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__________________________________________________________________________________________

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Over several decades, much attention has been paid to the preparation of K-12 teachers. More recently, the body of literature on graduate teaching assistants’ preparation for teaching has begun to increase. Since many graduate teaching assistants are hired as community college and university instructors, it is important to understand how they are prepared for teaching. The purpose of this thesis is to understand what newly hired instructors found helpful, and not helpful, about their education. A series of three interviews was conducted with four instructors over the course of one academic year. I share my findings from my investigation of the instructors’ experiences during their first years on the job: what courses they draw on while teaching, what courses have influenced their teaching, and what courses they are unable to draw on while teaching. Lastly, I offer recommendations for what types of courses might be helpful in supplementing a prospective instructors’ education based on the participants’ experiences.
College Instructor Preparation: Enough to Feel Comfortable?

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Eric Fleming

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Chapter 1: Introduction

The purpose of this research is to answer questions regarding the preparation of mathematics instructors for teaching in post-secondary contexts, such as community colleges and universities. At the four-year college level, regardless of the level of professorship, less than half of the professors surveyed reported that their graduate program prepared them well for their future role as an instructor (Hurtado, Eagan, Pryor, Whang, & Tran, 2012). Since only approximately half of new professors felt comfortable in their roles, it would make sense that something is missing from their preparation. Furthermore, since universities and community colleges teach many of the same mathematics courses, it would be reasonable to suspect that there is a similar trend at community colleges.

While working on their Master’s or Doctorate degrees, most graduate students spend several years working as a teaching assistant, which is one of the primary methods of funding graduate students (Bass, 2006). Their roles range from leading recitations and holding office hours to being the instructor on record for their own courses (Ellis, 2014). Hyman Bass (2006) notes that for the 178 departments that offer Doctoral programs in mathematics, the doctoral degree “was designed to be an apprenticeship into the research practice of an academic research mathematician” and that Doctoral students are well prepared for research, but there are many other functions for which they remain unprepared, including teaching (p. 109). The fact that Doctoral education rarely provides adequate training for teaching assistants only makes the problem worse (Golde & Walker, 2006). On
the way to earning their Doctorate, many of these students earn their Master’s. This would imply that any student that obtains their Master’s from these universities would also be ill-prepared to teach. Mathematics departments teach thousands upon thousands of undergraduates college-level mathematics, and sometimes they staff some of these courses with graduate students as instructors (Golde & Walker, 2006). Even so, Golde and Walker (2006) note that several reports indicate that little attention is paid to preparing and supporting graduate teaching assistants for teaching.

For a stark contrast, one need only look at what is required for the preparation of an individual wishing to teach at the K-12 level. In recent years, a lot of attention has been drawn to the preparation of secondary school teachers. There was a time during which one could become an elementary or high school teacher without obtaining a college education, but that was brought into question and ultimately changed (Feiman-Nemster, 1990). Today, to teach in elementary or secondary schools, the minimum requirement is a bachelor’s degree accompanied by an appropriate certificate. In some instances, a Master’s degree in education with a focus on teaching methods and student learning is required (teach.com, n.d.).

According to the Bureau of Labor Statistics (BLS), a Bachelor’s in the subject that you wish to teach along with a license and/or certificate are required to become a teacher at the high school level (Bureau of Labor Statistics, 2014). A required component of the certification is a period of fieldwork, which is commonly referred to as student teaching (Bureau of Labor Statistics, 2014). Another name for a
student teacher is a pre-service teacher, and they work under a more experienced teacher called a cooperating teacher. This period of time while the pre-service teacher works under the cooperating teacher is meant to introduce the prospective teacher to the field of teaching and give them some first-hand experience as to what teaching entails.

At the K-12 level it has been shown that (1) both teaching experience and certification matter and (2) the specific coursework within the certification programs, both content and pedagogically oriented, has a positive impact on student learning at all grades, especially among mathematics coursework (Rice, 2003). Similar to K-12 teachers, many mathematics graduate students engage in some type of preparation for teaching – anywhere from one day to a seminar class focused on aspects of teaching over the course of a term or even a year (Ellis, 2014). Often this is the only component of professional development required before a mathematics graduate teaching assistant (GTA) enters a classroom of their own, whether that be as a lead instructor or as a teaching assistant leading recitations (Ellis, 2014). There are a number of studies indicating that mathematics GTAs do not greatly benefit from some of these orientations. These studies indicate that these orientations do not address content-specific issues or pedagogical training specific to teaching mathematics courses (Dotger, 2011; Kung & Speer, 2009). The literature points to the idea that the professional development pre-service teachers receive would be beneficial to GTAs. A national effort, Preparing Future Faculty, has been focused on preparing graduate students as faculty. This program addresses the
teaching, research, and service preparation of graduate students in mathematics and other disciplines. Programs such as these have been shown to ease the transition from graduate student to instructor or professor (Defranco & McGivey-Burelle, 2001).

Mathematics GTAs have succeeded at their undergraduate studies and have moved on to graduate level mathematics. As a result, they likely have fairly strong content knowledge. However, researchers (e.g., Shulman 1986) have argued that this strong content knowledge is not enough to teach mathematics, even though most graduate students teach undergraduate mathematics. Studies have found graduate students who teach classes at the university level are more likely to attempt more novel student-centered pedagogically oriented instruction (i.e. Jackson, Garrison, Wilson, Gibbons, & Shahan, 2013). Even though researchers have found that student-centered teaching has a much better impact on students than direct instruction (Boaler, 1998; Jackson, et al, 2013; Kung, 2011; Rasmussen, 2001), studies have shown that most undergraduate mathematics courses are taught using a traditional lecture. However, it has been found that student-centered teaching is difficult to enact for those who have not received explicit training in such teaching methods (Lampert, Beasley, Ghouseini, Kazemi, & Frankie, 2010; Wagner, Speer, & Rossa, 2007) even though they have strong content knowledge, which Monk (1994) showed was not a strong predictor of student learning.

The negative impact mathematics instruction has had on students is well documented. For example, one of the main reasons STEM majors, in particular,
changed their majors was what students cited as poor instruction (Rasmussen & Ellis, 2013; Seymour & Hewitt, 1997; Thompson et al., 2007). Graduate students have an impact on students as well. Ellis (2014) found that there was a statistically significant difference between the persistence of students of a mathematics GTA and students of a non-GTA. Specifically 79.9% of students of Mathematics GTAs persisted into Integral Calculus, where students of non-GTAs persisted into Integral Calculus at a rate of 86.3%. As another example, College Algebra has a failure rate exceeding 50% at many institutions (Cullinane & Treisman, 2010). Similar to the failure rate of College Algebra, of the STEM intending students enrolled in Differential Calculus, less than 50% continued on to Integral Calculus and only 30% of them continued to complete Integral Calculus and Multivariable Calculus (Thompson, et al., 2007). One of the main reasons students cited for not continuing in the calculus sequence was poor instruction (Thompson, et al., 2007). In 2013, a study conducted on over 200 institutions, again with STEM students, 15% did not continue on to Calculus 2 (Ellis & Rasmussen, 2013). These studies have focused on STEM majors, but if these courses are having this effect on STEM majors (who are generally considered to be ‘good at math’), imagine what effect they could have on students who have the preconception that they are ‘bad at math’.

It is not just college level courses that are the problem, though. Historically, developmental education has been an obstacle that is too difficult for many surmount (Zientek, Ozel, Fong, & Griffin, 2013). Bailey, Jeong, and Cho (2010) show that approximately two-thirds of students that begin a remedial mathematics
sequence do not complete it. Not only are student outcomes in developmental level
courses not as high as one might hope, almost half of the freshman at public
community colleges enroll in at least one developmental level reading, writing, or
mathematics course (Parsad & Lewis, 2003).

Thus the goal of the study described in this thesis is to answer the following
research question: What are recently hired community college and university
mathematics instructors’ perceptions of their Master’s degree as preparation for
teaching?
Chapter 2: Literature Review

In this chapter, I will address four important issues that motivate my thesis. First, I address the growth in the student and instructor populations. Second, I address students’ experiences and outcomes in post-secondary mathematics courses. Then, I look at studies that investigate the teaching of mathematics in post-secondary mathematics courses, which has been found to be problematic for students. Next, I look at the preparation of post-secondary instructors as compared to the preparation of K-12 teachers. Finally, based on the literature, I present my research questions.

2.1 Increases in student population and the instructor/professor population

Today, higher education, at least to some degree, is a necessity. Currently, 59% of jobs require at least some postsecondary education, and by 2018, it is projected that this will increase to 62% (Carnevale, Smith, & Strohl, 2010). For more than a century, Americans have had a choice of going to a community college, university, or various other postsecondary education options. Community colleges have witnessed the most significant growth over the past twenty years. In 1910, approximately 5% of American 18-year-olds were enrolling in community colleges and universities, but by the 1960’s, 45% of all American 18-year-olds enrolled in college, and this was the point where parents concluded college was no longer just a luxury, but a necessity (Phillippe & Sullivan, 2005). From 1965 to 2001, enrollment in community colleges increased by almost 480%. More specifically, between 1998 and 2002, community college saw an 18% increase in enrollment while universities’
enrollment increased by 10% (Phillippe & Sullivan, 2005). Between the years 2002 and 2012, nationwide enrollment in post-secondary education (universities and community colleges included) increased from 16.6 million to 20.6 million, which is an increase of 24% (National Center for Education Statistics, 2015). During this time the number of full-time students rose 28% and the number of part-time students rose 19% (National Center for Education Statistics, 2015).

This increase in student population creates a demand for more instructors that are well prepared to teach the masses. Growing enrollments have prompted the need for more faculty. For example, the most recent College Board of Mathematics Survey (2013) shows that there is a steady increase in the number of students enrolled in mathematics courses, and the Bureau of Labor Statistics Occupational Outlook Handbook for Post-Secondary Teachers (2014) projects that the need for instructors at the post-secondary level increased faster than the national average. Over the years, there has also been a rise in the number of teachers required to educate the increasing student population at community colleges. In early 2014, the United States Department of Labor expected that the number of postsecondary teaching positions would increase by 19%, which is faster than the national average. Thus, instructional staff will increase significantly in the next few years, but are these instructors prepared to offer adequate services (lecturing, office hours, etc.) that are most beneficial to student outcomes?
2.2 Student outcomes in mathematics courses

Student outcomes in post-secondary mathematics courses, and particularly in lower-division courses, tend to be poor. For example, College Algebra has a failure rate exceeding 50% at many institutions (Cullinane & Treisman, 2010). There are other courses with similarly poor outcomes. Some of these courses, such as Differential Calculus, seem to cause Science, Technology, Engineering, and Mathematics (STEM) students to change majors (Ellis & Rasmussen, 2013; Seymour & Hewitt, 1997; Thompson et al., 2007). Similar to the failure rate of College Algebra, of the STEM intending students enrolled in Differential Calculus, less than 50% continued on to Integral Calculus and only 30% of them continued to complete Integral Calculus and Multivariable Calculus (Thompson et al., 2007). This is to say that, in their study, more than 50% of the students that enrolled in Differential Calculus either changed majors or options within their major so they were no longer required to take Differential or Integral Calculus. In 2013, a study conducted on over 200 institutions, again with STEM students, 15% did not continue on to Calculus 2 (Ellis & Rasmussen, 2013). These studies have focused on STEM majors, but if these courses are having this effect on STEM majors (who are generally considered to be ‘good at math’), imagine what effect they could have on non-STEM majors.

As of 2014, approximately one-twelfth of public, four-year institutions reported on-time four-year graduation rates of their first-time, full-time students according to the Education Department’s Integrated Postsecondary Education Data System (Douglas-Gabriel, 2014). At some institutions as many as 34% to 48% of
students earn their degree by their sixth year (Douglas-Gabriel, 2014). This means that, instead of taking what used to be the typical four years to complete a Bachelor’s degree, many students are taking six or more years to earn their Bachelor’s. This is becoming more and more commonplace as well. Over all, at the most known universities in their respective states, only 36% of students are getting their degrees within six years (Douglas-Gabriel, 2014). It is important to note that this is not all due to mathematics courses, but it is hard to imagine that with failure rates such as those we have seen in College Algebra, a required course for most majors, that mathematics courses are not at least a component of this delayed graduation trend.

It is not just college-level courses that are the problem, though. Historically, developmental education has been an obstacle that is too difficult for many surmount (Zientek, Ozel, Fong, & Griffin, 2013). Bailey, Jeong, and Cho (2010) show that approximately two-thirds of students that begin a developmental mathematics sequence do not complete it. The problem has been widely studied, but has not focused solely on mathematics. The U.S. Department of Education has funded and performed multiple studies of failure rates for classes taught at community colleges. In one of these studies, Adelman (2004) notes that developmental English and mathematics courses are among the most failed (including withdrawals, incompletes, etc.) courses taught at the community college level. Not only are student outcomes in developmental level courses not as high as one might hope,
almost half of the freshman at public community colleges enroll in at least one developmental level reading, writing, or mathematics course (Parsad & Lewis, 2003).

2.3 Impact of instruction on student outcomes in mathematics courses

There have been multiple studies that have linked student failure in mathematics courses at universities to the teaching of mathematics. One of the main reasons STEM majors, in particular, changed their majors was what students cited as poor instruction (Rasmussen & Ellis, 2013; Seymour & Hewitt, 1997; Thompson et al., 2007). Seymour and Hewitt (1997) conducted longitudinal interviews with students and found that negative learning experiences were the most common complaint for those pursuing a degree in a STEM field. This was true for individuals that remained in a STEM field and for those that switched to a different major because of these experiences (Seymour & Hewitt, 1997).

Additionally, these negative experiences were one of the main causes for students losing initial interest in STEM related degrees, and caused them to change majors to something that could offer them more positive learning experiences than their previous STEM field offered (Seymour & Hewitt, 1997). This study shows just how influential the teaching in a single course can be in students’ decisions to continue on in their degree or change to a major in which they will have a more positive educational experience.

Instructors who have earned their Master’s or PhD most often teach lower-division mathematics courses; however, there are many instances where a GTA is the instructor on record for the course. Studies have found graduate students in
these situations are more likely to attempt more novel, student-centered, pedagogically-oriented instruction (i.e., Jackson et al., 2013), and researchers have also found that student-centered teaching has a much better impact on students that direct instruction (Boaler, 1998; Jackson et al., 2013; Kung, 2011; Rasmussen, 2001). However, it has been found that student-centered teaching is difficult to enact for those who have not received explicit training in such teaching methods (Lampert et al., 2010; Wagner et al., 2007).

Ellis (2014) found that there was a statistically significant difference between the persistence of students of a mathematics GTA and students of a non-GTA. Specifically 79.9% of students of Mathematics GTAs persisted into Integral Calculus, where students of non-GTAs persisted into Integral Calculus at a rate of 86.3%. These GTAs have succeeded at their undergraduate studies and have moved on to graduate level mathematics, thus they likely have fairly strong content knowledge. However, researchers (e.g., Shulman 1986; Monk, 1994) have argued that this strong content knowledge is not enough to teach mathematics. Other researchers (Belnap & Alderage, 2009; Golde & Walker, 2006) have claimed that the preparation for teaching postsecondary mathematics – earning a graduate degree in mathematics – is inadequate. Since strong content knowledge is not enough by itself, some investigation into how future instructors and professors are prepared for their role as post-secondary mathematics instructors is necessary.

In an attempt to help ensure that future mathematics instructors are well prepared, the American Mathematical Association of Two-Year Colleges (AMATYC)
has set forth standards for hiring practices of instructors by community colleges, but no assessment has been published to see if these are being followed or even sufficient. The minimal preparation to become a postsecondary teacher at the community college level requires one to obtain a Master’s degree in mathematics or a related field that consists of at least 18 semester or 27 quarter credit hours of mathematics courses. To move from minimal preparation to standard preparation, one must obtain at least 30 semester (45 quarter) credit hours of mathematics courses with the added requirement of having teaching experience at the postsecondary level. For both of these categories, pedagogy is only listed as desirable.

According to AMATYC, after obtaining an instructor position at a community college one should continue formal education which may result in any of the following degrees: Doctor of Arts in mathematics, PhD or EdD in mathematics education, or PhD in mathematics (1992). Upon surveying the job postings from multiple institutions, it would seem that the minimal preparation is enforced at best. Moreover, there are a few institutions that do not enforce these standards, but replace the Master’s in mathematics with a Master’s in mathematics education. It would seem that these institutions assign value to a Master’s in mathematics education, where others do not. What makes these institutions view a Master’s in mathematics education and Master’s in mathematics both as adequate qualifications for teaching at the community college level? Do they see something that the rest of the institutions and the AMATYC do not? A survey of 22 community
colleges in Texas revealed that their presidents believed that courses in pedagogy and history of higher education and curriculum were two very important prerequisites to becoming an instructor at a community college (Johnson, 1977).

2.4 The Graduate Teaching Assistantship as Preparation for Post-Secondary Teaching

There have been several studies on mathematics GTA professional development. For a more comprehensive review, please see Ellis’ dissertation. During the past ten years or more, the literature on GTA professional development has increased. This increase correlates with national reports showing the significance of undergraduate education and with the increasing role that GTAs are playing in the teaching of mathematics courses (Blair, Kirkman, & Maxwell, 2010). Their roles range from leading recitations and holding office hours to being the instructor on record for their own courses (Ellis, 2014). Preliminary results from the most recent College Board of Mathematical Sciences (CBMS) survey show that there is an increase in the number of students enrolled in mathematics courses nationwide as well as a 5% decrease in the number of tenured and tenure-track mathematics faculty from 2005 to 2010 (Blair, Kirkman, & Maxwell, 2010). At the same time, the percentage of mathematics sections taught by full-time faculty fell from 56% to 48% (Blair, Kirkman, & Maxwell, 2010). So it is clear that these graduate students are becoming more and more important in the education of our undergraduates, but how well are they prepared to teach future generations?

Hyman Bass (2006) notes that for the 178 departments that offer Doctoral programs in mathematics, “Historically, the doctoral program in mathematics was
designed to be an apprenticeship into the research practice of an academic research mathematician” and that Doctoral students are well prepared for research, but there are many other functions for which they remain unprepared (p. 109). Among these other functions is teaching, which is interesting because less than one in three mathematics PhD recipients take jobs outside of academia (Golde & Walker, 2006). The fact that Doctoral education does not provide adequate training for teaching assistants only makes the problem worse (Golde & Walker, 2006). Many of these students stop their graduate education when they earn their Master’s degree. This would imply that any student that obtains their Master’s from these universities would be ill-prepared to teach.

While working on their Master’s or Doctorate, most graduate students spend several years working as a teaching assistant, which is one of the primary methods of funding graduate students (Bass, 2006). Mathematics departments teach thousands upon thousands of undergraduates college-level mathematics, and sometimes they staff these courses with graduate students as instructors (Golde & Walker, 2006). Even so, Golde and Walker (2006) note that several reports indicate that little attention is paid to preparing and supporting graduate teaching assistants. Results from a survey of 266 four-year colleges showed that only 48.7% of assistant professors and 46.9% of associate professors felt that the training they received in graduate school prepared them well for their roles as faculty (Hurtado et al., 2012). Since this is happening at the university level, and instructors at the university and community college levels receive the same or similar preparation, it is reasonable to
suspect that this is also happening at the community college level. Furthermore, an
effective instructor at either level will need to have some knowledge on how to help
students that come from diverse backgrounds and are at various stages in life. It
would be unreasonable to expect someone who has been successful in their
mathematics studies for the past six or more years to understand all that their role
as a teacher entails.

For a stark contrast, one need only look at what is required for the
preparation of an individual wishing to teach at the K-12 level. In recent years, a lot
of attention has been drawn to the preparation of secondary school teachers. To
teach in elementary or secondary schools, the minimum requirement is a bachelor’s
degree accompanied by an appropriate certificate. In some instances, a Master’s in
Education is required (teach.com, n.d.). According to the Bureau of Labor Statistics
(BLS), a Bachelor’s in the subject that you wish to teach along with being licensed
and/or certified are required to become a teacher at the high school level (Bureau of
Labor Statistics, 2014). While obtaining their Bachelor’s in their desired field of
instruction, “future teachers typically enroll in higher education’s teacher
preparation program and take classes in education and child psychology” (Bureau of
Labor Statistics, 2014, p. 1). A required component of the certification is a period of
fieldwork, which is commonly referred to as student teaching (Bureau of Labor
Statistics, 2014). Another name for a student teacher is a pre-service teacher, and
they work under a more experienced teacher called a cooperating teacher. This
period of time while the pre-service teacher works under the cooperating teacher is
meant to introduce the prospective teacher to the field of teaching and give them some first-hand experience as to what teaching entails.

At the K-12 level it has been shown that (1) both teaching experience and certification matter and (2) the specific coursework within the certification programs, both content and pedagogically oriented, has a positive impact on student learning at all grades, especially among mathematics coursework (Rice, 2003). The first of these two points is clearly addressed in the mandatory preparation of K-12 teachers. Teaching experience is accomplished via a work sample in most graduate degrees, and even in some undergraduate degrees. The term ‘work sample’ was discussed above under the name ‘student teaching.’

Feiman-Nemser and Beasley (1997) found that mentoring in general was beneficial to pre-service teachers, just as Rice (2003) agreed with later, but also found that the mentor played a critical role in the further development of the pre-service teachers’ pedagogical thinking.

For pre-service teachers, a class or seminar is considered neither necessary nor sufficient for professional development (Ellis J. F., 2014). However, this is often the only component of professional development required before a GTA enters a classroom of their own, whether that be as a lead instructor or as a teacher’s assistant leading recitations (Ellis, 2014). These orientation/seminars range from a few hours to a semester-long course. There are a number of studies indicating that mathematics GTAs do not greatly benefit from some of these orientations that are meant to be interdisciplinary GTA orientation. These studies illustrate that
orientations do not address content-specific issues or pedagogical training specific to teaching mathematics courses (Dotger, 2011; Kung & Speer, 2009). In a yearlong study conducted at one institution, Belnap (2005) concluded that the following experiences influence GTAs’ teaching, and that the impact of these experiences are also influenced by attitudes, knowledge, and preparation that GTAs brought with them: (1) a three day seminar addressing pedagogical, epistemological, curricular, and assessment issues through the mathematics department, (2) a one-day GTA training addressing general pedagogical techniques, the GTA union, sexual harassment, and similar Human Resource information, and (3) a one semester course, concurrent to their first teaching assignment, addressing pedagogical issues, microteaching opportunities.

A more successful model, stressing content-specific pedagogical knowledge and pedagogical training meant to target content-specific instructional practices, is needed (Hauk, Kung, Segalla, Speer, & Tsay, 2006; Kung & Speer, 2009; Luft, Kurdziel, Roehrig, & Turner, 2004). Ellis (2014) pointed out that since GTAs often have little teaching experience when they first become a GTA, programs that are designed for pre-service K-12 teachers could be very useful in developing GTAs’ professional development. Some of the aspects of these programs that could be particularly useful are apprentice teaching and opportunities for investigating student thinking (Ellis, 2014, p. 52). The literature points to the idea that the professional development pre-service teachers receive would be beneficial to GTAs. A national effort, Preparing Future Faculty, has been focused on preparing graduate
students as faculty. This program addresses the teaching, research, and service preparation of graduate students in mathematics and other disciplines. Programs such as these have been shown to ease the transition from graduate student to instructor or professor (Defranco & McGivey-Burelle, 2001).

While lessons can be learned from the preparation of K-12 teachers, Speer and colleagues (2005) pointed out the lack of literature addressing GTA’s teaching practices, preparation to teach, and knowledge needed to teach. Over the past 10 years, there has been a growing body of literature addressing these facets of GTAs’ teaching. Even though this body of knowledge is expanding, not much work has been done to understand how instructors and professors are prepared for teaching (Beisiegel, 2009; Speer & Hald, 2008; Speer & Wagner, 2009; Speer, Gutmann, & Murphy, 2005; Speer, King, & Howell, 2014; Speer, Strickland, & Johnson, 2005). Often, GTAs have strong content knowledge, but little teaching experience (Ellis, 2014). Speer, Strickland, and Johnson (2005) found that even experienced GTAs often lack extensive knowledge of student learning and have not developed any strategies to help support student learning.

2.5 Research Question

In the preceding literature review, I illustrated that the preparation of mathematics instructors is varied and not well understood. I compared K-12 preparation to post-secondary preparation, and showed that the former is well studied, while the latter is not. Thus, the purpose of this research is to answer questions regarding the preparation of instructors in post-secondary contexts, such
as community college and universities. The challenges that instructors face at the
different institutions (community colleges versus universities) may not be identical
in regards to student learning, but there is certainly some overlap. Therefore it is
reasonable to hypothesize that a similar trend will be observed at the community
college level as well.

My research question is the following: What are recently hired community
college and university mathematics instructors’ perceptions of their Master’s degree
as preparation for teaching?

Most of the potential effects of this research will be local, but this research
may spark others to conduct similar studies with a larger sample in order to have a
more widespread impact on the educational community. The main local effect could
be the development of a new track for graduate students that intend to earn their
Master’s in mathematics in order to teach at the community college level. If this
new track were created, then we would have better prepared future community
college teachers. This could result in higher pass rates for developmental
mathematics and trickle into increased pass rates for those transitioning from
developmental mathematics to college level mathematics. The increased pass rates
could then translate to more degrees being awarded, more students transferring out
to four year institutions, and a potential increase in self-efficacy.
Chapter 3: Methods

In this chapter, I describe the process I used to recruit participants, the interview protocols and rationales for questions posed during interviews, the process of thematic analysis for analyzing transcripts of interviews, the decisions made in thematic analysis, and how I completed each phase of thematic analysis.

3.1 Recruitment of Participants

Because my study aimed to understand their preparation for their roles as instructors and the transition from mathematics graduate student to mathematics instructor, I attempted to recruit mathematics instructors in their first few years of teaching. Participants were recruited in two ways. In order to recruit the community college instructors, the email found in Appendix A was first sent to the current head of the mathematics department of community colleges in the Pacific Northwest. Next, the participant was contacted directly using the instructor recruitment email found in Appendix B. Of the community college instructors that received and responded to the recruitment email, two were in the first few years of their career and volunteered to participate in the study. Recruiting instructors at universities was slightly different in that the recruitment email to the head of the math department was unnecessary. This email was unnecessary because the information needed to contact instructors at the college level was readily available online. Instructors at universities were emailed directly, regardless of current experience level. Of the instructors and professors that were contacted, two were in the first few years of their career and volunteered to participate in the study. Due to limited
response of potential participants, this study consisted of four mathematics instructors, with two teaching at community colleges and two teaching at a university. A profile of these participants will be in the next chapter.

3.2 Interview Protocols

Participants went through a series of three interviews over the course of the 2015 academic year, mostly during winter and spring terms. The intent of interview one was to learn about the participants background and to see if they have crossed the boundary between student and instructor yet, or when then may have crossed that boundary. Interview two had three different components: (1) what do you feel you missed in your education, (2) how has your education been helpful versus what have you had to learn while being an instructor, and (3) what support network(s) have you formed. The final interview was primarily clarification of previous responses and follow-up questions generated by previous responses. All three interviews contained questions about what the instructor was teaching that term, and what they have taught in the past, or will teach in the future. The intent of these questions is to build a profile of classes that each instructor has taught, and what they typically teach. The interview protocols can be found in Appendix C.

Participants were asked, “Do you feel that there is any coursework you could have done in your graduate or undergraduate program that would have helped you feel more comfortable?” to see what kinds of courses, if any, they would name to be beneficial beyond the courses that they had already taken. If the interviewee responded that there were no other courses that would have helped them feel
comfortable, then this might imply that they felt that their program prepared them well for becoming an instructor. As opposed to missing coursework, participants that had taken education courses were asked, “Have your education courses had an influence on how you think about teach and how you teach?” in order to see how much they felt that their education-related coursework helped them in their chosen career. Participants were also asked, “When you are teaching, do you feel that you pull on any of your knowledge from your graduate subject matter courses?” to see where and how their graduate subject matter courses were helpful.

Shifting the focus from coursework to their transition, participants were asked, “Have you had any particular difficulties or successes transitioning between a student and a teacher?” to see which difficulties and/or successes might be related to their different backgrounds. Moving beyond the transition, the question “What seems to have the biggest impact on how you think about and plan for teaching?” was asked to see what all instructors take into account while they are planning, which opens the door to asking where these factors came from (e.g., an instructor may take student thinking into account, to which the follow up question “Where did you learn to take that into account?” may be asked to see if it is something that the instructor came up with themselves, in their coursework, or from colleagues). These interviews were audio-recorded and I transcribed the interviews. The process of transcribing provided me the opportunity to become familiar with the participants’ experiences and their answers to interview questions. Upon completion of transcription, the interviews were analyzed using thematic analysis.
3.3 Thematic Analysis

The process of thematic analysis begins with a few important decisions. Braun and Clarke (2006) recommend that the researcher make the decisions before analysis, but be open to changing them during their analysis if it seems that a change would be more beneficial. For example, the researcher may begin with the intent of generating a detail-rich description of their entire data set, but in the end realize that they focused on detailed accounts of a few aspects of the data. The decisions are as follows: (1) rich description of the entire data set or a detailed account of one particular aspect of the data, (2) inductive/bottom up approach or Deductive/top down approach, and (3) semantic themes or latent themes. Below, you will find each decision and the rationale behind the decision.

The first decision I had to make was a rich description of the entire data set or an account of one particular aspect of the data set. I wanted to explore recently hired mathematics instructors’ perceptions of their Master’s degree as preparation for teaching, thus I chose to start with a detail-rich description of the entire data set rather than focus on one particular aspect of the data. Later I realized that, based on my data, I had actually focused on a few aspects of my data, rather than a detail-rich description of the entire data set. Thus, I changed my decision to focus on on a few aspects of my data. The second decision made was that I wanted to take an inductive or bottom up approach. My questions are quite complex and need more than a yes or no answer. I wanted to go into my study with an open mind, and not be restricted to a
certain lens to look through. I did not want to go into my study looking for certain occurrences, rather I wanted to be open to all that the participants said. Thus, I chose to build from the ground up. This means that I did not using a pre-existing coding frame, but developed my own through the process of reviewing the transcripts. I would let the data help me determine how to code, and the themes coming out of the data would be unrelated to a specific theoretical approach. Therefore, I would be using a data-driven, instead of a theory-driven, approach.

The final decision made before analysis began was whether my themes would be semantic or latent. As Braun and Clarke (2006) put it, “[w]ith a semantic approach, the themes are identified within the explicit or surface meanings of the data and the analyst is not looking for anything beyond what a participant has said or what has been written” (p. 13). For the semantic approach, themes are found in the data. As opposed to performing thematic analysis at the semantic level, “thematic analysis at the latent level goes beyond the semantic content of the data, and starts to identify or examine the underlying ideas, assumptions, and conceptualizations – and ideologies - that are theorized as shaping or informing the semantic content of the data” (p. 13). Semantic themes are themes that are explicit in the data whereas latent themes require some interpreting. An excellent visualization tool that Braun and Clarke (2006) presented was “If we imagine our data three-dimensionally as an uneven blob of jelly, the semantic approach would seek to describe the surface of the jelly, its form and meaning, while the latent approach would seek [to] identify the features that gave it that particular form and
meaning” (p. 13). For my data, I wanted to include both semantic and latent themes. Choosing only semantic themes would get rid of any interpretation, but choosing only latent themes would remove any potential themes that were verbalized during interviews. One example of a situation where choosing only semantic themes would not be sufficient, and in which the latent approach is necessary, is the following:

Interviewer: Was there any [experience in undergraduate or graduate school] that stood out as a very negative experience?

Chandler: You know that is the thing. I would not trade my undergrad degree at [University X] for anything. I really loved the math program. I really love math you know. So I liked all of my instructors or my professors and it was just a great experience overall, so no I would not say there was anything negative at all.

Here Chandler is not literally saying ‘I view both education-related and mathematics courses as an asset’, but rather I interpret that he is implying that these courses have helped him in his time as an instructor. He later explains that these courses have even helped him outside of the realm of being an instructor. Earlier in the same interview, he explicitly says that his graduate program prepared him for teaching really well:

Interviewer: Have you had any particular difficulties or successes transitioning between a student and a teacher?

Chandler: I would say no. You know the Master’s program was really good at [University X]. It was a condensed one year thing and they were very much a ‘trial by fire’ kind of situation. We did a lot of, you know, before we just got our own classroom, we did a lot of sitting in and watching our mentors teach and getting the students used to having us in the classroom. Then one day, they just flip it and say “ok this is your class now. Start teaching.” It is really scary at first, but then I kind of personally liked that system because you got to figure
out really quickly what did and didn’t work. The transition for me was pretty smooth.

Here, Chandler is telling me that his Master’s program was really good, which would mean that it prepared him in some way. He later responded similarly in the following exchange:

Interviewer: How did your graduate program prepare you for teaching?

Chandler: So I said before that they did a pretty good job.

These previous two exchanges also merit using the latent approach because Chandler does not literally say ‘I view education-related courses as an asset,’ but I interpret, by his saying that his Master’s program was really good, that his transition was smooth, that his Master’s program prepared him well, and that he values the education-related courses that he took during his Master’s program. The above examples illustrate the use of both the semantic and latent approach. Once these three decisions were made, the six-phase process of thematic analysis began.

There are six phases to thematic analysis that are listed and explained below. These can be found in Table 1 of Braun and Clarke’s 2006 paper titled “Using Thematic Analysis in Psychology” (p. 35):

1. Familiarizing yourself with your data: Transcribing data (if necessary), reading and rereading the data, noting down initial ideas.
2. Generating initial codes: Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes: Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes: Checking in the themes work in relation to the coded extracts and the entire data set, generating a thematic ‘map’ of the analysis.
5. Defining and naming themes: Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.

6. Producing the report: The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

According to Braun and Clarke (2006), phase one of thematic analysis is familiarizing yourself with your data. This may involve transcribing the data, and will involve reading the entire data set multiple times. While reading, the researcher should be searching for any present patterns. Researchers may take notes to assist with future phases. But keep in mind, “It is ideal to read through the entire data set at least once before you begin your coding, as your ideas, identification of possible patterns will be shaped as you read through” (p. 16). They warn that “the reading and re-reading of data is time consuming [and] therefore, [it is] tempting to skip over this phase, or be selective,” but this phase will provide structure for future phases (p. 16). Thus, they advise against skipping this phase or being selective in what the researcher reads.

During this first phase, I transcribed the recorded interviews myself. After the initial transcription, I replayed the audio and read along with my transcription to make sure nothing was missed and to help familiarize myself with the data. After this check was completed, I began the reading and rereading process. The first time I read through my data set, after the previously mentioned check, I did not take any notes or attempt to generate any initial codes. During my subsequent readings, before moving on to the next phase, I took notes. For example, I flagged instances
in which participants mentioned education, mathematics, and statistics courses. To illustrate, I flagged the following code with the ‘education course mentioned’ label:

Phoebe: Yeah. We learned how to break down story problems. I mean they were pretty basic ones like how to find area and stuff. Some of the different counting methods I learned about, like base [I guess we do base ten quite a bit]....I learned about binary arithmetic first in that class.

Here, Phoebe was explaining an education course that she took during her undergraduate statistics degree.

After reading through the data set a few times I moved on to phase two, which is generating initial codes. A code is a label that identifies an aspect of the data that interests the researcher and refers to the most basic element of the data (Braun & Clarke, 2006). During this phase, I read through my data and my notes and began generating some initial codes: ‘Education courses helpful’, ‘Education courses not helpful’, ‘Mathematics education courses helpful’, ‘Mathematics education courses not helpful’, ‘Statistics courses not helpful’, ‘Statistics courses helpful’, ‘Mathematics/Statistics courses not helpful’, and ‘Mathematics/Statistics courses helpful’. Once my data was coded, I was ready to move on to the next phase.

The third phase, searching for themes, begins “when all data have been initially coded & collated, and you have a long list of the different codes you have identified across your data set” (p. 19). This phase is where the researcher essentially analyzes their codes and begins to group similar codes under themes (p. 19). During this phase, I read through my data, again, with my codes off in the margins, and began grouping similar codes under potential themes. The codes
‘Mathematics courses helpful/not helpful’ and ‘Statistics courses helpful/not helpful’ were grouped under the theme ‘Graduate core courses helpful/not helpful’, and the codes ‘Education courses helpful/not helpful’ and ‘Mathematics education courses helpful’ were placed under the theme ‘Education-related courses helpful/not helpful’.

Once this set of themes has been identified, it was time for phase four: reviewing themes. During this phase, some themes may be eliminated due to a lack of supporting evidence, two themes may merge into one, or a theme may be divided into subthemes (Braun & Clarke, 2006). There are two levels to this phase. The first level is reviewing the coded extracts under each theme. The researcher will read each extract under a particular theme and see if there is indeed a pattern. If there is, move on to the next theme. If not, the researcher must determine whether it is the theme or the extracts that are cause the problem. If the extracts are causing the problem, then see which extracts need a new home (new theme) and create a new theme, or themes, to house them. Doing this, the researcher will create a candidate ‘thematic map’ that helps explain their data.

Once you have this map, then it is time for the next level. Level two of phase four involves determining “the validity of individual themes in relation to the data set” and whether “your candidate thematic map ‘accurately’ reflects the meanings evident in the data set as a whole” (Braun & Clarke, 2006, p. 21). This essentially boils down to, ‘Does this theme help explain my data?’ and ‘Does this map help explain both my themes and data?’. During this phase, all of my themes took on
new names: ‘Graduate core courses helpful/not helpful’ became ‘Graduate intensive mathematics-related courses viewed as an asset/potential liability’ and ‘Education-related courses helpful/not helpful’ became ‘Education-related courses viewed as an asset/potential liability’. This naming of themes is actually part of phase five, but it came a little earlier than expected. From this, I sketched a quick map connecting the themes to coded extracts, and determined that this map seemed fitting of my data.

Phase five is defining and naming themes and begins when the researcher’s thematic map fits their data well. After the researcher names a theme, the researcher must define what it is that the theme represents, refine their themes, and analyze the data that is within each theme. By ‘define and refine’, Braun and Clarke (2006) mean that the researcher needs to identify “the ‘essence’ of what each theme is about (as well as the themes overall), and determin[e] what aspect of the data each theme captures” (p. 22). For instance, the theme ‘Education-related courses were viewed as an asset’ got its name from my last phase, but could be defined as ‘Education-related courses provided something helpful or vital to the success of the instructor’. A similar definition follows for each of the other themes.

The last phase of thematic analysis as presented by Braun and Clarke (2006), phase six, is producing the report. During this phase of thematic analysis, the researcher writes up their conclusions in a way that is coherent and convincing to the reader of the merit of their analysis (p. 23). During this phase, I produced Chapter 4, which will describe the participants in this study, detail more of the process of Thematic Analysis (Braun & Clarke, 2006), and introduce boundary
crossing (Akkerman & Bakker, 2011; Jansen, Herbel-Eisenmann, & Smith III, 2014). This last phase also helped to produce Chapter 5 of this thesis, which frames the data through the lens of boundary crossing (Akkerman & Bakker, 2011; Jansen, Herbel-Eisenmann, & Smith III, 2014).
Chapter 4: Data Analysis and Discussion

This chapter will begin with a discussion of the participants, then move into a discussion of data, and finally the results via thematic analysis (Braun & Clarke, 2006). Note that pseudonyms have been used to protect the identities of the participants. Also, note that developmental level courses are courses that are meant as a prerequisite for College Algebra, from basic mathematics to Introduction to and Intermediate Algebra. The term remedial is used for courses which are meant for students that were previously unsuccessful at the non-remedial version of the course. For instance, if a student was unsuccessful at Geometry, they may be placed in a Remedial Geometry course, where both of these courses are intended to be a prerequisite for the same course.

4.1 Profiles of the Participants

Phoebe obtained Bachelor’s and Master’s degrees in Statistics. Her coursework was made up of statistical theory and methods, and she had only taken one course from the education department during her entire career as a student. She took this course during her undergraduate program. She described the course as an in-depth look at topics like story problems and how to break them down into simpler problems. Her prior teaching related experience came during her Master’s degree, where she was a teaching assistant for one term for an online class. This involved responding to emails more than meeting with students face-to-face. Currently, she is working at a community college in the Pacific Northwest as a mathematics instructor and is able to teach any math class from developmental
level mathematics through Differential Equations and Statistics with Calculus. Prior to, and during, the span of these interviews, she taught Fundamentals of Algebra (a prerequisite for the prerequisite for College Algebra), a prerequisite for College Algebra, College Algebra, and Statistics with Calculus.

Rachel holds a Bachelor’s in theater arts and mathematics. Her Master’s degree is a Master’s of Arts in Teaching. During her Master’s, her coursework was all education based, and she student taught at a high school in the Pacific Northwest. Prior to becoming an instructor at a community college in the Pacific Northwest, she taught at the high school level on the West Coast. Currently, she is working as a community college mathematics instructor. Because of her background, she is only qualified to teach courses ranging from developmental level mathematics to the prerequisite for College Algebra, all of which she taught prior to and during the course of her participation in this study.

Monica graduated with a Bachelor’s and Master’s in Mathematics. Her required coursework was in graduate mathematics, but she chose to take as many education-related courses as possible because she wanted to be an instructor with a teaching focus. After graduating, she became an instructor at a university in the Pacific Northwest. During her Master’s in Mathematics, she was a teaching assistant for College Algebra, Business Calculus, and Introduction to Linear Algebra and Power Series, and was the instructor on record for College Algebra and Differential Calculus. Prior to, and during, the span of these interviews, she taught Algebraic Reasoning, Introduction to Contemporary Mathematics, College Algebra, Business
Calculus, and Differential Calculus. She has taught primarily college level mathematics. The only potentially developmental level course she has taught is Algebraic Reasoning. This course falls into her idea of developmental level because it is paired with a developmental level mathematics course that is the prerequisite for College Algebra.

Chandler graduated with his Bachelor’s in Mathematics and later his Master’s of Arts in Teaching. His Bachelor’s degree consisted of intense mathematics classes, where his Master’s was teaching focused. During his Master’s program, he student taught a class where he was the lead teacher for six months, and for the last two to three months of this period, he taught the same number of courses that a full time teacher would teach. After graduating, he took a long term (about six months) substitute position at the same school where he had been a student teacher. After this, he taught at a rural community college for about six months. The classes assigned to him during this time were remedial Geometry and remedial Algebra. After this, he became an instructor at a university in the Pacific Northwest. During the course of, and prior to participating in this study, he taught Fundamentals of Algebra (the prerequisite for the prerequisite for college algebra), the prerequisite for College Algebra, Introduction to Contemporary Mathematics, College Algebra, Trigonometry/Precalculus, and Differential Calculus. Of these courses that he has taught, most of them have been developmental level.

Here, it is important to note that Rachel and Chandler are employed in different places, Chandler is employed at a university where Rachel is employed at a
community college. This may explain the difference in courses that they are qualified to teach.

4.2 The Surfacing of Themes

The following section will detail the surfacing of themes using thematic analysis (Braun & Clarke, 2006). The only code that became a major theme will be discussed in its own section. The minor themes will be discussed together in a joint section.

4.2.1 The Importance of Education-related Courses

During the first read through of my data, after transcription, I noticed mostly praise for education-related courses and a seeming indifference for graduate mathematics related courses. It was on the second read through that I began coding my data into four different categories. The first of these to surface was ‘education courses are helpful’. This surfaced when Phoebe was reminiscing about how she had her best and worst learning experience in back to back terms:

Interviewer: Same course title too?

Phoebe: Yeah, yeah. It is kind of funny. I think that experience will always stay with me. And now that I am teaching, I won’t be as hard on that former instructor of mine now. Or former professor, just because it is so hard being a first time professor. And he did not have an educational background much like I don’t have an educational background. So the learning curve is quite steep.

Here, I interpret that Phoebe is implying that if her previous professor had some education courses, then he would have been better prepared for teaching the course she had taken from him. She is also hinting that it would have benefitted her to have taken more education-related courses in her degrees. Later, when asked if
she felt there was any coursework that she could have taken in her graduate or undergraduate degrees to help her feel more comfortable in her role as a mathematics instructor, she responded:

   Phoebe: Not specifically education based. I wish I had known more about excel, just for the sake of grading. Because I do all of my grading in Excel. And there was a big learning curve in ‘How do I make this do what I wanted’. An education class probably wouldn’t have hurt.

She begins by saying that, of the courses she might have desired to take, she does not believe that she would have wanted an education-based course first, but later expresses that she believes that an education-related course could be valuable. She also remembered that she had taken an education course in her undergraduate degree in statistics. When asked if she leveraged any information from that course, she responded, “Yeah. We learned how to break down story problems. I mean they were pretty basic ones like how to find area and stuff. Some of the different counting methods I learned about, like base [I guess we do base ten quite a bit].... I learned about binary arithmetic first in that class.” She went on to say that she uses memories from this course more often than she uses memories from when she took some of the courses she teaches now. During this interview, I saw the first few instances of the code ‘Education classes helpful’.

   Another example of this code came from Chandler’s response to a similar question and can be found in the following exchange:

   Interviewer: Were there any courses that you specifically leverage some information from?
Chandler: There was a content pedagogy course, that was, you were kind of talking about it earlier when you said ‘it was very focused on here’s this stuff and here is an example. Let’s teach fractions’. Well, am I going to be teaching fractions or is this going to be useful, but the way that we approached the problems had the impression on me the most. And it was let’s look at this problem from all of the different angles. Let’s take them all into consideration before we go and tackle the problem. And that, just learning how to do that was really beneficial.

Here, it is clear that there are times where he sees this course as helpful to his teaching. He uses the example of fractions to demonstrate that this course was useful to him. Seeing that he has taught multiple levels of algebra classes, it is understandable that learning how to teach fractions is quite useful to him.

As I reread the transcript, it became clear that the code ‘Education classes helpful’ was not a clear description of what was actually being conveyed. When asked what she had the most difficulty with during the transition between a student and an instructor, Rachel responded that there were many choices that she needed to make that she was uncertain about.

Interviewer: So the most difficult thing was making those choices yourself.

Rachel: Yes. Exactly.

Interviewer: Have there been any particular successes? Anything that made the transitions a lot easier?

Rachel: Getting my master’s in teaching made things pretty easy because I spent a whole year learning how to teach things that I had already learned.

She clearly states that her Master’s in Teaching made most of her work easy in comparison to making what many might see as small decisions, such as when to
have what homework due or how to handle late homework and other things of that nature. To the same question, Chandler, who also got his Master’s of Arts in Teaching, responded, ‘I would say no.’

On the other hand, when asked the question ‘Have there been any particular successes [in the transition between a student and an instructor]?’ Chandler replied:

Chandler: You know, there were definitely a lot of successes. One of the things that I have always done is I have been really big on preparing for stuff.

He later attributed his learning the value of planning to his Master’s Degree. This exchange, which followed establishing that Rachel had taken education courses, particularly showcases that these courses were much more than helpful:

Interviewer: How do you think [your education courses] have had an influence on how you teach and how you think about teaching?

Rachel: Definitely a lot. Like, the biggest thing that has stuck with me is think time. So, because students react to questions at different speeds, so, asking a question and not lecturing and not letting anybody respond until everybody has had five or six seconds to think about, and then ask someone to respond. ... One of the other ones is when you do planning, planning with the end goal in mind. So it is reverse planning basically. So you start with the end goal.

It is interesting to look at Rachel’s response, “Definitely a lot.” During the interview, there was no pause between the question and the answer. She volunteered the answer as if it was almost basic instinct. She followed this with a strategy that she learned during graduate education. Both of these reinforce just how valuable, or how much of an asset, she views her Master’s in Teaching to be.

Chandler also echoed similar feelings by saying, “You know the Master’s program was really good at [University X].” And later added, “So I said before that
[My Master’s program] did a pretty good job [preparing me to teach].” To illustrate that this program did a good job, in response to ‘What seems to have the biggest impact on how you think about and plan for teaching?’ he responded, “I really tried to put myself in the students’ position. Like if I am learning this for the first time, where is the trouble spot? Where am I going to get tripped up?” which is something he learned in his Master’s program. Another prime example of how well he feels his Master’s program prepared him can be found in the following exchange:

Interviewer: Have your education courses had any influence on how you teach, or how you go about planning for teaching? You kind of answered earlier.

Chandler: I guess I did touch on it a little bit. In that I think the most beneficial thing, we are talking about the grad program right?

Interviewer: Yes.

Chandler: The most beneficial thing was that work sample and the ‘trial by fire’ situations. There were also a lot of classes that I felt like I really did not need at all.

The work sample mentioned here is a common component of a Master’s of Arts in Teaching, during which a graduate student is placed in a classroom, or multiple classrooms at a time, and gains hands-on experience while working under what is called a cooperating teacher. Chandler used the phrase ‘trial by fire’ to mean that, at some point, he was told, “This is your class now: teach.” He was not warned ahead of time and was not handed material to help him prepare or feel more comfortable beforehand. During his Master’s, he was able to get hands-on experience in a classroom as more of an observer and helper for the first few months of his work sample, but during the later portion, he taught one class for a
brief period. This all culminated with him teaching a full-time load for the remaining time left in his work sample. Here, we see him expressing great value in this period of time where he was able to experience being a teacher prior to graduation and prior to being hired on as an instructor. Rachel also completed a work sample, but she recalled that her work sample taught her what grades in high school she wanted to teach.

It became clear that ‘Education courses helpful’ had evolved into the theme ‘Education courses viewed as an asset’ as every participant expressed that having taken an education course would be beneficial to some extent.

There were some courses that the participants took that were not in the education department, but the participants chose to label as related to education. For example, Monica chose to take as many education-related courses as she could, but these were mostly through the mathematics department, and hence labeled as mathematics courses or as mathematics education courses with the course numbers all beginning with a label indicating mathematics. When asked if these courses have had an influence on how she thinks about teaching and how she teaches she responded:

Monica: My education courses have definitely had an influence, in that I mean I have done readings on ‘what does an effective classroom look like’ at both high school and college levels. And so that is why I try to not lecture all of the time and I try to have at least bare minimum some clickers, or ask the students to partner and discuss the problem with a partner and keep them interested and engaged. So education courses have definitely influenced how I teach, how I think about teaching, and how I want to run my class.
Here she is expressing that were gains from taking these education-related courses. These courses have had a noticeable impact on her classrooms. Monica also stated, “I’ve focused on Math Ed classes as much as I could.” In the case of both of these statements, we see that ‘Education courses viewed as an asset’ does not cover the fact that, going into their graduate degree, some future mathematics instructors/graduate students feel that education-related courses would help them in the future.

As a part of this focusing on Mathematics Education courses, Monica took a few Mathematics Education Topics courses during which the students read and responded to articles of mathematics education research or opinion/expository articles and worked through activities that focused on and answered questions about ‘How did you feel? How do we want students to be approaching these?’ They also wrote responses to these activities with prompts such as ‘Where do you think students will get stuck?’ Again, we see this idea of guessing where students will get stuck being tied to another education-related course. Along with the topics classes, she also took a class during which the students solved novel problems that caused them to slow down and analyze what they were doing in the process of solving these problems. Part of their assignment was to analyze how they approach problems and figure out how to apply that to helping students with approaches to problems. When asked ‘Do you feel that there is any coursework that you could have done in your graduate or undergraduate program that could have helped you feel any more comfortable, or do you feel that you are good as is?’ Monica responded, “I kind of
feel that with my background, which again is a little bit different than other people who get a masters in math, was adequate in that because I have again my minor is in secondary education in undergrad, I took math education seminar and took topics classes here. At a certain point you just kind of have to be thrown in.” These sparked the rewording of the theme ‘Education courses viewed as an asset’ into ‘Education-related courses viewed as an asset’. This theme is defined as ‘Education-related courses provided something helpful or vital to the success of the instructor’.

4.2.2 The Minor Themes

The first read through of the data also brought forth the codes ‘Intensive mathematics-related classes not helpful,’ ‘Intensive mathematics-related classes helpful,’ ‘Mathematics graduate students are not taught how to connect advanced mathematics to lower-division mathematics,’ and ‘New instructors sometimes have classroom management issues’. These codes had far fewer occurrences than the previously discussed code and some were only relevant for one or two participants.

When asked “When you are teaching, do you feel that you pull on any of your knowledge from your graduate statistics courses?” Phoebe responded:

Phoebe: In the [statistics with calculus], absolutely yes. In [College Algebra], a lot of that is...Well, I would have taken the equivalent as a senior in high school, and some of that is kind of fuzzy.

She has seen some clear benefits from her graduate statistics courses in her teaching of a statistics with calculus course, but for courses other than this one, what she learned in her graduate mathematics-related courses did not seem to be helpful or applicable for teaching. This introduced both of the codes ‘Intensive mathematics-
related classes helpful’ and ‘Intensive mathematics-related classes not helpful’. On subsequent readings of the data, and based on the emphasis she put on her statement “In the [statistics with calculus course], absolutely yes” during the interview, it seemed that ‘Intensive classes helpful’ did not quite capture the meaning behind this statement. To the same question, but about mathematics classes at the undergraduate level, Rachel said that she does not think she ever uses her knowledge from courses such as Real Analysis, Linear Algebra, or Group Theory.

Monica gave a short answer to this question in her explanation of another question. She said that she has been able to, while teaching Differential Calculus, discover some connections that can be made to Complex Analysis, but she only mentioned giving little blurbs such as, “This idea comes up again later in a graduate class called Complex Analysis.” She expanded on this later saying:

Monica: I feel like in general, I don’t get much opportunity to use graduate knowledge or graduate content at 100-level, 200-level classes. Sometimes I might mention, oh we can have up to this many real roots of this polynomial. You can learn the proof of why later. Here is this calculus rule, you can learn how to prove it later. The 100 level classes are a big challenge in trying to reinforce that with any graduate content. When you get into calculus, it is easier to say ‘oh well this is going to come back later’. I have not taught [Matrices and Power Series], but [it] is just rife with possibilities, but I kind of feel like my graduate content knowledge is beginning to slide out of my brain if I don’t practice it because I don’t get much of an opportunity to use it.

Here, it seems that Monica is bringing up an issue deeper than just ‘Intensive mathematics-related courses are not helpful.’ I interpret that she is also implying that she has never learned how to connect some of the advanced mathematics that she learned in graduate school to the lower division mathematics courses. This was
the only instance of the code ‘Mathematics graduate students are not taught how to connect advanced mathematics to lower-division mathematics’, but she was also the only one with a Master’s in mathematics in my study.

Based on findings by Monk (1994), it makes sense that both ‘Graduate intensive mathematics-related courses viewed as an asset’ and ‘Graduate intensive mathematics-related courses are viewed as a potential liability,’ which are defined as ‘Graduate intensive mathematics-related courses provided knowledge that helped the instructor relate ideas surfacing within a course’ and ‘Graduate intensive mathematics-related courses did not provide knowledge that helped the instructor relate ideas surfacing within a course’ respectively, appeared as only minor themes. In his study, Monk (1994) found the presence of diminishing marginal returns, or even threshold effects, based on the number of content-specific courses teachers had taken beyond the highest course they are currently teaching. That is to say, either subsequent courses do help in instruction, but less so as one takes more courses, or there is a certain number of courses such that, after that number, there are no noticeable benefits. The participants of this study felt this in action – that the graduate courses they had taken did not provide them with adequate tools for teaching mathematics.

Another code that I found through analysis was ‘New mathematics instructors sometimes have classroom management issues.’ This code is defined as ‘New mathematics instructors come across situations in class that they are not prepared to deal with,’ and this came up when participants were asked, ‘What have
you learned about teaching that your coursework did not teach you?’ Here is what Phoebe had to say:

Phoebe: Oh. Managing different personalities. Public speaking for sure. Yeah, you don’t really get to do much of that in your coursework. You get…. I don’t know. I did it a little bit. A scosch if you will.

In this statement, Phoebe is saying that she was not taught how to manage different personalities; this was something that she had to learn over time. This is something that all instructors will face during their career. She continues with the idea of public speaking, and she says that she got a little experience with public speaking in her graduate work. The public speaking that she mentions came during a seminar-like course called Consulting she took in her first year, and from her final oral exam that she passed at the end of her second year. She expands on these ideas below:

Phoebe: Because in college, you are definitely….If you do any sort of presentation, it is to your peers or your mentor. With teaching, it is to people that could be older than you, but generally don’t have as much knowledge about the subject as you do. Most of the time they do not. And, so being able to handle a group like that, if they are particularly distracted or something, or being able to keep the interest going for students that students that maybe do have a higher understanding of what you are talking about. Being able to present something that is interesting to them and not over the heads of everyone else in the class. That is fun.

Phoebe explains that the presentations that are a part of coursework are in front of peers and/or mentors. The presenting she had done in front of peers was first in Consulting, where second-year students present projects that they have been working on in front of statistics graduate students and faculty. At the end of the
presentation, the audience is able to give their input and share their ideas and ask questions about the project.

Monica expressed that she also has had some classroom issues, but has managed to learn a lot from them.

Monica: I’ve learned more about classroom management, in that I never would have expected people to just stand up during lecture and just leave. And in the large classes, I have pretty much just accepted that that might just happen and it is more disruptive if you bring more attention to it.

Here, Monica verbalized the code in saying “I’ve learned more about classroom management....” She went on to explain a couple of scenarios that she has had to learn how to react to on the spot. She explained that she has learned that she just has to let them leave, because, as she noted above, it ends up being more disruptive to the whole class if you draw attention to the student(s) leaving.

Another example of a code that showed up during the process of thematic analysis was ‘In-class experience was viewed as an asset,’ which can be defined as ‘in-class experience provided something helpful or vital to the success of the instructor.’ This code first came from Rachel’s response to “Did [your student teaching experience] have an impact on what you think about teaching?” She responded, “Yes. I taught remedial seventh grade math....” She went on to explain that this experience helped her realize that she did not want to teach mathematics at that level. It was not until she received word of an opportunity to teach at a community college in the Pacific Northwest that this information helped her decide
to take a new direction in her career. Chandler also provided some feedback about his work sample. When asked if he taught as a graduate student, he responded:

Chandler: As a grad student we did, there was a six month period where we taught at least one class on a daily basis. Then towards the end of that, so at the two to three months before graduation we had a full load of classes.

When followed up with the question “How did your [Master’s of Arts in Teaching] prepare you for teaching,” he had the following to say:

Chandler: I think most importantly it was a lot of in-class time. I think that is the best thing I could say about [University X]’s Master’s program is the fact that they really just throw you in a position where you are teaching and that, again you find out real quickly what is good and what is not good.

Here, we see that both Chandler and Rachel learned from their work samples, albeit they learned quite different things.

A work sample was not the only means by which the participants gained in-class experience. Monica worked in a classroom as part of her being a Teacher’s Assistant (TA), and she expressed the benefits of working in courses that had been restructured based on findings in educational research.

Monica: And so that work, so working with the [new course] as a TA really kind of helped influence my teaching philosophy and kind of my teaching style and how I look at teaching now.

In this case, we see another example of a participant expressing value in not just courses but also in gaining experience inside a classroom. This particular experience is different from what a typical Master’s of Arts in Teaching student experiences during their work sample. The [new course] included time spent co-teaching as the students worked on group activities.
4.3 Boundary Crossing

In the following section, I will use the framework of boundary crossing to further explain the themes identified in this chapter. I will begin with defining the following: a boundary, a discontinuity, and what it means to cross a boundary. Following each definition, I will provide an example to demonstrate the use of each term. Next, I will present how others have used boundary crossing in previous literature followed by how I will apply boundary crossing to my study. Finally, I will apply boundary crossing to my data, presenting discontinuities I interpreted from my data, and discuss each participants crossing or not crossing of the boundary between graduate student and instructor.

There are a few terms that are important to become familiar with before proceeding; boundary, discontinuity, and what it means to cross a boundary. A boundary is a demarcation between one context and another. For example, all of my participants were graduate students and are now instructors; they crossed the boundary from student to instructor in that they have all obtained a job as an instructor. We may also view a boundary as “a sociocultural cultural difference leading to a discontinuity in action or inaction” (Akkerman & Bakker, 2011, p. 133). A discontinuity is a “difference that is meaningful and that co-occurs with a change in an [instructor’s] attitude (Jansen et al., 2014, p. 285). For example, an instructor may come into their role with the idea that students learn mathematics by taking notes during lecture while the instructor talks, but the reality of the situation is that different students expect different teaching styles and not everyone learns solely by
listening and writing down what the instructor says. For the purposes of this study, *crossing a boundary* will involve encountering difference and “entering into a territory in which we are unfamiliar and, to some extent therefore, unqualified” (Suchman, 1993, p. 25).

As a particular example, Jansen, Herbel-Eisenmann, and Smith III (2012) used boundary crossing as a way to understand students’ transition between middle school and high school mathematics. Primarily, the discontinuities they face during this physical transition (from middle school to high school) and in terms of learning environment (problem-based instruction to procedure-based instruction and vice versa) (Jansen et al., 2012). Here, a discontinuity is any change that the student deems meaningful that co-occurs with some change in the students’ attitude (Jansen et al., 2012).

In this study, the participants crossed a different boundary related to education: they transitioned from being a graduate student to leading classes, grading homework/activities, writing exams, among other potentially new responsibilities as an instructor. Some of the participants transitioned from a university to a community college, while the others remained at the university level. Also, two participants changed from being a part of the education department to faculty in the mathematics department, one went from the statistics department to the mathematics department, and the last remained in the mathematics department. When making this transition, a new instructor may move across town, the state, or even the United States which would place them in a new social
environment. They may have made a move like this before, but they are still moving away from a previous support system and having to develop a new one. During this move, their responsibilities as a functioning member of society are changing; they were taking classes, tests, turning in homework, but now they are teaching courses, creating tests, and assigning homework. These changes could lead to discontinuities for the new instructors. I also think that understanding what these discontinuities are and how these new instructors reconcile them is important to better understand how to prepare future instructors. Considering the wide range of preparation that my four participants had, I expected to see varying levels of preparation and comfort while making the transition.

4.3.1 Boundaries Crossed and Not Crossed

In the following section, I will present some of the discontinuities my participants faced and how they crossed boundaries related to those discontinuities.

Phoebe was the first to express a couple of discontinuities in the following exchange:

Interviewer: Have you had any particular difficulties or successes transitioning between the student or as a grad student and becoming a teacher?

Phoebe: It is amazing how quickly I have switched which side I am on. As a student I always felt like “this is unfair. How can they give us so much homework?” To being a teacher and being like “You need this much homework because you need this much practice”. I switched to the dark side very quickly. So, I believe that, and then also my expectations as an instructor and what I expected from my students was that much greater than the expectations that I had for myself when I was a student. That also quickly flipped. Not that that is good or bad. I am sure we all just meet in the middle, don’t we? I would like to think.
The first discontinuity I interpret in what she says is the perception of there being ‘sides’ in the realm of education. Here we have the ‘student side,’ which she jokingly implies is the ‘light side,’ and the ‘instructor side,’ which she jokingly refers to as the ‘dark side.’ This would seem to imply that there is a battle between the students and their instructor, and that, in this battle, the students are on the good side while the instructors are on the evil side. This also indicates that she has crossed a boundary from the good side to the evil side.

The second discontinuity that I interpreted from this exchange is the variation in expectations between students and instructors. She explains that she has come into being an instructor with very high expectations for her students, even though her expectations for herself, when she was a student, were not as high. Later on, when asked, ‘what have you learned about teaching since you became an instructor?’ she responded “To balance out some of my expectations and maybe heighten some others.” While teaching, she has learned that she initially expected too much from her students overall. The third discontinuity I see in what she says is the varied expectations with regards to homework between students and instructors. She explained that, when she was a student, she remembers thinking, ‘it is not fair that you can give us this much homework and expect us to do it all,’ but now as an instructor, she has come to the realization that maybe students need to work through more problems than she had initially thought.

Consequently, in the following exchange with Phoebe, she explains that she was still figuring out some of these things:
Interviewer: What have you learned about students that you did not learn through coursework?

Phoebe: I didn’t value how important in class assignments are quite to the extent that I have now, just because a lot of the courses that I took in college were very lecture based. I don’t think we ever had any in class assignments above calculus. I don’t recall there being any “we will try this problem in class”. It was always lecture, lecture, lecture, and go home. Try it out. Come back. Where I feel like it is very much a way of life at [Community College Y]. Lecture for thirty minutes or less and either break up your lecture with an in class assignment, or wait to do the in class assignment at the end of class. …. I feel like the typical lecture based class is going to be SOOO BOORING that we almost have to break it up with an in class assignment and be like do this. Do not just watch me. Go try this out. Because they are not going to focus.

She went on to explain that she has learned that the predominant learning type is no longer the auditory learner, but more tactile and a mixture of the learning styles. Here, I interpret that Phoebe was still figuring out what does and does not work for her in terms of lecture versus in-class activities, etc. I interpret that, when she began her career as an instructor, she was still trying to cross the boundary between graduate student and instructor.

In contrast to Phoebe, Monica has not experienced as many discontinuities. This is illustrated in her response to the same question:

Monica: In my mind there is kind of a clear demarcation between student time and teaching time. So, I sometimes miss being a TA, so my difficulty has been being ‘The Person who makes the big decision about the class and class policies’. I have particularly enjoyed not having my own homework, just having homework in the form of grading and class prep. But no, I have not really felt a big struggle I guess transitioning from being a student to being an instructor.

Here, we see that Monica’s biggest struggle is being the person that makes decisions about course policies and homework policies. I interpret that this
struggle is not very much of an issue for her based on her saying, “I have not felt a big struggle....” I interpret that Monica has already crossed the boundary between graduate student and instructor in the sense that she seems prepared to fulfill her responsibilities as an instructor.

Similar to Monica, Rachel also felt that the most difficult thing she has to do is be the person that makes decisions about homework and other paperwork that are not already made for her. She goes on to explain that getting her Master’s of Arts in Teaching has made everything else very easy for her. I interpret that she has already had the opportunity to cross the boundary between student and instructor before her first year as an instructor outside of the realm of being a student. This may have happened during her work sample, as this is where she gained in-class experience as a student.

Even though Chandler also earned his Master’s of Arts in Teaching, in the following exchange, he reports no struggles transitioning between being a graduate student and becoming an instructor:

Interviewer: Have you had any particular difficulties or successes transitioning between a student and a teacher?

Chandler: I would say no. You know the Master’s program was really good at [University X]. It was a condensed one year thing and they were very much a ‘trial by fire’ kind of situation. We did a lot of, you know, before we just got our own classroom, we did a lot of sitting in and watching our mentors teach and getting the students used to having us in the classroom. Then one day, they just flip it and say “ok this is your class now. Start teaching.” It is really scary at first, but then I kind of personally liked that system because you got to figure
out really quickly what did and didn’t work. The transition for me was pretty smooth.

He later goes on to explain that there have been many successes in the transition and credits multiple of those to his Master’s program. I interpret that, like Rachel, Chandler already had the opportunity in the past to cross the boundary between student and instructor, and he has managed to do so. Similar to Rachel, this opportunity may have come during his work sample, which he claims was very helpful in the exchange above. During this work sample, he says that he was able to figure out some things that did and did not work, which would allow him to use that knowledge when he began his role as an instructor.

In understanding the participants’ experiences, each of them managed to cross the boundary between graduate student and instructor, but there were differences in when they crossed this boundary and what they experienced while crossing this boundary. Phoebe, who did not have any work sample experience and was only a GTA for an online class for one term, took the longest to cross the boundary. For her first year as an instructor, she was still experimenting and figuring out what does and does not work in relation to instruction, more so than others vocalized.

In slight contrast to Phoebe, Monica came into her role as an instructor with some idea of what will work in a classroom, but was still figuring out a few classroom management ideas (i.e., whether or not to call people out on leaving the class early). Monica did not have work sample experience, but was a part of a course in which the GTA was present during class two days a week. During these days, the TA and
instructor co-taught the course. Monica says that this experience influenced her teaching philosophy, teaching style, and how she looks at teaching now. I interpret that this experience helped her cross the boundary between student and instructor earlier than Phoebe.

In stark contrast to Phoebe, but only slight contrast to Monica, Rachel had no classroom management issues, and just one struggle during the transition. Her only struggle was making decisions on what to do with the paperwork related to teaching (i.e., what homework to assign when and how to handle grading homework). She credits her Master’s of Arts in Teaching to helping her learn how to teach the developmental level courses she has been teaching during and before this study. Her Master’s degree included a work sample in which she was placed in a few different classrooms. During this time, she gained in-class experience as a pre-service teacher working under a cooperating teacher. Earlier, she stated that this experience helped her realize what level (i.e., high school versus community college versus university) she wanted to teach. During her work sample, she was exposed to different teachers who had lessons and activities already prepared and had their methods of teaching pre-determined. She had examples and templates that she could follow or modify to fit her liking.

Lastly, Chandler’s transition was similar to Rachel’s, but he reported no struggles during the transition. Coupled with his lack of struggle, he reported that there were many successes while transitioning from a graduate
student to and instructor, and he credits many of them to his Master’s of Arts in Teaching. His biggest successes were his persistence in planning and the habit of trying to figure out where students will get stuck in lessons, and he attributes both of these to his Master’s degree. Just as Rachel’s, his Master’s degree included a work sample. Earlier, it was shown that he had only positive things to say about his work sample and how it helped him determine whether or not certain ideas would be effective in the classroom later. He even went so far as to say that the most beneficial thing in his Master’s program was his work sample.

Based on this analysis of participants’ experiences and boundary crossing, it seems that the more experience a new instructor has and the more education-related courses they have taken during their education, the less they will struggle with the everyday tasks of running a classroom when starting out.
Chapter 5: Conclusions

In the previous chapter, I analyzed my transcribed interviews and identified themes via thematic analysis, then further interpreted these using the framework of boundary crossing. In this chapter, I will draw conclusions based on the themes presented and the discussion of boundary crossing in the previous chapter. Further, I will discuss the limitations of this study and present implications and recommendations for future studies.

5.1 Discussion of findings

During my data analysis, I only found one major theme that applied to all participants: Education-related courses were viewed as an asset. The participants who had taken more education-related courses in their degrees – Chandler, Rachel, and Monica – seemed to have crossed the boundary between graduate student and instructor much more easily and quickly than those that had taken fewer education-related courses. Phoebe, who had not taken as many education-related courses, but had focused on mathematics-related courses, had more difficulty crossing this boundary. Based on the findings in Monk’s (1994) study, it makes sense that this was my only major theme. In his study, he found the presence of diminishing returns and threshold effects based on the number of content-specific courses instructors had taken beyond the highest level course they are currently teaching. This means that, in some cases, more classes were helpful to the instructors teaching, but considerably less to almost not at all beyond the highest course the instructor can teach. In other cases, more content-specific courses were not helpful
past a certain threshold. In line with this result, my participant who had more content-specific courses also struggled more with the everyday tasks of being an instructor than my participants that did not have as many content-specific courses. This participant expressed that she had difficulty connecting these courses with what she had taught prior to the interviews. It seems that she could have used some direction about how to connect graduate course material with the courses that she has been and will be teaching. These results are important because they agree with results from previous studies, and because they are the first results regarding the preparation of instructors at the community college level.

Earlier it was stated that Hauk et al (2006) gave the recommendation to include content-specific pedagogical knowledge and pedagogical training in GTAs’ preparation for becoming an instructor. In my study, those who had more pedagogical training in the form of pedagogy courses (education-related courses) and had either completed a work sample or something similar (the unique GTA experience that Monica had) reported feeling more prepared than Phoebe, who had very little to no pedagogical training of any kind as a graduate student. These results are also in line with what Belnap (2005) and Ellis (2014) found in their studies, which is that pedagogical development is important to the training of GTAs intending to become instructors. Defranco and McGivey-Burelle (2001) also found pedagogy-focused preparation programs have been shown to ease the transition between student and instructor. Looking at the results of my study compared to those just mentioned, the interpretation that participants who had taken several education-
related courses found their education to be more preparatory than those who had only taken very few education-related courses seems reasonable.

5.2 Limitations

Due to the small sample size of this study (only four instructors volunteered to participate), I know that I cannot draw general conclusions, and that this thesis is more of an exploratory investigation. Also considering my limited number of participants, the subjective nature of their experiences in their transition, and that all of my participants graduated from graduate schools on the West Coast, I understand that my results may not generalize to others making similar transitions in other parts of the United States.

5.3 Implications and Recommendations

Again, my study is limited in the power of generalization, but the results show that there is a benefit to taking education-related courses in instructor preparation. Based on my findings, I recommend that graduate students who desire to become instructors, at either the community college level or university level, strongly consider taking courses that emphasize student thinking and pedagogy, on-the-job experience, and expose students to education-related literature.

The next step would be to conduct a study with considerably more participants who, ideally, would have more varied backgrounds (i.e. more with a Master’s in a mathematics-related field with no education-related coursework, etc). Furthermore, results from a study whose participants are more spread out across
the United States, or even outside of the United States, would be more
generalizable, and thus have a broader impact.
Bibliography


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Appendices

Appendix A: Recruitment Tool: Department Head

Dear [head of the mathematics department]:

My name is Eric Fleming. I am a graduate student in the Mathematics Department at Oregon State University. I am conducting a research study beginning at the end of this fall term and ending at the end of winter term titled *Two-Year College Instructor Preparation: Enough to Feel Comfortable?* This letter is an invitation that I would like to extend to new hires in the Mathematics Department at the community college at which you are employed. I would like to ask you for the names of new mathematics instructors in your department so that I can contact them for participation in this study.

The rationale for my study is this: In recent years, there has been a lot of focus on the preparation of teachers at the secondary level. The focus has resulted in new standards of educating future secondary education teachers. Unfortunately, no one has focused on instructors at community colleges the same way. I would like to interview newly hired mathematics instructors at community colleges to answer the question: Do newly hired mathematics instructors feel that they are prepared to teach and evaluate students at the community college level?

Participation in this study includes:

- Interviews with instructors about their background in mathematics and in teaching mathematics in various roles (Instructor, teaching assistant, classroom aide, etc.) and about their undergraduate and graduate level preparation for teaching at the community college level. These interviews will occur at three different times between December 2014 and May 2015.
- I will conduct the interviews. I will maintain confidentiality of instructors involved in the study.
- I estimate that these interviews will take a total of seven hours spread out over this term and next term.
- All of the information provided by instructors will be kept confidential.

Please forward the names of any new mathematics instructors in your department to Eric Fleming at fleminge@math.oregonstate.edu. If you have any questions about the study, please contact Mary Beisiegel at mary.beisiegel@oregonstate.edu.

Best regards,

Eric Fleming
Appendix B: Recruitment Tool: Instructor

Dear (Instructor’s name and title):

My name is Eric Fleming. I am a graduate student in the Mathematics Department at Oregon State University. I am conducting a research study beginning at the end of this fall term and ending at the end of winter term titled *Mathematics Instructor Preparation: Enough to Feel Comfortable?* This letter is an invitation to participate in a study that investigates community college or university mathematics instructors’ preparation for their careers. My research question is: Do mathematics instructors who meet American Mathematical Association of Two-Year College’s minimal preparation feel comfortable teaching and evaluating students at the community college or university level?

The rationale for my study is this: In recent years, there has been a lot of focus on the preparation of teachers at the secondary level. The focus has resulted in new standards of educating future secondary education teachers. Unfortunately, no one has focused on instructors at community colleges or universities in the same way. I would like to interview you (a **community college mathematics or university instructor with zero to three years of experience**) about your experiences as a new mathematics faculty member.

Participation in this study includes:

- Interviews about your background in mathematics and in teaching mathematics in various roles (Instructor, teaching assistant, classroom aide, etc.) and about your undergraduate and graduate level preparation for teaching at the community college or university level. These interviews will occur at three different times between December 2014 and June 2015. They will last no more than 100 minutes each, for a total participation time of five hours.
- I will conduct the interviews. I will maintain confidentiality of instructors involved in the study as well as any names or other identifying information that is discussed during interviews.
- You will be compensated with a $50 Amazon gift card for full participation (3 interviews) in this research study. Compensation for partial completion of the study activities will be the following: You will receive a $10 gift card for completing one interview, a $15 gift card for completing the second interview, and a $30 gift card for completing the third interview.

Please let me know if you would like to participate in this study at your earliest convenience. My email address is fleminge@math.oregonstate.edu. If you have any questions about the study, please contact Mary Beisiegel at mary.beisiegel@oregonstate.edu.

Best regards,
Eric Fleming
Appendix C: Interview Protocols

The wording of the following interview protocols was modified based on the individual being interviewed. For instance, if the participant was an instructor at the university level, then question 5 in interview one was changed to read similar to “Why did you choose to become a mathematics instructor” or “Why did you choose to become a mathematics instructor at the university level”.

**Interview 1**

1. Name
2. Age
3. Bachelors, Master’s, PhD, or other?
4. In this degree, how would you describe your coursework?
   a. Did you take all hardcore math classes like Linear Algebra, Real Analysis, etc. or did you take some math education courses as well?
5. Why did you choose to become a community college mathematics instructor?
6. Have you had any particular difficulties or successes transitioning between a student and a teacher?
   a. As an instructor, Graduate Student, and so on.
   b. If you were ever a teaching assistant, how did your work as a teaching assistant have an impact on how you felt and/or thought about teaching?
   c. What courses have you taught prior to this term, if any?
7. Where have you taught prior to your current job?
   a. As an instructor, Graduate Student, and so on.
8. How did your graduate program prepare you for teaching?
   i. Were there any profession development opportunities related to being a teaching assistant?
9. What do you enjoy most about teaching so far?
   a. Why?
10. What do you enjoy least about teaching so far?
    a. Why?
11. What courses are you teaching?
    a. Primarily developmental?
    b. College level?
c. A mixture?
12. Do you know what courses you might be teaching next term?
13. How would you describe a well-taught math lesson?
   a. What should the teacher be doing?
   b. What should the students be doing?
14. How would you describe a poorly-taught math lesson?
   a. What would the teacher be doing?
   b. What would the students be doing?
15. What have you learned about teaching since you became an instructor?
16. What have you learned about yourself since you became an instructor?
   a. Your teaching
   b. Your knowledge
   c. Etc.
17. How were your experiences in your graduate or undergraduate math
courses?
   a. Are there any that stand out?
18. Before becoming a teacher, did you know how you wanted to teach?
   a. If so, are you teaching that way?
      i. Why or why not?

Interview 2

1. How comfortable do you feel in your teaching role?
   a. [If you are not very comfortable] Do you feel that there is any
coursework you could have done in your graduate or undergraduate
program that would have helped you feel more comfortable?
2. Do you feel that your idea of effective teaching has changed?
   a. If so, how?
   b. If not, has anything reinforced your ideas?
3. What courses are you teaching this term?
   a. Primarily developmental?
   b. College level?
   c. A mixture?
      i. Are there any specific challenges that you have faced that
         seem unique to developmental courses?
      ii. Are there any specific challenges that you have faced that
          seem unique to college level courses?
   d. If transitioning from developmental to college level, do you feel ready
      for that transition?
4. What are your department’s expectations about teaching?
5. Do your students seem to react to your teaching?
   a. 
6. Have you been given any feedback about your teaching?
   a. If so, what form has the feedback taken?
7. When you are teaching, in what ways do you think you use your knowledge graduate mathematics? Specifically, do you rely on any knowledge from courses like Real Analysis, Linear Algebra, etc?
8. If you have taken any education courses, have they had an influence on how you think about teach and how you teach?
   a. If yes, what influence?
   b. If not, why not?
   c. Or what courses specifically have you leveraged information from?
9. What have you learned about students and teaching during your time as an instructor?
10. What seems to have the biggest impact on how you think about and plan for teaching?
11. Do you talk about teaching with your community college colleagues? Do you talk about teaching with anyone else?

**Interview 3 Reiteration**

(It is important to note that this interview was used as a supplemental interview. Additional interview questions were asked based on responses to previous interview questions.)

1. Do you feel that your idea of effective teaching has changed?
   a. If so, how?
   b. If not, has anything reinforced your belief?
2. What courses are you teaching this term?
   a. If transitioning from developmental to college level, do you feel ready for that transition?
Appendix D: Example Transcriptions for Phoebe

Phoebe Interview 1

• Okay so first what is your name?
  o My name is Phoebe. [extraneous detail]

• You got your Master’s in Statistics right?
  o That is correct.

• From [University Y]?
  o Yes.

• In this degree, how would you describe your coursework?
  o My coursework was made up of statistical theory and also statistical methods. For at least the first year, and the second year the emphasis was more so on methods.

• So it was all more of what you would describe as hardcore classes instead of education-related classes.
  o No it was not education whatsoever.

• Okay. When did you choose to become a community college math instructor?
  o I had applied for the job three months after I graduated at [Community College Y]. I applied for [Community College Y] three months after I graduated from [University Y]. I did not hear back from them until six months later. After that I was still without a job and then I accepted their offer to teach [the prerequisite for College Algebra] for that spring quarter.

• Okay. So did you know you wanted to teach at the community college level or was it just convenience?
  o For the longest time I thought I wanted to teach, but then I thought I was going to be more of a researcher as an actual statistician, but when I kept applying to those jobs they kept saying that they wanted me to have experience. It is hard to get experience without having a job first, so it was a bit of a moot point. [Community College Y] was the first job offered to me so I took it. However, in retrospect I am happier I think as a teacher because I get to interact with so many personality types and people. Whereas if I was in a cubicle every day, not interacting with very many people I think I would probably be depressed. So, I think it worked out as it should have.

• Have you had any particular difficulties or successes transitioning between the student or as a grad student and becoming a teacher.
  o It is amazing how quickly I have switched which side I am on. As a student I always felt like “this is unfair. How can they give us so much
homework?”. To being a teacher and being like “You need this much homework because you need this much practice”. I switched to the dark side very quickly. So, I believe that, and then also my expectations as an instructor and what I expected from my students was that much greater than the expectations that I had for myself when I was a student. That also quickly flipped. Not that that is good or bad. I am sure we all just meet in the middle, don’t we? I would like to think.

- Have you taught anywhere else than your current job as in, when you were a grad student, were you a TA that lead recitation or did you have any of your own courses?
  - I did not, I was a TA, but it was for an online course. So I answered several emails. Because these were students from, they might have been in [the Pacific Northwest], I have had, I had students in other countries or in Texas (also another country as people would say). So yeah. That, I did not have any sort of recitation. I did not have any of my own courses. In the time that I have been at [Community College X] I have since taught two different courses over at [University Y]. However, they were the same quarter. It was a year ago. And then they did not need me after that, so that was the end of that.

- Okay. Were there any professional development opportunities when you were a grad student?
  - Not for the purpose of teaching, no.

- Okay. What do you enjoy most about teaching so far?
  - Hm. When somebody, when a student is very much like “No, no, no, no, I can’t learn this. No one has even done this before.” And then all of a sudden it does click for them and they say “What was my life like before I even knew this?” It is probably not quite to that extreme, however it is really cool to see the wheels turning in people learning. And things clicking. That is neat. So,

- So those ‘AHA! Moments’ where they thought they would never get it and thought they couldn’t get it.
  - And they get it, yeah.

- What do you enjoy least?
  - Uh. There is a personality type that I don’t necessarily get along with very well. [talking to the dog] The personality, see people don’t get along with this personality type in general anyway. It is the very loud and obnoxious and everyone is wrong except them kind of a thing. I don’t get along with that personality type well, especially when they are very loud about it. And whenever someone starts yelling at me, I
am better about dealing with it now than I used to be, but I still have more to learn with how to deal with that personality type. So that is the part I don’t so much like. Or, as the students that fall asleep or are lazy in your class, they’re not very disruptive when they are sleeping. So, I suppose that is preferred to people that are disruptive, but it is discouraging because you know you do not want to be the boring teacher. Nobody wants to be that.

- Okay. What courses are you teaching in that are they primarily developmental or are they college level?
  - The ones that I have been teaching have been more college level. Last summer I got [the prerequisite for College Algebra] to teach. But, I guess I have only taught [Introduction to Algebra] and that was just once, I have taught [the prerequisite for College Algebra] twice, and aside from that it has been all college level. Those were the only three occurrences.

- What courses are you able to teach with your master’s in statistics?
  - As far as I know, I am able to teach up through 200-level, although depending on the college I could probably teach 300 level. Depending. I have a friend that has the same degree as myself and he teaches the 300 level general statistics over at [University Y].

- So at [Community College Y] you could teach anything that they offer all the way up through [Differential Equations or Statistics with Calculus].
  - Right, which I am now teaching. However, I don’t know that I would take on anything from the calculus series. Specifically because I think I would be so rusty at it. So, the [Statistics with Calculus] I can pull off without too much trouble, if I do say so myself. But, yeah the calculus series, I feel like I would be rusty on. So,

- Do you know what courses you are going to be teaching next term?
  - Next term I got a section a [College Algebra], which will be the 7th or 8th time I have taught it.

- Do you like that course?
  - I do. I like some parts of it more so than others. Like chapter three is kind of my favorite. Favorite of all of them. I don’t know that it is particularly applicable to them. Aside from modeling, I think is where I would use it the most. Modeling different polynomials, but the students seem to like it better, which makes me like it. And, it is a nice break from teaching the chapter 1 and chapter 2 material, which they are very much like “I don’t want to remember all of this at the same time. This is too hard” and it is before the logarithms where they just want to commit suicide. You know it is true.
• I understand. How would you describe a well taught math lesson in that, what would you as the teacher be doing and what would students be doing?
  o Oh probably the perfect lecture would go that I teach for 30 minutes sort of giving them the rundown of applicable theorems that they would want to be able to use a couple of example problems that go step by step through getting to an answer. And then the last 20 minutes, if this were a 50 minute course, would be them practicing different problems and sort of getting the new material before they are able to leave my classroom. That is what I would say.
• So it would be primarily just lecture based.
  o Lecture based at least for the first half, for the second half….  
    • Experience based.
  
    • Yeah. That way they don’t leave the classroom saying “I don’t know what I have just learned. Will I practice it? I don’t know.”
• On the other side of the coin, how would you describe a poorly taught math lesson?
  o There are two possibilities that could probably be worse: One that is completely lecture based without asking the students any questions and without asking them to engage with you because then it is very easy for them to space out which they can do anyway even if you are asking them questions. The other side to that would be maybe not teaching them anything at all and just sort of handing them the book. It can be good because they are learning to use their own resources to do something like that, but if it’s a particularly hard topic, then that might not be the best case scenario. Lately they have been doing the reversed classroom where students have been watching videos and then the time in the classroom is spent doing problems. That I think is fine as long as the students actually go through and watch the videos. And then that classroom time can be spent doing more practice problems. It is like the extension to that 20 minutes I was referring to earlier. So, I suppose the worst case would be take out the videos and just expect them to do problems in class. That would probably be poor.
• What have you learned about teaching since you’ve become an instructor?
  o To balance out some of my expectations and maybe heighten some of the others. For example, in my trig class that I am teaching this quarter, there was one section that we had started on a Friday and it was a Friday after the exam so I had low attendance anyhow, and they weren’t engaging. I was mentioning I need you guys to respond
to this so that way I know how you feel and whether or not I can carry on. No one said anything. Actually one person in the back finally said “I think I get it.” And then I was able to move on. The following Monday, to finish up the section I made a worksheet that essentially lead them step by step through graphing trig functions. It lead them step by step with what they were able to do and learn to do on Friday, but there were some extra pieces that we had not covered yet that A they could find in their book or sort of think about what they think should happen with the graphs. And so, that was probably, I am not going to say it was the best class I have ever have, but it was probably the most satisfied I have been with one of my worksheets that I had given. But the question is what have I learned from teaching. Sometimes it is better to give a worksheet. Give them a little bit. Give them a worksheet. And then they finally have to engage with you because they want to actually succeed on this worksheet or on something that they are working on. I know, and see one of the other instructors [Instructor 3], she actually probably put that better in words, that she had a class that I think she had trouble keeping them quiet so that way she could speak and she is very soft spoken anyway. So finally she just started making the examples in class a little bit harder. So that way they would actually have to be quiet and listen and that, but then they would work very well with each other and figure out the problems and they were able to learn quite a bit that way. So, uh. In pieces, that is what I have learned. I don’t know that I have constructed that thought very well in my own head. So I don’t think that I am able to reproduce that for you today.

- So one thing it sounds like you are saying is that your teaching in front of class needs to be adaptive.
  - Yeah to the class that actually have and the environment that I have. Or to the particular lecture that I am giving that day. Whether or not it is directly after a test or not.

- Okay. What have you learned about yourself since you have become an instructor?
  - I am surprised sometimes at my ability to adapt to different environments like that. And then sometimes I forget that I am particularly good at math and somebody will ask a question and I will answer (snaps fingers) without really even thinking about it. And I will say “ooh. That was very deep for myself. That was quite a good thought.” And I will get very proud of myself. “That got very deep there. I quite like that.” So, Yeah. Sometimes I surprise myself in
how much I have learned just in the study of math from teaching, so. The thing about teaching for me is I think what can happen when you learn math too early in your lifetime is somebody tells you a bunch of rules and you don’t necessarily question why or I was not the personality type to question why. It was more of like, teacher said so. Why would they lie to me? They are not out to get me. And so I accepted it as fact. Now that I am actually going through and teaching it and I am in charge of knowing why, it is very surprising to me, different things that I was allowed to get away with without really knowing why for so long and now I am having to ask myself that question. So I guess that would fall under categories of things that I have learned from teaching slash learned about myself. It is surprising, the number of things that I was able to get away with not completely understanding, but now I am.

• [Interview turned on the interviewer]
  o Some of the best thinking moments I have had are when I am driving from [home to work]. I am driving on the highway and I am just like “Oh that was a random variable, I could think about that from the context of rules that I know about combinations for random variables. I will have to call [student], email her and let her know that I have thought about this further.”

• So how were your experiences in your graduate or undergraduate math, or stats, course in this case? Were there any that specifically stood out? Was there one class that seemed more useful?
  o They, I am trying to think. What was the most? Probably the class that was the most useful, Probably, Now see there were classes that I liked. Whether or not that they were useful to me, I can’t. It is hard for me to pick out one that was more so useful, especially now to me in this moment that I can actually remember.

• Was there a group of classes that helped you at least in some way? Like, maybe just things that the instructor did, helped you learn as to what you would want to do as an instructor?
  o Well I definitely had ones that I did not like. Like senile old people. Like ugh, I need to retire when I need to retire. I learned what not to do. Now that I think about it, my intro to real instructor gave us essentially reading ahead assignments and that was something that I had used in my College Algebra class last quarter, with some success and I would be willing to try again. Now that I think about it that is one technique that I used from her that she did for the first semester. I don’t recall her doing it for the second semester, but it is something
that stayed with me long enough to say, “Oh I think I will use that again for my own class.” And for my general stats course that I had in undergrad, there was a particular quiz, I still have all of my quizzes for undergrad, that I was able to use for an in class assignment for my current stats class.

- So you picked up some tools?
  - Well and it was so funny too because I did not do very well on that quiz, actually as it turns out. And uh so thankfully I can do better on that quiz now. When I gave it to my students as an in class assignment, I told them that this was a quiz for me when I was in your guys’ position a sophomore in school, although in hindsight, I guess I was a junior, but I don’t want to tell them that. It is fine. They got to experience that and then if they struggled, then I could say “You know I had this as a quiz. I did not get to work with others on this. You get to work on this in a group and attack this. You get to take away more from this probably because you are working on it as a group.”

- So really valuing the idea of group work?
  - Yeah.

- So were there any that stood out as bad experiences that you remember specifically?
  - You know, I had a rough time with my elementary analysis class. It was the class that you were supposed to take over the course of the semester before intro to real. It was a new instructor. He was really good at the research that he did. Was not necessarily good at teaching yet. And I actually got a D in the course. I struggled. Struggled hardcore. And then I went nuts on the final and every little noise was distracting. And it was one of those moment where I realized “oh. I don’t know anything” and I had a freak out moment, every little noise was distracting, and I just couldn’t write anything of value down on the paper. And so it contributed to me getting a D in the course. Though, earlier in the semester didn’t help either. I thankfully, the head of the department decided that he was going to offer it over the summer for me and one other girl that really needed it. And I was able to get an A on it then. Which it is amazing how much you can learn when you are one of two students because there is that expectation there? It is not like you can just sit there and be absent minded. You have to listen when there is only two people.

- Right. And you are forced to participate.
Right. I had a lot of my best learning moments after that course. So, yeah. I probably had my worst course and my best course back to back. In that case,

- Same course title too?
  - Yeah, yeah. It is kind of funny. I think that experience will always stay with me. And now that I am teaching, I won’t be as hard on that former instructor of mine now. Or former professor, just because it is so hard being a first time professor. And he did not have an educational background much like I don’t have an educational background. So the learning curve is quite steep. Additionally, he was from a different country, and so his English was not poor, but still having to think through a question in your own language and then having to recite that in a different language is difficult. So, and I don’t have that barrier, so he had it even harder than I do now. For grad school, again, I had an instructor who was teaching a grad course for the first time and we were so hard on him. And I have seen him again since then, and I don’t know that I apologized, but I made sure to be extra friendly because I felt so bad for being so mean as a grad student. He is still teaching now. It sounds like he is doing great now. I guess some of the worst classes I have had is either they are new to teach or they are super old and senile. I have not had too many problems with anyone in the age group in between. That I can recall.

- Last question: Before becoming a teacher, did you know how you wanted to teach?
  - I knew that I wanted to find a way to be casual and I wanted it to be a low stress environment. However, still have standards so that people could progress. I am still finding that middle road.

- So you are still attempting to be able to get to teach that way.
  - Mhm.

Phoebe Interview 2

- What courses are you teaching this next term?
  - [College Algebra]

- So, that is college level
  - Yes

- How comfortable do you feel in the teaching role so far?
  - For that course or in general?

- In General.
A lot of it does have to do with how often I have taught the course, but for a course like [College Algebra], I have taught it the most and so I am pretty comfortable with taking a peak at the notes and just rolling into the class. So there is not a lot of prep work that goes into it from the teaching aspect.

- So you feel very comfortable it sounds like.
  - Mhm.

- Do you feel there is any coursework that you could have done in your grad or undergrad program that would have helped you feel any more comfortable, say more near the beginning?
  - Not specifically education based. I wish I had known more about excel, just for the sake of grading. Because I do all of my grading in Excel. And there was a big learning curve in ‘How do I make this do what I wanted’. An education class probably wouldn’t have hurt. Some of the different things that I have learned….I am pretty stubborn, I probably still would have had to make the mistake and be like ah that is why that told me that this wouldn’t work out. So, not really. Yes, Excel. Education based, eh.

- Okay, so more of like technology would have helped more than anything else.
  - Yes.

- Okay. Do you feel that your idea of effective teaching has changed at all from last term to this term? Or do you still hold the same kind of picture of what you think the classroom should be like ideally.
  - Probably the same picture. As beginning of last quarter. With the statistics course that I taught, I did see. Because a lot of them are engineering majors, they do like to have me just give them a bunch of problems and work on it with each other. With some of the other classes, like [College Algebra] and [its prerequisite], they are still kind of at the stage where they are more independent. They don’t necessarily work with each other in the same way. It was interesting to give in class assignments or projects to that class because in their major, they all know each other anyway from taking calculus or physics or whatever. So it was interesting to see how quickly and how many of them would break down into little groups. So there were much fewer lone wolves that you often see at the [College Algebra or its prerequisite] level.

- What are the expectations that your department has about your teaching?
  - Gosh. Is that easy to say in a sentence? Be effective. That is always the main goal. Hopefully,
So there aren’t any pinpoint things that you are expected to do, or?
  o I am sure it is written down somewhere. But I use my common sense. I guess my common sense would say to just be effective. So, If you see that lecture, lecture, lecture maybe is not the best course of action just because the students have the tendency of falling asleep, then maybe doing more in class assignments or saying ‘fine, you want to fall asleep in class’ try doing this. Or try this yourself. Maybe you can sort of put into perspective what it was that I was telling you. Then maybe that is a better avenue to go at. So, be effective.

Along with that, how do your students react to your teaching?
  o I don’t know that they think about it. By the time that they get to seeing me, they have been in school so long that they have seen so many lectures, they have done so many in class assignments, they probably just think of it as just another day in the life. I don’t know that they say “hm. She is doing an in class assignment. Why isn’t she doing this as a lecture? Maybe she has a point to this?” I would be surprised if they thought that deeply about it.

Has your teaching been evaluated, or have you been given any feedback about your teaching?
  o There is the end of quarter evaluations from students. I had the dean sit in on my first class that I taught and then I had [Instructor A], she used to be the part time faculty advisor when that was her role, she also sat in on my class. But not since then. Not since my first quarter.

Did they provide you with any sort of feedback from that?
  o Oh yeah. Both of them did. Mhm.

Okay
  o That I have kept. I believe it is in my [prerequisite to College Algebra] binder. So every once in a while I do look back at it and say “Have I made these improvements? Has this actually happened?”

Awesome!

When you are teaching, do you feel that you pull on any of your knowledge from your graduate stats courses? Like your hardcore stats courses.
  o In the [Statistics with Calculus], absolutely yes. In [College Algebra], a lot of that is...Well, I would have taken the equivalent as a senior in high school, and some of that is kind of fuzzy. For reasons... It was yesterday.... It was not over ten years ago.... So, yeah, definitely for the [Statistics with Calculus]. A lot of that was more reason knowledge, and I could remember oh this is the class that I learned it in. This is where it finally settled. Where I truly understood this
concept. With the college algebra, that’s harder for me to remember where that finally sunk in. So, yes for [Statistics with Calculus]. Anything lower, not really.

- Okay, fair enough. And you have not taken any education courses correct?
  - I have not. OH. I took math for elementary school teachers, but that is not in the education department. So you can count that if you like.

- So, do you leverage any information from that course when you are teaching?
  - Yeah. We learned how to break down story problems. I mean they were pretty basic ones like how to find area and stuff. Some of the different counting methods I learned about, like base [I guess we do base ten quite a bit]….I learned about binary arithmetic first in that class.

- Nice.
  - It was a really interesting class. So in some sense, yes I use that course more often than say my memories of college algebra. So,

- Okay. So there was an education-related course that was helpful.
  - Yeah.

- Good. What have you learned about teaching that coursework did not teach you?
  - Oh. Managing different personalities. Public speaking for sure. Yeah, you don’t really get to do much of that in your coursework. You get.... I don’t know. I did it a little bit. A scosch if you will.

- Defending a Thesis?
  - Yes. Oh my gosh! That is the worst. That is a heart attack.

- Things to look forward to.
  - Yeah. Woohoo. For you as well. But yeah, but not in the same sense. Because in college, you are definitely....If you do any sort of presentation, it is to your peers or your mentor. With teaching, it is to people that could be older than you, but generally don’t have as much knowledge about the subject as you do. Most of the time they do not. And, so being able to handle a group like that, if they are particularly distracted or something, or being able to keep the interest going for students that students that maybe do have a higher understanding of what you are talking about. Being able to present something that is interesting to them and not over the heads of everyone else in the class. That is fun.

- Alrighty. What have you learned about students that you did not learn through coursework?
I didn’t value how important in class assignments are quite to the extent that I have now, just because a lot of the courses that I took in college were very lecture based. I don’t think we ever had any in class assignments above calculus. I don’t recall there being any “we will try this problem in class”. It was always lecture, lecture, lecture, and go home. Try it out. Come back. Where I feel like it is very much a way of life at [Community College X]. Lecture for thirty minutes or less and either break up your lecture with an in class assignment, or wait to do the in class assignment at the end of class. It is interesting how teaching has changed, I feel like for this newer generation. I don’t know if you have noticed this in yourself, but I find myself... Sometimes I will be watching YouTube video on my own free time, I get bored by what they are doing so I bust out my cell phone and multi task, then this is boring too, and so I will add in a third element. I don’t know if it is because I am coming more OCD, not OCD, ADD, but it’s like I am becoming more part of this newer generation where you have to be doing like five things at once to actually keep your brain stimulated. Maybe it is just because I drink a lot of coffee. That could be a lot of it too. But I almost feel like they are going through the same thing where it is like they are trying to be on their cell phone, or like I had a kids bring in a Rubik’s Cube, not because he was not paying attention to the lectures, but it was like he had to be doing something so he could actually focus on what it was that I was talking about.

- Interesting.
  - Because of the cell phone generation, and like watching TV, being on the computer, being on their cell phone,

- [and studying at the same time]
  - Yeah. I feel like the typical lecture based class is going to be SOOO BOORING that we almost have to break it up with an in class assignment and be like do this. Do not just watch me. Go try this out. Because they are not going to focus.

- [I have had a few students that don’t focus unless they have their textbook with them and they are following along.]
  - Right.

- That has been interesting.
  - Yeah, so I mean that is yet another aspect. They can’t just... They are not auditory learners, and even though you are writing it down on the board with that it is not enough because they will just get distracted by something else. Like the 100 other things that are going on in the
room. So, that is what has been interesting about this generation. Maybe it is true to some extent for older generations. Back then people just didn’t care. People were like this is how I am going to present this. Deal with it. More so than this current generation. We are all just trying to make it work because it is very much like ‘you have to go to college, or you are not going to get anywhere in life’ So because we have so many of these students that would not have typically done well in this lecture environment, we are trying to sort of cater to them more. So, because it is not like we don’t want them to succeed.

- Right. We kind of want them to succeed just a little bit.
  - Right? Just a scosch.
- Alright. What seem to have the biggest impact on how you think about and plan for teaching?
  - Some of my... I guess maybe not greatest thoughts, but every once in a while I will catch myself waking up at the beginning of the day and then saying ‘Why am I doing this like this? It is not working.’ For example, I used to give reading quizzes in class for my stats kids. And for my college algebra students, I had come up with some reading ahead worksheets so that they would get into the book, read ahead, and come to class with a certain amount of knowledge, that way class time would go that much more smooth. Boom in class assignments. It makes things flow a little bit quicker. Some of the questions that they would have had in class or maybe not have thought of in class, they could them come up with when they are reading ahead. And then, when we actually cover it in class, they could say ‘hey wait, this did not make sense to me.’ Instead of learning it in class and then going home and being like ‘ah this didn’t make sense to me, who o I talk to? Neighbor kid down the street, you are smart help me.’ And I was not doing that for my stats kids, and it was not until week seven or eight and I woke up and I was driving to work saying ‘Why did I not do the same thing for them?’ I would end up quizzing them, sometimes up to a week after we had actually covered the material. And by then, they should not be forgetting what they had covered. But let’s be real. They had forgotten what they had covered. So it was a lot of “Yeah what is a T test? I don’t know. Why would I use it?” Because you want a hypothesis? I don’t know. So the last two quizzes of the quarter I actually made take home. It ended up being a read ahead kind of an assignment and so they came to class with a certain level of knowledge and things flowed better. As they tend to
do. And because they were so used to taking those in class quizzes, they were so much more thankful that they were take home. It was like they knew, they realized, this is how bad it could be. ‘She is so great for giving this to me as take home’. It made me look cooler.

• Nice.
  o Which I am always down for.
• Very nice.
  o Mhm. That is always my evil plan.
• Here is a difficult question. Do you talk about teaching with your community college colleagues?
  o A little bit. A scosch. We, I think we do, even out of the context of this. At first, I think sometimes when something’s not working, or we’re having a hard time with maybe a particular student or teaching a particular class, I think in some sense, we do vent to each other, but because we are saying it out loud it is allowing us to think about what is going on out loud and maybe bounce ideas off of each other, and so even outside of this whole realm, I feel like it is something that we all do.
• [Side Conversation again unrelated to the interview]
• Do you talk about teaching with anyone else, say outside of colleagues?
  o Yeah. Actually, last night I ended up going to [a friends house] and we were talking a little bit about Ratemyprofessor, and because she is an owner of a restaurant she has to contend with reviews about her restaurant on things like Yelp or Google or what not. And so we were talking about how those two things are relatively similar. Also, she has a Waitress that is about to take [College Algebra] and she debated taking my 8am class and then thought, ‘oh yeah, that is not me’ and I said ‘me too, but I don’t get to choose’. So, yeah. And then, with my riding instructor I will talk about teaching and different things that I have trouble maybe explaining, or something. Because she teaches Horseback riding, so she runs into some of those same issues, so that has been interesting.
• Very nice. And that would be the end of the painful questions.