time that we talked about the professional development that you would like to share, so I don't make you forget?*
Bethany	0:12.90 – 0:19.55	Uh, just main, you, you asked me the last time, the question, just the components of good professional development.
Interviewer	0:19.55 – 0:20.45	*Right*
Bethany	0:20.45 – 0:58.40	Um . . . and, and I think that the components are there that you like . . . those four things that you talked about, those are very good. I think that . . . as a teacher attending one of those things, knowing, and I think you probably said something like this . . . but maybe just more reminders, like, "what we're going to be doing now is . . . we're going to be talking about this, but please keep in mind that what we are doing is modeling . . . so you might not already know this, and maybe you don't know this super well but we're modeling the type of teaching you're doing, you don't as teachers need to be modeling student responses . . . you just need to be actively participating in it
Interviewer	0:58.40 – 0:59.55	*Right*
Bethany	0:59.55 – 1:08.09	Because I think that some teachers were kind of caught up on . . . I'm trying to pretend like I'm a student who doesn't know this and that slowed the whole thing down. You know what I'm saying?
Interviewer	1:08.09 – 1:13.26	*Yeah, yeah, I noticed a couple of teachers who were doing that and thinking, "That's not the purpose".*
Bethany	1:13.26 – 1:29.57	And again, I think if we were to like, if that was to be more clearly stated like, "This is not the goal for you to be a student. The goal is for you to experience this and watch how we're doing it and not to be a junior high student or to be a high school student."
Interviewer	1:29.57 – 1:31.26	*Yeah, we're not role playing. We don't need*
Bethany	1:31.26 – 1:35.43	Yeah, we're being the teachers, you don't need to be that kind of a student.
Interviewer	1:35.43 – 1:36.23	*Right*
Bethany	1:36.23 – 1:36.83	You just need to be a normal . . .
Interviewer	1:36.83 – 1:40.20	*That is a theme that has been coming across pretty consistently.*
Bethany	1:40.20 – 1:42.08	Oh, ok . . yeah.
Interviewer	1:42.08 – 1:48.25	*So that's interesting . . . Um . . . well, that takes care of several of the questions I already had. (Chuckles)*
Bethany	1:48.25 – 1:49.43	(chuckles)

Interviewer	1:49.43 – 2:01.51	*But um, so . . . as you reflect back on the activities that we modeled during the four days of professional development, how many different instructional strategies can you identify?*
Bethany	2:01.51 – 2:10.20	. . . hoh, now see, I'd have to have the list of instructional strategies listed out, so I saw that one, yeah I saw that one cuz I can hardly remember like
Interviewer	2:10.20 – 2:11.11	*Right*
Bethany	2:11.11 – 2:13.50	the specific ones . . . um . . .
Interviewer	2:13.50 – 2:15.48	*Do you have the list of activities that we did?*
Bethany	2:15.48 – 2:26.61	I do. I have the list of the activities, but as far as instructional strategies that were used . . . I, I couldn't . . . I'm not good at like, off the cuff at remembering what those are.
Interviewer	2:26.61 – 2:33.66	*And see that comes back to what you just said, the idea that we're explicit on, . . ."by the way, this is what we just modeled"*
Bethany	2:33.66 – 2:34.66	Hmm mmm
Interviewer	2:34.66 – 2:11.11	*And . . . cuz I look at it and think, at moments when we had small group discussion, whole group discussion, we had guided inquiry, we had discovery, we had direct explicit instruction,*
BETHANY	2:11.11 – 2:48.76	Hmm mmm
Interviewer	2:48.76 – 3:12.56	*We had um, working with technology, we had all these different components and as I look at them and think . . . "were they obvious to the participants" and think "what strategies did I see?" And you think back on those activities, and do you remember the activities? Do you remember the strategies used for those activities? Because they were picked . . . very specifically for the activities.*
Bethany	3:12.56 – 3:13.46	Hmm mmm . . Hmm mmm
Interviewer	3:13.46 – 3:20.48	*Uh . . . the example, and I'm going to go back to the one that I did with the pizza activity, because I did that one, I actually led that activity.*
Bethany	3:20.48 – 3:22.07	Right . . Hmm mmm . . Hmm mmm
Interviewer	3:22.07 – 3:31.87	*When we did, finding the center of the circle. That was a very direct procedure . . . even though it was hands on*
Bethany	3:31.87 – 3:32.57	Hmm mmm
Interviewer	3:32.57 – 3:38.63	*it was a direct . . . do this first, then do this, then do this, now you've got the center of the circle.*
Bethany	3:38.63 – 3:39.62	Right
Interviewer	3:39.62 – 3:45.08	*So there was no real inquiry. There was no real discover, it was hands on, but it was step, by step, by step*
Bethany	3:45.08 – 3:45.98	Hmm mmm
Interviewer	3:45.98 – 4:06.97	*We then moved into the activity where we were discovering the relationship between the, the radius of the circle and the distance*

		around the circle and the arc length. So that was a discovery activity, so . . . same manipulative, different instructional strategy because I wanted to find the center of the circle with the purpose to lead into the other task.
Bethany	4:06.97 – 4:08.96	Right . . .right
Interviewer	4:08.96 – 4:24.14	*And so, those instructional strategies were picked intentionally . . . and . . . I'm wondering if the teachers were really aware that . . oh . . . that wasn't by chance, it was picked because of the intent of the activity.*
Bethany	4:24.14 – 5:02.54	See, and I think that looking on, thinking of, reflecting on that activity, it, it did go more smooth than I think a lot of the activities, other activities went, not a lot, but some of the activities went, just because . . . and I appreciated it, that like, this is what we need to know, so here is the explicit . . . I mean it's discovery, but it's still like, step by step, by step for them to discover it. And I think . . . in a classroom setting, not necessarily professional development, but even us modeling, watching what was modeled . . . there's time that you need to do that, like you said yesterday. There's clearly time that you need to be able to just say, "This is our goal . . . dadadadadada . . . this is how we're going to get there."
Interviewer	5:02.54 – 5:03.53	*Mmmmm*
Bethany	5:03.53 – 5:13.47	And then there's also time for more discovery of that, like more . . . um, "how would you figure it out?" But that has to be within a certain . . . framework, you know what I mean?
Interviewer	5:13.47- 5:14.26	*Hmmm mmm*
Bethany	5:14.26 – 6:09.43	And then I, I like how you did that, like, this is what you have to know, and we're not going to mess around to get there . . . but now that you've experienced that . . . now let's take that a little bit further and now have you discover more. And I think that was great. I think that was . . .a great way to , I mean as far as my professional development goes, or for me to see what needs to be modeled, seeing, yeah. Explicit . . . basically, with discovery in there and then . . . yeah, go on to . . . discover more. Like once that environment was established and you were talking about having the learning environment, like once that environment of, "your group can do something successful together" or "you can do something successful" . . . let's take that further and . . . see what else happens. And I think that was really a very, like I thought that was a very good lesson. I think there were things like, we had like 17º, I think, is that what you did with it or was that what Celeste did with it?
Interviewer	6:09.43 – 6:09.93	*Uh huh*
Bethany	6:09.93 – 6:37.25	The 17º or π –seventeenths . . .or . . . what ever it was, um . . . that was a little obscure and I don't think that led into the exact, like what we wanted to accomplish with that lesson, but I think for adapting it for what teachers can do, you know what I mean? Like adapting it to your students, I think it was good . . . and we talked about this at our table. As we said, I think it was really good, I don't

		think the seventeenths would be good with our students
Interviewer	6:37.25 – 6:37.64	*No*
Bethany	6:37.64 – 6:48.25	But for us . . . it was what needed to happen . . . so I, I . . our table at least, was able to see that it was just what you had adapted for us as teachers
Interviewer	6:48.25 – 6:54.71	*So you saw that it was to keep you engaged at a higher level, rather than something that was so trivial that since you already knew the answer, why do it*
Bethany	6:54.71 – 6:55.70	Right
Interviewer	6:55.70 – 6:56.20	*Ok*
Bethany	6:56.20 – 7:06.53	That's what I saw, I mean and I don't know that everybody saw that, but again it was . . . seeing that you were modeling what we could do and taking it for us making it . . .different
Interviewer	7:06.53 – 7:09.11	*So you recognized the modeling as it was occurring.*
Bethany	7:09.11 – 7:10.41	I did.
Interviewer	7:10.41 – 7:10.90	*ok*
Bethany	7:10.90 – 7:22.46	And then we talked about it as tables . . but I can see that . . . but there was like . . . why would we be doing this, and they're like, no I would never do this with my students, and I'm like, yeah I think that was just because it was us the he was teaching.
Interviewer	7:22.46 – 7:22.62	*Yeah*
Bethany	7:22.62 – 7:24.15	. . . and so, you know, like I bet so.
Interviewer	7:24.15 – 7:31.80	*Would it have been better if I had been more explicit to reinforce that so that you know that I'm not trying to be ridiculous on this?*
Bethany	7:31.80 – 7:32.69	right
Interviewer	7:32.69 – 7:38.12	*But I am trying to push you to a point where you would understand what the students are going through rather than on a trivial problem.*
Bethany	7:38.12 – 7:44.87	Right . . . and I do, I remember thinking that, cuz to them everything like, even π fourths to them is like woow, what? You know what I mean?
Interviewer	7:44.87 – 7:45.47	*Yes*
Bethany	7:45.47 – 8:12.90	And so, I think for them . . . for us experiencing what our students would be going through I think it was perfect because . . . here we, we are use to like the π thirds, π fourths, π sixths, everything like that, you know . . .simplicity to us, it's very simple, but then the seventeenths were like . . . ah, what? You know, so . . . like, thinking about it again. So I think it was . . . I, I liked it, I was really appreciative of you making it a challenge for us, that was good. (chuckles)
Interviewer	8:12.90 – 8:24.63	*The idea though, would have been, from what I'm hearing, is that it would have been better if I had explicitly said why . . . somewhere*

		along, either before, or in the middle or after . . . So that you knew that I was not just being ridiculous
Bethany	8:24.63 – 8:25.62	Yeah
Interviewer	8:25.62 – 8:28.51	*But bringing you into the instructional part of it and say look why I did this.*
Bethany	8:28.51 – 8:59.08	Yeah . . . yeah . . an. . . yeah cuz I think it may be . . . I don't know what your feedback has been on that specific activity from other participants in the class, if they, if they felt that there's no way that my high school students could do that, and why would you possibly do that? Because our high school students couldn't do that. And yeah that's true, but that wasn't the purpose, and so maybe if you were to like you said, to explicitly say, "now, I don't expect your students to know what π seventeenths . . . was it seventeenths that you did? . . . I don' remember. I think it was some obscure . . .
Interviewer	8:59.08- 9:00.67	*I believe it was fifteenths.*
Bethany	9:00.67 – 9:23.83	Something, something like that, yeah. And say like, "clearly, your students wouldn't need to do that, that's not in the core. But, they're experiencing, their experience with the unit circle would be so abstract . . . that . . . for you, like what you're going through right now, but for them, π sixths is like WOOoow, what's happening? " And so they need a, the need to get that grasp of it, so.
Interviewer	9:23.83 – 9:35.65	*See, that's interesting because you, you brought that up and one of those participants I interviewed said, "well that was a fun activity for me, but I would never use it because my students aren't ready for it."*
Bethany	9:35.65- 9:36.44	Yeah
Interviewer	9:36.44 – 9:47.27	*And I tried to explain it, well . . . you know you can start off with smaller, more common fractions . . . And, and he kept saying the students aren't ready for it*
Bethany	9:47.27 – 9:58.20	Well, and I don't think our students, I don't think our Secondary 3 students even need to get to the level where they have to consid . . . contemplate π seventeenths at this level, like there's no point.
Interviewer	9:58.20 – 9:59.09	*No . . no*
Bethany	9:59.09 – 10:02.27	But . . . the unit circle units, you know . . .
Interviewer	10:02.27 – 10:15.53	*Right . . and that's where I', I'm trying to figure out, how did you recognize it, how did you cue into the modeling, and others didn't? They didn't realize that we were actually modeling something for them.*
Bethany	10:15.53 – 10:48.59	Yeah, I don't know, I think . . . it could be just that I know Marsha Haws and I know that (chuckles) you know what I mean, that I know that's what she was doing. There was one activity that she called me ahead of time and had me prepare my own little thing for it . . . And so maybe because I was more ready and . . . maybe that's something, I mean as far as an aspect of the training. To have more of the participants, more people attending participate ahead of time and prepare something so that they can that . . . their claws in what was happening and what the goal of the thing is.
Interviewer	10:48.59 –	*Right*

	10:49.12	
Bethany	10:49.12 – 11:11.39	And maybe bring them into those four, four goals that you had for the training. So that they can experience it so that when they are experiencing it as a learner, they can see, ok, this was the goal . . . this is how they altered it for us . . . you know like, this is how, this is how the instructor differentiated it for us teachers . . . so.
Interviewer	11:11.39 – 11:28.77	*Ok . . . that's good insight . . . um, as you look at those professional developments you mentioned you've attempted some of them in your classroom. Um . . . can you identify any common factors for those that made you want to try them in your classroom versus those that you looked at and thought "I'm not going to try those"?*
Bethany	11:28.77 – 12:12.94	. . . I think that um, again it's, it's what I feel, that's the biggest thing. If I felt huge frustration during the training . . . then there's no way I want my students to. And I mean, that's me, as a teacher experiencing huge frustrations, either mathematically or . . . what ever, I think the biggest thing there . . . is . . . my entry point. If I felt like if I had an entry point, and I felt like there was a way for my students to have an entry point into . . . the experience, into the learning, into the whatever . . . Then, yeah, I would want to be able , like if I could see a way that I could get my students engaged in this thinking, and thinking about it on their own, then I would be like, "Yes! I'm going to use this. " And what one did I use? . . . oh, oh like the repeated roots
Interviewer	12:12.94 – 12:13.63	*Right*
Bethany	12:13.63 – 12:29.21	I listened to that. I found a way that I could tweak it. And, my, like I say, like . . . I found that entry point. I knew my students could get that, and I went with it and they were doing great on it. So I think that's the main thing. That I can see an entry point.
Interviewer	12:29.21 – 12:41.72	*And so, that's more intrinsic where you have this desire to look for those entry points. Where some of the teachers that looked at it and, and they just shut off and didn't even attempt it. They weren't even looking for those entry points.*
Bethany	12:41.72 – 12:54.04	Yeah . . . but also it's the feeling too. You know what I mean? Where I, cuz if I felt like I could do it, then like ok, then I want to find an entry place for my students to do it.
Interviewer	12:54.04 – 12:54.64	*Right*
Bethany	12:54.64 – 13.01.29	But if I didn't feel like I could do it, if I felt like it was some, like, "Who can read my mind?"
Interviewer	13.01.29 – 13:02.38	*chuckles*
Bethany	13:02.38 – 13:10.43	"Who can do it? Who can do it?" then I'm not gonna, you know, like, I don't want my students to read my mind. That's a scary place to go (laughs).
Interviewer	13:10.43- 13:16.89	*(laughs) . . . no, I hear you. That's . . . that makes sense . . . as we ah . . .*
Bethany	13:16.89 – 13:21.76	So maybe if, sorry, do you mind if just continue with that . . .
Interviewer	13:21.76 – 13:22.55	*No, go ahead, go ahead.*
Bethany	13:22.55 –	Maybe with each lesson, if you could say, "This is what we did. This

	13:41.84	is what we modeled. Do you feel like you could do this, and what are " maybe just some discussion at the end of each lesson. What are some ways that you can see that you could adapt this for your students to be able to still have the same goal in the core that we want to accomplish . . . you know what I mean, and like . . .
Interviewer	13:42.44 – 13:43.04	*Right*
Bethany	13:43.04 – 14:23.63	. . . and just, and it doesn't need to be a long discussion. And that's another thing that I like , ohh, long discussions. . . (Chuckles) . . . where, and again it's creating that environement and I have, clearly I have no problems sharing my opinions (laughs) Hum, so um, I would, I would share, interject things like that. Or like, let's just say two or three things that . . . like write down two ways on your lesson on this day reflecting, "what are some things that you could do that could be an entry point for your students? And where could you, what kind of plan could you . . . do that they could develop this more. Where they could solidify it. What types of practicing would be important to make this concept . . . profound for them?"
Interviewer	14:23.63 – 14:35.75	*And then provide opportunities for them to be shared and it doesn't have to be shared. It doesn't have to be in the professional development, it can be on a wiki page or a blog or what ever where people could share . . . But then you would have access to how, "oh that's how they adapted it . . .*
Bethany	14:35.75 – 14:36.75	Right
Interviewer	14:36.75 – 14:48.57	*And that would be, ok, that, that's great insight. I appreciate that. Um . . . as I talked to you last time, I said we were going to go over some of the reform-based instruction items*
Bethany	14:48.57- 14:48.97	Hmm mmm
Interviewer	14:48.97 – 15:04.17	*So as I go through these, uh . . . I would like you to just list several . . . reform-based instructional strategies And I would like you to address four questions. Ok?*
Bethany	15:04.17- 15:04.56	Ok
Interviewer	15:04.56 – 15:19.27	*One is: what is your evaluation of your current implementation of that strategy? (waits while she writes notes) . . .ok*
Bethany	15:19.27 – 15:20.56	Hmm mmm . . . ok
Interviewer	15:20.56 – 15:32.78	*The second one is, what is your desire for future implementation? Do you want to scale back, or do you want to implement more or . . . I'm not even thinking about it type of a thing.*
Bethany	15:32.78 – 15:33.57	Right
Interviewer	15:33.57- 16:03.96	*Number three. Did the professional development address this instructional practice . . . (waits while she writes notes) . . . ok and then number four. Did the professional development prompt you to want to change your current practice? (waits while she writes notes) . . .*
Bethany	16:03.96 – 16:05.05	Ok
Interviewer	16:05.05 –	*Ok . . . and there are no right or wrong answers to this.*

	16:09.52	
Bethany	16:09.52 – 16:10.12	Right
Interviewer	16:10.12 – 16:15.29	*Ok, so, the first one is "Have students work in cooperative groups."*
Bethany	16:15.29 – 16:21.38	.Bethany is writing notes . . . I'm just writing these down so I can focus my comments. . .
Interviewer	16:21.38 – 16:22.07	*That's fine*
Bethany	16:22.07- 16:38.72	Ok, so um . . . I uh, it did, I currently . . . I did change things up . . . um . . . and, and I say it was because of the professional development in part . . .
Interviewer	16:38.72 – 16:39.51	*ok*
Bethany	16:39.51 – 17:55.84	But also watching what other teachers do. So this year, I tried, I have tried groups, something I was afraid to do with my demographics. Because I was afraid they were going to be like, cheating and copying off of each other and then talking relentlessly. But, it, it worked. I set up groups . . . they were . . . it was great for motivation, but fantastic for being able to create that discussion. There were a lot of friendships that were actually ended up, that came out of that. Which I thought was great. Friendships within the classroom. But um, as far as learning, creating that learning environment it was very good, I really was, um . . . yeah, cooperative groups. Yes I am, I have changed, I did change it this year. It makes me want to do more of it and more effectively, and especially looking at how we did things and having more . . . actually, I did feel like a lot of the stuff did. I even have white boards that I got for my last school that have been sitting in a drawer for the whole school year and I went and pulled those out based on what we did because we had those boards that we would go off to the side and share things and talk about. So I did that same thing. Um . . . yes it did develop a . . . you addressed it and it encouraged me to implement it. Did I answer all your questions?
Interviewer	17:55.84 – 17:56.54	*Yes you did.*
Bethany	17:56.54 – 17:58.06	Ok good.
Interviewer	17:58.06 – 18:02.87	*Great. How about, having students participate in hands on activities?*
Bethany	18:02.87 – 18:48.51	. . . Um . . . I don't think that I do it as much as I could do it. That's my current thing. I do do it, but not very often, other than, "you try this problem" and then I walk around the classroom and see how they are doing on it. Um . . . but it's more of a problem than it's a hands on activity, unless activity means trying a problem. (chuckles) anyway, um . . I do have more desires to try in the future. I feel um . . . the professional development did encourage me to do that and . . . yeah it did address it and encourage me to do that. The hang up I have with it is there is so much to cover.
Interviewer	18:48.51 – 18:49.11	*I know*
Bethany	18:49.11 –	and so little time.

	18:50.09	
Interviewer	18:50.09 – 18:54.47	*It's one of those things where I need to be judicious and choose what will catch their attention.*
Bethany	18:54.47 – 19:13.58	Right . . . this is where we put, uh, how we put it in our school is, the first year teaching this was just putting up the framework and no walls really, just the framework. And then this year we've done walls and maybe this next year we'll be putting some paint on the walls, you know what I mean?
Interviewer	19:13.58 – 19:38.54	*Yeah, that make sense. . . um, the next one, you elluded to the fact they are related but they are a little bit different. The next one is, engage students in inquiry oriented activities . . . And it is different from hands on. Because as I said, with the pizza . . . when we found the center of the circle, it wasn't inquiry based. It was step by step and very procedural*
Bethany	19:38.54 – 19:41.12	Right . . . right
Interviewer	19:41.12 – 19:51.26	*Just because I have a manipulative does not make it inquiry based, and I can do an inquiry base without manipulatives. So, engage students in inquiry based activities.*
Bethany	19:51.26 – 20:40.46	I can think of a few activities that I did where it was inquiry based. Not as many as I think should happen, or could happen But more than in the past. For example, the um, the . . . activity we did with the repeated roots. Um, I have my students look at those things, answer some questions and then I was going around, "Now do you think there's a pattern? Do you see a pattern?" and it was AWESOME to see them like, "Wait a minute, I see that!" and then you see like the light bulb, the ah haw moment happen. But I can't say that I do that enough. I loved it, but I, you know, trying to get a question or scenario where they can come up with that ah haw . . . is kind of few and far between. Like you . . like you need to set up that foundation . .
Interviewer	20:40.46 – 20:41.05	*Right*
Bethany	20:41.05 – 21:08.03	. . . and then be able to help them get to the next point. And I want them to do that more on their own. But then with the environment, I'm trying, you know it's getting there. But (Chuckles) so, inquiry based, I do want to do it more. I feel like um, sometimes with the inquiry based . . . I feel like the professional development tried to get that, but failed because it was more of a frustration then the ah haw that happened . . . so . . .
Interviewer	21:08.03 – 21:14.09	*And that's kind of tough because you shoot and you miss. (chuckles)*
Bethany	21:14.09 – 21:21.64	Yeah and maybe that's where um . . . I'm a little bit Leary about doing some of those inquiry based things
Interviewer	21:21.64 – 21:22.43	*Right*
Bethany	21:22.43 – 21:49.23	Just because I don't want that frustration to come, and, and that goes back to, "I want to make sure that every student can access that. And enter into the inquiry, rather than just be like, "I have no idea". And there were some things that I did where I walked around and some student were like, "I am so lost." (Laughs) so I tried to group them so there was at least somebody at their table

		that was willing to take those chances. To try to get into it and sometimes it worked and sometimes it didn't.
Interviewer	21:49.23-21:53.70	*Right . . . how about "Use performance based assessment?"*
Bethany	21:53.70 – 21:58.37	. . . um . . . yes, as like in a quiz?
Interviewer	21:58.37 – 22:08.90	*Um, it could be a quiz, it could be a test, um . . . you may have heard me talk about how I assessed my students on finding the volume of a cylinder.*
Bethany	22:08.90 – 22:11.58	Uh, remind me.
Interviewer	22:11.58 – 22:30.62	*I had tin cans in my room and each student took their own tin can. They had to measure it and tell me how much water would fit in the can. And my assessment was . . . they sat in a chair at the front of the classroom, I held the can over their head and I poured the amount of water into the can that they told me to.*
Bethany	22:30.62-22:33.20	(Laughs)
Interviewer	22:33.20 – 23:15.63	*That was the assessment. I did not offer them a test on paper. This was my test. And I knew after they completed the activity, that they knew what the volume of a cylinder was. I didn't have to give them a paper test. So that's an example of a performance based assessment. In the professional development, I don't want to cue you in, because there were a couple of times where we were checking to see if you knew what you were doing by walking around and looking at a task. To say "Ok, that got that one."*
Bethany	23:15.63 – 24:00.58	Yeah, yeah . . . that's good, um so I do, we did quizzes, we did mastery quizzes, so they have to get a certain percent in order to move on. Um . . . in fact we did it before we even put their grade into the computer. Shhh . . . I'm reassessing if I want to do that or not. Uh, um . . (Chuckles) cuz anyway . . um . . but . . . so . . I do with mostly quizzes and tests and then other things, not so much performance based. It's more of them assessing how they feel about it. How well they, how strong I feel they could do another problem.
Interviewer	24:00.58 – 24:01.38	*Hmm mmm*
Bethany	24:01.38 – 24:22.64	And I would do informal, like again, I would give them another problem and walk around and see how they did it, but not as often as I probably could be. Um, so mostly performance based was just quizzes or tests, and then some walking around and assessing how they were doing. But it was never anything that I would like mark down like, "they understood it" or "they didn't understand it" or any sort of grade.
Interviewer	24:22.64 – 24:30.89	*Ok . . . um . . . how about having students take responsibility for their learning?*
Bethany	24:30.89-25:04.39	. . .OH, um (laughs) . . . Big sigh, right? (chuckles) . . . uh . . . I . . . so . . . that's a tough one. Because, especially with our demographics. And I think it's getting worse as a society. Like, there's just that huge amount of apathy, um . . . "I don't care. I got an F on it, mmeh!" . . . and um . . . so, I try (chuckles) that's my current eveluation. I try.
Interviewer	25:04.39 –	*Yeah*

	25:04.88	
Bethany	25:04.88 – 25:29.03	I wish . . be new ideas, and I, and I . . . I think just with that professional development, we are all teachers, and we all want to try. But at the same time, you were saying there were people there who were forced to be there and their interest in trying something was just not there . . . um, but I, I didn't see that cuz I was always with a group that wanted to be there, even though like, it was inconvenient, but at the same time, if we're going to be there, we might as well get something out of it.
Interviewer	25:29.03 – 25:29.28	*Right*
Bethany	25:29.28 – 25:39.61	Really, like um . . . yeah, inconvenient with like missing our own classes. But um . . . yeah, if you know the trick to that, let me know.
Interviewer	25:39.61 – 25:40.80	*We're trying to figure it out.*
Bethany	25:40.80 – 25:59.95	I, I would try to tell the students, my students, like, "Look, here's the deal, it's like, either you earn the points or you don't. It's your grade. It's your education. You might as", and people, kids would always say, "I hate math." And I'm like, "you don't have to like it. You do have to do it." (Chuckles) so
Interviewer	25:59.95 – 26:04.03	*(Chuckles). . . um, . . . well, if I can go back to that activity with the tin cans.*
Bethany	26:04.03 – 26:05..02	Hmm mm
Interviewer	26:05..02 – 26:06.08	*Um . . finding the volume of the can.*
Bethany	26:06.08 – 26:07.70	yeah
Interviewer	26:07.70 – 26:38.54	*It was interesting when I did the evaluation, there'd be times when I'd tell the student, "get up slowly, do come straight up, slip out" because the can's pretty full and I would say "good" and they would say, "Ugh" because it wasn't good to them. Even though I had said it was good, they would go back with that same can. Do the measurements, come up with a new value, and come back again, to do the activity over. Even though I did not ask them to. I'd already given, in my mind, I'm thinking, "They've passed it off. They've got an A. They know what they are doing." But for them, it wasn't good enough.*
Bethany	26:38.54 – 26:38.94	Right
Interviewer	26:38.94 – 26:43.11	*Sometimes, when the activities engaged them to a point where they forget they're learning . . .*
Bethany	26:43.11 – 26:44.60	Right
Interviewer	26:44.60 – 26:47.29	*You know, they become enthusiastic*
Bethany	26:47.29 – 26:48.28	Yeah
Interviewer	26:48.28- 27:22.79	*It helps them to take on some of the responsibility for it, because, like I say, they were coming up asking to do it again because even though I had said it was ok, my evaluation was not good enough. They had already taken responsibility and said, "That's not where I wanted to*

		be."
Bethany	27:22.79 – 27:23.34	Right
Interviewer	27:23.34 – 27:24.03	*Part of it's already won*
Bethany	27:24.03 – 27:49.53	See and it's, I, I wish I could say I did more. There are some times when my students were so excited to get to class, like we did at the end with the statistics stuff, we . . instead of a test-test, we did a um . . . they had to do presentations. So they had to come up with their own survey question, find out all the statistics stuff on it, like the margin of error and confidence interval and the medim, mode and range, da da da. And they were so excited about that . . . it was fantastic. (Chuckles)
Interviewer	27:49.53 – 27:52.21	*See, that's performance based assessment.*
Bethany	27:52.21 – 27:53.80	Oh yeah. . . yeah
Interviewer	27:53.80 – 27:55.69	*And notice how they responded to it.*
Bethany	27:55.69 – 28:08.34	Oh yeah. . . way better, yeah . . . I mean, some of them, I can tell like, I say margin of error or confidence interval and it gloss, you know, like "What are you talking about?" (Chuckles) anyway.
Interviewer	28:08.34 – 28:12.11	*(Chuckles) . . . How about the use of technology?*
Bethany	28:12.11 – 28:57.38	. . . we have, so this is one thing I think is great about our school is, that. We all have, we require that the students have a calculator. We rent calculators out to them for the year if they want it. Um . . . but we rent calculators out to them just showing it's that important to us that they have technology. And I think that works great. So we do use technology all the time, mostly with the calculator. Um, somethings with the computer, but mostly to just watch us on the computer because we don't have that much access to computers. (Chuckles) And then actually, this next year we're going to be doing, so as far as like . . . ahh . . . doing it next year, we are going to have more access to computers.
Interviewer	28:57.38- 28:57.90	*Oh good.*
Bethany	28:57.90 – 29:05.23	Cuz with the SAGE testing you have to get more stuff to make more experience with it. Mastery connect, are you guys using Mastery Connect? Have you heard of that?
Interviewer	29:05.23 – 29:06.72	*We haven't no.*
Bethany	29:06.72 – 29:18.87	Ok. It's this new thing our district's trying. Which I think is going to be a good thing. It's um, basically more um, common assessments that you can give them on the computer . . . or what ever else.
Interviewer	29:18.87 – 29:20.46	*You called it Mastery Connect?*
Bethany	29:20.46 – 29:49.03	Mastery Connect. I don't know all the extent of what you can do on it yet . . . but I'm hoping that we can do, get the computers smaller and be able to do more stuff, especially things like . . . Geogebra, I like that, but again we didn't have . . . my classes were always the same time that concurrent enrollment classess were . . . and so I

		didn't have access. And well, unless I went, unless I made more special efforts to go downstairs and whatever . . . but . . . yeah.
Interviewer	29:49.03 – 29:55.48	*Ok, um . . . how about requiring students to explain their reasoning when giving an answer?*
Bethany	29:55.48- 30:43.21	. . . I could do that more. I've done that . . . and like . . . have students back it up . . . and . . . it's hard with that, cuz how do you assess that? I do it in my class or in the discussion or in my lesson, or what ever. But as far as an assessment,"Explain why" and then ther's such huge degrees of explanation that you get. Um . . . I, I liked it. I think that in the training we did have a lot of that. And we can because we're teachers, do that. And so, yes it was modeled. Um, I want to do it more, I want to do it in more effective ways. Because like you said, if they don't realize that they're learning, then . . ."well yeah, because bla, bla, bla" you know what I mean? They can back it up and they can see if it's not . . . they can evaluate themselves.
Interviewer	30:43.21 – 30:56.37	*Right. Some of their explaining their reasoning doesn't have to be with the teacher. They could be in pairs and explain how they did it to each other.*
Bethany	30:56.37 – 31:30.64	Yeah, which is that group, goes back to the group thing. So now get your answer. Get pretty solid on it. I'm going to give you this much more time, in fact, I did, I found a game with them that was fantastic. I feel like a genius. Anyway, but like, they each work on it. And like, you each have to work on this and you have this much more time to work on it and when you're done with this time, share with your group. Explain your answer, and once you all have it hold your board up. And anyway, so like (laughs) but it was good because then they could evaluate themselves and see how other people did it. And do you see where you went wrong with this? Did anybody else have an answer of . . . why was that wrong? Anyway, so . . .
Interviewer	31:30.64 – 31:33.72	*And what's the engagement rate like when you do that?*
Bethany	31:33.72 – 31:38.78	Oh, games . . . when they know that there's like a tootsie roll at the end, the motivation was fantastic.
Interviewer	31:38.78 – 31:39.58	*Right*
Bethany	31:39.58 – 31:58.54	. . . every lesson can't be like that, but you know. Like, it was great. The participation level, I mean it got to a certain point where some groups just felt like completely defeated the whole time, but that was not . . . there were more groups that were very actively, competitively participating in this. It's great to tap into that competition. (Chuckles)
Interviewer	31:58.54 – 32:03.41	*Ok . . . how about encouraging students to seek out alternative methods to solutions?*
Bethany	32:03.41 – 32:50.11	. . . Um . . . that's a tricky one, because there were some students that found alternate methods and I think that I could do better at that. Cuz there were some alternate methods and I would show the class, like, this is awesome. This is not what I taught, this is not how I taught it, but I want you guys to see how they got this answer. So I would show it . . . not very often, but usually what would happen is that the students that were barely hanging on with, to the understanding when I would do that would be like, "Whaa . . . nooo,

		you've just confused me." And so I, I try, I would love to do that more, but most the time they're just like, "what just happened?" And, and so I'll just say, "if you understood this . . . I want you to plug your ears and so those . . ." and so I 've done things like that just for those students who are just barely hanging on don't get more confused.
Interviewer	32:50.11 – 33:00.37	*Right, that's a strong strategy. Uh, how about work on models or simulators?*
Bethany	33:00.37 – 33:13.61	. . . didn't use any. I didn't use any . . . um yeah. I could work on, well, I didn't use any simulators other than with . . . the simulation part of . . . the statistics unit.
Interviewer	33:13.61 – 33:14.11	*Ok*
Bethany	33:14.11 – 33:56.63	And even with that, cuz it was sooo much better to do on a computer . . . and on the calculator you can do it but it was still inconvenient . . . anyway, it was, it was tedious and as a model . . . I can't think of it as much that I did much with that. Other than, "let me model for you what to do" but as far as it's 3-D something that's a tangible model . . . I can do better. I didn't do it very much and we did do a lot of that with the . . . the. . . graph was great, like the graphing thing was a good idea. I don't think it worked as well in our classes because it was envisioned to work (Chuckles) but uh . . . at least with my group we were like, "Naa, this isn't interesting." (Chuckles) so . . .
Interviewer	33:56.63 – 34:13.62	*Um . . . if we were to offer another professional development next year . . . what would you like to see us present in order to make it worth your time to come?*
Bethany	34:13.62 – 35:07.95	Umm . . . I think . . . I think just taking the concepts, and I'd, I'd have to look more at the core to see which concepts I struggled with in trying to present them in a more creative idea . . . but, like, like you've said, you can't do hands on activities for every lesson. You can' do think, like you know for everything . . . but maybe taking what we've already done and like, don't, don't repeat that per say, but taking some other aspects of the core and saying, "Here is a . . ." and whether that is hands on or modeling or simulation or what ever, here's another method . . . to make this . . . possibly better for your students. Again, we are modeling how to teach it. We've made, we've adapted it to you . . . as people who know this basically . . . but, and then, you know, does that make sense?
Interviewer	35:07.95 – 35:08.37	*Yes it does.*
Bethany	35:08.37 – 35:25.30	Modeling, Modeling but other . . . hands on type, or . . . activity based things that . . . other than just a lecture. Cuz that's . . . we never got just a simple lecture. And that was nice to see. Cuz, I can lecture all day. (Laughs)
Interviewer	35:25.30 – 35:27.68	*(Laughs) That's the easy way to get through the day.*
Bethany	35:27.68 – 35:46.11	Yeah, and there were days when I just recognized that, like you know? I should be teaching this in a more powerful way. And I even told my students, "I should be teaching this in a more powerful way for you, but the fact of the matter is, I can't think of a way." (Laughs) A better way than just this. So I'm sorry, it's just going to

		be . . so you know, I would try my hardest. (Laughs)
	35:46.11 – 35:54.26	*But you know what? They do respond to that. Even if you tell them "I wish I could do this another way, but in reality, this is how I have to do it so we can get to a point where you can do something else."*
	35:54.26- 36:17.87	Well . . . And I love, I love teaching at the high school level because they are able to think about their education more and say, "Yah, that probably isn't the most effective." And there were other days when I could say, "there is a more effective way to teach this . . . I don't have the energy. So sorry." (Laughs)
Interviewer	36:17.87 – 36:18.01	*Yeah*
Bethany	36:18.01- 36:28.53	This is what you are getting today (Chuckles) so . . . This is the dry stuff that will lead to the better stuff.
Interviewer	36:28.53 – 36:35.58	*So uh, before we end, is there anything you'd like to share about professional development in general or from this experience?*
Bethany	36:35.58 – 36:50.96	I think it's awesome that you are getting feedback. I think that's, and this type of feedback rather than like, "leave your comments here on a piece of paper at the end." Cuz that's nice, but like, how many people actually read that? And how many people really put anything thoughtful into it?
Interviewer	36:50.96 – 36:51.66	*Right.*
Bethany	36:51.66 – 37:12.15	You know what I mean? All this stuff, I'd never just want to be like, "Let me just tell you . . . la di doodle doo". You know? I mean, it's not going to happen. I mean, even typing or handwriting it, I'd never give this much feedback in that form. So that's . . . I think it's great that you're doing this. I think that . . . I think the classes had good intent, but I think there was a lot of time that could have been better used.
Interviewer	37:12.15 – 37:12.54	*Hmm mmm*
Bethany	37:12.54 – 38:13.34	And I, and I, I see that you agree with that, and, and that means a lot. Um . . . I would encourage others to do it . . .uh . . . with the common core, one of the biggest complaints people have is they don't, like especially for elementary teachers so I think it's neat that you're doing that. As you were saying, that you had something for that . . . they don't see the whole big picture. They don't see that the way that they're teaching fractions or the way that they're teaching multiplying or dividing . . . cuz to them, it's such a different beast compared to what they're used to. And people are so mad. Like, you didn't carry the one, or like, we know how to do it this way and how dare you change it up. But if there was more, if there was better information out there to even the teachers . . . the teachers at one of the high schools at Holly High School, they're just up in arms right now. All because . . . it was so different for them. And students were having such a hard time grasping it. That they were almost like, there's almost a mutiny.
Interviewer	38:13.34 – 38:13.94	*Right*
Bethany	38:13.94 – 40:15.60	So, um . . . and I think that's sad. And I think it's all because they don't see the big picture. So I think it would be awesome if more teachers were interested in seeing the big picture. Because if they

		saw the big picture, including, I mean, you can't tell, you can't really tell elementary teachers, "well if they can learn to add and subtract fractions at this level, really well, then when they're adding and subtracting polynomials . . . you know like (Chuckles) . . . of the fourth degree or whatever, it would be a piece of cake. You know what I mean? They don't get that. And they won't understand that. And you can try to teach them about the polynomials. And they're all like, "Ahhhhh what ever." But if they see the foundations, like, what you are teaching them right now is sooo important. Because, and I can even say . . . like . . . the basic skills, I can tell the elementary schools, basic skills . . . basic multiplication is so important. When I have a student that I'm asking them two times three, "ahhh I don't know" Ok, figure it out. "ahhhh" you know how to do this. "can I use a calculator?" I mean, when they really get stuck on that, on two times three or three times seven, or basic things . . . if they're stuck on that because of whatever happened in elementary school . . . they're lost in high school. They're lost at this stuff. They have no hope of passing really. And if they can't do, like at our school, if they don't get a calculator, the will not pass. Or if they do pass, it's with a D minus. You know what I mean? Like if they can see that when we tell you to something, not because we're trying to be mean and all nasty. . . as high school teachers, telling our elementary school teachers, they need to know their multiplication, they need to do that, or parents, even teaching parents . . .we want you to practice the times tables with your kids. You may not see the importance of this, but let me tell you. Those poor kids, they're seventeen years old and they can't do two times three? That;s sad. There's something wrong here and I don't think it's my fault.
Interviewer	40:15.60 – 40:16.10	*No.*
Bethany	40:16.10 – 40:28.39	I think that's the thing. If they can have better information out there. Elementary teachers . . . elementary parents . . . you know like everything, it would be so nice.
Interviewer	40:28.39 – 40:50.64	*Well we can work on it . . . well again, thank you for taking time for this. Um, you've given me great insight and feedback that I can use. And we can hopefully make the professional development better. Thank you very much and have a good summer*
Bethany	40:50.64 – 40:52.43	Yeah, and thank you for listening, I really appreciate that.

CURRICULUM VITAE

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EDUCATION

Ph. D.	Dec 2014 Education, Utah State University Specialization: Curriculum and Instruction Emphasis: Mathematics Education and Leadership
M.Ed.	June 1997 Master of Education, Utah State University
B.S.	May 1988 Bachelor of Science in Mathematics, Idaho State University. Secondary Mathematics Teacher's Certificate
A.S.	December 1986 Associate in Science, Mathematics Emphasis, Ricks College (BYU-Idaho)

EMPLOYMENT HISTORY

Director of Mathematics and Instruction (2013-present)
Provo City School District, Provo, Utah
Responsibilities include supervision and evaluation of district teachers K-12; the creation and delivery of professional development for mathematics instruction K-12; establishment of instructional practices; representing the district in the BYU-PSP Math Initiative Committee and the Utah State Office of Education's State Mathematics Education Coordinating Committee (SMECC); create and lead mathematics textbook adoption committees; serve as SLO specialist; chair district mathematics committee; chair district STAT; and advise district administration and school board on issues concerning mathematics education.

Assistant Principal (2012-2013)
Provo High School
Responsibilities include supervision and evaluation of teachers in the Science, Mathematics and ESL Departments; evaluation of fee waivers; serve as administrative representative on IEP's; and supervision of students with last names S-Z.

District Mathematics Curriculum Specialist for K-12 (2005-2013)
Provo City School District, Provo, Utah
Responsibilities include the creation and delivery of professional development for mathematics instruction K-12; representing the district in the BYU-PSP Math Initiative Committee and the Utah State Office of Education's State Mathematics Education Coordinating Committee (SMECC); create and lead mathematics textbook adoption committees; and advise district administration and school board on issues concerning mathematics education.

Adjunct professor, Mathematics Education (1998-present)
School of Continuing and Professional Studies
College of Education, Southern Utah University.
Responsibilities include teaching graduate courses for elementary mathematics endorsement and secondary mathematics academies for the School of Continuing and Professional Studies.

Adjunct Instructor (2010-present)
David O. McKay School of Education
Brigham Young University
Responsibilities include teaching "Assessment for Linguistically Diverse Students" and "Integrating Content and Language" for the Teaching English Language Learners (TELL) Program for the ESL Endorsement Series.

High School Teacher (1998 -2005)
Provo City School District, Provo, Utah
Taught high school mathematics courses and coached wrestling and women's fast pitch softball.

Adjunct Professor, Mathematics (2001 -2002).
Utah Valley University, Orem UT
Taught Math 1050 (College Algebra).

High School Teacher (1994-1998).
Granite School District, Kearns, Utah
Taught high school mathematics courses, computer programming, and coached wrestling.

Junior High School Teacher (1993-1994).
Granite School District, Salt Lake City, Utah
Taught Utah History, middle school math courses, and coached wrestling and track.

High School Teacher (1989-1993).
Jefferson County Joint School District, Rigby, Idaho.
Taught high school mathematics courses, computer basic skills, computer programming, and coached wrestling, track and women's softball.

High School Teacher (1988 - 1989).
Madison County School District, Rexburg, Idaho
Taught high school math courses, history, computer basic skills, computer programming, and coached wrestling.

PUBLICATIONS

Curriculum Development

Twitchell, R. (2008). *Elementary Algebra.* Textbook for Provo City School District Center for Accelerated Studies (PSD-CAS). The textbook included the concepts needed for the Utah State Core for Grade 6 Math, Pre-algebra and Algebra. The text is currently used for the algebra class at PSD-CAS.

Henry, P.P., Blackington, D. M., Mankus, M. L., & Wittmann, P. (2010). *Describing our World: An activities course for elementary school teachers*. Twitchell, R. (Ed.). Weber State University textbook for elementary mathematics endorsement course in geometry.

Twitchell, R. (2005). *Algebra Academy*. Utah State Office of Education professional development curriculum for 5 day workshop.

Twitchell, R. (2006). *Geometry Academy*. Utah State Office of Education professional development curriculum for 5 day workshop.

Twitchell, R. (2006). *Pre-algebra Academy*. Utah State Office of Education professional development curriculum for 5 day workshop.

Twitchell, R., Honey, J., Jones, T., & Riddle, H. (2001). *Navigating Data Analysis.* Utah State Office of Education professional development curriculum for 5 day workshop.

Twitchell, R., Honey, J., Nordfelt, L., & Riddle, H. (2002). *Introduction to Technology in Mathematics.* Utah State Office of Education professional development curriculum for 5 day workshop.

Twitchell, R., & Partridge, L. *Applied Algebra 2.* (1996). Utah State Office of Education professional development curriculum for 5 day workshop.

Twitchell, R. *Applied Algebra.* (1995). Utah State Office of Education professional development curriculum for 5 day workshop.

Journal Article - Pending

Twitchell, R. (2012). *A First Unit for the New Secondary Math 1 Course of the Common Core State Standards.* The Mathematics Teacher. NCTM

Other

Twitchell, R. (2001-2004). *UCTM Newsletter.* Twitchell, R. (Ed.) Utah Council of Teachers of Mathematics.

GRANTS FUNDED

Program co-manager. ($120,000 annually). Utah Science, Technology, and Research (USTAR) Initiative. (2014 - 2016). State grant for encouraging teachers of mathematics and science to teach Science, Technology, Engineering and Mathematics (STEM) Courses within their current school districts through the use of incentive pay and educational opportunities.

Program co-manager. ($194,939 annually). Utah Science, Technology, and Research (USTAR) Initiative. (2011 - 2014). State grant for encouraging teachers of mathematics and science to teach Science, Technology, Engineering and Mathematics (STEM) Courses within their current school districts through the use of incentive pay and educational opportunities.

Program co-manager. ($290,000 annually). Utah Science, Technology, and Research (USTAR) Initiative. (2007-2011). State grant for encouraging teachers of mathematics and science to teach Science, Technology, Engineering and Mathematics (STEM) Courses within their current school districts through the use of incentive pay and educational opportunities.

Program Administrator. ($36,000 annually). Math, Engineering, and Science Achievement (MESA). (2004-07). State grant for encouraging underrepresented populations of students to participate in the areas of mathematics, science and engineering.

LEA-Facilitator. ($513,000). Improving Elementary Math Instruction for All (2006). Utah State Office of Education competitive grant for the BYU-Public Schools Partnership. This grant funded the BYU-PSP mathematics initiative with the charge to improve the academic achievement of students in the area of mathematics in the participating five school districts.

UNIVERSITY TEACHING
Brigham Young Universithy, Provo, Utah (2010-present)
David O. Mckay School of Education

Courses Taught

TELL 420-Assessment for Linguistically Diverse Students.
This is the third of seven courses that lead to an ESL endorsement. Participating teachers explore pedagogical practices within their disciplines and builds understanding of how to integrate content and language instruction in the mainstream classroom.

TELL 440-Integrating Content and Language
This is the fifth of seven courses that lead to an ESL endorsement. Participants explore content-area learning from a second language perspective. This course engages students in curriculum development that demonstrates understanding of how to integrate content and language instruction in the mainstream classroom.

Southern Utah University, Cedar City, Utah (1998-present)
School of Continuing and Professional Studies

Courses Taught-Extension Courses, Southern Utah University
MATH 5450-Geometry and Measurement for Secondary Math Teachers
Graduate course. This course looked at the important components of a traditional secondary geometry course including transformations, deductive and inductive reasoning, proof, and measurement.

MATH 5500-Fundamental Components of Algebra for Secondary Math Teachers
Graduate course. Students explored the critical concepts of elementary and intermediate algebra in the Utah Core Standards for Mathematics. Emphasis was placed on making connections between the abstract and the concrete.

MATH 5520-Data Analysis and Probability
Graduate course. Topics included Binary, Poisson, Geometric and Normal distributions; Measures of central tendency; Confidence intervals; sampling; and modeling.

MATH 5530-Algebra Academy
Year-long seminar for secondary teachers of elementary and intermediate algebra. Students explore the relationship between arithmetic properties and algebraic properties. Instruction also addresses the fundamental theorem of algebra.

MATH 5540-Algebra Foundations
Graduate course. This two credit hour course reviewed important algebraic properties, functions, graphs and modeling associated with elementary algebra, intermediate algebra and college algebra and the importance of proof.

MATH 5550-Applied Mathematics for Secondary Teachers
Graduate course. This course addressed the application of elementary algebra concepts in real-world problems for business and marketing, agriculture and agribusiness, health services, family and consumer sciences, and industrial technologies.
MATH 5570-Geometry Academy
Year-long seminar for secondary teachers of plane analytic geometry. Concepts covered in the course included deductive and inductive reasoning, proof, congruence and transformations.

EDUC 5450-Introduction to Technology in Mathematics Education
Graduate course. Topics covered in the course included how to use graphing calculators, virtual manipulatives, interactive word processors, geometric manipulation software, word processing, spreadsheets, data collection technology and websites in a secondary mathematics classroom.

EDUC 5455-Mathematics for Elementary Teachers K-8: Numbers and Operations
Graduate course. This course is one of 6 courses for required for a Utah Elementary Mathematics Endorsement. This course covered the content of Number and Operations to develop a comprehensive understanding of our number system and relate its structure to computation, arithmetic, algebra, and problem solving.

EDUC 5505-Mathematics for Elementary Teachers K-8: Rational Numbers and Proportional Reasoning
Graduate course. This course is one of 6 courses for required for a Utah Elementary Mathematics Endorsement. The purpose is to provide practicing teachers a deeper understanding of rational numbers, operations with rational numbers, and proportionality, and instructional strategies to facilitate the instruction of this content for elementary students

EDUC 5515-Mathematics for Elementary Teachers K-8: Algebraic Reasoning
Graduate course. This course is one of 6 courses for required for a Utah Elementary Mathematics Endorsement. This course was designed to help teachers of grades 4-12 incorporate technology in their mathematics instruction. This course provides practicing teachers a deeper understanding of algebraic expressions, equations, functions, real numbers, and instructional strategies to facilitate the instruction of this content for elementary students.

EDUC 5520-Developing Mathematical Ideas: Building a System of Tens
Graduate course. This course was designed for elementary teachers to explore the structure of the base ten number system and the ways children come to understand it. Half of the course involved case studies that examine how students think about adding, subtracting, multiplying and dividing. The second half of this course focused on the use of a delivery tool for mathematics instruction called the CITES Mathematics Initiative Framework (CMI Framework) which was developed in cooperation with Brigham Young University and five partnership school districts.

EDUC 5525-Mathematics for Elementary Teachers K-8: Geometry and Measurement
Graduate course. This course is one of 6 courses for required for a Utah Elementary Mathematics Endorsement. This course provides practicing teachers a deeper understanding of the geometry and measurement content that exists in the state core and instructional strategies to facilitate the instruction of this content.

EDUC 5535-Mathematics for Elementary Teachers K-8: Data Analysis and Problem Solving
Graduate course. This course is one of 6 courses for required for a Utah Elementary Mathematics Endorsement. This course develops a firm problem-solving foundation. Using skills and strategies applied in mathematical contexts practicing teachers will learn to think, work with others, present solutions orally to the whole class, and write up detailed solutions in order to gain a deeper understanding of probability and data representation and analysis.

EDUC 5555-Mathematics for Elementary Teachers K-8: Assessment and Intervention
Graduate course. This course is one of 6 courses for required for a Utah Elementary Mathematics Endorsement. This course provides practicing teachers a deeper understanding of the various types of assessment and their appropriate use for guiding instruction, intervention, and evaluation of student learning of mathematics content.

EDUC 5565-Developing Mathematical Ideas: Reasoning Algebraically about Operations
Graduate course. This course explores the actions modeled by the four basic operations with whole numbers and rational numbers through case studies that examine student's ideas, issues and generalizations.

EDUC 5575-Mathematics Technology Academy
Graduate course. This course was designed to help teachers of grades 4-12 incorporate technology in their mathematics instruction. Participants learned instructional strategies for Wiki Pages, Google Documents, MicroSoft ® Word, MicroSoft ® Powerpoint or Keynote ®, Audacity ® and I-Movie ®, I-tunes ®, My

UEN and Wimba ® in order to meet the various needs of their diverse learners through rich documents, webpages, podcasting and presentations.

EDUC 5655-Developing Mathematical Ideas: Making Meaning for Operations
Graduate course. This course covers three types of generalizations: properties of operations; relationships between operations; and results of operating on particular kinds of numbers. These generalizations are explored through case studies.

EDUC 5500-Reading, Writing, and Technology in Mathematics
Graduate course. This course explores the distinct challenges of reading and writing in the context of mathematics and identifies the strengths of using technology to answer some of these challenges.

EDUC 5510-Intervention and Assessment in Mathematics
Graduate course. The purpose of this course is to provide practicing teachers a deeper understanding of the various types of assessment and their appropriate use for guiding instruction, intervention, and evaluation of student learning of mathematics content. Teachers will also learn procedures for managing and analyzing assessment data.

EDUC 5900-TI Interactive workshop
Graduate course. This course provides instruction on the use of an interactive word processor for creating alternative instructional material and assessment tools for mathematics instruction.

Utah Valley University, Orem, Utah (2001-2002)

Courses Taught-Utah Valley University
MATH 1050-College Algebra
Undergraduate course. Topics include graphs and solutions for families of functions, parametric equations, matrices and conic sections.

PUBLIC SCHOOL TEACHING

Madison County School District, Rexburg, Idaho (1988-89)

Courses Taught –Madison High School
Algebra 1, Geometry, U.S. History, Word Processing, Spreadsheets, DataBase, Computer programming in BASIC, and Wrestling.

Jefferson County School District, Rigby, Idaho (1989-93)

Courses Taught –Rigby High School
Algebra 1, Applied Algebra, Geometry, Algebra 2, College Algebra, Trigonometry,

Pre-calculus, Calculus, Computer Programming in BASIC, Computer Programming in PASCAL, Wrestling, Track, & Softball.

Granite School District, Salt Lake City, Utah (1993-94)

Courses Taught –Westlake Jr. High School
Algebra, Geometry, U.S. History, Track, & Wrestling.

Courses Taught –Kearns High School
Algebra 1, Applied Algebra 1, Applied Algebra 2, Geometry, Algebra 2, College Algebra, Pre-calculus, Computer Programming in PASCAL, & Wrestling.

Provo City School District, Provo, Utah (1994-2005)

Courses Taught –Westridge Elementary School
Pre-algebra course for accelerated 6th graders.

Courses Taught –Provo High School
Applied Algebra, Applied Geometry, Geometry, Elementary Algebra, Intermediate Algebra, Pre-calculus, A. P. Calculus, & Wrestling.

PRESENTATIONS

Invited Addresses

Twitchell, R. (2014, July). *Use of Technology in Teaching Mathematics*. Presentation to Utah State Legislature Joint Education Subcommittee. Salt Lake City, Utah

Twitchell, R. (2011, January). *Effective Assessment Practices: Tier 1 Instruction for all students*. Elementary Principals' Mathematics and Science Leadership Academy, Utah State Office of Education (USOE). Provo, Utah.

Twitchell, R. (2008, March). *Instructional techniques with i-Pods.* Utah Coalition for Educational Technology (UCET) Annual Conference, SLC, Utah.

Twitchell, R. (2004, September). *How to use manipulatives to teach non-traditional students.* USOE Adult Education Training Seminar, Salt Lake City, Utah.

Twitchell, R. (2000, September). *How to use manipulatives in an elementary math class, grades 2-6.* Idaho Council of Teachers of Mathematics (ICTM) Annual Conference, Twin Falls, Idaho.

Twitchell, R. (2000, September). *How to use manipulatives in a secondary math class, grades 7-12.* (ICTM) Annual Conference, Twin Falls, Idaho.

Invited Keynote Addresses

Twitchell, R. (Mar 2001). *Problem solving grades K-12.* Keynote Address, UCTM Regional Reach Out Conference, St. George, Utah.

National Presentations

National Council of Teachers of Mathematics (NCTM)

Twitchell, R., Mantilla, J., and Rushton, S. (2012, April). *Making the Common Core State Standards (CCSS) Accessible with Technology*. Presentation, 90th Annual Meeting of the National Council of Teachers of Mathematics (NCTM), Philadelphia, PA.

Twitchell, M., and Twitchell, R. (2000, April). *Working on Fractions without Fear*. Presentation , 78th Annual Meeting of the National Council of Teachers of Mathematics (NCTM), Chicago, IL.

State & Regional Presentations

Consortium for Mathematics Education Enhancement (CMEE)

Twitchell, R. (2005, April). *Teaching algebra skills in elementary grades, grades k-6.* Consortium for Mathematics Education Enhancement (CMEE) Annual State Conference, Salt Lake City, Utah.

Twitchell, R. (2005, April). *Teaching strategies for fractions, grades 3-6.* Consortium for Mathematics Education Enhancement (CMEE) Annual State Conference, Salt Lake City, Utah.

Twitchell, R. (2003, April). *Teaching with manipulatives, grades 7-12.* Consortium for Mathematics Education Enhancement (CMEE) Annual State Conference, Salt Lake City, Utah.

Twitchell, R. (2003, April). *Teaching strategies for fractions, grades 3-6.* Consortium for Mathematics Education Enhancement (CMEE) Annual State Conference, Salt Lake City, Utah.

Twitchell, R. (2002, April). *Using manipulatives in secondary math classes, grades 7-12.* Consortium for Mathematics Education Enhancement (CMEE) Annual Conference, Salt Lake City, Utah.

Twitchell, R. (2000, April). *Hands on real-world lessons (CORD).* Consortium for Mathematics Education Enhancement (CMEE) Annual Conference, Salt Lake City, Utah.

National Council of Teachers of Mathematics (NCTM) Regional

Twitchell, R. (2003, October). *Operating on fractions without anesthesia, grades 5-8.* Workshop Presentation, National Council of Teachers of Mathematics (NCTM) Western Regional Conference, Salt Lake City, Utah.

Twitchell, R. (2003, October). *Teaching with literacy in elementary mathematics classes grades 3- 5.* Presentation, National Council of Teachers of Mathematics (NCTM) Western Regional Conference, Salt Lake City, Utah.

Twitchell, R. (1998, November). *Hands on real-world lessons (CORD).* Presentation, National Council of Teachers of Mathematics (NCTM) Western Regional Conference, Reno Nevada.

Twitchell, R. (1997, February). *Teaching reasoning skills with humor in a geometry class*, *grades 7-12.* Presentation, National Council of Teachers of Mathematics (NCTM) Western Regional Conventions, Salt Lake City, Utah.

Twitchell, R. (1997, February). *Strategies for teaching algebra with manipulatives*, *grades 9-12.* Workshop Presentation, National Council of Teachers of Mathematics (NCTM) Western Regional Conventions, Salt Lake City, Utah.

Utah Coalition for Educational Technology (UCET)

Twitchell, R. (2014, March). *UEN's NROC Resources for Teachers*. UCET Annual Conference, Sandy, Utah.

Twitchell, R., Mantilla, J., and Rushton, S. (2012, March). *Making the Common Core State Standards (CCSS) Accessible with Technology*. UCET Annual Conference, Sandy, Utah.

Twitchell, R. (2011, March). *Using electronic portfolios*. UCET Annual Conference, Sandy, Utah.

Twitchell, R. (2008, March). *Instructional techniques with i-Pods.* Utah Coalition for Educational Technology (UCET) Annual Conference, SLC, Utah.

Utah Council of Teachers of Mathematics (UCTM)

Twitchell, R. (2012, October). *Resources for implementing the Utah State Core in Mathematics, grades K-6.* Utah Council of Teachers of Mathematics (UCTM) Annual Conference, American Fork, UT.

Twitchell, R. (2012, October). *Resources for implementing the Utah State Core in Mathematics, grades 7 - 12.* Utah Council of Teachers of Mathematics (UCTM) Annual Conference, American Fork, UT.

Twitchell, R. Mantilla, J., and Rushton, S. (2011, November). *Making the Common Core State Standards Accessible with Technology, grades 5-8.* Utah Council of Teachers of Mathematics (UCTM) Annual Conference, Magna, UT.

Twitchell, R. (2010, November). *Effective Assessment and The 3-Tier Model of Teaching Mathematics*. UCTM Annual Conference, Bountiful, Utah.

Twitchell, R. (2009, October). *Teaching mathematics using technology.* UCTM Annual Conference, Orem, Utah.

Twitchell, R. (2005, October). *Fighting fractional fear, grades 3-6.* UCTM Annual Conference, Clearfield, Utah.

Twitchell, R. (2005, October). *Teaching reasoning and proof with humor, grades 7-12. .* UCTM Annual Conference, Clearfield, Utah.

Twitchell, R. (2004, October). *How to teach fractions using manipulatives grades 3-6.* UCTM Annual Conferences, Salt Lake City, Utah.

Twitchell, R. (2004, October). *How to use manipulatives in a secondary math class grades 7-12*. UCTM Annual Conferences, Salt Lake City, Utah.

Twitchell, R. (2002, October). *How to use manipulatives in an algebra class, grades 9-12.* UCTM Annual Conferences, Salt Lake City, Utah.

Twitchell, R. (2001, April). *Probability and statistics in the secondary math class, grades 7 -12.* UCTM Regional Reach Out Conference, Logan, Utah.

Twitchell, R. (2001, April). *How to use manipulatives to teach elementary algebra.* UCTM Regional Reach Out Conference, Logan, Utah.

Twitchell, R. (2001, October). *How to use manipulatives in an algebra class, grades 9-12.* UCTM Annual Conferences, Salt Lake City, Utah

Twitchell, R. (2001, March). *Use of manipulatives in elementary math grades 2-4.* UCTM Regional Reach Out Conference, St. George, Utah.

Twitchell, R. (2001, March). *How to use manipulatives to teach elementary algebra.* UCTM Regional Reach Out Conference, St. George, Utah.

Twitchell, R. (2000, October). *Teaching with literacy in elementary mathematics classes grades 3- 5.* UCTM Annual Conferences, Salt Lake City, Utah.

Twitchell, R. (1999, October). *How to incorporate technology in a secondary math class, grades 7-12.* UCTM Annual Conferences, Salt Lake City, Utah.

Twitchell, R. (1998, October). *Hands on real-world lessons (CORD).* UCTM Annual Conferences, Salt Lake City, Utah.

Twitchell, R. (1997, October). *Strategies for teaching algebra with manipulatives*, *grades 9-12.* UCTM Annual Conferences, Salt Lake City, Utah.

Utah Education Association (UEA)

Twitchell, R. (2003, October). *How to use manipulatives to teach fractions in elementary math classes.* Utah Education Association (UEA) Annual Fall Conference, Salt Lake City, Utah.

Utah Principals' Mathematics and Science Leadership Academy

Twitchell, R. (2011, January). *Effective Assessment Practices: Tier 1 Instruction for All.* Utah Principals Mathematics and Science Leadership Academy, Utah State Office of Education.

Utah Rural Schools Association
Twitchell, R. (2010, July). *Effective Assessment practices and the 3-Tier Model of Mathematics Instruction*. Utah Rural Schools Annual Conference, Cedar City, Utah.

Twitchell, R. (2014, July). *Resources for the New Utah State Mathematics Core*. Utah Rural Schools Annual Conference, Cedar City, Utah.

Professional Presentations-Pending

Twitchell, R. (2014, November). *Necessary Changes to Instructional Practices Required by the SAGE Assessment.* UCTM Annual Conferences, Layton, Utah

NATIONAL LEADERSHIP & SERVICE

Reviewer (2011, June)	*Association of Mathematics Teacher Educators (AMTE).* 2012 AMTE Annual Conference proposals.
Reviewer (2011-present)	Mathematics Teacher article submissions, NCTM

STATE SERVICE-LEADERSHIP ACTIVITIES

Committee Member (2014-present)	*Utah State Office of Education Utah Core Standards Review Committee.* This seven member committee was created by state legislation and tasked to review the core standards in order to provide the Utah State Board of Education with recommendations regarding possible changes to the existing core or adoption of new core standards.
Member (2012-Present)	*Utah State Office of Education SLO Technical Assistance Team (STAT).* This team is tasked with defining practices for implementing Student Learning Outcomes as a growth measure as part of teacher evaluation in the state of Utah.
Committee Member (2011-present)	*Utah State Office of Education Mathematics 1030 Concurrent Enrollment Design Committee*. Committee is tasked with creating a concurrent enrollment course for math 1030 based on the Mathematical Decisions course.
Committee Member (2010-present)	*Utah State Office of Education Mathematics Curriculum Guides Committee*. Committee creates curriculum guides for grades 2-6 in preparation for state adoption of the Common Core State Standards.
Committee Member (2010-present).	*Utah State Office of Education Mathematics Advisory Committee.* Committee plans and implements strategies for state adoption of the Common Core State Standards.
Member (2010-present).	*Utah State Office of Gifted and Talented Mathematics Task Force.* Task force plans and implements strategies to meet the needs of gifted and talented students as the new Utah Core State Standards are implemented.
Committee Member (2005-present).	*Utah State Office of Education State Mathematics Education Coordinating Committee (SMECC.)* Represents Provo City School District at State meetings designed to implement statewide programs for mathematics curriculum and instruction.
Member (2010)	*Utah State Office of Education Technology Enhanced Items for Geometry CRT Task Force.* Wrote items that required computer aided tools for assessing geometry concepts on the state CRT.
Committee Member (2009)	*Utah State Office of Education UHALPA Item Writing Team.* Served as item writer for assessment of English Language Students in mathematics for grades 2-4.
Committee Member (2008-10).	*Utah State Office of Education Elementary Mathematics Endorsement Committee*. Represent Provo School District at statewide meetings. Collaborate with mathematics faculty and school leaders from Utah IHEs and LEAs in the development of a USOE elementary mathematics endorsement.
Committee Member (2009-10).	*Utah State Office of Education Advanced and Alternative Secondary (AAS) Mathematics Courses Committee.* Headed subcommittee that created a new senior mathematics course entitled "Decision Making for Life." Worked on general committee to evaluate all other AAS mathematics courses.

Committee member (2009-10)	*Utah State Office of Education 3-Tier Model of Mathematics Instruction Writing Committee.* Served on subcommittee that wrote the components of effective instruction in the 3-Tier Model of Mathematics Instruction.
Member (2009-10)	*Utah State Office of Education Intermediate Algebra Vertical Articulation of Mathematics Standards Task Force.* Worked in process that created the cut scores for the state CRT for Intermediate Algebra.
Committee Member (2006-07)	*Utah State Office of Education Mathematics K-12 Core Writing Committee.* Served on subcommittee that wrote the K-6 mathematics core for the state of Utah.
Committee Chair (2005-08)	*Utah State Office of Education Secondary Mathematics Professional Development Committee.* Chaired the committee that wrote curriculum for secondary mathematics professional development offered by the State Office of Education. Trained the state trainers of that professional development and acted as fiscal agent for all funds associated with the statewide professional development.
Member (2001-04).	*Utah Education Association Executive Committee.* Represented Provo Education Association (PEA) as part of duties as president of the PEA.
Member (2003-04)	*Utah State Office of Education Item Writing Team.* Wrote items for State CRTs in elementary algebra, applied math, and geometry.
Committee Member (2002-03)	*Utah State Office of Education Mathematics K-12 Core Writing Committee.* Headed the subcommittee that wrote the Applied Mathematics core for the state of Utah.
Board Member (2001-04)	*Utah Council of Teachers of Mathematics.* Served as Newsletter Editor.
Past President (2000-01)	*Utah Council of Teachers of Mathematics.*
President (1999-2000)	*Utah Council of Teachers of Mathematics.*
President Elect (1998-99)	*Utah Council of Teachers of Mathematics.*
Board Member (1995-98)	*Utah Council of Teachers of Mathematics.* Served as Secondary Representative on the Board. Helped plan and implement the regional outreach training sessions and the annual conference.

STATE SERVICE-OUTREACH FOR UTAH PUBLIC SCHOOLS

State wide training, Utah. (2012-2013) *Comprehensive Mathematics Instruction (CMI) I (USOE course 32861)*. Facilitator, Four-day workshop throughout the school year to train up to 55 elementary teachers in the state.

State wide training, Utah. (2012-2013) *Essential Elements of Common Core State Standards for Math 5 (USOE course 34950)*. Facilitator, Three-day workshop throughout the school year to train up to 55 Fifth grade teachers in the state.

State wide training, Utah. (2012) *Essential Elements of Common Core State Standards for Math 4 (USOE course 34943)*. Facilitator, One-day workshop during the school year to train up to 55 fourth grade teachers in the state.

State wide training, Utah. (2012-2013) *Essential Elements of Common Core State Standards for Secondary Math 2 (USOE course 34592)*. Co-facilitator, four-day workshop throughout the school year to train up to 100 secondary mathematics teachers in the state.

State wide training, Utah. (2011-2012) *Essential Elements of Common Core State Standards for Math 6 (USOE course 33578)*. Facilitator, Seven-day workshop throughout the school year to train up to 40 sixth grade teachers in the state.

State wide training, Utah. (2011-2012) *Essential Elements of Common Core State Standards for Secondary Math 1 (USOE course 33551)*. Co-facilitator, four-day workshop throughout the school year to train up to 55 secondary mathematics teachers in the state.

Nebo School District, Jordan School District, Provo School District, Park City, Utah. (2009, June). *Reasoning Algebraically about Operations (RAO).* Co-facilitator, Five-day workshop training facilitators from three districts for the Developing Mathematical Ideas: RAO for 15 elementary teachers.

Wasatch School district, Heber Valley Elementary School, Utah. Grades K-6. *BYU-PSP CITES Mathematics Initiative Training*. (September 2007-May 2008). Presented training with one other colleague from the BYU-PSP Mathematics Committee to all elementary teachers at Heber Valley Elementary School.

Nebo School District, Jordan School District, Provo School District, Park City, Utah. (2008, June). *Reasoning Algebraically about Operations (RAO).* Co-facilitator, Five-day workshop training facilitators for the Developing Mathematical Ideas: RAO for 20 elementary teachers.

Provo City School District, Nebo School District, and Wasatch School District.

Secondary Mathematics Academies. (2008, August-Present). Created curriculum for pre-algebra, algebra, geometry and technology in math academies. Presented the professional development for these academies for 50 teachers of three districts.

Provo City School District, Provo, Utah. (2008, June). *Geometry and Measurement for All*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Davis School District, Farmington, Utah. (2008, June). *Geometry and Measurement for All*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Davis School District, Farmington, Utah. (2008, June). *Technology in Mathematics II*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Jordan School District, Sandy, Utah. (2008, July). *Geometry and Measurement for All*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Sevier School District, Richfield, Utah. (2008, July). *Technology in Mathematics II*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Cache County School District, Logan, Utah. (2008, August). *Technology in Mathematics II*. Lead Facilitator, Five day workshop for 20 grades 9-12 teachers.

Granite School District, West Valley City, Utah. (2008, August). *Technology in Mathematics II*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Sevier School District, Richfield, Utah. (2006, June). *Assessment and Intervention in Mathematics*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Davis School District, Farmington, Utah. *Fundamental Components of Algebra*. (2006, July). Lead Facilitator, Five-day workshop for 20 grades 8-12 teachers.

Jordan School District, Sandy, Utah. *Fundamental Components of Algebra*. (2006, August). Lead Facilitator, Five-day workshop for 25 grades 8-12 teachers.

Alpine School District, American Fork, Utah. *Fundamental Components of Algebra*. (2006, August). Lead Facilitator, Five-day workshop for 25 grades 8-12 teachers.

Nebo School District, Mapleton Elementary School, Utah. Grades K-6. *BYU-PSP CITES Mathematics Initiative Training*. (September 2004-May 2005). Presented training with five colleagues from the BYU-PSP Mathematics Committee to elementary teachers at Mapleton Elementary School. Served as resource to Professional Learning Community for first grade teachers.

Sevier School District, Richfield, Utah. (2005, June). *Data Analysis*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Washington County School District, St. George, Utah. (2005, July). *Applied Math I*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Washington County School District, St. George, Utah. (2005, July). *Applied Math II*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Granite School District, West Valley City, Utah. (2005, August). *Navigating Geometry*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Tooele School District, Tooele, Utah. *Applied Math I*. (2004, June). Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Iron County School District, Cedar City, Utah. *Applied Math I*. (2004, June). Lead Facilitator, Five-day workshop for 25 grades 9-12 teachers.

Provo City School District, Provo, Utah. *Applied Math I*. (2004, July). Lead Facilitator, Five-day workshop for 30 grades 9-12 teachers.

Tooele School District, Tooele, Utah. *Applied Math II*. (2003, June). Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Davis School District, Farmington, Utah. (2003, June). Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Provo City School District, Provo, Utah. *Applied Math II*. (2003, July). Lead Facilitator, Five-day workshop for 30 grades 9-12 teachers.

Granite School District, West Valley City, Utah. (2003, August). *Applied Math I*. Lead Facilitator, Five-day workshop for 30 grades 9-12 teachers.

Granite School District, West Valley City, Utah. (2003, August). *Applied Math II*. Lead Facilitator, Five-day workshop for 30 grades 9-12 teachers.

Uintah School District, Vernal, Utah. (2002, July). *Applied Math I*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Uintah School District, Vernal, Utah. (2002, August). *Applied Math II*. Lead Facilitator, Five-day workshop for 20 grades 9-12 teachers.

Alpine School District, American Fork, Utah. (2001, June). *Applied Math I*. Lead Facilitator, Five-day workshop for 30 grades 9-12 teachers.

Weber School District, Ogden, Utah. (2001, June). *Applied Math I*. Lead Facilitator, Five-day workshop for 30 grades 9-12 teachers.

Alpine School District, American Fork, Utah. (2001, July). *Applied Math II*. Lead Facilitator, Five-day workshop for 30 grades 9-12 teachers.

South Summit School District, North Summit School District, and Park City School District, Park City, Utah. (2000, July). *Applied Math I*. Lead Facilitator, Five-day workshop for 15 grades 9-12 teachers.

South Summit School District, North Summit School District, and Park City School District, Park City, Utah. (2000, July). *Applied Math II*. Lead Facilitator, Five-day workshop for 15 grades 9-12 teachers.

Provo City School District, Provo, Utah. *Applied Math II*. (1999, July). Lead Facilitator, Five-day workshop for 30 grades 9-12 teachers.

Provo City School District, Provo, Utah. *Applied Math I*. (1998, July). Lead Facilitator, Five-day workshop for 30 grades 9-12 teachers.

Math and Science Education Foundation (MASEF), Park City, Utah. *Applied Math I*. (1995, June). Facilitator, Five-day workshop for 30 grades 9-12 teachers.

PROFESSIONAL SERVICE-INSTITUTIONAL

Provo City School District
Institutional Service-District Level

- Committee Chair: Provo City School District Mathematics Committee (2012-Present)
- Committee Chair: Provo City School District STAT (2014-Present)
- Committee Chair: Elementary Mathematics Textbook Adoption Committee. (2007-08).
- Committee Chair: District Numeracy Coordinators Committee. (2004-2009).
- Search Committee Member: District Superintendent (2003-04).
- Associate: BYU-PSP Cites Associates (2009-10).
- Committee Member: BYU-PSP Mathematics Initiative Committee (2004-Present).
- Presenter: Every Day Math Counts (2004). Professional development for elementary teachers of mathematics.

Institutional Service-High School Level

- Accreditation Committee Member: Response to Intervention subcommittee chair for Provo High School. (2003-04).
- Committee Chair: Conflict Resolutions Committee, Kearns High School. (1995-98).
- Advisor: Junior Class Officers, Kearns High School. (1995-98).
- Committee Chair: Safe School Committee, Rigby High School. (1992-94)

AWARDS & PROFESSIONAL RECOGNITION

- Muffet Reeves Award, Utah Council of Teachers of Mathematics (2005).
- Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST), Utah State Finalist (2003).
- Golden Apple Award, Provo City School District (2002).
- Utah Educator Excellence Award Winner, State Legislative Award (2001).
- Tandy Technology Teacher of the Year (1992).
- Rigby High School Outstanding Teacher Award (1992).

PROFESSIONAL AFFILIATIONS & LEADERSHIP ROLES

CONSORTIUM FOR MATHEMATICS EDUCATION ENHANCEMENT (CMEE)

- Member, CMEE Board (2004-present).
- Program Chair for Annual CMEE State Conferences (2004-09).

JEFFERSON COUNTY EDUCATION ASSOCIATION (JCEA)

- Board Member, Secondary Representative on JCEA Board (1989).
- 1st Vice-President, JCEA Board (1991-93).
- Negotiations Team Leader (1990-93).
- Head Negotiator (1993).

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS (NCTM)

- Delegate, NCTM Delegate Assembly (2002).
- Presenter at National Meeting (2000 & 2012).
- Delegate, NCTM Delegate Assembly (1999).
- Presenter at Western Regional Meetings (1997, 1998, & 2003)

NATIONAL EDUCATION ASSOCIATION (NEA)

- Delegate, NEA National Convention (2004).

UTAH COALITION FOR EDUCATIONAL TECHNOLOGY (UCET)

- Presenter at State Convention (2008, 2011).

UTAH COUNCIL OF TEACHERS OF MATHEMATIC (UCTM)

- Board Member, UCTM Newsletter Editor (2001-2004).
- Program Chair for Annual UCTM State Conferences (1999-2000).
- Past President, President, President Elect, UCTM Board (1998-2001).
- Presenter at State Conventions (1997-2002, 2004-5, 2009-11).

UTAH EDUCATION ASSOCIATION (UEA).

- Member, UEA Executive Committee (2001-04).
- Presenter at State Convention (2003).

PROVO EDUCATION ASSOCIATION (PEA)

- President (2001-04).