University of Alberta

From Frustration to Understanding: An Inquiry into Secondary Mathematics Teachers' Experiences with Government Mandated Examinations

by

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For my family:

Thank-you for allowing me to pursue this journey

Abstract

The purpose of this study was to develop an understanding of secondary mathematics teachers' experiences in a context of government-mandated examinations (GMEs). Having had my own experiences teaching mathematics courses where students wrote a GME, I had my own understandings of GMEs. From conversations with teachers, I found that others did not share the same view of GMEs that I had developed. Using a philosophical hermeneutic research methodology and philosophy based on the writings of Gadamer, the experiences of three secondary mathematics teachers are examined.

The study took place in Alberta, Canada, where the current GME program has been in place since 1984. The exams that students write in Grade 12 are considered high stakes for the students because 50% of their grade in the course is determined by their score on the GME. The exams are considered moderate stakes for teachers because student results on the exam are reported publicly. Through conversation with three experienced secondary mathematics teachers, I found that teachers feel that the GMEs are high stakes for themselves for very different reasons. Additionally, the teachers in this study expressed perceptions of and relationships with the GME that were unique to their experiences and contexts.

Engaging in the hermeneutic circle of developing understanding, the stories of experience and the language that the participants used to describe their experiences are investigated. Specific experiences are outlined and analyzed with both commonalities and differences between experiences highlighted. Each of the teachers in this study used the phrase *preparing students* to write GMEs.

Exploration of how the teachers *prepared* her students revealed their beliefs about mathematics teaching and learning. The exploration also revealed the teachers' understandings of the role of GMEs.

Mandated examinations are a visible part of the education system in Alberta, Canada, and the world. Understanding how teachers experience teaching within the context can provide insight into how teachers negotiate demands on their work.

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Chapter 1: How I Came to This Work

This dissertation explores my developing understanding of secondary mathematics teachers' experiences teaching in a context of government-mandated examinations (GMEs). I have lived my entire educational life in a context of GMEs—it is all I know. I experienced writing government examinations in my career as a student in the K–12 school system and I experienced having students write them in my career as a secondary mathematics teacher. In addition, I spent time as a developer of GMEs. (To many of my colleagues, I had joined the "dark side" by working for the government.) From my experiences as student, teacher, and developer, I have come to embrace GMEs and accept them as a necessary part of the education system. However, conversations with other teachers made me realize that my understanding of GMEs is not necessarily shared by others. Thus, my research explores teachers' experiences and how those experiences help them make sense of government-mandated examinations.

My Life with Government-Mandated Examinations

As a Student

My first memory of an experience with a GME as a student was in Grade 3. I remember writing a timed number-facts test where we had to bubble in our answers with an HB-2 pencil. I am not sure if the examination was a Provincial Achievement Test (PAT) or some other externally developed examination the school chose to administer. Before and during the examination, there was no

sense of stress from the teacher or from other students. I was up to the challenge, not afraid or worried. Our teacher shared with us how we did; I got one or two questions wrong and felt proud for doing well. These results confirmed that I was good at mathematics and embedded a positive memory of success with these sorts of examinations.

Although I must have written PATs in different subjects in Grades 6 and 9, I have no recollection of them. In Grade 12, I wrote several GMEs, called *diploma exams,* in Mathematics 30, Chemistry 30, Biology 30, Physics 30, English 30, and Social Studies 30, each worth 50% of the final grade. I have two clear memories from writing those examinations—one with Mathematics 30 and one with Social Studies 30.

Mathematics 30. I remember being so confident on the day of the Mathematics 30 diploma examination. Although we had permission to start writing at 8:50 a.m., I sat with my examination booklet closed until the clock showed 9:00 a.m. exactly because I knew that the examination was to start at 9:00 a.m. I can still visualize myself sitting there with my booklet closed as my classmates were working away on the questions. I just sat there for 10 minutes. Once the clock read 9:00 a.m., I opened the booklet and started working. I finished in less than one hour so I sat still with my booklet closed and waited until I could hand it in.1 I did not rush through the examination, nor did I go particularly slowly. I received a mark of 92%. I was thrilled with that mark and so

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[1] Students writing diploma examinations may not leave the room until one hour has passed.

was my teacher. He asked all his students who got over 90% to give him a picture to put on his wall of fame. I was proud to go on that wall with the others who were there. Again, I experienced success and my aptitude for mathematics was confirmed.

Social Studies 30. Not every experience I had with GMEs as a student was positive. I scored what I considered to be very low on the written essay portion of the Social Studies 30 diploma examination. The question had to do with Hitler and World War II. When I left the room, our social studies teacher was standing outside the door asking students how it went. I described the main ideas of my response. He hesitated, and finally said, "Well, it will be interesting to see what they think of that." When I received my results, his concern was validated. Although I had only one wrong on the multiple-choice portion, I almost failed the essay portion. The results were quite devastating and I carry that feeling with me to this day. I understand how performance on GMEs can influence a student's perception of their abilities in a particular subject area.

Still, most of my experiences in school were positive and I went on to university, where there were no GMEs. My next experience came in my first year of teaching mathematics in secondary school.

As a Teacher

My first teaching job was in a small, rural K–12 school. I was the only secondary mathematics teacher not just at the school but in the entire division. In my second semester, I taught a combined Grade 12 mathematics class, with two

students in Mathematics 30 and nine in Mathematics 33. That year Mathematics 30 had a diploma examination at the end but Mathematics 33 did not. The two courses shared some curricular outcomes where I would combine the two groups. Each course also had optional content. I chose to integrate the courses as much as possible to make the most efficient use of time.

In June the two students in Mathematics 30 wrote their diploma exams. I received the results from Alberta Education in the fall. I found the information that was reported to me was unhelpful: It told me nothing concrete about my teaching or my students' understanding of the Mathematics 30 content. There was a note on the statement to the effect that "results that include fewer than 10 students should be analyzed with caution and will not be publicly reported." All that I felt I could do with the data was to note the questions both students answered incorrectly and pay attention to those topics for the next group of students.

Thinking back, I realize that I changed some teaching practices during my second year due to my first experiences with diploma examinations. Although in my first year of teaching, Mathematics 33 did not have a diploma examination, the following year it did. I felt free in the first year to combine the Mathematics 30 and 33 classes for several topics, but in the second year I did not combine the classes at all. I remember thinking that I needed to follow the program of studies for Mathematics 33 more closely than I had in my first year so that my students would be successful on the diploma examination. I scrutinized the curricular outcomes, looking for nuances that I had perhaps not noticed the year before.

Interestingly, I do not remember how either the Mathematics 30 or 33 students in my second year teaching performed on their examinations.

In my fourth year of teaching, I moved from the small rural school to a large city school for part of a semester, then to an outreach school for the next three years. In the outreach school, students took courses individually through distance education. I was responsible for assisting them with course work in any and all subjects in Grades 10, 11, and 12. The majority of students chose to take option courses or to repeat a mathematics or science course they had recently taken. Although only a few students were taking Grade 12 courses, each year I had at least one who took a diploma examination course. Usually these students were repeating a course to improve their mark. Similar to my earlier experience, I found the results reported by Alberta Education were not useful in improving my teaching or student learning.

After three years in the outreach school, I spent two years as a mathematics and science department head at a midsized urban school with Grades 7–12. I moved from there to be a mathematics department head and teacher in a large urban high school. Here, I paid close attention to the format and style of question on the mathematics diploma examinations. I also spent time analyzing my students' results. Because there were more students in each class, these were now more meaningful than before. When interpreting the results, I considered how they either confirmed or refuted what I thought I knew about my students. I used the information to adjust my practice in areas where students did not perform well. For example, if few students answered questions regarding the application

of sinusoidal functions correctly, then I would spend more time on that topic the next term.

During diploma examination time at the large urban school, I felt a sense of excitement. A few days before the mathematics examination, I would wonder: Would students remember everything we did during the semester or would they blank out during the exam? The morning of the examination was filled with tension: students asking last-minute questions; borrowing calculators; making sure they had extra pencils, erasers, and batteries. We mathematics teachers would spend time in the hallways helping students with questions and encouraging those who expressed concern. When the examination began, teachers would help students clear the memory on their calculator per examination guidelines. Once that was done, we returned to our classrooms.

Alberta Education permits teachers to access the examination after one hour. As soon as the hour elapsed, the mathematics teachers would go en masse to the school office to collect two or three perusal copies. Then we hunkered down. We flipped through the examination booklet to get a general sense of the questions and to see if there were any surprises. We would then complete each question to ensure we could answer them. We would talk about the questions and compare this examination with previous ones. We would predict how well we thought our students would do.

Perusing the examination as a group was an excellent opportunity for us to engage the course content and to discuss our teaching with respect to particular concepts. We would comment on the wording of questions and wonder if our

students would be confused: “My students wouldn’t get this.”; “We covered a question just like this.” We would also look to the examination to find different ways of approaching concepts or asking questions in our own teaching.

I was excited to be able to see the examination and complete the questions. I was always relieved when I could do all of the questions. Once there was a question I could not answer, and I remember getting very upset, wondering what the government was going to do and how a diploma examination could include a question that did not have an answer. After talking to a colleague, I realized I had misunderstood the question. There was indeed an answer. I was quite embarrassed by my mistake and in subsequent years paid closer attention to the questions before saying there was no answer!

As a Mathematics Department Head

I was the mathematics department head at the large urban school for approximately three years. One of my initiatives was for Grade 10 and 11 teachers to use the format and style of diploma examinations on all their classroom exams. I thought that, if students had extensive experience with the type of question and with diploma examination–style marking, they could focus on the content instead of worrying about the format. Now, as I reflect on that practice, I wonder what disservice I might have done to the teachers in my department by insisting that all use the same format for examinations, invalidating any professional knowledge they had concerning assessment. I also wonder what disservice I did to the students by subjecting them to the same format of test, class after class, year after

year.

As department head, I led the analysis of results from diploma examinations, coordinating meetings between teachers who taught the same course. Based on student performance, the teachers might identify deficiencies in how we were presenting the curriculum. If so, we made adjustments as a department. When we received the results from the following semester, we would look for any changes in student performance in light of the adjustments made.

With time, I became increasingly comfortable with GMEs. I analyzed student results on each examination; based on the analysis, I made changes to my teaching. During my career, I also became involved with GMEs from a different perspective: as an examination developer and marker.

As an Examination Developer

In my early years' teaching, my classroom examinations were not well developed. In fact, I had one experience my first year where my examination development skills were called into question by the school administrator. This somewhat painful experience prompted me to learn more about examination development.

In my third year of teaching, I volunteered to participate in a Mathematics 33 diploma examination item-writing committee for Alberta Education. We spent two days writing questions that could appear on a future diploma examination. I learned how to write clear questions and found the experience fascinating. At that time I was still the only secondary mathematics teacher at my rural school, so I

loved the conversations about mathematics teaching and learning we engaged in while developing questions. I took the new-found knowledge about constructing multiple-choice, numerical response, and written response questions from the item-writing committee back to the classroom and incorporated the knowledge into my practice.

The same year, I was accepted to participate in *marking* the Mathematics 33 diploma examination. During the marking sessions I learned from teachers around the province the challenges they had in teaching mathematics and strategies they used to teach specific content. I learned about expected and acceptable student responses on the written response portions. What I learned I took back to my classroom and starting making changes. For example, I started marking written response questions as they were marked on the diploma examination.

I found both the writing and marking of items for GMEs to be an extraordinary professional learning experience. I enjoyed conversations about teaching secondary mathematics with colleagues from all over Alberta. I more deeply understood the program of studies we were mandated to teach. I understood GMEs more deeply, too. I honed my skills as an examination developer. As a result my classroom examinations became stronger and more closely aligned to curricular outcomes.

I took every opportunity to participate in item development or marking. Some years I submitted my name and was not selected—I would be disappointed. Over my career, my interest in examination development grew, so I searched for

further opportunities to become involved in GMEs. The searching led to an opportunity to work closely with Alberta Education as an examiner.

In fall 2008, I began a two-year secondment to the Learner Assessment Branch of Alberta Education[2] as the Pure Mathematics 30 examiner. My role was to support the examination manager in developing the diploma examination. Specifically, I organized the teacher selection process for item development and marking, and I was responsible for creating field tests administered throughout the province. The field tests were questions that came from the item-development sessions: They had to be piloted with students to ensure their validity. For a question to be included on a diploma examination, it had to meet specific statistical standards through the field-testing process.

Through my experiences with Learner Assessment, I gained insight into the processes used to ensure that PATs and diploma examinations are as fair as possible, and that as many classroom teachers as possible are involved in developing them. In short, I learned to respect the processes used in developing GMEs.

I enjoyed this work at Learner Assessment considerably. More important, I gained a strong sense of the purpose behind the diploma examination program in Alberta and a belief in GMEs as a necessary tool in the Alberta education system.

During my time with Learner Assessment, I became intrigued by

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[2] For ease of reading, I will use the title Learner Assessment to refer to the Learner Assessment Branch of Alberta Education.

conversations with teachers about how students engage with examination questions. Teachers would often comment how they envisioned students answering a particular question, or what pieces of a question might cause difficulty. I wondered how accurate teachers were, which led me to start a PhD program with the intent of exploring how students engage with multiple-choice examination questions. My research focus changed, however. In the next section, I describe how my lifetime of experiences with GMEs has led me to explore the experiences of other teachers.

Coming to My Research Question

As mentioned, I originally planned to investigate how students interact with multiple-choice examination questions. I was pushed beyond this idea in one of my doctoral seminar courses. Our professor advised us to "find what really gets you in your gut, what keeps you up at night—that's what your research topic should be." As I lay in bed that night I pondered what really puzzled me, what was "keeping me up at night." I realized that I did not understand why secondary mathematics teachers seemed to be preoccupied with GMEs.

What led to this wondering were some of my experiences while working with Learner Assessment. A revised program of studies for secondary mathematics was being implemented. Course content, expectations for teaching, and beliefs of about how students learn were communicated to teachers with a focus on the processes that students use to learn and understand mathematics (Alberta Education, 2008). Nevertheless, the most urgent question I fielded from

teachers was “What are the diploma exams going to look like?” Teachers seemed to be more concerned with the diploma examination than with how they were going to implement the new curriculum.

I was frustrated by the constant concern with the diploma examination. Teachers seemed to be using diploma examinations as an excuse not to make changes to their teaching, stating, “If the diploma exam isn’t going to change, then I won’t.” Davis (1996), too, noted that the questions mathematics teachers ask during a curriculum change tend to be focused on the assessment practices as opposed to pedagogy or classroom practice. I did not understand why this was the case. Why were teachers so concerned with diploma examinations? I decided to focus my research on secondary mathematics teachers’ experiences in the context of GMEs. In this way, I hoped to understand what was keeping me awake at night.

As described above, GMEs have been part of my life—whether as student, teacher, or examiner—for my entire career. I do not know teaching without such examinations; nor have I questioned the value of them. I welcomed opportunities to engage with the development of questions for and marking GMEs. However, while I was the Pure Mathematics 30 examiner I sensed what seemed to be a distrust of the GMEs on the part of other teachers; I did not understand their unease.

Many teachers I talked with were vehemently opposed to diploma examinations; they did not feel the diploma examination was a fair assessment of student understanding. What I found intriguing is that many of the same teachers

who opposed the diploma examination said they modelled the exams' format and style in their classrooms. Why do teachers who believe the diploma examination is not an appropriate assessment tool use that very tool to guide classroom practice? What in their teaching experiences could have promoted the use of something they do not believe is valuable? Perhaps these were naïve questions. I was not able to understand how teachers saw diploma examinations.

In short, I began to I wonder how secondary mathematics teachers make sense of the diploma examination. Do they see it as a test of themselves as teachers? I wondered about teachers' interpretation of students' performance. Do they link performance to their quality or worth as a teacher? How do teachers' various teaching contexts influence their perception of the examinations? These questions puzzled me and led to the research presented here.

In the following section, I interrogate the questions that brought me to my research. van Manen (1984) said, "to truly question something is to interrogate something from the heart of our existence, from the centre of our being" (p. 45). The wonder I had about other teachers' experiences affected, and continues to affect, the centre of my being. I could not ignore it. Drawing on Gadamer, Moules (2002) commented, "hermeneutic inquiry begins with an experience of being addressed by a topic . . . the feeling of being caught in something's regard" (p. 13). I was addressed by my topic and needed to follow where it led.

Inquiring into the Question

I begin with the following questions: What does it mean to be a secondary

mathematics teacher in a context of GMEs? In what ways do they make sense of teaching in a context of GMEs? What relationship do secondary mathematics teachers have with GMEs?

I approach these questions through the tradition of Gadamer's philosophical hermeneutics (Ellis, 2006; Gadamer, 1975/2004, 1976/2008; A. Prasad, 2002; P. Prasad, 2005; D. G. Smith, 1991; J. K. Smith, 1993). But before I could begin investigating answers, I needed to thoroughly investigate what it is I am asking. Carson (1986, p. 75) wrote, "Hermeneutic inquiry begins with an attempt to understand the question itself. This is what Gadamer has referred to as the 'hermeneutical priority of the question' (1975/2004, p. 325)." In my attempt to understand the question, in the following section I explore the contexts within which I lived, taught, and conducted research.

The Context

Using philosophical hermeneutics as the research tradition, I respect that "the interpretation of meaning must take place within a context" (J. K. Smith, 1993, p. 186). Therefore, to understand how secondary mathematics teachers make sense of teaching in a context of GMEs, I must attend to the current and historical context within which they work and live.

The contexts of education and the relationships that students, teachers, parents, and government officials have with GMEs are complex. Clandinin, Murphy, Huber, and Orr (2009) commented that "the stories of school are increasingly driven by standardized achievement plotlines. Present accountability

policies in Canadian schools place increased emphasis on achievement testing and mandated assessment practices reflected in provincial policies on yearly testing across the country" (p. 81). Clandinin et al. found that the assessment and accountability policies in Canada shaped the stories that teachers, students, and parents told. Such policies are not unique to Canada or to North America (Doig, 2006; Smyth & Banks, 2012; Walls, 2008). However, because I have chosen to conduct my research in Alberta, it is the Alberta context that is relevant here.

Alberta's history with GMEs. Alberta has a long history of provincial examinations and structured accountability (McEwen, 1995). "In 1982 Alberta introduced the Achievement Testing Program for Grades 3, 6, 9, and in 1984 reinstated the Diploma Examinations Program at Grade 12 as one requirement for high school graduation" (McEwen, p. 27). Prior to 1984, the province had mandated examinations at Grade 9 and 12 called departmental examinations (Alberta Teachers' Association [ATA], 2004). In 1970, the Grade 9 examinations were replaced by a "battery of power tests" (ATA, 2004, n.p.); in 1973, mandatory Grade 12 examinations were abolished. However, government examinations did not completely disappear in 1973 (ATA, 2004). The examinations were made optional – students could choose to write particular diploma examinations and sometimes, a sample of students from a given grade level was given the examination rather than the entire cohort.

Currently, students write Provincial Achievement Tests (PATs) in Grades 3, 6, and 9, and diploma examinations in Grade 12. Parents of students in Grades 3 through 9 can choose to have their child opt out with no negative consequences.

The results from PATs are not required to be included in student grades, but are reported to the public and to school authorities (Alberta Education, 2012). The results from diploma examinations are similarly reported but they count 50% toward a student's final grade in Social Studies 30-1 and 30-2, English Language Arts 30-1 and 30-2, Biology 30, Chemistry 30, Physics 30, Science 30, Pure Mathematics 30, and Applied Mathematics 30. Students who complete the coursework for a diploma examination course but do not write the examination do not get full credit for the course. Additionally, students must earn credit in a 30-level English Language Arts course and a 30-level Social Studies course to earn a high school diploma.

Purpose of the diploma examinations program. The diploma examinations program grew out of a recommendation by G. L. Mowat. (Mowat was appointed in 1979 by the minister of education to analyze a report from the Minister's Advisory Committee on Student Achievement.) Mowat's report noted "a demand from the general public for mandatory Grade 12 examinations" (ATA, 2004, n.p.). In response to the recommendation, the first set of diploma examinations was administered in 1984. The program has evolved over the years. According to Alberta Education (2010b), the diploma examinations program now serves three main purposes:

- to **certify** the level of individual student achievement in selected Grade 12 courses;
- to **ensure** that province-wide **standards** of achievement are maintained; and,

• to **report** individual and group results [emphasis in original] (p. 4)

Having worked at Learner Assessment developing Pure Mathematics 30 diploma examinations, I believe that they also measure how well students understand mandated curricular outcomes. However, the apprehension that I have felt from teachers surrounding diploma examinations has been intense. The apprehension caused me to wonder about their experiences with diploma examinations and how those experiences have shaped their teaching.

Accountability Pillar. In September 2004, Alberta Education implemented the "Accountability Pillar," which places emphasis on "achieving outcomes, reporting results and using results for informed decision making for the purpose of improving programs and student results in subsequent years" (Alberta Education, 2010a). The Accountability Pillar takes into account provincial examination results of a particular school in comparison with provincial averages and with respect to the school's results the previous year. School results are presented to the district and to school administrators in a table showing whether performance on each indicator has improved, remained the same, or become an area of concern. I believe the implementation of the Accountability Pillar has heightened sensitivity to provincial examination results among school superintendents, administrators at the school level, teachers, and parents.

Public results. The Fraser Institute[3] has been ranking high school

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[3] The Fraser Institute describes itself as "an independent non-profit research and educational organization" that "measures and studies the impact of competitive

performance since 1999 and elementary school performance since 2002 (http://www.fraserinstitute.org/report-cards/school-performance/alberta.aspx) in what it calls School Report Cards. The institute contends that report cards help parents choose a school and help schools improve (Cowley, Easton, & Thomas, 2010, p. 3). Report cards identify "three indicators of effective teaching" (p. 5) based on "average diploma examination mark" (p. 5), "percentage of diploma examinations failed" (p. 5), and "difference between school mark and examination mark" (Cowley et al., 2010, p. 6). Thus, the Fraser Institute is saying that effective teaching is indicated by performance on diploma examinations.

The public nature of the Fraser Institute School Report Cards encourages competition between secondary mathematics teachers, which "ultimately pits teacher against teacher and school against school so that a community of learners is discouraged" (Volante, 2006, pp. 10-11). The Alberta Teachers' Association (ATA) commented:

> Ranking schools places additional pressure on programs to conform to what is narrowly measured by the tests; this practice of ranking has the effect of limiting the curriculum, undermining school climate, diminishing community confidence and support, and disregarding the interests and efforts of parents, students and teachers in the school. (ATA, 2005, pp. 52-

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markets and government interventions on individuals and society" (Retrieved from www.fraserinstitute.org July 31, 2013).

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I understand that the focus on accountability and reporting of results has produced an educational context in Alberta in which measuring results, comparing to others, and striving for constant improvement are central. I wonder how teaching within this environment affects secondary mathematics teachers.

Additionally, many school authorities and schools report individual student results in news reports or in local newspapers. Individual students who perform exceptionally well on GMEs may see their results made public as a way of congratulating them. Some schools offer monetary awards and other recognition to students who score the highest in the school on a particular GME. When I think about the public attention student results can get, I wonder how teachers of those students perceive the publicity and how they negotiate teaching within that context.

High-stakes? In much of the research on GMEs in the United States, the term "high stakes" is used to describe the examinations (Abrams, Pedulla, & Madaus, 2003; Barksdale-Ladd & Thomas, 2000; Goertz & Duffy, 2003; M. L. Smith, 1991; Yeager & von Hover, 2006). According to Association for Supervision and Curriculum Development, high-stakes tests are those "used to determine which individual students get rewards, honors, or sanctions. Low-stakes tests are used primarily to improve student learning" (http://www.ascd.org/Publications/Lexicon-of-Learning/H.aspx, accessed March 19, 2013). Similarly, an examination that alone determines a high portion of students' final grade is a *high-stakes* examination (Dager Wilson, 2007; Volante,

2006; Webber, Aitken, Lupart, & Scott, 2009). In Alberta, both PATs and diploma examinations have been termed high stakes (Burger, Bolender, Keates, & Townsend, 2000). From these sources, *high-stakes* is used to describe any examination in which consequences are attached to results. But is that not the case for all examinations? If students do not pass an examination, are there not consequences? What makes some exams higher stakes than others?

Abrams et al. (2003) provided clarification regarding the *stakes* on an exam. They commented that there are

> two general categories of stakes: (a) consequences for districts, schools and/or teachers and (b) consequences for students. Within these two categories, the severity of the stakes attached to the test results was classified as high, moderate, or low for both the district, school and/or teacher level and student level of accountability. (p. 22)

This description clarifies that the level of stakes varies and that for whom the stakes are corresponding also varies. Abrams et al. described how the classification as high, moderate, or low stakes was determined:

> For districts, schools and/or teachers *high stakes* refers to state-regulated or legislated sanctions of significant consequence. . . . The low-stakes category included states with testing programs that did not have any known consequences attached to test scores. If the stakes attached to the state test for districts, schools and/or teachers did not meet the criteria of either the high- or low-stakes definitions, states were placed in the moderate category. The moderate-stakes category included states that

> publicly disseminated test results. . . . High stakes for students referred to state-regulated or legislated sanctions that included the use of test scores to make decisions about grade promotion and/or high school graduation (Huebert & Hauser, 1999). The low-stakes classification was applied to states in which no observable consequences resulted for students based on state test performance. The moderate-stakes classification served a default function and was used to categorize states where the consequences for students did not meet the criteria for either the high- or low-stakes definitions. (p. 22)

A particular examination could be high stakes for teachers and high stakes for students—or any other combination. The description above highlighted that being specific about whom the stakes apply to is important in describing examinations.

From the description provided by Abrams et al. (2003), I understand that diploma examinations in Alberta are *high* stakes for students (because they determine 50% of the course grade) and *moderate* stakes for teachers (because the results are reported publicly, but there are no stated repercussions for teachers based on student performance). Yet, I wonder about comments I have heard from mathematics teachers concerning diploma examinations. Do they feel the examinations are high, moderate, or low stakes for them? Throughout this dissertation, I explore the stakes that are in play with respect to the stories teachers tell of their experiences. As noted earlier, I suspect that, although there are no explicit sanctions for teachers based on GME results, teachers feel the stakes are higher than they appear to be from the outside.

Reflecting on my experiences, I acknowledge how comfortable I am with GMEs. I know how they are developed; I understand their purposes. What I now realize is that not all teachers share my perspective. My experiences have shaped my view; but, in this research I sought to understand the views of other teachers. How do teachers who have not had my experience make sense of GMEs in an environment where so much rides on their results? Do teachers see the examinations as a threat? Do they try to understand the examination in ways other than becoming involved in marking and developing them?

In Chapter 2, I outline the theoretical frame that underpins this research - philosophical hermeneutics. I also detail how I engaged in the research process as well as how I developed my understanding of teachers' experiences. In Chapter 3, I present my understandings of the experiences of the teachers who participated in this work with me - Valerie, Marla, and Susan. In Chapter 4, I explore understandings I have developed about teachers' understandings of and relationships with GMEs. Finally, in Chapter 5, I describe how engaging in this research has changed my horizon.

Chapter 2: Concerned with Understanding

In this chapter, I will explicate how philosophical hermeneutics has informed my inquiry into secondary mathematics teachers' experiences. Specifically, I explore the following questions: What does it mean to be a secondary mathematics teacher in a context of government-mandated examinations (GMEs)? In what ways do mathematics teachers make sense of teaching in a context of GMEs? What relationships do they have with GMEs? I then present the details of how I conducted the research; how I engaged in the analysis; and how I chose to represent my understandings.

Philosophical Hermeneutics

I journeyed through several different paths when trying to discover a methodology that fit who I am, what I want to explore, and my desire for understanding. Along this journey, I found philosophical hermeneutics (Carson, 1986; Ellis, 2006; Gadamer, 2004; Moules, 2002; A. Prasad, 2002; P. Prasad, 2005; J. K. Smith, 1993) to be a methodology that connects to my understanding of how I am in the world both personally and professionally, and how I envisioned the research unfolding.

A Short History of Philosophical Hermeneutics

Philosophical hermeneutics, as a way of developing understanding of experience, evolved over centuries. The root of the word hermeneutics has been contributed to Greek mythology and the tale of Hermes: the trickster messenger of the gods (Gadamer, 2006; Moules, 2002). Current philosophical hermeneutics

also has its roots in biblical and theological interpretation. Friedrich Schleiermacher, sometimes referred to as the father of contemporary hermeneutics, viewed hermeneutics as a science or *techne* used to develop a correct or truthful interpretation (Moules, 2002). Gadamer, on the other hand, referred to hermeneutics as an *art*, incorporating philosophy and the idea that "truth is a living event; it is changing, not stagnant, and is expansive and full of possibilities (Moules, p. 11). The evolution of Gadamerian philosophical hermeneutics is a move away from truth being static to truth being organic and open.

Gadamer drew on Aristotle, Augustine, and Dilthey (among many others) to formulate his thinking around philosophical hermeneutics. Gadamer's *Truth and Method* (2004) outlines the history of hermeneutics and the development of philosophical hermeneutics. Through reading and engaging in a discussion group surrounding *Truth and Method*, I have come to an understanding of philosophical hermeneutics that guided me through this research. The ontological basis of philosophical hermeneutics and the focus on "genuine experience (Erfahrung)…which does not leave him who has it unchanged (Gadamer, 2004, p. 86) has brought forth a way of being a researcher and conducting research that does not assume that I, the researcher, *know* how teachers experience government mandated examinations. Rather, philosophical hermeneutics opens up the space to develop an understanding of how a teacher experiences GMEs through conversations.

Conducting Research in a Philosophic Hermeneutic Tradition

Through reading *Truth and Method*, I had hoped to discover a way of conducting philosophical hermeneutic research. However, Gadamer did not write about *method*. Instead he wrote about understanding and what understanding can mean. In my search for a method, several researchers provided insight about research conducted in a hermeneutic manner. One was J. K. Smith (1993), who wrote:

> As qualitative inquirers attempt to understand who they are and what they do as inquirers, they must come to terms with hermeneutics—especially with the challenge hermeneutics presents to inquiry. . . . Qualitative inquirers may well find interesting answers, but not, of course, definitive or final ones, to questions concerning the nature of qualitative inquiry and, in particular, concerning the kinds of claims that can be made for the results of this form of inquiry. Put simply, because hermeneutics is a theory of understanding, it is also, not surprisingly, a theory of self-understanding. (pp. 183–184)

To me, this statement meant that the research process would help me learn as much about myself as a mathematics teacher and a researcher as it would about my participants. Referencing the work of Palmer (1969), Smith also stated:

> Philosophical hermeneutics is not about a method for objectively valid understanding, but is rather about understanding itself. This version "is concerned not so much with understanding more correctly . . . as with understanding more deeply, more truly." (Palmer, 1969, quoted by J. K.

> Smith, 1993, pp. 196–197)

Both statements provided me with a sense that hermeneutic inquiry would be a good fit for me. Such inquiry could help me understand more deeply my experiences as a mathematics teacher, my participants' experiences, and who I am as a researcher. I realize that my interpretations will be not be "objectively valid," as Smith noted. Further, I do not expect that my understanding of how secondary mathematics teachers make sense of teaching in a context of GMEs is the *only* understanding one can have. Secondary mathematics teachers' experiences are complex; I do not expect to gain a single or surface understanding of what is shared with me. As well as wanting to understand more deeply how teachers make sense of teaching, I wanted to communicate my understandings so that others can come to know some of the nuances of teaching in a context of GMEs.

J. K. Smith (1993) also presented a sense of how an inquirer using philosophical hermeneutics might go about the inquiry. He said:

> There [are] no particular or special procedures the inquirer must undertake in order to realize an interpretation . . . as they go along in their attempt to understand the meanings and intentions that stand behind the expressions of the people with whom they are dealing. . . . Just as in the case with our day-to-day attempts to understand others, there is no pre-established process for the interpretation of meaning and intentions. (p. 197)

Although the idea that there was no special procedure to follow was a bit frightening to me as a new researcher; I connected to the sense that my research was going to be conducted in a way similar to the way I interact with others in my

daily life. In my interactions, I try to make sense of others' lives from their perspectives. Because each person has different experiences and different perspectives, I adjusted how I interacted and how I understood them based on our conversations. I chose not to make judgments about people; rather, I chose to put myself in that person's position to try to understand why and how that person thinks or feels that way, and how I would think or feel in the same context. As van Manen (1984) aptly described, "As I identify myself with the protagonist of a story, I live his feelings and actions without having to act myself. Thus I may be able to experience life situations, events, and emotions that I would normally not have" (pp. 57–58). I tried to come to know people through having conversations with them and through asking questions. I imagined that, as I was trying to understand secondary mathematics teachers' experiences teaching in a context of GMEs, a process for working together would emerge through our interactions.

Conversation

In research done in a philosophical hermeneutic tradition, conversations and stories shape the inquiry process as participants and inquirers engage in deepening their understanding of the topic under inquiry. Carson (1986) commented that "hermeneutic interpretation . . . is inherently conversational" (p. 76) and that "the participants in the conversation seek to deepen their understanding of the topic of conversation itself" (p. 76). Carson also stated:

> Establishing a conversational relation is a hermeneutic endeavor. Such a view is rooted in Gadamer's philosophical hermeneutics which considers

> interpretive acts in their widest possible sense as the ontological task of understanding the nature of human being-in-the-world. . . . Philosophical hermeneutics allows us to understand . . . in a continuing and evolving conversation. (pp. 74–75)

By framing the interactions I was had with mathematics teachers as conversations as opposed to interviews, I tried to lessen the stress for the participant about participating, as well as to open the space for a continuing and evolving understanding to be developed. In my conversations with teachers, I did not have a predetermined series of questions. Instead, I wanted participants to feel free to explore whatever was important to them at the time. "Conversation has been particularly attractive, both because of its richness and because it is a friendly and natural form of intercourse which allows for an easy exchange of experiences" (Carson, 1986, p. 81). I wanted to develop a deep understanding of teachers' experiences alongside my own experiences; thus conversations that could become "a joint reflection on a phenomenon, a deepening of experience for both" (Weber, 1986, p. 65) were what I hoped to engage in with teachers.

Conversations allowed us to explore larger aspects of the education system and GMEs together with teachers' specific experiences within that context. The conversations also provided a way to explore my own experiences working within my specific contexts, which helped create my prejudices and my horizon (Gadamer, 2004; J. K. Smith, 1993; Vandermause, 2008). In short, philosophical hermeneutics provided the framework for listening to and inquiring into the stories of teachers and of me, as we had conversations about our lives in an

educational culture of GMEs.

My Prejudices

My experiences—both as a classroom teacher developing items and marking examinations, and as a teacher seconded to work in Learner Assessment—have shaped my prejudices with respect to GMEs. Moules (2002) describes a person's prejudices as

> prejudgments that exist or are rendered before all other situational elements are examined. Unlike the notion of bracketing, we do not hold our prejudices in abeyance, but we situate them in our understandings. . . . A declaration, even to ourselves, of our prejudices does not serve to shed them, but to acknowledge that our prejudices move with us and stand in front of and between us and the world, filtering our perceptions and interpretations. (p. 12)

Moules's interpretation of Gadamer clarified that our prejudices are our pre-understandings and our already-existing notions of a phenomenon. Moules also highlighted that we cannot hold our prejudices separate from our understandings; yet, we need to recognize that our prejudices inform our developing understanding. Our prejudices are lenses we use when looking at the world.

I recognize my prejudice surrounding diploma examinations: I accept them as a necessary component to the education system in Alberta. Diploma examinations have been a part of my entire life as a secondary mathematics teacher and I have welcomed opportunities to engage with them. Through this

research, I wanted to inquire into the lives of teachers who have not had experience working with Learner Assessment and who may have a different horizon (Gadamer, 2004; Moules, 2002), or way of seeing, the examinations.

My Horizon

Gadamer (2004) referred to one's horizon as "the range of vision that includes everything that can be seen from a particular vantage point" (p. 301). One's horizon can also be identified as one's perspective and understanding of a particular experience and one's expectation for future experiences. Moules (2002) commented that "understanding occurs when horizons of the other and our selves fuse to extend the range of vision" (p. 9). The understanding that comes from a fusion of horizons (Gadamer, p. 305) broadens my own horizon, and thereby my perspective changes. Specifically, having conversations with mathematics teachers about their lives in a context of GMEs broadened my horizon with respect to interpretations of my life as a teacher in a similar environment. As others read the experiences described here, perhaps their horizons will be expanded as well.

When thinking about my horizon before I started this research, I recognize that I did not understand why teachers objected to GMEs so strongly. I did not have this horizon, but I wanted to see what others saw. Why did they think differently? More specifically, I wanted to know what in their experiences contributed to their prejudices toward, and horizon of, GMEs?

Who Inquired Alongside Me?

In my inquiry, I had conversations with secondary mathematics teachers who had more than five years' teaching experience; who were teaching a Grade 12 mathematics course during the 2011–2012 school year; and who had no experience writing, marking, or reviewing questions for GMEs. Each aspect was important to my research.

Experienced Teachers

I invited secondary mathematics teachers with more than five years' teaching experience because such experienced teachers could have had multiple opportunities to teach a Grade 12 mathematics course involving a GME. I did not focus my work on the lives of beginning teachers. Rather, I wanted to have conversations with teachers who could draw on their past as well as their current experiences.

Teaching a Grade 12 Mathematics Course

The teachers I invited were teaching a Grade 12 mathematics course during the inquiry and their students wrote either the Pure Mathematics 30 or the Applied Mathematics 30 diploma examination in January or June 2012. Because my inquiry was about the experiences of secondary mathematics teachers within a context of GMEs, the participants needed to have these examinations as a part of *their* context for the duration of the inquiry. Ellis (2006) writes that regular conversations with participants over the duration of an experience allow the researcher to "learn the stories as they are happening and invite both immediate

and later reflection" (p. 113). Hearing about the experiences of teachers in the context of GMEs as they were actually living there allowed for immediate reflection. Further, having teachers respond to the transcripts of their previous interview gave them a chance to reflect again on the experiences they had shared; this reflection, in turn, made room for further response in the next conversation.

No Experience with Learner Assessment

In thinking about my life as a secondary mathematics teacher and relating my experiences with Learner Assessment and engaging closely with GMEs, I wondered how those experiences influenced my prejudices and my horizon. I wondered how teachers who had not had an opportunity to engage closely with GMEs negotiated teaching. How did they make sense of the examinations?

Finding Participants

My inquiry began with an invitation to secondary mathematics teachers to participate in conversations about their experiences with GMEs. I began my search for participants in southern Alberta, because that was where I was living and working at the time, and then extended the search to all of Alberta when I did not find any participants who met my criteria. Following research ethics protocols, my initial contact was with the superintendents or designates of school divisions in Alberta asking for their permission to contact high school principals. Once I received permission, I e-mailed principals asking for permission to approach mathematics teachers in their school about participating in my research. When consent was granted, I e-mailed an invitation to secondary mathematics

teachers. I asked them to contact me directly if they were interested in participating in the research.

Finding participants was more challenging than I expected. Nevertheless, through continued efforts, three teachers agreed to participate in this research with me: I will call them Valerie, Marla, and Susan. Each was teaching at least one secondary mathematics course that had a GME over the duration of the study; each had more than five years' teaching experience; and none of them had worked closely with GMEs. I go into further detail about their contexts and teaching experiences in Chapter 3.

Our Conversations

Valerie and I had three conversations during the 2011–2012 school year: in early November; in late January, after students had written the Pure Mathematics 30 diploma examination, and in early April. Each conversation was in a public location chosen by Valerie, and lasted between one and two hours. Valerie was very open and willing to describe her experiences teaching secondary mathematics courses in a context of GMEs.

Marla and I had four conversations, three in person and one via phone. The face-to-face conversations were at a location and time of her choosing. Our first conversation was at the beginning of January during winter break; the second was at the end of January, after students wrote the Applied Mathematics 30 diploma examination; the third was in mid-April; and the fourth was in June, before students wrote the Applied 30 Mathematics diploma examination. Each

conversation lasted between one to two hours.

Susan and I had the opportunity to speak together only once. The conversation took place over Skype, in late January. It was one hour long.

Pre-conversation Activities

I used pre-conversation activities (Ellis, 2006) as a basis for our first conversation. The purpose of the pre-conversation activity was to give me a holistic sense of the context of the participants' experiences (Ellis, 2006). Referring to the work of Malchiodi, Ellis (2006) explains why drawing pictures can be a useful pre-conversation activity. Malchiodi, Ellis writes, "argues that the completion of drawing or other art forms can enable [participants] to relate their personal life experiences with expression of personality and emotion" (p. 118). Having used pre-conversation activities in a previous research project, I agreed with Ellis that "drawings have the potential to evoke narrative accounts both through what is present in the image and the [participant's] response to what is in the image" (pp. 118–119). In my previous use of pre-conversation activities, I started the conversation by inviting the participant to talk about her response to the activity she had chosen to do (Ellis, Janjic-Watrich, Macris, & Marynowski, 2011). That activity became a common reference point for the rest of the conversation. For the present inquiry, therefore, I imagined that starting the conversation by having each participant describe her response to the pre-conversation activity would be an effective way of entering into conversation.

Ellis also believed "a conversational relationship can be established

through discussions of the pre-interview activity products" (2006, p. 121). The pre-conversation activities I had designed asked the participants to represent their experiences in a visual or metaphorical way. The list of pre-conversation activities I used is included as Appendix A.

Participants were invited to choose one activity from the list, complete it, and bring it to our first conversation. Because of my previous positive experience, I expected pre-conversation activities to play a larger part in the research than they actually did—only Marla completed the activity. Nevertheless, as described in Chapter 3, the resulting discussion around the activity provided a cornerstone for Marla and me throughout our conversations.

Developing Understanding

Teachers tell stories of their experiences as teachers to colleagues, to students, and to themselves. Ellis (2006) wrote, "A story . . . is a theory of something. What we tell and how we tell it is a revelation of what we believe" (p. 9). Through conversations, I invited teachers to tell their stories. In choosing a philosophical hermeneutic methodology, I recognized that I would be unable to separate my understandings from those I am researching, and that the stories I tell about my teaching life with GMEs are also interpretations of those experiences. As I am a member of the community of secondary mathematics teachers in Alberta, I have my own unique experiences with examinations that I expected would flow into my interpretations of the experiences of the teachers in this research. I did not expect that my experiences could be put aside, because my

experiences shape my understanding of others' experiences. I did expect that my experiences would inform my understanding, would add to the richness of any understanding I might develop.

It is also important to address the notion of accuracy. According to Ellis (2006), "A researcher does not seek a uniquely correct or 'accurate' interpretation, but rather the most adequate one that can be developed at that time. . . . The search is for an interpretation as coherent, comprehensive, and comprehensible as possible" (p. 27). Ellis confirmed that I did not need to come up with the "right" answer to my question: in fact, there is no one specific way that mathematics teachers live in a context of GMEs. Instead, I was compelled to inquire until I came to a deeper understanding.

Through engaging in conversations with teachers, I understood stories would be told about teaching both by the teachers and by myself. As D. G. Smith (1991) noted, "We find ourselves, hermeneutically speaking, always in the middle of stories, and good hermeneutical research shows an ability to read those stories from inside out and outside in" (p. 201). To come to an understanding of these stories, I would need to engage in "the hermeneutic circle" (Ellis, 1998; Gadamer, 1975/2004; Moules, 2002).

How I Engaged in the Hermeneutic Circle

Using a hermeneutic orientation to my research means that I used the concept of a hermeneutic circle to better understand the meanings of stories expressed by teachers. Ellis (1998) clarified the importance of the hermeneutic

circle in “uncovering” (p. 22) unexpected and surprising meanings in “attempts to see what was unseen before” (p. 26). My research was therefore not just to explore what it means to be a secondary mathematics teacher in a context of GMEs. My research was also to develop a fuller understanding of myself as a teacher and of my life with GMEs.

I needed to look backwards to my own experiences with GMEs, as I did in Chapter 1, to consider how those experiences helped create my present understanding. I also needed to attend to the current context that exists between teachers and GMEs, noting that context is always in flux. Therefore, what I heard during our conversations were teachers’ experiences as they were understood at the moment.

> Throughout this work, I drew from D. G. Smith (1991), who wrote:
>
> From Schleiermacher on, three themes in hermeneutic inquiry have always been present; namely, the inherent creativity of interpretation, the pivotal role of language in human understanding, and the interplay of part and whole in the process of interpretation. That process later became articulated as the “hermeneutic circle” at work in all human understanding. (p. 190)

The reflexivity of interpreting, questioning the interpretations, and having conversations over time (Glanfield, 2003) that support new understandings was one way I engaged in the hermeneutic circle. Moules (2002) wrote:

> The hermeneutic circle is the generative recursion between the whole and the part. . . . There is an inherent process of immersion in, and dynamic

> and evolving interaction with, the data as a whole and the data in part, through extensive reading, re-readings, reflection, and writing. (p. 15)

The process I engaged in to develop new understandings began during our conversations as I asked my participants clarifying questions. Once the conversations were over, they were transcribed, checked, and reviewed by the participants. In reviewing the transcripts, the participants could edit, delete, or clarify parts of the conversation if what they meant were not captured by the transcription.

Reading through the transcripts. Once the transcript was checked, I read through it and highlighted parts of the transcripts I found interesting, making notes alongside about why I highlighted that section and what it said to me about the teachers' experiences. I also kept notes of key words and phrases to mention during subsequent conversations or to write about later. The highlighting during my first reading of the transcripts was based on what I thought might be important or to keep track of a story that had been told. I highlighted more rather than less. I tried to colour code the highlights as to particular categories, but that did not work for me.

Whenever I read the transcript, I considered the contextual variables at play: where we were sitting, what time of day, what time of year, what we were drinking, what else was going on, and so on. Each aspect of context was important to consider when reflecting on the conversations. In the initial reading of the transcripts, I highlighted whatever caught my attention. In subsequent

readings, I focused on experiences directly related to GME courses. Experiences not related specifically to such courses informed my understanding of participants' various horizons.

As well as reading the transcripts, I listened to the recordings. As Fleming, Gaidys, and Robb (2003) commented, "The researcher must take care not to be totally reliant on the written transcript, but to read these while listening to the words on tape where the two partners are working together to create a common understanding (Gadamer, 1990)" (p. 118). Transcripts do not easily capture the interplay between participants and me, nor do they reflect the emotions present in the spoken word. Listening to the recording rekindled the experience for me, often providing clarity when I was unsure of a participant's intent.

Further to reading the transcripts the first time, as I began to think more about what I wanted to write, I read the transcripts with different foci. One focus was on stories that resonated with my experiences or prejudices. I pulled out each of the stories and placed them into a different document, a separate document for each participant. I then read those stories over to see if there were commonalities within conversations with a participant, or between participants. I then organized similar stories into their own documents. The stories with resonance to my experiences were then later intertwined through Chapters 3 and 4.

Another reading I used to focus on stories that did *not* resonate with my own, or that caused me to wonder. Smythe and Spence (2012) describe how noticing difference in experiences can lead to understanding: "Encountering difference helps to reveal taken-for-granted assumptions, showing us afresh what

we already understand in a non-thinking way (Spence, 2004). Difference raises questions. Difference is the way to thinking" (p. 20). The stories that the participants told that caused me to wonder were placed in a separate document, one document for all three participants. I revisited these stories and commented beside them what specifically about them I did not understand or what made their experiences different than mine. Like the stories that I noted in the previous paragraph, these stories became intertwined throughout Chapters 3 and 4.

In addition to focusing on stories of experience, I read the transcripts to specifically pay attention to the *language* each participant used to describe her experiences. Language is a vital aspect of hermeneutic inquiry. A hermeneutic researcher must "develop a deep attentiveness to language itself, to notice how one uses it and how others use it" (D. G. Smith, 1991, p. 199). As I had read through the transcripts multiple times, the language that the participants used became familiar to me and did not seem to warrant any extra attention until I engaged in conversation with others about what had been said during our conversations. When a colleague pointed out to me that Susan using the word 'obliged' to describe how she felt was a strong way of describing feelings, I was surprised. I had not thought of that. I then went back through the transcripts and paid closer attention to how each of the participants used language. My attention to their words, brought me deeper into thinking about what the teachers were saying. As I read the transcripts, I realized that my teacher participants were sharing both their explicit and their "tacit" (Polanyi, 1966) understandings of GMEs. That is, their stories revealed both their experiences with and their

relationships to the examinations. Many of these ideas are further explored in the following chapters.

Engaging in the hermeneutic circle. The process I used to engage in the hermeneutic circle of developing my understanding is illustrated in Figure 2.1 below.

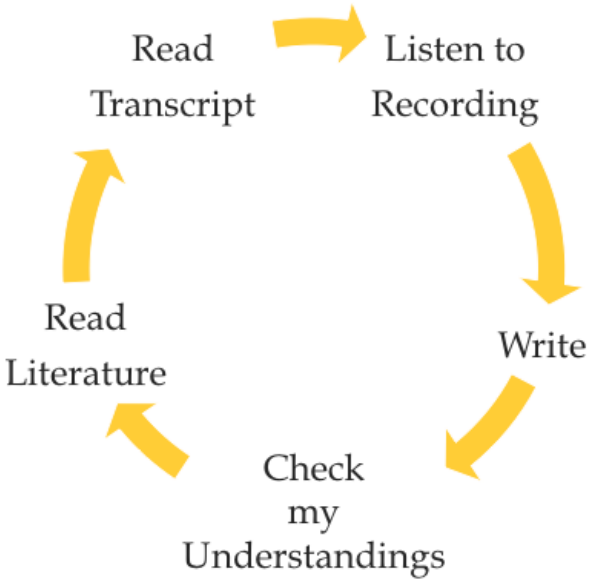

Figure 2.1: How I engaged in the hermeneutic circle

As I reflected on the process of coming to an understanding of my participants' experiences, I found that there were multiple paths I followed. Engaging in the hermeneutic circle is a process by which a hermeneutic inquirer engages in "an ongoing . . . interpretation and reinterpretation of meaning" (J. K. Smith, 1993, p. 199). I entered and exited the circle in different places depending on where I was in my writing or in my reading. Some days I read transcripts and

listened to recordings, then read articles and research reports. Other days I talked my ideas out with colleagues and wrote. Coming to an understanding was both messy and difficult (Bhattacharya, 2007; Hendry, 2009; P. Prasad, 2005), more messy and difficult than I had expected.

I spent over a year with the transcripts, the recordings, reading, and writing engaging in thinking about what the stories that Valerie, Marla, and Susan told me and could tell others about teaching in a context of government-mandated examinations. Through engaging in the hermeneutic circle, I noticed that Valerie, Marla, and Susan talked about GMEs in different ways, reflecting their different understandings and their unique experiences. In this study, I have attempted to make visible (Abram, 1996) those understandings.

Representing Understandings

Throughout this work, I engaged deeply with the topic and the textual data. As noted above, I continually revisited the transcripts to enrich my understanding. Hovey et al. (2011) wrote:

> In philosophical hermeneutics, interpretation is an ongoing process that begins with initial understandings of the research protocol; continues through the interview process, transcription, and textual analysis; and is finally explicated in interpretive writing. This approach relies on a deep engagement with the topic and textual data and attempts to generate new or different understanding rather than extracting or codifying themes. (p. 3)

Putting words to what I was feeling, doing, and thinking was key. Jardine (2006) wrote that hermeneutics provides researchers "an image of how human understanding operates in the world" (p. 269). While writing this dissertation, I wrote several other pieces that took different foci on participants' experiences. Between June 2011 and November 2013, I presented my dissertation work at five conferences (Marynowski, 2011; 2012; 2013a, b, c). For each presentation, I chose to focus on a slightly different aspect of this research. As Jardine stated:

> A hermeneutic study, in part, is the articulating of this process, not simply articulating of the *end-product* of this process. I can only find out about the revelations and distortions that my life brings to the images . . . by *working such matters out*. And I have to work these matters out *in public*—in writing, in talking to colleagues. (2006, pp. 280–281, emphasis in original)

These conference presentations helped me explore different ways of thinking about the research, about myself as a researcher, and about how to best communicate my understandings to the larger research community.

By working out my ideas in public through presentations and through periodic conversations with colleagues, I was able to test out ideas and to clarify my thinking about what the stories that were shared by my participants, meant on a larger scale. I found I was stuck in the specificities of each story, and by talking out my ideas and having others ask questions of me, I was able to come to an understanding of a larger picture.

Struggling with writing. When I began to think about creating a dissertation, I did not know where to begin. How would I know if I covered everything I needed to? I found that each time I went to write, I started in a different place. I knew readers would read my work from beginning to end—not start in the middle and move in either direction—but it made sense to me that I first engaged in reading and thinking about the participants, then reading and thinking about hermeneutics, then reading and thinking about how I had gone about the process of conducting this research, and that is how I wrote. "To work with the data is to listen for the ideas that jump out, to hear what is being said in one's own writing, to think and read and think again over the same ground, to go back and forth between 'everything'" (Smythe, Ironside, Sims, Swenson, & Spence, 2008, p. 1395). As I worked with the data, listening for ideas, my mind moved from one area of interest to another. My writing followed.

Throughout the writing process, I continued to read hermeneutic literature to help focus my thinking. The following passage helped me understand the writing process:

> Understanding spirals, grows, becomes confused, gains clarity, holds contradictions, and recognizes paradox. To explain such experience of understanding, hermeneutic scholars talk of the gift of grace (Vanhoozer et al., 2006; Gadamer, 1982). Grace is the act of handing over self to await the coming of a thought while at the same time being an active player in the seeking of new thoughts. In the interplay of seeking and waiting, of writing and pondering, of knowing and doubting, tentative understandings

take shape. (Smythe & Spence, 2012, pp. 19–20)

When I read Smythe and Spence's article, I was struggling, trying to push forward through the process. I did not have grace. I did not allow for the difficulty and the doubts and the confusion. To allow myself respite, I took a break from writing. The waiting proved fruitful: when the thoughts came, they came in earnest.

As I continued to write, I focused on the language teachers used to describe their experiences. In his introduction to Gadamer's *Philosophical Hermeneutics* (2008), Linge wrote: "Word and subject matter, language and reality, are inseparable, and the limits of our understanding coincide with the limits of our common language" (p. xxviii). Language is the way we describe our world and our experiences. The challenge, then, is knowing language well enough to be able to interpret, develop, and represent understandings. Throughout the writing and interpretation processes, I referred to an etymological dictionary and a standard dictionary to help me further understand the words used and the speakers' possible intentions.

In this study, I attended to the specifics of each teacher-participant and then to the general understandings I have come to. As D. G. Smith (1991) wrote, "Good interpretation involves a playing back and forth between the specific and the general, the micro and the macro" (p. 190). I attend closely to each participant, her experiences, her words, and her context: the micro (see Chapter 3). I then present a "metainterpretation and overarching interpretive discourse" (Hovey et al., 2011, p. 3) that attends to ideas that kept recurring to me and stories across participants that made me take notice (Jardine, 2006): the macro (see Chapter 4).

Vandermause (2011) wrote: “The interviewer seeks to uncover what it means to be as it shows up or reveals itself through story. As the stories are elicited, the interpretation begins” (p. 369). I attended to these stories throughout this work. I use the literary technique of *pastiche* (Rex & Nelson, 2004) to keep participants’ language at the forefront of my interpretation.

Representing Understandings through Pastiche

Because I wanted to faithfully represent (Fleming et al., 2003) the words and experiences of teachers, pastiches presented themselves as a way to maintain participants’ stories and illustrate my understandings. Rex and Nelson (2004) said the main purposes of the pastiche are to “create a readable and purposeful representation” (p. 1297) and to provide “descriptive narratives” (p. 1290) with rich descriptions of classroom practices. Rex and Nelson described how they developed pastiches in their work: “Segments were transcribed verbatim to represent the teacher’s professional position in his or her own voice, and linked together to produce coherent texts that were later condensed into representative pastiches” (p. 1297). Because I had several conversations with Valerie and Marla, it was possible to draw together pieces from different conversations that related to the same idea.

Slomp (2007) used pastiches to represent his conversations with teachers. Slomp further detailed how he developed his pastiches:

> Out of respect for the individuals participating in this research, each pastiche is punctuated to reflect the voice of the speaker as accurately as

> possible, therefore punctuation reflects the conventions of spoken English rather than written English. Also, each pastiche has been edited with a focus on reflecting the intent of the speaker rather than capturing his or her comments verbatim: pauses, stutters, repetitions, and other features of spoken language have been edited out of these pastiches. (p. 148)

I followed Slomp's approach in the development of the pastiches. As mentioned above, because I had several conversations with Valerie and Marla, I was able to pull parts of different conversations together that I felt were connected. In my conversation with Susan, because we returned to a number of topics more than once, I used a pastiche to pull together pieces of that conversation. An example of how I developed a pastiche is in Appendix B.

What Addressed Me?

In constructing this dissertation, I chose not to use *themes* to represent teachers' experiences. Jardine (2006) anticipated my reluctance to use themes when he stated that "a dead theme under which teacher's comments silently 'fall' . . . is no longer true in this 'hermeneutic' sense. There is nothing 'true' about a 'theme' under which instances fall" (p. 283). But how to indicate what addressed me (Gadamer, 2004; Jardine, 2006) if I did not use themes?

Attending to the Part

As I read through transcripts and listened to the recordings of our conversations, I kept noticing specific words and phrases. They kept drawing me in, asking me to pay attention. These key phrases became the titles of sections in

the discussion of each participant.

For each participant, in the following chapter I present her context and how she came to be a teacher. According to Gadamer (2004), "A fundamental principle of understanding [is] that the meaning of the part can be discovered only from the context—i.e., ultimately from the whole" (p. 189). Part of teachers' lives is their history and school context. Not attending to those aspects would leave me with a less complete understanding of their experiences.

Following a description of her context, I translate my understandings of the teacher's experiences into representative pastiches alongside my interpretation of what her words say to me. Because I want to understand each teacher's unique horizon (Gadamer, 2008), I engage with each of their stories in a separate section.

Attending to the Whole

As I approached interpretation on a macro (whole) level, I noted elements of experiences that resonated across my three participants' lives. Interpreting their experiences of teaching in a context of GMEs led me to realize that their stories illustrated possible ways of knowing and living. Vandermause (2008) wrote:

> It is the task of hermeneutic research to translate our understandings of experience into language that, in turn, can build and create a practice. This is the poiesis or putting together, creating the explication and presenting understanding that the hermeneutic process offers. (p. 71)

I explicate my understandings of the teachers' ways of knowing and living in Chapter 4, incorporating individual experience into a larger image of teaching. I

also note that, as described in Chapter 1, each teacher has a different sense of *stakes* with respect to student results on the GMEs.

Attending to My Horizon

When I listened to my participants' stories, I heard some of my own. Thus my inquiry into participants' lives affected how I saw myself, helping my self to become more clearly defined. As Carson (1986) wrote, "In a hermeneutic sense understanding is not completed unless we see what is understood as applying to us in some concrete way" (p. 82). Philosophical hermeneutics provided a frame in which I could acknowledge myself as a researcher, acknowledge my subjectivities and prejudices, and understand how I have changed through the inquiry process. In Chapter 5, I further attend to how my horizon has been broadened through my conversations with Valerie, Marla, and Susan.

In this study, I have tried to follow the advice of Fleming et al. (2003): "The researcher should thus attempt to understand how personal feelings and experiences affect the research, then integrate this understanding into the study" (p. 117). By noting my experiences along with those of Valerie, Marla, and Susan, I am able to see more clearly how my experiences are and are not reflected in their stories.

In the following chapter, I present Valerie, Marla, and Susan's experiences as teachers within a context of government mandated examinations. I address each teacher separately, and then in Chapter 4, I address understandings I have developed that transcend all three teachers' experiences. Chapter 5 concludes the

dissertation, presenting my new horizon and extended learnings from this research.

Chapter 3: Teacher Experiences

This chapter focuses on individual participants' experiences, examining the micro level of their teaching in a context of government-mandated examinations (GMEs). As noted in Chapters 1 and 2, I used philosophical hermeneutics as the research methodology, engaging the hermeneutic circle to develop my provisional understandings of the experiences of Valerie, Marla, and Susan. Here I present pastiches of the participants' words to describe how she chose teaching mathematics as a career as well as her teaching context. I present my understandings of what her words say, along with, as a kind of counterpoint, my own experiences.

In searching for participants to have conversations with me about their experiences, I found Valerie, Marla, and Susan. Little did I know that these three women would share rich stories and experiences with me. I did not intend to have three women as participants, but I am fortunate to have found three that had diverse teaching assignments and understandings of government-mandated examinations.

Valerie

Becoming a Mathematics Teacher

Valerie decided to become a mathematics teacher when she was in Grade 12. She had wanted to get a business degree, and certainly had the ability, but wasn't sure she wanted the life of an executive. A friend was looking into becoming a teacher and Valerie went with her to learn about the University of

Lethbridge, where she could get two degrees in five years, and thus have a fallback degree if she did not like teaching. Valerie had taught dance for six years and had considerable experience tutoring math and science. She loved learning; mathematics came easily to her. Her grandfather had been a math teacher and her godmother was a teacher. Teaching seemed like a natural fit, and she liked the lifestyle: the job security, the flexibility, the pension.

Valerie's Context

Valerie teaches in a midsized high school, Grades 9 to 12, whose population consists mostly of affluent, rural students. The school offers regular as well as Advanced Placement programming. The culture of the school is one of success and excellence. Parents are actively involved in their children's education. The school encourages teachers to provide portions of courses online as each student is expected to have a laptop or mobile device. There is no formal mathematics department; three teachers teach only mathematics and two or three others teach one course.

Valerie has taught for approximately eight years: three years at a middle school teaching mathematics and Grade 5 and the past five years at her current school. Valerie has taught Pure Mathematics 30 at least once a year each year she has taught, either in regular class, summer school, or by distance learning. She has also taught a variety of high school mathematics courses with most of these being high-academic Grades 11 and 12 courses and calculus.

I have organized Valerie's experiences into three sections. Each section

title is a phrase she used that represents a salient aspect of her experience.

We Are Coachland High

The students in Valerie's school are from an affluent community; most will go to a post-secondary institution when they have completed high school. Thus Pure Mathematics 30 is not the end of the mathematical learning journey for many of Valerie's students. Most students are enrolled in Pure Mathematics 30. Valerie commented, "We have only 36 kids out of 200 taking Applied." The school promotes academic excellence.

Notably, in our conversations Valerie commented several times on the school culture. When describing why or why not the school was engaging in particular practices, she said simply, "We are Coachland High." For example, explaining that she offers a weekend review session just before students write the Pure Mathematics 30 diploma examination, she said: "We spend a whole weekend where we do exam prep just because we're Coachland High." Using this phrase to justify particular practices suggests that there are expectations of students and staff to be maintained.

Valerie also used this phrase when describing a professional development session that changed the way she thought about teaching mathematics. Inspired by the speaker, Valerie wanted to change how her courses were structured. She was planning to change her Grade 11 course but not her Pure Mathematics 30 course. She imagined how she would respond if the speaker confronted her about not making changes to the Grade 12 course:

> I know what you're saying but you come from a province with no diploma exams, you don't come from Coachland High, you have a doctorate and you get to do what you want. I don't. I love my job and I'm not about to freak out the entire community of Coachland.

There is a certain way of doing things at Valerie's school that is understood by the community— students, teachers, and parents. She is not willing to push against that consensus. Handal and Herrington (2003) referred to Ball (1997) when they stated, "Oftentimes teachers are afraid of what parents and administrators will think in regard to a curriculum innovation" (p. 63). Valerie articulates a fear of how her community might react to what could be perceived to be drastic changes in the mathematics classroom.

Another feature of the school community that contributes to the culture of conservatism is a stable teaching population. Valerie said: "It's a neat culture at Coachland High. People have been there for 30 years and we have only 35 on staff." She waited three years for a position at the school and she is not willing to give her position up easily. In her words, "You have to wait on someone to retire because I'm going to sit in my job until I retire and that's 24 years from now. So if you're waiting in line for me, you're going to wait a long time."

The way of doing things at Coachland High is well established; her colleagues as well as parents and students could potentially resist radical changes. If parents choose to have their children go to the school because of the tradition they know, making a change to that tradition may not be beneficial to Valerie's career. As she said, "I kind of have the top position . . . it does not get any better

than that. I have a brilliant job." She does not want to jeopardize her standing in the school or in the community.

Part of being a teacher at Coachland is maintaining diploma examination results higher than the provincial average. Valerie's students' results have never been lower than the provincial average. She has taught Pure Mathematics 30 at least ten times and is confident of her ability. But the anxiety of her students' results being lower than the provincial average is still there, and it drives her to continue being diligent so she remains safe in her "top position" at the school. Valerie believes, if results were lower than the provincial average, she would be chastised. She is safe "as long as we're bigger than the provincial average. Big worry if I was less or something, like if the average comes out at 76 or something and I'm at 74, they'll haul me in and I'll have to justify it somehow." M. L. Smith (1991) commented: "Administrators in high-scoring districts use [examination] scores to ward off outside interference from parents and patrons and as symbols of status. Thus some apply pressure to teachers to keep scores higher, raise them, or exceed the previous year's achievement growth" (p. 9). Valerie feels that she is expected to help maintain the status that Coachland High has achieved.

I May Have a Trick

In our conversations Valerie referred several times to having a "trick" for her students. In teaching Pure Mathematics 30, Valerie uses particular activities, or tricks, to help students remember difficult concepts. For example, when students struggle finding the centre of a hyperbola, she says: "Stand up. Now, in

Ukrainian, your belly button is your poopitz; find your poopitz. We're hyperbolas and this is our centre." She shared another trick for remembering the direction of opening of a hyperbola: "How do you know the direction of a hyperbola, right? Well, if it equals negative one, it makes an umbrella and it's sad and negative when it's raining." Giving students tricks is a strategy to help when they confront a question on an examination that they are not sure how to begin. She said, "If you don't know your direction opening, and that's really just a convention, you're sunk, so I can give you a trick so you can start the question." Being able to provide students with appropriate tricks seemed important to Valerie.

Having such "tricks" demonstrates Valerie's competence. She described the scene in a Mathematics 30 Applied course:

> Every now and then they'll bring me this stuff and I'll say, okay, I need to think through this, because I don't have a trick for them—that's what I find frustrating. I don't have a quick . . . I know how I learned it but I don't have a fast, you know, "What if we do this?"

Without that trick, she feels like she does not have a good enough handle on the course for the students to have confidence in her or for her to have confidence in herself.

I wonder if Valerie's reliance on tricks to help students perform reflects her understanding of mathematics. Ernst (1989) described three philosophies of mathematics that are connected to how a teacher goes about teaching. From Valerie's comments above, her philosophy of mathematics seems to be an "instrumentalist view that mathematics is an accumulation of facts, rules and

skills to be used in the pursuance of some external end. Thus mathematics is a set of unrelated but utilitarian rules and facts" (Ernst, 1989, n. p.). The tricks Valerie incorporates into her teaching do not encourage students to explore and think critically about mathematics, but to memorize little details.

I have used acronyms or stories myself to help students remember conventions or particular ideas. One I used often was the order in which transformations of functions are applied: stretch, reflect, then translate. I used the analogy of when you get up in the morning you *stretch*, then you look at your *reflection* in the mirror, then you *translate* yourself to school. I did not explain why transformations were applied in that order or what difference it made to the resulting graph. I just wanted my students to remember the specific detail.

When I think back on that practice, I was not encouraging students to look deeper at the mathematical ideas governing transformations. I was saying, in effect, "This is too difficult for you to understand why, so I am just going to give you a way to remember it." My students were happy they had a way to remember the order of transformations and they did not have to worry about learning it. That is not what I intended. Like Valerie, I wanted students to be able to answer the question without getting tripped up at the beginning. I realize now that I was short-changing their learning opportunities. I also realize that *I* did not know why transformations had to be done in that order.

Valerie talked about the change in curriculum in her Grade 11 courses and her expectations for the following year for her Grade 12 ones. She admitted having a hard time implementing the philosophy of the revised program of

studies. She said:

> I'm having trouble making their ideas tangible in my room: I know what works for my kids; and I know what Alberta Ed wants me to do; and I know what my principal wants to me to do; and there's no overlap. Alberta Ed's moving away from technology, my school just went all one-to-one all to single digital devices and I'm not sure who's going to fire me first if I don't teach what I'm supposed to teach, so I just lie to everyone and tell them I'm doing everything they want me to do.

Valerie wants to do the right thing by her students, her administration, and Alberta Education, but she cannot envision how each of these competing pieces should come together for her in the classroom. Her instinct is to hide and to tell everybody what they want to hear. As noted by Handal and Herrington (2003), when teachers' goals conflict with the goals of classroom reform, "teachers will maintain their hidden agendas in the privacy of their classroom" (p. 65). Valerie cannot visualize how to live up to the varying expectations of students, administration, and Alberta Education. She believes she has "a brilliant job" and does not want to jeopardize her standing in the school. Therefore she tells each group that she is doing what they ask of her.

Until They Show Me What This Diploma's Going to Look Like . . .

Even in our first conversation, ten months before the revised curriculum would be implemented in Grade 12, Valerie commented that she did not want to be teaching during the transition. She said: "I'm hopefully going to be pregnant

and having a baby and it won't be my problem. I'll just come back when they've figured out how that's supposed to go."

Valerie is comfortable with the current GME: She can predict the topics and kinds of questions that will be asked. Facing an examination she has not seen before produces anxiety:

> I wish Alberta Ed would tell me what this 30 diploma is going to look like. I think that's what a lot of teachers are apprehensive about. I think once we see the diploma, and that students will be allowed to use their own strategies, then we're going to be more apt to let students use different strategies. If the diploma is going to have questions that if students don't do it in a specific way, they can't get to the answer . . . I don't want to wait until November to know if it's part calculator, part non-calculator; are they allowed to use any strategies. I hate this: "Use any strategy you want" but we're going to put you in a multiple-choice test and we're going to say, 'Little Johnny did the following question . . . where did little Johnny make his mistake?'—through some strategy that *my* kids chose not to use.

Valerie is concerned about the potential inconsistency between encouraging students to use their own strategies—a practice she understands is in the new curriculum—and the examination's requirement that students use specific strategies. She is trying to reconcile the expectations of the curriculum and what might be present on the diploma examination. Because the exam is an unknown, she worries about encouraging students to use alternate strategies.

In the preceding pastiche, Valerie emphasized the word *my* when referring

to students in her classes. The emphasis indicates what I understand is her protectiveness toward the students she teaches: they are truly *her* students. Valerie feels responsible for her students and for their performance on the exam; she does what she can to ensure success for her students and for herself.

Together with her expressed anxiety regarding the examination, she is not confident how she is going to organize teaching the new Grade 12 course. She said: "There is such a mishmash in this course. I don't really know how you do everything from polynomials to transformations to rational functions." Valerie is comfortable with the current content and organization of the courses but is having a difficult time envisioning how the new course will be structured.

Because of her discomfort, Valerie is taking opportunities to become familiar with the content by editing resources that will be available for teachers to use in the revised program. During our final conversation, when Valerie was expecting to be back teaching in the fall, she said:

> I've gone through the new book, so I know kind of where I'm going. I'm not afraid of it. I'm annoyed about the level of work. I'm not a binder person but there are some things I teach really, really well. I teach conics really well and it's gone. I guess I find it dry; maybe that's the word. I'm good though. I just don't want to redo it all again. Being pregnant would be a goal. I would like to have this all shake out and then figure it out for about a year.

Valerie is reconciled to the fact that she will have to teach the new course in the upcoming semester. She does express that she is unhappy with the added

workload of creating new resources and lessons and not being able to teach topics that she is good at. Though she says that she is good and not afraid of the new course, she still would prefer not teaching the first year of the new program.

Valerie talked about other teachers who are resistant to the change in the program and who are stuck in a debate of whether or not they will adopt the new program. She said, "Some of us are moving forwards and others aren't. What I think we need to do in order for this to be a go, because it's not really a choice that we have, is to stop arguing about if we're going to do this because you have to do it." Valerie had been one of the resistors, yet she finds others to be more resistant than she was. There are teachers in her school who are saying they are not going to change; Valerie understands that they *must* change. She knows there is going to be change, but she does not have to like it.

Engaging in the hermeneutic circle to come to an understanding of Valerie's experiences, I concluded that diploma examinations were high stakes for Valerie. In Chapter 1, I suggested that diploma examinations in Alberta—although high stakes for students—should be *moderate* stakes for teachers. Why then are the stakes so high for Valerie? The degree of concern that Valerie expressed regarding student results on the examination suggests that in her horizon, the results are an indication of her competence as a teacher. I further explore the stakes for Valerie in the next chapter. In the next section, I discuss Marla's experiences. Though she has similar number of years' teaching as Valerie, Marla's context and experiences are much different.

Marla

Becoming a Mathematics Teacher

In an e-mail, I asked Marla how she decided to become a mathematics teacher. She responded:

> My first year of university was in the Bachelor of Science program as a prerequisite year before Business. I wasn't really sure what I wanted to do but I was considering opening my own music store (selling CDs and vinyl) or being a chemistry teacher. I discovered I did not like my economics classes nor my chemistry class, which left me at a loss. I completed that first year and then I took three years off school. I started to think about what I enjoyed and remembered my experience as a math tutor in high school. I eventually narrowed possible career choices to naturopath, massage therapist, or math teacher. I decided, through conversations with my family, that math teacher was the best choice since it seemed to offer the most job security, as well as coming to the top of the list with any career personality test I took. So, at 23 years of age, I went back to university in the Bachelor of Education program with a major in Mathematics and a minor in Intercultural/International Education. (personal communication, November 20, 2012)

Although Marla and I had once been colleagues, I did not know that being a mathematics teacher was not her first career choice. This surprised me: I had assumed she started her education degree immediately following high school, as I

had. This new information about Marla's progression in becoming a teacher caused me to reconsider my already established horizon of her. I had been opened up to consider what I had not seen before.

Marla's Context

Marla teaches at a large urban high school where the student population comprises many different cultures and socioeconomic statuses. The school offers a wide range of programs, from a full International Baccalaureate diploma for students with high academic standing to Knowledge and Employability[4] courses for students who are traditionally unsuccessful in school subjects. The mathematics department consists of approximately ten teachers and a department head.

Marla has been teaching secondary mathematics for eight years, all at the same school. She has taught mostly Grades 10 and 11, with the majority of her classes what are often considered "lower" academic courses. The year we had our conversations, Marla was teaching four sections of Applied Mathematics 30. She

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[4] According to Alberta Education "The Knowledge and Employability courses are designed for students who meet the criteria and learn best through experiences that integrate essential and employability skills in occupational contexts. The courses provide students opportunities to enter into employment or continue their education" (retrieved from http://education.alberta.ca/teachers/program/know.aspx May 17, 2013).

had recently made a change from teaching full-time to three out of four periods every day because she had some health problems. She has found that decreasing her workload made a major difference in her health and personal life.

A Good Day and a Bad Day

Prior to our first conversation, I asked Marla to complete a pre-conversation activity, as described in Chapter 2. Marla responded by drawing a picture of good day and a bad day in her classroom. She described what she drew:

> My good day is: Students that all have something to write with and paper; and in this case they're all working together and they're helping each other. Like this one guy is like, "Oh, how did you get that?" instead of just "Oh, what was your answer for b?" and just copying it down. They're actually wanting to know how to do it or catching their own mistakes and helping each other or getting the materials and working on the problems. So that's my good day and my bad day is: Some students don't have pencils; some students don't have pencils and paper; some are just sleeping on their desks; some are attempting stuff but just say "I don't get it" and stop or are off task; some just want to watch a movie. That's not so awesome.

Marla's description of good and bad days in Applied Mathematics 30 connected to my experiences teaching the same course. I nodded my head along with her as she described her drawing. I remember telling similar stories of students in Applied Mathematics 30: They were either very willing to work or had no interest

in anything that was occurring in the classroom. The two extremes were present in each class period I taught.

I smile each time I read Marla's comment that some of her students want to watch a movie. I recall a group of Mathematics 30 Applied students who kept asking me the same thing. I got frustrated with the continued pestering, so I finally showed them *Donald in Mathmagic Land* (Luske, 1959). Some of the content was relevant to the course. The students were excited when I told them we were going to watch a movie that day, until I started playing it. I remember some of them groaning and asking me to turn it off but I made them watch the whole movie. They never asked to watch a movie again.

I asked Marla if she could identify a pattern as to when the class might become a good or a bad day. She replied that she was never quite sure which it was going to be:

> Sometimes I really don't know the logic between when it's going to be a good day and a bad day. I mean, there might be a pattern that I haven't uncovered yet but it just seems to be whether they've had enough sleep. It's also dependent on the lessons. If it's a really heavy lesson where I'm going to be at the board for most of the lesson, it tends to go more towards a bad day. But if I can break it up then it is not so bad. It also depends on the material. If it's really hard material, like let's say near the end of vectors, and the students are frustrated with the material, then it's more inclined to go towards a bad day than a good day.

Marla recognizes that students in her Applied Mathematics 30 classes do not

respond well to heavy note taking and content days. Those days often turn into bad days.

Marla's description resonates with my own experiences. Students in this course sometimes resisted what appeared to be challenging content. Some students disengaged from the class rather than try to make sense of the material. I can hear students' words in my head: "This is too hard," "I'm never going to get this," "When am I ever going to need this?" When students made these comments, I knew it was going to be a bad day.

Student comments in my Applied Mathematics 30 class led me to believe that some of them do not find mathematics useful. Their beliefs can lead to bad days. Similarly, Fennema and Sherman (2004) found that higher-achieving students considered mathematics to be more useful than did lower-achieving students. Reyes (1984) also reported studies that "identify usefulness as important in predicting mathematics achievement" (p. 272). If students do not find mathematics useful, their achievement is predicted to be low. The reverse is also true: If students do not have success in mathematics, they perceive it to be not useful. For students in Marla's and my Applied Mathematics 30 classes, perceived usefulness and difficulty of content often determined how students reacted to the lesson.

The understanding Marla and I shared of "good" and "bad" days extended through all four of our conversations. The discussion surrounding the pre-conversation activity allowed us to create a common understanding of what her classes sometimes felt like. We referred to good and bad days often, and the idea

reappears in some of the pastiches that follow.

We're in Applied

As I reflect on Marla's description of a bad day, I think about the mathematical journey of some of my students in Applied Mathematics 30. I suspect some of these students had limited success in mathematics. By the time they reached Grade 12, they may have had little confidence in their abilities, and little desire to put effort into work they felt they could not do. Marla connected her comment about willingness to try with a wonder about a particular aspect of the school system:

> I wonder about the automatic passing in grades K through 9, students moving on with their age group. I get being with their peer group, but I also get that if they're moving on to the next level and they don't know what they're doing, if they don't know as much as their peers, if they're not at the same level as their peers, then at that next level, they feel self-conscious about trying. They feel like they're stupid and they can't do it but they're just going to be moved on anyway. "I don't know how to do this, I didn't know how to do the other stuff, and I know I'm going to be moved on anyway, so even if I do put in the effort, I don't know what I'm doing, I'm going to fail anyway and look stupid. So what's the point of trying when I could just not do it and maybe make people laugh in the back of the room or get some sort of positive reinforcement that way.

The attitude Marla noted in some students could reflect how they have

experienced school. Klem and Connell (2004) reported that "a high proportion of students are not engaged in school and that some students become disengaged as they progress from elementary to middle to high school" (p. 262). Marla's comment, alongside Klem and Connell's, makes me wonder if students who have not been successful (but have been promoted to the next grade, where they are even further behind) disengage from learning.

Marla noted that some students, rather than trying and failing, put on a front that they are too "cool" to even try to understand the material. Reyes (1984) labelled this phenomenon "learned helplessness" (p. 568). Reyes connected learned helplessness with shame and failure:

> Students experienced the most shame when they had tried hard and failed anyway. The least shame and perception of low ability were associated with failure after not trying. Thus, it is likely that the learned helpless student will avoid the shame of failure by not making an effort. Since such a student sees failure as inevitable, failure without effort is perceived as less painful than failure when an effort to succeed has been made. (p. 569)

Some students in Marla's Applied Mathematics 30 demonstrated learned helplessness. To make no effort is a "functional coping strategy" to retain a positive self-image (Hannula, 2002, p. 43). Marla sums up the mentality: "We're in Applied, we don't have to work, we don't need to do homework, we're in Applied." They know they are seen to be in the "dumb" math class—all the "smart" kids are in Pure Mathematics 30. Marla mentions a few students who were in the high-academic mathematics course before transferring to Applied:

"They're fun to work with and they actually will try stuff because they haven't failed their whole math life." The students from Pure Mathematics were willing to engage in the class. Notably, Marla used the word *fun* to describe interactions with these students.

Respond lowly to low expectations. Marla feels that she responds to students' not completing assigned questions outside of class time by not *expecting* them to complete questions outside of class time. But is she "caving" to their lack of effort or "meeting students where they are at"? She pondered:

> One of the conversations we've had within our department is are our expectations for the 30 Applieds too low? And they respond lowly to those low expectations. "You don't expect us to study over Christmas break, we're not going to study over Christmas break." Is that it? Or is it we know they're not going to study over Christmas break so we change it so we don't hold them accountable for that? Like if I made the exam after Christmas break it wouldn't make them study, but am I just playing into that low expectation by not putting it after Christmas break?

Marla touches on a wonder I have had throughout my career. Have I set low expectations for my students because of my experiences, or were my students responding to my lowered expectations by doing what I was expecting? I have battled that uncertainty myself and I have no resolution for it.

Klem and Connell (2004) stated that "young people need to know what adults expect regarding conduct, that consistent and predictable consequences result from not meeting those expectations, and that the expectations are fair" (p.

262). Alongside consistent and predictable expectations, Klem and Connell noted that "either teacher support or a focus on learning and high expectations leads to improved levels of engagement and achievement; however, the combination of the two far exceeds the outcomes associated with either one individually" (p. 271). Students respond to consistently high expectations with increased engagement and increased achievement.

Marla speculated that our expectations for students in Grades 10 and 11 are not high enough. Consequently, when they get to Grade 12, they are unable to perform as we think they should. She said:

> We do all of these things in 10 and 20 to enable students not to work really hard but all of a sudden we expect them in 30 to magically become fantastic workers. We don't really expect very much from them until 30 and then we expect them to do work and to study and I don't think they really know how to study.

Marla's comments highlighted a seeming disconnect between the rigour of Applied Mathematics 20 and 30. I have heard teachers say that a student can pass Applied Mathematics 20 if they just show up every day. Then when they go into Applied Mathematics 30 with the same low expectations, they are taken aback at how challenging the content is. I wonder if the seemingly inconsistent expectations between the grades set teachers up for having more "bad" days than "good" in the Grade 12 course. Also, does the GME at the end of Grade 12 result in teachers having higher expectations?

A sort of working relationship. Although Applied Mathematics 30 has

presented challenges to Marla, there are good moments, too:

> I like teaching 30 Applied and I don't like it. I feel like I'm starting to get comfortable with the 30 Applied student, like I can develop a sort of working relationship with them where we joke around and still get some work done . . . I like the personality of the class. I like on the good days when they say stuff like, "We really like math" or "I totally get this now," because it means so much more to them than I feel it does in the Pure. Where in the Applied it's like that's triumphant if you're saying I like math. That's massive. Whereas in Pure they've probably experienced that success before, so those "aha" moments just feel a little bit more special in the Applied classroom.

I remember the feel of the Applied Mathematics 30 classroom being different than that of a Pure Mathematics classroom. The atmosphere in Applied Mathematics 30 is almost relaxed and casual—there is little stress about students worrying about achieving high marks. Students often celebrated earning a 50% with high fives because that means they passed. Having a student who struggled say they got it instead of giving up was cause for celebration and enjoyment.

Like Marla, I developed a working relationship with my Applied students. There was a unique personality to the class: They accepted me for who I was just as I accepted them. I found that Applied Mathematics 30 students were likely to engage in the mathematics because they liked me as a teacher rather than because they liked mathematics. I was able to connect with some students through my love of professional football or my non-mathematics knowledge. I found that the

connections I made with students outside mathematics were beneficial *in* the class.

Along the same lines, Hackett and Betz (1989) confirmed the relationship between self-efficacy, anxiety, and performance. *Self-efficacy* is defined as an "individual's confidence in her or his ability to successfully perform or accomplish a particular task or problem" (p. 262). Hackett and Betz found that mathematics self-efficacy predicts mathematics-related performance and math anxiety. As noted earlier, some students in Applied Mathematics 30 are not confident of their abilities. According to Hackett and Betz, such low self-efficacy would be related to increased anxiety and decreased performance.

Oh My Gosh, We're Not Going to Get through This

When Marla teaches Applied Mathematics 30, she tries to read student motivation to engage with the material. She then adapts her lesson depending on whether she feels it is going to be a good day or a bad one:

> If I feel like the students are motivated on their own then I'm more inclined to let them work on their own. But if I give them ten minutes to work on some problems or to brainstorm and they're just talking about what they're going to do this weekend then I feel like I'm just wasting class time. So I end up guiding them or telling them what to do. But if they're actually engaged in the material and they're motivated to try that day then I'm more inclined to give them opportunities to try. Sometimes though I just feel like I'm behind in the unit, I need to get this done, I need

> to do the exam on this day ’cause I can’t push it forward, so whether they’re engaged or not, we’re doing this heavy, note-laden lesson. It feels like more of a struggle to me when I have a heavy, push-through day. Maybe it’s because I feel more of the panic and if there’s one minute where we’re not on task I feel like, oh my gosh, we’re not going to get through this.

Although sometimes Marla sees that students are not engaging with the ideas, she feels a need to keep going so that each minute of the class is spent moving forward. Marla does not necessarily want to move ahead when students are not understanding, but she feels compelled by the panic of not completing the course to push through anyway.

Some of the panic is due to the GME. I had asked Marla if she felt this panic in other courses, or if the feeling was unique to the Grade 12 (GME) course:

> I still feel a bit of panic when I teach 20 Applied. But I don’t think I feel it to the same extreme because I also kind of feel with 30 Applied that I don’t know what’s going to be on the diploma. I’m trying to teach them as much about the subject as I can and I say, Okay, a question could look like this, or it could look like this, how would you approach these different types of questions? And I feel like I’m just trying to cram as much in as I can. Whereas if it’s a 20-level course, I know where we’re going, I know what’s on that final, I know what to expect and I can adjust the exam to match the course or I can adjust the course to match the exam. I feel like I have more flexibility with that.

I also experienced the lack of flexibility Marla described. As noted in Chapter 1, I taught Mathematics 33 one year when there was no diploma examination and the next year when there was. M. L. Smith (1991) observed that, in contexts where there is an externally administered test, "a narrowing of possible curriculum and a reduction of teachers' ability to adapt, create, or diverge" (p. 10) is evident. I found I was less apt to broaden course content when there was diploma examination.

> Marla further reflected on how GMEs can affect day-to-day practice:
>
> There isn't really a deep understanding of mathematics. It's totally superficial and that's where, when they get to the diploma and they see different types of questions, they get floored because they haven't seen that question before. "We didn't learn that. You never gave us a question like this in class." This semester I have been trying to emphasize I don't know what kind of questions you're going to get. So I've been trying to kind of incorporate questions they haven't seen before and get them to try it. I just want them to try it, and to experience that thought process of how do I try a question I haven't seen before. I don't know if it's really even successful though, because if it's too new then they're just like, "Can you go through this with us? I don't know how to do this. I'm just going to wait until you do it on the board." They'll wait forever and eventually I do end up breaking down and either I give them a hint or I get someone else, like one of the students, to do it on the board or I do it on the board. I don't know how long to wait and when does waiting just become

> pointless. I mean, if they've decided they're not to do it, they're not going to do it no matter how long I wait them out.

Marla expressed trying to encourage students to attempt questions they are not familiar with. These students have learned that, if they wait long enough, the teacher will do it for them. Marla is battling years of learned behaviour from her students; she is finding that they are able to wait her out. Although she wants them to experience trying new questions, she expresses that at some point waiting the students out is not effective. I wonder if she feels she does not have the time or the patience to break down the resistance that students exhibit.

Marla has also not completely figured out what motivates some of her students. She tries complimenting them on their behaviour and work ethic, yet that does not always work. She stated:

> There's some where—if they're doing good things, and I say, You're doing so awesome, just keep up the good work, you're doing so well, or I call home and tell their parents and I say, You know what? They've made so many improvements this week, it's so impressive. The next day they could either work just as hard or they might skip because they've accrued all of this big credit that now they can relax a little bit. I never know should I call and give that positive reinforcement or does that just mean they're going to not show up and we'll lose all that momentum.

Marla noted that complimenting a student for having a good day and for working hard can lead to a bad day. Students sometimes feel like they have earned the right to not have to work as hard the next few days.

Because compliments do not always have their intended effect, Marla does not know how to motivate students to continue doing good work. She experienced success getting a particular student who regularly did not attend on exam days to show up for exams. I smile when I think of the elation in her voice: "I was really proud [laughter] that he showed up for every exam after that. I'm like, Yeah, I got you. I got you, kid." Marla wondered:

> If it was a one-on-one conversation that I could have with every student then maybe I could get students to see the value in challenging themselves in learning for the sake of learning and to push yourself. To say, You know what? this is hard, but I can do this—having belief in yourself and confidence in your ability to take on those challenging situations. But maybe that's a lesson that has to be learned later. Maybe someone doesn't learn that as a teenager. Some people do though.

Marla speculated that having individual conversations to persuade each student that learning is worth the effort might be the key to reaching them. However, the time to have those conversations is not necessarily available—not to mention students' willingness to participate. Marla wonders if she is expecting too much from her students, yet she sees in other students what seems to be missing in hers.

Marla's experiences remind me of the challenges of teaching diverse populations and the necessity of getting to know students to find what works with each one. Like Marla, I learned that different students respond differently to different incentives. The hard part is figuring out which incentive works.

We're at Our Limit

In Marla's school, diploma examination results are analyzed every semester in each subject area department. Traditionally students in her school perform below the provincial average on the Applied Mathematics 30 examination. The pastiche below represents Marla's account of one of her experiences analyzing results.

> We got together as a department and looked at the results in the two courses, Pure and Applied, and our department head made lots of charts about what we're doing well at and what we scored low on and what are we compared to the province in everything, so it was like a very detailed analysis—several pages of charts about the results. Then we looked at them. We had to break apart into these groups and take a day to brainstorm and come up with an action plan of how we were going to improve ourselves. We decided that the students needed help on numeric response but didn't really come up with any sort of action plan to help them with that. So, because we didn't come up with a plan, that's my responsibility because I'm the only teacher for 30 Applied. I still haven't come up with a solution on that. I don't really understand where they struggle with numeric response so I don't know.

What I find most interesting about Marla's comments is that the focus of the action plan was on how the teachers were going to improve themselves. The focus, at least from Marla's perspective, was on the teacher, not the student. Also, because Marla was the only teacher in the school scheduled to teach 30 Applied in

the next semester, developing an action plan fell to her alone.

Marla's interpretation that, to improve examination results, teachers must improve themselves, is consistent with many conversations she related to me between the school administration and teachers. She said:

> I feel we've tried everything that's reasonable for us to try and it's not changing the results, so we're at our limit really now. We need to start looking beyond the teachers and I don't really feel like we're getting a lot of support for that. "You can't change the student's behaviour—you can only change how you react to it" is the message we get. I get that but we can put consequences into place. We can set standards where we expect students to be. We can expect responsibility and that's a fair expectation for a high school student, that's not an unreasonable request, but I just don't feel like there's any support for that . . . we're at our limit. If a student fails, I have to fill out a sheet talking about all of the steps that I did to help that student and why they're still failing. It's my responsibility to have that conversation with the student and I do, but that's never taken past me. I feel that that takes all the responsibility off of the students, like, Well, why are you failing?

Marla expressed being at her limit. She does not know how else she can change her behaviour such that the behaviour and examination results of her students will improve. I connect with Marla's comments. Sometimes I felt that responsibility for students' being active participants in their education has been removed from them and placed on teachers. I wonder if hard conversations with students about

their learning are avoided. Do students learn sometime in their schooling that they are not responsible for engaging, and that giving up is acceptable?

Tutorials for students. To improve the diploma examination results, the administration at Marla's school requested that each department provide review sessions during the examination period for the next semester. The mathematics department scheduled review sessions for both Grade 12 mathematics courses. Because Marla was the only one teaching Applied Mathematics 30, she was responsible for organizing and running review sessions. She described the sessions:

> I set up four tutorials altogether and the first one no one showed up to. The second one I think four students showed up and the third one there was like five students. It was two hours long, a couple trickled in after an hour and some left early and then I had an afternoon one and there was three students, but of those three, the one girl was text messaging every five minutes and the other two would ask me a question and then they would have a side conversation about their social life so that last one was a little frustrating. [chuckle] We scheduled multiple times in case they had other diplomas so that if they couldn't make one of them, they would be able to make another one. In the tutorials that I gave this past week I had told students ahead of time I'm not teaching a lesson. This is a venue for you to come with questions because you've already done studying before you're coming to this tutorial, you're coming with questions or a concept that

> you're still not sure about or you know you're bringing something to offer, to work on. I just had a bunch of students that came and just sat there, and I said, "Well, what do you want to work on today?" "I don't know. Everything." "We can't work on everything. We have two hours. I'm not going to teach this whole course in two hours." [chuckle] "Well, um, sinusoidal then." "The whole unit? Could you be more specific? Is there a question that you have that you got stuck on in the review or a concept in the notes or something?" "No, the whole unit." Okay. So then [sigh]—I don't know if it's a co-dependent side kicked in, but of course I want them to succeed—so I go through and make up questions or pull questions from other resources that I have and go through them. Basically I'm going through questions for the students. There's a couple that brought paper and pencils and were writing stuff down but there was one guy who came to two tutorials and didn't once open his book. He just sat there and listened and it just felt like he was so passive in the learning, like I'm just supposed to shower him with information and somehow it'll seep into his skin. But not every student is like that. They weren't all like that. It's just that, those are the ones that frustrate me.

The intent of the tutorials was that students would bring questions and Marla would go over them. She found that they came without any questions.

Speaking against review tutorials before an examination, Cheng (2000) argued that "coaching classes, which were intended for preparing students for exams, were not a good use of the time, because students were practising exam

techniques" rather than learning mathematics (p. 11). Marla makes it clear that her review sessions were intended to focus on content, not to practise exam techniques. From students' perspectives, however, "exam preparation, particularly practising previous exam papers in class, [is] an explicit strategy for managing their sense of confidence and fear of failure" (Smyth & Banks, 2012, p. 285). As noted earlier, some students in Applied Mathematics 30 may have low self-efficacy and high anxiety with respect to mathematics. Such students might well view practising exam questions in review sessions as an appropriate strategy.

Marla's experience with review sessions recalls her point about the discrepancy between the expectations of teachers and students. Teachers are providing opportunities for students to get assistance, but students are not taking advantage. Marla's frustration comes from the difference between the effort she is putting in and the effort her students are putting in. The sheer passivity of a student waiting for her to do the work for him is evident in other experiences as well. Marla wonders why students even come to class if they are not planning to engage.

The administration at Marla's school provided professional development support for the teaching staff to help them develop engaging lessons for review sessions. She said:

> We got this handout at our PD staff meeting a month or two ago talking about instead of just doing a bunch of questions for review, try and make it more interesting for students by doing a game or having them tour around the room in groups or something. There was a bunch of different

> options and they seemed interesting, but the students have to care in order to do that. I used to try and make my lessons interesting and I feel bad for giving up, but at the same time I know I don't have the energy to do anything else. I know that if I make an interesting lesson plan and they aren't on board with it, that I'll just get even more frustrated and even more angry and bitter and I don't want to do that . . . but the reasoning is, right, if those students aren't engaged, then I need to make a more engaging lesson. That's the only logic, right?

The message for teachers at Marla's school is that they need to work harder engaging students. Yet Marla found that, when she tried potentially engaging activities, students did not necessarily respond. This further frustrated her. Sutton and Wheatley (2003) found that negative emotions, including anger and frustration, are reported by teachers when students do not seem to share the same goals. Sutton and Wheatley also reported that "emotions may affect teachers' intrinsic motivation, attributions, efficacy beliefs, and goals," with "negative emotions often reduc[ing] teachers' intrinsic motivation" (p. 338). As I see it, Marla's emotions are having an impact on her self-efficacy. She feels she is at her limit.

I Feel like a Horrible Teacher

Marla feels that many of her students are not interested in thinking, studying, or learning. Their apparent lack of interest is frustrating and disheartening for her. Marla values education highly, and when students do not

acknowledge a similar value she questions the larger educational system and wonders where the students' lack of interest comes from:

> I've been feeling really defeated this semester as far as those like discipline things go. I just, [sigh] I don't even know what to do anymore, like the battle with cellphones and getting students not to play on their phone during class. In one of my classes I just gave up, like, whatever, you guys can watch videos all class instead of listening to me if that's what you want. I have one student who's frustrated because he doesn't get the material. You don't see the connection between you watching videos on your phone when you're supposed to be working and the fact that you're not understanding the material? How do you not make that connection? I don't know [sigh] and I feel like a horrible teacher for not taking all of their cellphones away whenever I see them. I can't fight that battle anymore and I feel like a horrible teacher for saying that and honestly, I haven't admitted that to anyone that I'm not taking their cellphones away. I don't know what to do anymore. I feel like I'm fighting everything. [Laughter] Fighting to get them to study, fighting them to not use their cellphones, fighting them to value any sort of education, fighting to have them come to class on time, fighting for them to open their books and bring a pencil. [laughter]

Feeling like she is constantly battling, Marla does not have the energy to continue the battle, nor does she feel it makes a difference anyway. When I listen to the tape of our conversations from January and April, I am struck by the tone of

Marla's voice, which in both instances is almost sad. She seemed to want to abide by the expectations of the administration by taking away cellphones, yet did not want arguments with students.

Fighting students takes energy, but not enforcing the expectations of the administration is also wearing. Steinberg (2008) noted that "emotions are evoked by what is important. In the case of teachers, what is important is often linked to their educational ideals" (p. 44). Marla is compromising her educational ideals, which is provoking strong emotion in her.

When I read Marla's words I get a strong sense of defeat in the daily "fight" of teaching. Marla talked about not knowing what else to do to encourage students to become invested in their learning. She related a story about a student that illustrates what that student does value:

> I find it frustrating that students don't value education at all. There was this one girl in my class and she's talking about how blah-blah is the best teacher ever because he let them order pizza. She has mentioned that five times in my class this semester. Blah-blah was so awesome, he let us order pizza one day, "Like one day I just said can we order pizza and he was like sure and he gave me his cellphone and I ordered the pizza and it was awesome." I'm like, that's your evaluation of a good teacher is that they let you order pizza? That's what you value? I just find it frustrating.

As the year progressed, the frustration and the sense of defeat became stronger and the focus of our conversations became more about the bad days. The sense that I got from our final two conversations is that Marla felt frustrated and

unconfident. Marla's discouragement permeated our conversations. She expressed tiredness and a lack of willingness to fight the daily battles of teaching. Agrey (2004) commented that "many quality educators are leaving the field of education because of the intense pressures placed upon them" (n. p.). The potential to leave teaching is apparent in Marla's case as the battle she constantly has to fight with her students is wearing on her and is adding to her sense of discontent.

Marla appears to be battling herself, school administration expectations, and her students. She feels like a horrible teacher for not enforcing the school's cellphone policy, yet she does not have the energy to keep up with the fight. She is negotiating what she understands to be what a good teacher does and not being able to do that. Schaefer (2013) refers to "strategic compliance" (p. 10) in early-career teachers and how "strategic compliance may help to avoid social tension, the dilemma, or internal tension" (p. 10) by conforming to what is done by other teachers in the school. Although I would not consider Marla as an early-career teacher as she has more than five years' teaching experience, by complying with what she perceives are other teachers' expectations for student behaviour, she is compromising her beliefs about what being a good teacher is. In many senses, she has chosen to give up the fight.

During our third conversation, Marla admitted that she did not know if she wanted to be teaching anymore:

> I've been just thinking about maybe I don't need to teach anymore because honestly I'm not really enjoying it. I like feeling good about what I'm doing and I like feeling skilled and competent and that I'm good. I

> don't feel that in teaching. Yeah, maybe one day I do but then the next day I don't. Maybe one week I will but in the next week I don't. And I can't even fully enjoy the good day because I know the shit day is coming up. I know I'm going to have to pay for this good day. I know that this day is going to have consequences to it and those are the really shitty days.

Marla does not consistently feel like she is good at teaching; she is having more bad days than good ones. I noticed Marla's language had changed. In our first conversation, she called them *bad* days. In this conversation, she called them *really shitty* days. I know Marla to be careful with language; her using such strong language stood out.

Referring to Bakhtin, Maybin (2001) commented on the centrality of language: "For Bakhtin language use is intrinsically evaluative . . . the kinds of things we say, the way we say them and the evaluations of experience that they carry" (p. 66). Marla's shift from *bad* to *shitty* is a direct evaluation of her experiences. She is overtly expressing her discontent.

Marla wonders "if I got out of the classroom for a little bit, I might be less angry at education." But do other teachers experience this anger?

> I also feel like there's something wrong with me. There's all these people that are in teaching for years and they seem to manage it and do it. I don't know how that works, but for the last couple of years I've thought I just need to do things differently. I just need to try something. I need to be more organized. I need to do this and everything will get better. Work from 8:00 until 4:30 and that'll be it and I'll leave it at school and I won't

> have these conflicts with students and I won't have this conflict with discipline. My lessons will be awesome or I'll be happy with whatever level my lessons are at—but that's not me. It's not going to happen. I can keep saying it and I can keep trying new stuff, but I watch teachers that have been teaching there for 20 years and they're still stressed and they're still taking stuff home and they're still frustrated. I don't want to be frustrated for 20 years.

Marla had thought that teaching would get easier over the years; that she would be able to spend less time at the school planning and marking. She tried to restrict her hours at school but then was not satisfied with the quality of her lessons. Marla wonders if something is wrong with her because she does not feel like she can endure the frustration.

During our final conversation, near the end of the school year, Marla had almost given up on her students—and some of her students had given up on the course. Many students see graduation and completion of high school as walking across the stage:

> I had a girl who came to class like the Monday after grad and . . . I overheard her talking to another student and she's like, "Ah, I've given up on this class, I walked the stage, whatever," and the other student was like, "Yeah, that doesn't mean you've graduated. You still probably want to pass this class." "Nah, I walked the stage. That's all I cared about. I don't need this class."

This student's lack of interest adds to Marla's discontent. She wonders why she is

working hard for her students when they are not working hard for themselves.

One bright note in our final conversation is that Marla had been granted a leave of absence for the fall semester and thus will get a reprieve from her frustrations. Marla hopes her time away will be an opportunity to reflect on what she really does want from a career. Teaching may not be what she wants. She wondered, "I don't think you'll find a group of people that are all passionate about learning. Do you think? Do you think that exists—that there's a group, there's a community, there's a class that you teach where everyone is passionate about learning?" "Teachers' emotions are . . . inextricably bound up with the basic purposes of schooling—what the purposes are, what stake teachers have (and are asked to have) in them, and whether the working conditions of teaching make them achievable or not" (Hargreaves, 1998, p. 841). Marla's earlier comment that she is "angry" at education suggests that her understanding of the purpose of education is inconsistent with her experience. Unable to achieve what she sees as the purpose of schooling, Marla gets angry.

In light of her anger—and knowing that she did not initially intend to be a teacher—I wonder whether Marla will able to sustain her career. Day, Elliot, and Kington (2005) argued that "institutional support for the person in the [profession] is an essential contributory factor to sustaining commitment" (p. 572). Perhaps Marla did not get the support she needed and her commitment to the profession diminished.

I do not recall being angry at education or giving up the fight. My experiences have not necessarily been better than Marla's—I just do not recall

that persisting negative emotion I heard in her voice. I too have been frustrated with students and their lack of interest in mathematics, but I always felt a sense of hope about the next class. This hope kept me going. I enjoyed the fact that each semester, each school year was a new beginning: a new group of students, a new opportunity to re-invent my teaching and my classroom.

However, conversations with Marla have opened my horizon to understand that, although we taught in the same school, our experiences differed. How we have made sense of ourselves in a context of GMEs is unique to our prejudices, our experiences, and our histories. Perhaps the fact that I taught in several different schools contributed to my experiencing little anger. Also, my experiences are not as fresh as Marla's, having been absent from teaching for four years.

Susan

Becoming a Mathematics Teacher

Susan has a Master's degree in Education and has won a teaching award. During our conversation she expressed a strong connection to student learning and a clear sense of who she is as a mathematics teacher. However, Susan began her career in the early 1990s as a drama teacher. Because the climate in education at the time was one of cutbacks and job insecurity, she applied for a leave to reconsider her options. She happened to see a documentary on fractal geometry, "Colours of Infinity" (1995). The video reminded Susan of her own love for mathematics. Combined with her school division's goals for deeper learning in

mathematics, Susan began to imagine a math education that was generative and expansive, where her skills in math could combine with her skills in the drama classroom. She imagined math classes that revolved around investigation, inquiry, and group problem-solving. She went on to earn a Master's degree in the area of visualizing polynomials and embodied learning. Since her graduate work, Susan continues to engage with educational researchers, policy makers, and mathematicians.

Susan's Context

At the time of our conversation, Susan was teaching at an online school where she was responsible for teaching several high school math courses, including Mathematics 30 Pure and 30 Applied. Susan was in her second year of teaching at the school and in her twentieth year of teaching (twelfth year of teaching mathematics). Susan had taught at several different high schools but has taught Grade 12 mathematics courses only three times in her career.

I Wasn't Happy with the Kinds of Learning

Susan had been teaching mathematics in traditional classroom environments for ten years before moving to the online school. There she found a system that did not match who she was as a mathematics teacher. She described changing the student experience in the online course to promote more effective learning. She began phasing in a new philosophy of what it means to be a student in this online school. In the pastiche that follows, Susan describes the changes she has been making and some of their challenges and rewards:

We have two programs and the Pure Mathematics 30; students have the option of which to use. There was a paper-based and an online program. The online one had been a teacher-invented program and had been tweaked over the years into kind of a digital workbook that had these applets to link to things, like Internet things. It's very workbooky. The paper-based students used the green booklets with the coil booklets to guide them and the textbook. I note I wasn't really happy with the kinds of learning and the kinds of assignments in the paper-based program. By the middle of the year last year I switched things up and said, Okay, the assignments that you've got, you can still do those things if you want to. I said do these open-book assignments, I'm publishing the key because I don't know if you know this, but kids copy that stuff, and I gave them these assignments now to self-mark. I made them out of 20% of their mark and a unit test out of 80%. What I did with the self-marking assignments was there were three kinds of policies I put in place that made it really difficult to cheat and do well. Now when you self-mark, you can't just self-mark, you have to do a reflection on it. If you submit your books with correct answers, I will give you 50% 'cause you've completed the booklet. You could have copied it, I don't care how you did it, but you completed it. If you correct your work using the key and make all your corrections, you can get as much as 80%. If you ask me reflective questions based on your reflective writing and your comments on your own work, then you can get as much as 100%, but that's just 20% of your mark so you've done

> all this work to get that 20%. And then I had this policy that if you write our final exam and your mark is 25% different from your course work, you get your final exam mark. End of story. So now they could have done really well—they could have got a bunch of 100s on the assignments—but if they can't write the exam, they still won't benefit from those 100s.

One reason Susan's experiences teaching in an online environment addressed me powerfully is that I spent three years teaching in an outreach school where students used correspondence materials.[5] I had similar experiences with students' copying answers to assignment questions from their friends and scoring very well on assignments—but scoring below 40% on the final exam. I suspected that some of Susan's students, like some of mine, used the program to get courses done quickly. Did students use the resources for learning or for expediency?

Susan said she found the practice of previous students' keeping their marked assignments and sharing them with current students to be unacceptable. Thus Susan implemented changes consistent with her philosophy of learning. She changed how students worked through the material and how marks were calculated. What I most noticed about Susan's comments was that she was more uncomfortable with the lack of attention to learning than to the fact that students

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[5] Correspondence materials at the time consisted of coil-bound instruction booklets along with workbooks that students submitted for marking. The instruction booklets provided information and suggested other resources, such as textbooks and websites.

were copying off others. Her focus was student learning.

Like Susan, I remember being unhappy with the kinds of learning evident in student work. I was also unhappy with the materials we were giving students to learn from. My dissatisfaction with student resources led me to pursue a Master's degree in secondary math education. Specifically, my project was to develop a student resource to supplement the outreach program for Pure Mathematics 10 (Marynowski, 2001). Students could use the resource to help understand why they were using particular processes. I provided worked-out examples as well as an accompanying narration about how the processes worked and why I chose that particular method. My intent was that students would become more aware of processes and alternative solutions.

In a similar vein, Susan commented that her changes to the online course have influenced not only student learning but how she herself deals with assignments:

> I think it has improved learning and it has improved learning for our upper-end kids, too, because our upper-end kids already know that self-reflection is important and so now they are. It was excellent for the time it took to mark. I used to be going through these things I knew kids copied, trying to find the errors, I felt I was engaging a pointless task. Now I look at them, open them quickly, and in another colour somewhere there's a question for me that's sincere and real, and I don't mind spending 10 minutes writing on one question to this kid because they have decided they want that information. It's made the back-and-forth between teacher and

> student more meaningful. It has been good. I'm pretty proud of that, actually.

I understand how going through student work that you suspect has been copied can feel pointless. If the student did not care enough to complete the work in the first place, why would I as the teacher care about spending time giving meaningful feedback?

Susan wanted both student work and her work to contribute to learning. Goddard, Hoy, and Hoy (2000) might describe Susan's experiences with student work as affecting her teacher *efficacy:* "Teachers feel efficacious for teaching particular subjects to certain students in specific settings, and they can be expected to feel more or less efficacious under different circumstances" (p. 482). In the system she came into, Susan did not feel effective. Therefore, she made changes. Susan expressed pride in how students responded to the changes. She now finds her interactions with student work beneficial to both parties.

Susan showed me some of these online interactions with students and also how she created opportunities for students to log on and ask questions in real time. These conversations were then visible for other students to see and to learn from. Susan said:

> We're still kind of, as a school, grandfathering out this old model of kids who don't really need their teacher very much and don't think of our school as a place to get actual leadership. Instead they think of it as a place to deposit their work when they're finished it.

Susan's comment connects strongly to what I experienced teaching in an outreach

school. Many students did their work outside of school, dropped off their work once a week, and picked up a new unit of work. My sense of those students was that they were not interested in engaging with me as a teacher; they were interested in finishing the work and being done. That sort of attitude did not seem to fit well with Susan's philosophy of teaching and learning; in her words, "I just don't believe kids can completely learn on their own." When she said that, I understood more fully why she had made certain changes. In her view, students need to interact with others if they were to learn, either a teacher or other students. Thanks to the changes she implemented in Pure Mathematics 30, students must interact with her. Interactions with other students are promoted by means of synchronous online sessions. Such sessions help develop a community of learners.

Creating an effective online learning community requires three critical components: "cognitive presence, social presence, and teaching presence" (Anderson, 2008, p. 343). Susan's changes to Pure Mathematics 30 incorporate all three: a *cognitive* presence, by having students reflect on their learning; a *social* presence, by having students post questions and responses to activities online; and a *teaching* presence, by responding to student work and questions. Anderson also commented that "learning and teaching in an online environment are much like teaching and learning in any other formal educational context: learners' needs are assessed, content is negotiated or prescribed, learning activities are orchestrated, and learning is assessed" (pp. 343–344). The changes Susan made to the online courses reflect her understanding of teaching and learning in face-to-face settings.

The changes Susan made to Pure Mathematics 30 have impacted the

school's finances. She stated that "we've had a big dip in our fundable credits, which is a thing at our school, but we've got kids that are achieving what they ought to achieve and I think the learning is better." Schools in Alberta get a certain dollar amount for each student credit earned, so if her students are earning fewer credits, the school is not getting as much money for programming. Yet she returns to a focus on student learning, which is the important piece for her. She is happy the learning is better and that is more important than the financial impact.

This Trickle-Down Thing

Susan's focus on student learning was evident in all her descriptions of teaching diploma examination courses. Her attentiveness to student learning was expressed strongly in several different contexts. In the pastiche that follows, Susan describes what teaching and learning could possibly be in the context of GMEs.

> I haven't loved the diploma. You know, that's not entirely true. I chose not to teach 30 Pure. I wasn't interested in that pressure that seemed to be there with my colleagues. I see this trickle-down thing happen from the diploma. The diploma dictates how Grade 12 will go, and then the Grade 11 teachers look at that and say, well, we'd better make Grade 11 look like Grade 12 or they won't be ready for that, etcetera, etcetera, and I was working in opposition to that. I wanted learning to look different and the test to take care of itself. I felt like if I got into the Grade 12 business that I would not be enjoying myself anymore. Everybody was so sure that the

> way to test these kids was using the way the diploma asks questions, but I think the diploma does that because it has to, you know.

I found Susan's description different from my own experiences. I fully embraced the diploma examination format, adjusting each of my exams to mirror it. I believed I was doing what was best for students: I wanted to be sure they were not ambushed by types of questions they were not familiar with.

When Susan spoke about examination styles trickling down from the diploma exam grade to the earlier grades, I was reminded of when, as department head, I encouraged teachers of Grades 11 and 10 courses to do exactly what she was describing. I asked them to model the diploma exam format and style of question in all their exams. I helped teachers make changes to their examinations and I had the department administer common examinations.

But by standardizing examination practices, I was inadvertently standardizing teaching. We had daily plans for each course laid out so that everyone teaching it knew where they should be at all times. This schedule enabled us to give common unit examinations on the same day. Much of the standardization of teaching and testing came as a directive from the principal, to whom concerns had been expressed, by parents and students, about one or two teachers. Standardization was the principal's way to deal with teachers whose teaching or assessment practices were not in line with the rest of the department. Clearly, our principal did not demonstrate confidence in "teachers' assessment efficacy" (Wolfe, Viger, Jarvinen, & Linksman, 2007, p. 463).

As the department head responsible for implementing the principal's

directive, I thought I was doing what was best for students and the department. However, from another perspective, the standardization of timelines and examinations potentially undermined our "collective teacher efficacy" (Goddard et al., 2000, p. 483). Goddard et al. (2000) stated, "one way for school administrators to improve student achievement is by working to raise the collective efficacy beliefs of their faculties" (p. 502). Our thinking was that it did not matter who was teaching, the course would be similar and the tests the same; as a result, achievement would increase. Students could not complain that a particular teacher's tests were harder than others because they were all the same. When I think about Susan's comment about working "in opposition" to that, I wonder what I would have done as department head if she were working in opposition to me. Would I have seen her as a troublemaker or would I have encouraged her to follow what she thought was right?

Susan has not been a supporter of diploma exams and admits choosing not to teach Grade 12 courses because of them. She did not want to spoil her enjoyment of teaching. She did not want to change her teaching to suit diploma exams. If we insist on commonality, something is lost:

> If being with me students can't get what's the best out of me, what's the point, you know. If we all should dip ourselves in some sort of exactly like stuff, then that's not a job for me. I mean, it's not good for them either, because I have gifts—I have ways of seeing mathematics that are useful and good.

I think this statement is profound. It speaks to the unique relationship between

teacher and student. I wonder now if I inadvertently hindered this relationship by pushing common examinations. I wonder why I was so keen on conformity. And I wonder what I would do now, knowing what I know, if I were in that same context—would I resist like Susan, or would I again push for conformity? I am not sure.

Where did Susan's feeling that she has "ways of seeing mathematics that are useful and good" come from? Recall that she came to mathematics teaching later in her career, with a background in drama. Inspired by a documentary on fractal geometry, she had a different take on mathematics teaching. Susan talked about being inspired by Jo Boaler with respect to "learning by investigation and constructivist models" of education. Susan chose to complete a Master's degree in mathematics education because she was inspired by the possibilities of incorporating creativity into the math classroom. She had the opportunity to question teaching practices, conduct research, and have conversations with mathematics education researchers that opened up her imagination to different possibilities. Thus she developed a philosophy and practice of mathematics teaching that was different from what most of us were doing.

I'm Obliged to Get Them Ready for a Diploma

> Susan described how she prepares students for the diploma examination:
>
> I think that I'm obliged to get them ready for a diploma, but my bigger obligation is to teach them math and to treat them—well, like people—and teach them how to learn. So, for the most part, I want my lessons and the

> conversations I have to be about thinking and about mathematics. However, when we get close to exams, like at the end of units, we will switch gears and also I want to pepper the course with model diploma questions throughout the time so that it's not a surprise—so they feel confident and I've done my due diligence to prepare them for what they need to prove themselves in, the format they need to prove themselves in. So, my course seems to be a course organized around diplomas, and sometimes that's the case 'cause that's what students are hungry for. I always, though, begin not in that space.

One word that strikes me here is that Susan feels *obliged* to get students ready to write the diploma exam. One definition of *oblige* is "to bind morally or legally, as by a promise or a contract" (retrieved from http://dictionary.reference.com/browse/oblige, April 9, 2013). Susan is saying she feels morally bound to get her students ready for the diploma. This statement is striking. What I also find fascinating is that she sees her bigger obligation as teaching students how to learn. Susan is bound therefore both to teaching mathematics and preparing students for the examination. These are two separate things for her, and she talks about switching gears from one to the other. Doing just one is not enough: she needs to ensure that students in diploma examination classes get experiences of thinking about mathematics *and* answering the kinds of questions that could be on the exam. But where does Susan's sense of double obligation come from? Has somebody told her, or is it what Polanyi (1966) would call a "tacit" understanding?

Susan understands that student learning could be negatively affected by too much attention to the diploma examination. According to Barksdale-Ladd and Thomas (2000), teachers in general feel that standardized tests have a negative effect on students' learning, achievement, and self-esteem. Barksdale-Ladd and Thomas report that "teachers view tests as hurting their performance as good teachers and hurting children by forcing teach-to-the-test instruction. . . . Yet, these teachers feel powerless to do anything except prepare children for the tests" (p. 395). As I see it, Susan feels that too much attention to the exam can be harmful; it detracts from good teaching. Nevertheless—and as suggested by her use of the word *obliged*—Susan feels "powerless" to do anything else.

When I think about my own experiences in relation to Susan's, I wonder how I knew, as a Grade 12 mathematics teacher, that I was supposed to get students ready for the diploma examination. Was it because when I was a student in Grade 12 math, my teacher prepared me? I remember spending hours reviewing previous diploma questions and getting together with other students in study groups. I do not recall being told in my teacher education program that I needed to prepare students to write GMEs, nor do I recall my first principal telling me. But I knew that is what I had to do. Perhaps teachers of GME courses tacitly know that part of their teaching responsibility is to ensure that students are ready for them.

Get People in Line

In a previous pastiche, Susan said that she did not "love" diploma exams

because they constrained her teaching. Focusing on student learning, Susan even chose courses that did not have GMEs. Her experiences in the online school, however, changed her attitude:

> Before I made these changes to the courses, our students were getting 99 as their coursework mark at our school and they would write our final exam and get 50 or 44 and it would be 30% of their mark, which gave them an 80 going into the diploma where they got another 45, and so [chuckle] we had a disparity between our teacher mark and our diploma mark of 40%. Yeah. And up until then, I had been saying these diplomas, what use are they? I can't stand these diplomas. They're constraining my teaching, blah-blah-blah. They're making other teachers crazy and I was pissed. But now I'm kind of a big proponent of the diploma [chuckle] because I understood that it was created for this purpose exactly: to get people in line. I don't think it's created for the teachers whose marks are 6% out or 10% out. I think that would be just fine.

Susan now sees GMEs as a way to ensure that students are learning what they are supposed to learn and that teachers are accountable for teaching the mandated program. Alberta Education (2012) stated one purpose of the diploma examinations program is "to *ensure* that province-wide standards of achievement are maintained" (p. 1; emphasis in original). For teachers like Susan who are already teaching what they are supposed to, diploma exams can be a nuisance—a disruption to teaching the course. But how do teachers who are *not* teaching the mandated curriculum see GMEs? Are they seen as threatening? Are they attended

to at all?

In the following chapter, I present my provisional understandings of the experiences of Valerie, Marla, and Susan. Attending to the language they use to describe preparing students for diploma examinations helps us understand what is at stake for them when they teach mathematics in a context of GMEs.

Chapter 4: So What Does All This Mean?

In the previous chapter, I described aspects of three secondary mathematics teachers' experiences in a context of government-mandated examinations (GMEs). In this chapter, I take a closer look at some of the teachers' perceptions of and relationships with GMEs. I inquire into what they mean by the phrase "preparing students to write the diploma exam." Finally, I revisit the discussion of the stakes involved whenever teachers work in a GME environment.

Perceptions

Each teacher explicitly stated what she felt about diploma examinations. Paying attention to the "micro" of their experiences, here I consider what they said together with the context they were working in.

Valerie has mixed perceptions of the GMEs. She said she has no issue with diploma exams for her students: "I'm not afraid of the diploma in any way"; "I don't have a problem with exit exams"; "diploma exams don't bug me." She also commented that she "kind of looks at the diploma, not to teach to" but for interesting ways to ask questions. She gave an example of a type of question she has seen on the exam that interested her. "I like the numerical response for trig proofs. Students find which number results when they plug in given value."

At other times, however, Valerie expressed serious concerns with elements of the GME program. One is how much it contributes to a student's final mark. She disagrees that the exam should be 50%. She said, "I would like the grade I give to be weighted 70% and the diploma to be weighed 30 'cause I think

I know my students better than that test. I think if the diploma was weighted 30 the mark they got would really reflect what they knew." Whereas Valerie expresses trust in her teaching and in the mark that students get for her 50% of the course, she does not trust the examination to accurately represent student understanding. Valerie is also frustrated with the process used to maintain consistent standards:

> Why are we making our kids write a 50% exam, especially if Alberta Ed is going to curve it? If you're going to curve those marks and bring my kid down when he scored 98%, got one question wrong, but was given only 95%. That's not fair. He scored higher than his class mark and dropped a percent overall. On the other side, someone that gets 18 out of 40 gets moved up to 50%. I don't have a problem about 18 out of 40 failing the exam. I don't. That's what you achieved. You failed it.

Valerie expresses a misconception about the process of equating student marks when she uses the word *curve* to describe how marks are adjusted. Curving marks is commonly understood to mean they are made to fit a standardized or normal curve with a specified mean and standard deviation. The process is also called norm-referenced grading. Brookhart and Nitko (2008) describe norm-referenced grading as assigning grades to students based on how they performed relative to others in the group. Curving is *not*, however, the process used to equate marks on diploma examinations in Alberta.

The equating process for diploma exams is a way to maintain consistency of scores over time. If a particular exam is more difficult than previous ones, the

equating process makes the scores consistent with what they would have been had there been a different exam. I understand that the process of determining scores is complicated. However, the intent is not to harm students but to "accurately reflect their achievement regardless of which examination form they have written" (Alberta Education, 2012). Valerie is uncomfortable when some students seem to be unfairly advantaged or disadvantaged by the equating process. For example, when a student who scores 18/40 is "equated up" to 50%, there seems to be an unfair advantage; when a student who scores 98% (one wrong) is "equated down" to 95%, there seems to be an unfair disadvantage.

Valerie's misunderstanding of the process used to determine grades influences her perception of the examination. Having had no experience developing questions for reviewing or marking GMEs, Valerie does not fully understand how they are scored. Her lack of knowledge translates to a mistrust of the process. She said, "I don't have a problem with the government exam. I don't have a problem with them checking that I'm teaching what I'm supposed to and I don't spend four months on trig and thirty seconds on stats. I don't—it's what they do with it I don't always trust." Valerie's statement illustrates a complex view, accepting the reason for the examination but mistrusting what is done with marks afterwards.

Like many teachers I have talked to, Valerie questions the fairness of the equating process. On an individual level, the process may not seem fair when a student gets "bumped down" to 95% from 98%, or another gets bumped up to 50% when they scored only 45%. Valerie described how she is trying to make

sense of the process:

> So the anchor set then tries to keep the test consistent for the students. So is it then fairer for the group of students that's writing a hard test than the group of students that wrote the easier test? Do you know what I mean? So I'm trying to negotiate that in my head, what's better for each group of students. And how is it the same fairness when you curve it? Is it better then to curve it and say, okay, 70% is what they should come out with and if you had a harder test then people get curved up. If you had an easier test people get curved the other way?

She is trying to understand how the equating process can be fair for a given group of students. If an examination is harder than past ones, shouldn't all marks be moved up; and, if an examination is easier, shouldn't all marks be moved down? Yet, she sees marks are *unequally* moved up and down on the same exam: 98% to 95%, 45% to 50%. Valerie cannot reconcile how the equating process is fair when she considers individual adjustments on the same exam.

Valerie agrees that there needs to be a system to verify teachers are teaching the prescribed curriculum. She imagines what that system might look like in the absence of diploma exams:

> But how does Alberta Ed make sure teachers are teaching the curriculum? What do they do? I think they should have something. I don't have a problem if Alberta Ed wants to see my exams. Maybe they just do a random polling and teachers have to keep their files and have to keep their exams. If I get audited that year, and maybe I have to enter what days to

what days we did this and Alberta Ed has full right to access those files. Although she is comfortable with a system of accountability, Valerie does not think diploma examinations are the best way to achieve it. She would welcome a different system that ensured teachers were doing what they were supposed to without interfering with students' grades.

Valerie also expressed concern with the format of the mathematics diploma examination. From 1984 to 2009, diploma exams in all subjects had a written response section where students had to construct a response to given prompts. In fall 2009, Alberta's Minister of Education announced that mathematics and science examinations would contain no written response components. This announcement shocked the mathematics and science education community in Alberta. Valerie's response was similar to what I heard from other secondary mathematics teachers:

> I have a problem when Alberta Ed throws a wrench in and my kids get thrown by the format. I don't have a problem with testing the curriculum; I don't have a problem with how the questions are asked. Don't change the format, though, to not match what we've been doing all year. Like when they changed the written part in November. When I got told that I was like, Are you freaking serious? So I thought, all right, I'll teach them how to write a multiple-choice test. You pulled my written; you're going to make 50% of their mark on a multiple-choice, 40-question test? I'll teach them how to write multiple-choice tests. Here's how you graph your answers. The students say, But that's not testing what we learned, and I

said, But that is not your problem. That is Alberta Education's problem and they think they're assessing you thoroughly, so we'll take it.

Valerie's comments here show how strongly she disagreed with the decision to scrap the written component. When I listen to the recording of our conversation, I hear vehemence in her voice. She was also visibly upset at this point.

Steinberg (2008) noted that "teachers have intense emotions around assessment" (p. 44), particularly around items they deem important. Two items were important to Valerie: the removal of the written response component and the timing of the announcement. She believes in written response as an appropriate way to assess students' understanding of mathematics. Without that component on the GME, Alberta Education is not thoroughly assessing student understanding. The timing of the announcement was also inappropriate. She had already spent two months under the assumption that the diploma examination was going to be the same format it had always been. Valerie deemed this late change unfair, and she responded in a spiteful manner by saying she was going to teach students how to negotiate a multiple-choice examination.

Valerie's response to the removal of the written response portion is to teach skills for answering multiple-choice questions. In effect, Valerie's students learn how to beat the system. They understand that, when they use these alternate methods such as graphing, they are not necessarily demonstrating the understanding that is intended. For Valerie, what is most important is that her students do well on the examination and she is providing them with skills to do just that.

For **Marla**, the examination is an unknown quantity because "You don't know what kind of questions you're going to get." Although Marla pays close attention to the examination—she reviews it the day students write it and analyzes results when available—neither she nor anyone else can predict exactly how questions will be worded. Instead, she emphasizes strategies: "I'm trying to teach them as much about the subject as I can. I say, Okay, well, the question could look like this, or it could look like this. How would you approach these different types of questions?" Furthermore, with the written response component gone, Marla is unsure how multiple-choice questions can address ideas that were traditionally part of the written response questions: "They could test you on more complicated stuff in the written response. Whereas now, they have to incorporate all levels of learning within 33 multiple choice and 7 numeric response."

Marla did not explicitly challenge the existence of GMEs, nor did she criticize the weighting of the examination. However, a source of anxiety is the analysis of student results: "I don't like the anxiety that I feel about my results. Especially this year being the only 30 Applied teacher, our results are going to be me, that's it, and in that case we're really just analyzing how I did."

I take Marla's lack of critique of the existence of GMEs to mean that she tacitly accepts them. Instead, our conversations focused on contextual factors: the type of student in Applied Mathematics 30, the emphasis her school places on improving results, and how she gets students ready for the exam. The first two were addressed in Chapter 3; the last one will be addressed later in this chapter.

Susan articulates a transition from questioning the existence of the GMEs

to seeing value in them. In previous teaching contexts, the examinations were a nuisance: "I had been saying these diplomas, what use are they? I can't stand these diplomas. They're constraining my teaching and blah-blah-blah. They're making other teachers crazy and I was pissed." Susan paid attention to her students' learning; she did not need an external exam to confirm what she already knew.

In her current teaching situation, however, Susan saw striking discrepancies between course marks and diploma examination marks. This led her to acknowledge the value of an external examination: "Now I'm kind of a big proponent of the diploma [chuckle] because I understood that it was created for this purpose exactly: to get people in line." From her previous experiences, Susan did not realize that some teachers were not teaching the mandated curriculum. When her context changed and she witnessed the incongruence, she recognized a main purpose for GMEs and now accepts them as necessary. In short, once Susan's horizon (Gadamer, 1976/2008) was opened, she was able to view the examinations differently.

Relationship

Valerie, Marla, and Susan each had a different relationship with GMEs. **Valerie** stated that she is "not afraid" of the GME but also expressed conflicting views. Over her career, Valerie has developed a more comfortable relationship with the exam. She worked hard at finding patterns and being able to predict the kinds of questions that were going to be asked. After seeing the examination, she

said, “I usually go home and I kind of debrief.” As mentioned previously, teachers are able to review the examination one hour after it starts but cannot keep it or even take notes. Valerie tries to memorize as many of the questions she can so she can debrief about them later. She commented on specific questions from the most recent examination and how they connect to questions on previous ones:

> There were two pathways questions, one where it has to go through a point and one was a probability one. Very predictable, covered all the outcomes, still transformation based, transforming a point, transformations of a graph. Two sigma questions, I haven’t seen two sigma notations in a long time. One to condense and one to expand and it’s usually one or the other. Pathways question with probabilities. The same one that was on January two years ago, how many pathways go through *b* but it’s not hard because there’s more paths that go through *b* than everything else and there’s only one answer over 50%. There was a binomial, a standard deviation, a normal curve and an inverse norm question on stats which is better than last year’s three of the same. No invariant points. Invariant points was kind of their trendy question for a while and maybe they’re over it.

Valerie’s detailed attention to specific questions and trends in questions astonished me. While I was seconded to Learner Assessment, I remember having conversations about the types of questions that have traditionally appeared and about changing some of them up a bit. Valerie noticed the changes we had discussed.

Valerie further commented about how the examination had changed over

time:

> I still think, well, maybe the diploma has shifted a lot though, because the exam questions can't get to the same trig proofs and now you can't get to a lot of the things that we were testing, students can just go around—the fallout from removing the written response.

I am intrigued that she noticed the trend and that she included herself in the testing. She does not have formal experience engaging with the examination, yet she engages thoroughly in her own way and sees herself complicit in the testing.

Valerie does not have a perfectly comfortable relationship with the examination. Although she spends much time getting to know it, Valerie has moments of doubt and therefore feels validated when she sees that she has taught everything she needed to:

> I just felt validated when I wasn't way off. 'Cause you get that diploma examination booklet and you're thinking, Please don't let there be something on here that I forgot. Ever thought that maybe you forgot a unit? [chuckle] And you're sitting there and you're like, I had an awful lot of time review this year, did we not do all the perms and combs? What did I miss?

Valerie needs the examination to validate, "to confirm or corroborate," her predictions (retrieved from http://www.thefreedictionary.com/validate April 18, 2013) [6]. She still has a sense of insecurity about what she is doing in the

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[6] I have chosen to use the dictionary definition of *validate* as Valerie was referring

classroom that needs to be confirmed. M. L. Smith (1991) reported that, "during the testing session, many teachers themselves feel anxious, worrying about whether they have adequately prepared their pupils for the test" (p. 9).

Valerie's ability to teach mathematics was once questioned by a parent. Valerie described the situation. She said:

> A group of students have had the same math teacher for Grade 9, Math 10, Math 20, so I'm their first new one and I'm not used to being tested because I'm the one who teaches this 30 you know but they'd always had Mr. Allison. I spent a month of just transitioning and the parents were very nervous about me taking over. One parent wrote a concern that the level of learning will decrease significantly now that Mr. Allison is no longer in the room.

Such questioning of her ability undoubtedly shook Valerie's confidence. Even so, in saying she is "the 30 teacher," Valerie asserts that she is qualified to teach the course and has done so before.

Contributing to her confidence is her ability to predict student scores: "We're not really surprised by the results." Predicting scores—not to mention

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to her teaching and knowledge of the program of studies being confirmed by her students' performance on the diploma exam. I recognize that validity has particular uses and understanding when being used to talk about assessments (see Messick (1989) or Kane (2005)) but in this instance, those definitions to not fit the context that Valerie was referring to.

routinely scoring above the provincial average—is important to Valerie. As discussed further later in this chapter, each facet of her relationship with GMEs is reflected in the *stakes* Valerie places on examination results.

Marla, on the other hand, has a troubled relationship with GMEs. She has been teaching at the same school for eight years, and the administration has been saying the same thing: Results on the Applied Mathematics 30 diploma examination are not good enough.

> We get asked what more can we do or how can we do this different? You can do it any way you want. It's not going to make a difference [chuckle] on the results. Eight years I've been teaching and eight years we have the same conversation.

Marla is reluctant to invest effort getting to know the examination, because whatever she tried in the past failed and she cannot see any other way that is going to make a difference. She is even "tired of trying to guess" how students might score because she is always disappointed:

> I was almost happy about the diploma this semester, I had a sense of hope, you know, like maybe this semester everyone will pass, but I know that it's a scary thought though. I don't want to be that hopeful because whenever I get that idea in my head, I'm usually disappointed, so I'm trying not to be, but I felt like I worked really hard with them this semester. Because it's so frustrating to work so hard trying to get these students through and then they bomb the diploma.

Marla has given up trying to predict students' scores and given up being hopeful

of student success. To avoid being disappointed, and so as not to put energy into a doomed relationship, she has given up attending to the examination. Whatever she does is not enough.

Marla feels that she has put effort into Applied Mathematics 30 but her efforts are not rewarded:

> So it seems frustrating, as I feel like I'm working really hard and I don't feel like the results reflect that, and that seems to be the only measure of success is how we do compared to the rest of the province.

In Marla's view, her administration has only one measure of success: improvement in examination results relative to the rest of the province. Any effort Marla might make that does not lead to improved scores is not acknowledged. Abrams et al. (2003) stated that "high-stakes assessments increase stress and decrease morale among teachers" (p. 20). Marla's morale is clearly decreased. "I don't have memories of them celebrating what we've achieved," she said. Why bother even trying? Her work will not result in success.

Marla's relationship with the diploma examination has come to resemble that of her students'. She described the lack of effort made by some students:

> If you don't pay attention to when an exam is and it just happens you'll be like, Oh, I didn't do well because I didn't study. It takes some responsibility off you. I love when they say, I didn't even study for this at all, I didn't even open my book and I got 60% on it. Even if I do put effort, I don't know what I'm doing so I'm just going to fail anyway so I'm just going to look stupid. So what's the point of that when I could just

not do it?

The last two lines reflect my understanding of Marla's relationship with GMEs. Because she does not experience success, she has, just like her students, given up trying. Instead, she focuses on things other than the diploma examination. The stakes Marla places on GMEs are discussed later in the chapter.

Susan has a reformed relationship with the diploma examination. She has avoided teaching courses that have them, yet she now sees the value in having a GME to ensure standards are being met. Nevertheless, Susan actively resists letting her teaching be influenced by the examination. Unlike her colleagues who allow the diploma examination to infiltrate their practice, Susan wants "learning to look differently." In her current context, Susan has witnessed how attending to students' learning—and as a result making changes to courses—can contribute to higher examination scores. She learned that what she wanted mathematics teaching and learning to look like did not have to be sacrificed in order to improve results. Susan had a major revelation that contributed to her reformed relationship with the examination.

Any teacher working in a context of GMEs develops a particular relationship with them. As we have seen, Valerie, Marla, and Susan each developed a unique relationship, coloured by contextual and personal factors. Therefore it is impossible to make statements about teachers "in general." Even in a sample as small as the one here, the relationships teachers have with GMEs are complex and highly varied.

Preparing Students

Reviewing the transcripts, I noticed that each participant used the phrase *preparing students to write the diploma exam.* I have heard this phrase countless times during my career. I have used it myself. When I listened more closely to how each teacher described *preparing students*, I noticed startling differences. In the next section, I elaborate my understanding of what Valerie, Marla, and Susan meant by the phrase alongside what it meant to me. I begin by describing the word *prepare* and then detail how each teacher prepares her students.

The first listed definition of *prepare*, according to The Free Dictionary.com, is "to make ready beforehand for a specific purpose, as for an event or occasion: The teacher prepared the students for the exams" (accessed July 4, 2012). The etymology of the word *prepare*, according to the Online Etymology Dictionary, is from the Latin *prae* 'before' and *parare* 'make ready' (accessed July 4, 2012). These two sources did not provide any large insights on what preparing meant. I was astounded that The Free Dictionary had as it's example of prepare a teacher preparing students for exams as that was the exact phrase I was trying to go deeper into.

By having the phrase that I was trying to investigate be the phrase used in the dictionary to describe the meaning of the word, I understood that there exists a common understanding of what *preparing students to write an exam* means. Yet, the phrase was used differently by each teacher in this research,, and what it looked like in their classrooms was different. I also thought about what I, as a mathematics teacher, meant when I uttered the same phrase. What did each of us,

Marla, Valerie, Susan, and I mean when we say we are *preparing students to write the diploma examination*?

Valerie uses *prepare* to indicate making students ready for the specific purpose of writing the Pure Mathematics 30 diploma examination. She sees the examination as a hurdle for students to jump over so that they can go on to different things. (As mentioned in Chapter 3, most of Valerie's students will go to a post-secondary institution after high school.) In our first interview, Valerie related how she talks to her students about preparing:

> This is for the one day. We talk about how the diploma exam is scary, but it's [only] one day. I know you know this. I know you got it, because if not you couldn't pass the course. Here's how you get through your one day.

Valerie admits the examination is stressful; even so, she has confidence in her students' abilities, and they should, too. She is also saying she knows how to help them through the process. She *will* get them ready for this event.

During the course, Valerie emphasizes concepts likely to be on the examination. She tells her students, "This is a big idea, this might be on the diploma." By her own admission, Valerie is "pretty good at remembering what was on past diplomas and stuff," and she uses that knowledge in her teaching.

Valerie structures Pure Mathematics 30 so she can spend eight or nine days preparing for the diploma. The time is devoted to tips, tricks, and strategies. For example, she spends "days teaching them how to write a multiple-choice test." From her experience, Valerie knows that graphing is a viable option on

many questions rather than completing the algebraic solution. Therefore, she advises students to be sure that, "if you can graph it, you know how to graph it." A second strategy is to work backwards on multiple-choice questions: "Plug in A, plug in B, plug in C, plug in D, circle answer and move on." Although neither strategy is specific to Pure Mathematics 30, both are useful skills for writing diploma examinations.

To reinforce these strategies, Valerie has students complete previous diploma examination questions during in-class review time and the pre-exam review weekend. Valerie models what to do when they are unable to find an answer to a question. She says, "You'll be clipping along thinking you're a genius, because you are, you're super smart, and then you will hit something you don't know or you can't get an answer for, but keep going. You can't assume that you're wrong; keep going and then it'll be there." Valerie builds up students' confidence by telling them they are smart and by suggesting a strategy when they encounter difficulty. Cheng (2000), however, argues that "coaching classes, which were intended for preparing students for exams, were not a good use of the time, because students were practising exam techniques rather than . . . learning activities" (p. 11). This is precisely what Valerie uses the review weekend for: practising examination writing techniques. Valerie believes she is providing her students what they need to be successful on the examination.

For **Marla**, preparing students to write the Applied Mathematics 30 diploma exam is about a larger goal than preparing for a specific test: it is to prepare them to think, to study, and to apply their learning. Most of Marla's

students are in Grade 12, but few have effective study strategies. When she asks how they plan to study, students either have no response or say, “Well, I’ll read my notes.” Therefore Marla tries to weave into her daily teaching study tips and strategies to help them prepare for the diploma examination.

Throughout the semester, Marla highlights strategies for dealing with types of questions the students have not experienced. She tells them that questions on the diploma examination could test their knowledge “in a different looking question. I don’t know what the question is going to look like. It’s probably going to look different, so read it, look for key words. But if it’s any different, they just panic.” Marla finds that students will not attempt unfamiliar questions, so she gives them strategies for doing so. The strategies are transferable to all courses. Thus Marla is preparing them for far more than this one diploma examination.

During the last few days of class, Marla tries to structure review activities that are engaging and at the same time will help students make connections about their learning: “I was going to make flash cards with them one day, we were going to look at some mind maps for a couple of the units and kind of summarize some of the key points.” However, she found it was difficult to get students to engage with them. They preferred to work on previous diploma examination questions.

Given that Marla has a troubled or even “doomed” relationship with GMEs, she focuses instead on the broader picture. Marla wants to provide experiences that go beyond specific examination preparation:

I feel that communication is a strong part of mathematics. So from my

> standpoint I still want them to communicate. I still emphasize using units and showing all their steps and all of that because for me it's still important. They say, What does it matter? There's no written on the diploma. And I say, Well, there's written on your unit exam, and still a big part of math is communicating and being able to explain your thoughts and show your work and convince someone else that your answer is correct.

In short, Marla incorporates ideas into the course that will help students understand and communicate mathematically; furthermore, these ideas will help students perform well on the examination.

Susan feels an obligation to get students ready for the diploma examination together with an obligation "to teach them math and to treat them, well, like people, and teach them how to learn." She subordinates preparation for the examination to thinking and learning. She incorporates diploma-style questions in her course, because "that is what they are hungry for."

In her previous teaching, Susan resisted multiple-choice questions. She commented:

> I've always been really opposed to multiple choice. But now because the teaching portion of my courses is so non-multiple-choice I'm quite happy to have my students write multiple choice tests online. I'm also happy not to be marking and instead to be spending my time back and forth in the learning. Once they decide to write that exam, that's their business and that's their preparation. It's a little litmus test and it's also their

preparation for the diploma.

Susan chooses to use multiple-choice exams, delivered electronically, thus freeing up her time to engage more deeply with student work. Knowing students will write a mainly multiple-choice examination at the end, she gives them an opportunity to assess their ability ahead of time.

Preparing students to write the diploma exam is something I have heard over and over again from teachers of Grade 12 mathematics courses, but I had never probed deeply to understand what the phrase means for different teachers. Not surprisingly, it means different things for Valerie, Marla, and Susan. They value GMEs differently and understand learning and teaching differently. Put another way, each teacher wants her students to be successful, but has different views of what success is.

As a secondary mathematics teacher, *preparing students to write the diploma exam* was certainly something I used to think and talk about a lot. In each story we have heard, I recognize myself: I gave students study tips and test-taking strategies; I modelled unit exams after the diploma; I shared with my students everything I knew about the exams, including how they were constructed and scored.

I would like to think I was doing more than preparing students for the specific event of the diploma exam, but I now recognize that is exactly what I was doing. Hearing Marla and Susan describe preparing students, I realized that, in my practice, I did not necessarily always pay attention to the larger picture. Instead, I saw the exam as an event that students needed to be readied for and I used all my

knowledge to do just that. I now see that I took too narrow a view of teaching and learning.

A Return to Stakes

As discussed in Chapter 1, the diploma examinations in Alberta can be considered high stakes for students, because it determines 50% of their final grade in the course, and moderate stakes for teachers, because results are made public and sometimes reported in the media. However, the discussion in this chapter and the previous chapter have led me to recognize that a teacher's experiences can also influence the stakes.

Valerie exudes confidence in her teaching ability. The confidence could be attributed to her diploma examination results consistently being above the provincial average and to her in-depth knowledge of the content in the Pure Mathematics 30 course. She gives students problem-solving "tricks," which in turn gives students confidence in her. The community of Coachland High has expectations of excellence. If Valerie's students did not score above average, she would have to explain why.

The diploma examination is high stakes for Valerie because the results affect her own confidence and the community's confidence in her teaching ability. She believes she has the top teaching position in her school: she teaches elite courses to elite students. As M. L. Smith (1991) noted, however, "political and social uses" can be made of mandated exams (p. 11). Valerie believes that, if her students received low scores, a "political and social" result would ensue: she

would lose the high-level students. For this reason, the examination is high stakes.

Marla has found that the focus on diploma examination results and the constant push to improve teachers' practice—together with student apathy—have depleted her energy. In her view, the administration of her school is telling teachers that, because examination results are not good enough, they are not good enough. Marla wants to feel like she is good at teaching, but she does not. Constantly pressured to analyze diploma examination results and to improve them through improving herself, Marla feels that, no matter what she does, it will not be enough. Steinberg (2008) observed that assessment gives teachers "the pride and pleasure of observing students' progress in understanding. Assessment thus connects the inner satisfaction that gives meaning to a teacher's professional purpose with the outer world of success" (p. 45). Marla, however, is getting little inner satisfaction because her students are considered unsuccessful.

For Marla her belief in education and in her ability as a teacher is at stake. Marla feels pressure to have her students perform well, yet there seem to be no equivalent expectations for students. Although the diploma examination is technically high stakes for them (because it is worth 50% of the final grade), students are not held otherwise accountable for behaviour that could lead to improved results.

The administration's pressure for improvement affects how Marla feels about herself as a teacher. Lacking the confirmation that she is doing a good job, she does not feel like an effective teacher. She is no longer sure she even wants to teach. Kelchtermans (1993) wrote:

> People define themselves not only in terms of their actual life situation and the way they experience it. At the same time they look back to whom they have been in the past and who they could be in the future. (p. 447)

As Marla looks to who she could be in the future, she sees the unpleasant possibility of always being frustrated. For Marla nothing less than her career is at stake. Thus, diploma examinations are high stakes for Marla.

Susan avoided teaching diploma examination courses and did not allow the examination to determine her teaching. Even so, she recognizes her obligation to familiarize students with the examination. She is still working toward reconciling a tension between her beliefs about teaching and GMEs. In the words of Rex and Nelson (2004),

> What and how teachers teach, even within powerful accountability cultures, is dominated by their own ethical senses of what they should do for their students and who they need to be as a teacher. Even when they believed they were teaching to the test, they relegated competing pressures of subject matter standards and test preparation to a secondary position when confronted by the ethical and professional challenges of doing what they thought was best for their students. (p. 1289)

Susan has a strong sense of what she wants mathematics teaching and learning to look like. Although she now inserts diploma-style questions into her teaching, her focus remains on what is best for student learning.

At the root of Susan's resistance is the desire that the examination not dictate how she teaches and assesses her students. She believed she knew better

than the government what learning could look like in a mathematics classroom:

> My unit tests are great; they're married to the instruction that I gave, so when I said to kids, in an exam, "Create a family of polynomials that could be associated with this," well, that's language that they wouldn't see in a school division exam but it honoured the experience we had between us. Now, could they still pass a division exam? Yes, but the questions aren't, in some ways, as challenging.

Susan believed strongly in the way she was teaching; her assessment practices mirrored her instruction. She resisted common district examinations just as she resisted teaching diploma examination courses. (In a course with a GME, however, she could not have said, "No, my students will not write that exam.")

When someone else dictates what Susan does in the classroom, her autonomy as a teacher is threatened. She chose not to teach Grade 12 rather than let others influence her assessment practices. For the same reason, Susan chose not to have her students write division unit examinations. She did not enjoy teaching from a prescribed book because it did not let her teach as she believed best. Whereas many mathematics departments in the division were using a standard workbook, Susan said: "I feel like I'm dying when I'm teaching out of this book. I feel like the learning is dying." For Susan, her autonomy as a teacher and her students' learning is at stake.

Thus, the stakes for Susan involve a sacrifice of her strong belief about teaching and learning. Brady (2008) reported "testing often takes precedence over a teachers' [sic] personal teaching philosophy" (p. 148). At stake for Susan was

having her teaching philosophy sacrificed by perceived pressure to ensure students performed well on the diploma examination. Abrams et al. (2003) stated that the majority of teachers in states that have mandated examinations indicated

> that their state testing program has lead them to teach in ways that contradict their own notions of sound educational practice. These results suggest that regardless of the rewards and/or sanctions associated with test results, the implementation of state testing programs has changed teaching in ways that many teachers feel negatively impacts the quality of instruction students receive. (p. 23)

Diploma examinations have then changed the way teachers teach and the students' classroom experiences. Alongside the stakes for her, Susan sees the stakes for her students as a potential sacrifice of learning. If students' classroom experiences have been affected by GMEs, then the type of learning has, too. Learning is so important to Susan that the stakes are high if student learning is being sacrificed.

For Valerie, Marla, and Susan, the diploma examination is high stakes—but for different reasons. The stakes are high for Valerie because her identity as a teacher of elite students would be jeopardized by below-average scores on the GME. The pressure Marla feels from her administration for higher GME scores is causing her to question her very future as a teacher. And Susan feels that if she were to teach a GME course, her autonomy and her students' learning would suffer.

Conclusion

Each teacher perceives the GME from her own horizon, which in turn is influenced by her experiences and prejudices. When I was the Pure Mathematics 30 examiner and was first confronted with various perceptions of the examination, I became frustrated with teachers who did not see it the same way I did. I was not acknowledging their different horizons.

Similarly, before doing this research, I assumed that the stakes for GMEs are, at most, moderate for teachers. I now realize that teachers perceive and relate to GMEs in complex ways, and that the stakes can be surprisingly high.

In the final chapter, I reflect on how engaging in this research has changed my horizon. How can this new horizon inform my practice as a researcher and preservice teacher educator? How can this work inform the mathematics and assessment communities?

Chapter 5: My New Horizon

Hermeneutic inquiry is never completed (D. G. Smith, 1991; J. K. Smith, 1993). Based on our experiences, we develop partial understandings and eventually interpretations. With new experience, our understandings change. The idea is to continue in the hermeneutic circle until a level of satisfactory understanding is achieved (Prasad, 2005). As Gadamer (2004) wrote, "understanding is provisional and unending":

> Understanding is always a movement in this kind of circle, which is why the repeated return from the whole to the parts, and vice versa, is essential. Moreover, this circle is constantly expanding, since the concept of the whole is relative, and being integrated in ever larger contexts always affects the understanding of the individual part. (p. 189)

Secondary mathematics teachers' experiences of government-mandated examinations (GMEs) are relative to the whole of the teacher's life, the school landscape, and the broader landscape of GMEs in Alberta, Canada, and the world. This dissertation reflects what I've come to understand of teachers' lives in the culture of GMEs at this moment in time.

The teachers who participated in this research are not, of course, representative of *all* teachers. Instead, my goal was to come to a provisional understanding of three participants' experiences in their context and in the larger context of GMEs.

Where I Began

At the beginning of this research, I did not completely understand the perspective of teachers who seemed to place a large emphasis on diploma exams. I was "kept up at night" wondering about the following questions: What does it mean to be a secondary mathematics teacher in a context of GMEs? In what ways do secondary mathematics teachers make sense of teaching in a context of GMEs? What relationship do secondary mathematics teachers have with the diploma examination?

Reading hermeneutic literature that spoke of *preunderstandings* and *prejudices* (Fleming, Gaidys, & Robb, 2003; Gadamer, 2004; Paterson & Higgs, 2005), I became aware of my own understandings of GMEs. I realized I needed to attend to my prejudices and identify my horizon so that I could work to understand how other teachers see GMEs:

> Researchers underpinning their work with the philosophy of Gadamer are required to identify their preunderstandings or prejudices of the topic. Reflecting upon these will enable them to move beyond their preunderstandings to understand the phenomenon and so transcend their horizon. This in turn will influence the research findings. (Fleming et al., p. 117)

Through engaging in conversations with Valerie, Marla, and Susan, I have moved beyond where I began; I now have a deeper understanding of how other teachers experience teaching in a context of GMEs.

Where I Am Now

This research opened the understanding that, although GMEs in Alberta are high stakes for students and carry no formal sanctions for teachers, the examinations may in fact be high stakes for teachers. Before my conversations with Valerie, Marla, and Susan, I did not understand the influence GMEs could have. I did not acknowledge that teachers could feel pressured by GMEs to engage in in particular practices. Although I recognized that people have different horizons, I did not understand those horizons. I now know that by listening hermeneutically, by asking hermeneutic questions, and by engaging in the hermeneutic circle, I am able to look past what is visible to more deeply understand how others live.

I discovered that mathematics teachers, influenced by their experiences and their contexts, develop unique perceptions of and relationships with GMEs. I also discovered that paying attention to the language we use to talk about experience is essential for understanding. For instance, investigating Susan's use of *obligation* and Marla's change from *bad* to *shitty* days contributed to a deeper understanding of their experiences. Attending carefully to their language helped me see how Susan understood her role and how deeply Marla was affected by her context.

What I have presented in this dissertation can inform examination developers, school administrators, professional development providers, teacher educators, and teachers. Particularly relevant is the idea that teachers engage with GMEs differently depending on their contexts and experiences. Therefore, the

present work alerts the education community to the necessity of bringing teachers into the conversation about government-mandated examinations.

Examination Developers

As presented in this dissertation, though diploma examinations in Alberta can be regarded as moderate stakes for teachers, not all teachers view the examinations this way, for many different reasons. Examination developers could acknowledge that teachers may view diploma examinations as high stakes for them. Examination developers could also ensure that the messages they send to administrators and the public reflect the three purposes of the diploma examination programs as noted in Chapter 1: to certify level of achievement; to ensure provincial standards are maintained; and to report results (Alberta Education 2010b). Controlling the use of examination results by administrators or the public is not the responsibility of the examination developers, but communication surrounding how to use the results properly could be made more clearly.

Communication by examination developers with administration and teachers regarding policies and procedures surrounding the examination and ways to analyze results to improve practice is another potential implication for examination developers. Both Valerie and Marla spent time analyzing the results of their respective diploma examinations. Both looked to the results to provide them with information to improve future results.

In addition to communicating about analyzing results, examination

developers could communicate more clearly about the reasons behind and processes included in maintaining consistent standards or equating the examinations. Valerie expressed a misconception around how results were calculated with respect to maintaining consistent standards and equating. This process could be communicated more clearly to teachers so that they can fully understand how the process is fair for all students.

Some of the misconceptions or mistrust teachers have about GMEs could be due to not being involved in the development or marking of the examinations. I specifically chose to interact with teachers who had not had that experience to see what they understood about GMEs to see how their knowledge of GMEs was developed. By not having direct involvement with the GMEs, Valerie, Marla, and Susan relied on their knowledge of mathematics teaching and learning and the messages they were receiving from their administrators and public regarding GMEs to form their understanding. The potential for misunderstandings to develop about the purposes and the interpretation of GMEs is higher if teachers are not involved directly with examination development. Some teachers may not know about potential opportunities to engage with GMEs, thus examination developers could be more proactive about trying to engage as many teachers as possible in any of the processes surrounding the development of GMEs.

School Administrators

My conversations with Valerie, Marla, and Susan revealed that teachers' perceptions of GMEs are strongly influenced by the school context. Valerie's

school had a history of excellence on the diploma examination and the administration wanted to keep it that way. For Valerie, these are causes of trepidation: What would happen to her if her students performed below the provincial average? The administration at Marla's school, on the other hand, was telling teachers they must do a better job. Marla feels profoundly discouraged and has no long-term vision for a career in teaching. Susan was pressured by administrators to have students write diploma-style examinations in non-diploma courses. With a strong sense of what mathematics teaching and learning could look like, Susan resists the pressure.

School administrators may not have intended their messages to teachers to be interpreted as they were by Valerie, Marla, and Susan. A common message I hear in schools from administrators is 'we have to improve our results,' but what that potentially means to teachers is 'you are not doing a good enough job.' Instead of administrators calling teachers into their office to explain their results, as Valerie was afraid of if her students scored lower than provincial average, administrators could approach teachers with a message of support and understanding.

I learned from Marla's experiences, school administrators could be aware that the teaching assignment given to teachers is balanced with both courses that could be potentially more challenging in a managerial, classroom behaviour aspect and courses that could be less challenging with respect to student behaviour. Marla felt that she did not get a break from potentially challenging courses and was not feeling as if she was a good teacher because she was

constantly fighting with student behaviours. Balance in Marla's teaching assignment could have provided her with a sense of success as a teacher.

Teacher Educators

For teacher educators, this research has brought forward more questions than implications. What does it mean to prepare pre-service teachers to work in a context of government-mandated examinations? Do we invite government officials to speak to our pre-service teachers about the examinations? Or, do we resist against them? How do we help our beginning teachers to view the examinations as low stakes for them? Or can we? Or should we?

In my first two years as a teacher educator, I insisted on inviting representatives from Learner Assessment at Alberta Education to speak to my students about GMEs in Alberta. I was intrigued with the response of the pre-service teachers to the Learner Assessment representative. During the presentation on GMEs, the students seemed tense and the atmosphere uneasy. After the presentation, I asked students if they had the same sense I did and why. They responded that they felt uneasiness as well, but were unsure as to why. I wonder about this experience and will pay attention to future student responses to Learner Assessment representatives. In addition to the previous experience, when a group of students began their presentation on large-scale examinations by giving their classmates a mock exam, the tension in the room was palpable and the students that were giving the presentation did not expect such an intense response from their classmates to a mock diploma examination. I am fascinated by the pre-

service teacher negative responses to situations and people involving diploma examinations.

In my future pre-service teacher education courses on mathematics teaching and learning, I intend to have conversations with students regarding mathematics diploma examinations and what teaching can look like in a context of GMEs. Not disregarding GMEs and their potential influence on teaching, but to make students aware there are ways to teach within the context of accountability and pressures that both attend to mathematics and to the examination.

I do not feel there has to be an adversarial relationship between teachers and GMEs. I hope that by having conversations with pre-service teachers about the intended role of the examinations they will be less inclined to fear or distrust them. Many pre-service teachers are surprised that during their practica they are not allowed to teach subject areas that have PATs or diploma exams. Having discussions with the pre-service teachers as to why this might be so, and exploring the potential pressures that teachers or administrators in that school might be under would be valuable conversations to have.

Teachers

I hope other teachers will see themselves in the stories of Valerie, Marla, and Susan, just as I have seen some of my own experiences reflected in their words. My hope is that teachers will see that they are not alone in their experiences and that they find a way to be true to themselves and to their belief of what being a teacher is in spite of teaching in a context of accountability and

GMEs.

Future Research Directions

This study broadened my horizon with respect to teacher experiences and how context plays an important role in understanding experiences. I am intrigued with teacher experiences and teachers' lives. As I noted in Chapter 1, concern for teachers is what "kept me up at night". This research helped me realize that working with teachers and bringing their experiences to a broader audience is what I want to continue doing throughout my academic career.

Further study with respect to teacher relationships with GMEs and how those relationships are developed would play an important role in informing us as a community of educators working within similar contexts. Further research into teacher experiences within a context of GMEs would serve to broaden the education community's horizon on how teachers relate to and perceive GMEs. A broader horizon and understanding can lead to how to best support teachers in their work in a context of GMEs.

The context of Alberta's GMEs is changing: in 2014, the PATs at Grade 3 will no longer be written at the end of Grade 3, as a measure of what students learned, but at the beginning of Grade 3 as a diagnostic tool for where students are at. Results from the new Student Learning Assessments (SLAs) will provide information to teachers about how to help students move forward in their learning (Johnson, n.d.). I wonder how this change to GMEs will affect teacher perception of the results of those exams: Will these examinations be considered high or low

stakes for teachers? As SLAs are implemented in Grade 3 and then extend to Grades 6 and 9, research attending to teacher experiences will be needed to be able to understand how SLAs are being used to support teaching and learning.

An End is Yet Another Beginning

Although this is an ending to my dissertation research, it is a beginning to my new life as a researcher and teacher educator. I will bring forward my awareness of the diversity of experiences and relationships that teachers have with GMEs into my work as a researcher and as a teacher educator. I look forward to sharing my understandings with pre-service education students, so they will have a better idea of what to expect when they become teachers. I also look forward to working with practicing teachers to even further broaden my horizon of what it means to be a teacher in the context of GMEs.

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Appendix A

Pre-conversation Activities

Please choose one of the following activities to respond to and bring it to our first conversation.

1. Draw a timeline of important events in your teaching career.

2. Draw a good day for you as a secondary mathematics teacher, and a bad day for you as a secondary mathematics teacher.

3. Choose three colours to make a diagram or abstract drawing that shows the way you experience mathematics diploma examinations.

4. Draw a diagram and label it to show where your support systems come from in your teaching career.

5. Make a schedule of your day, week, or year in the classroom to show how your time is spent. You might choose to use colours to colour code the different things that divide your time and use a legend.

6. Make a diagram of a place that is important to your teaching and use notes or keywords to indicate what happens where in that place.

7. Complete the following metaphors:

   Classroom assessments are like _____ .

   Diploma examinations are like _____ .

Appendix B

Verbatim Transcript

Conversation three between Valerie and Richelle: April 2, 2012

Valerie: I'm, I'm annoyed about the level of work if that makes sense, like I'm kind of like oh why do I have to and I'm not a binder person but there's some things I teach really, really well. I teach conics really well and it's gone like and then I was teaching you know composition of functions, the rational expressions. How dull. I guess I find it dry, maybe that's the word.

Richelle: That could be.

Valerie: The new 30 is really dry.

Richelle: Yeah that could be hey.

Valerie: Like it's going to be hard to pump them up for some (chuckle) of this.

Richelle: It seems very algebraic.

Valerie: Yes it's very, it's all function based. It's all pre-calc based which I which then they would have taken out, if that was the point I wish they would have taken some of the pre-calc factoring and the rationalizing the numerator and brought that down from 31 'cause if you didn't have to teach that in 31, you'd have more time in 31 to do like, um, exponentiation

and stuff like that right.

Richelle: But they haven't like touched the 31 curriculum in.

Valerie: '86.

Richelle: Yeah.

Valerie: I was five.

Richelle: I looked at the, um, Art curriculum 'cause I taught them math and art and the Art curriculum is from about that time, I'm like and it's not even written in like current lang-it's so bad, I'm like how do you guys even teach out of this 'cause I'm trying to pull outcomes out to talk to them about it and I'm like I don't get it. (Chuckle) I can't figure anything out. They're like we know. (Chuckle)

Valerie: That must be frustrating them right. Go to your program of studies. Well ours doesn't really exist. Math 31 though because you're allowed 20 percent to spend on whatever you want.

Richelle: Yeah, that was the old 30, 33 and there was 10, there was 10

Valerie: [Oh was it? Ten percent?

Richelle: or 20 percent that was open and you could just put in whatever. Yeah that was fun. I taught a little bit under that too and I just found it fun 'cause that, then you felt okay to do a big project right.

Valerie: Yes. Or just ‘cause you had some time in there to implement.

Richelle: Yeah, yeah. Yeah so.

Valerie: No, but the 30-2, that’s the new book I’m starting now, with the logic games and stuff in it but I’m like oh really, really we had nothing else to teach you in 30-2 but that. Then put a logic part in it. Then do the actual logic unit to the actual Venn diagram in, like put the put the proof stuff that we took out of 20, put in actual logic symbol unit then. Not you know if John has a cat and Sally has a dog and Sally and John are brothers, then who works at the car wash, like I, those I don’t understand. That’s the diploma that’ll be interesting to see.

Richelle: ‘Cause for those kind of things you need more words.

Valerie: But you need more time. You can’t ask the kids to do a logic problem in three minutes.

Richelle: Yeah that’s true. That’s true.

Valerie: So how do you, that’ll be interesting on diploma to see how that’s going to go, you know and they’re still doing all the exponents and logs. They’re not doing the function step right, all the function step is gone but they’re doing exponents and logs, ah, the probability, perms and combs. It’ll be interesting. That diploma I’d be a little bit more worried about than the 30-1 ‘cause 30-1 they’re going to steal a ton from the current one

Richelle: Yeah. Well and they could possibly steal a ton from like

Valerie: The old 30.

Richelle: old 30 right like.

Valerie: But there has never been anything like 30-2 before.

Richelle: Yeah. Well there's never anything like 30 Applied before either.

Valerie: Well and look at how that turned out.

Richelle: I know.

Valerie: (Laughter) We got a reading test until the last year. January they finally cut down the reading. That's very helpful. Just read, grade 10 reading level and they put a University reading level question in there No and I'm good though. I'm, I'm just, I don't want to redo it all again.

Richelle: Last time you were talking about having babies next year.

Valerie: That would be a goal. I would like to have this all shake out and then figure it out for about a year.

Pastiche

I've gone through the new book, so I know kind of where I'm going. I'm not afraid of it. I'm annoyed about the level of work. I'm not a binder

person but there are some things I teach really, really well. I teach conics really well and it's gone. I guess I find it dry; maybe that's the word. I'm good though. I just don't want to redo it all again. Being pregnant would be a goal. I would like to have this all shake out and then figure it out for about a year.