COLLEGE TEACHING PREPAREDNESS: CONTRIBUTIONS OF GRADUATE STUDENT EXPERIENCES

A Dissertation presented to the Faculty of the

Department of Educational, School, and Counseling Psychology

at the University of Missouri

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

---

by

MARSHA J. MCCARTNEY

Dr. Stephen Whitney, Dissertation Supervisor

MAY 2014

The undersigned, appointed by the dean of the Graduate School, have examined the dissertation entitled

COLLEGE TEACHING PREPAREDNESS:
CONTRIBUTIONS OF GRADUATE STUDENT EXPERIENCES

presented by Marsha J. McCartney,

a candidate for the degree of doctor of philosophy,

and hereby certify that, in their opinion, it is worthy of acceptance.

Professor Stephen Whitney

Professor David Bergin

Professor Roberta Scholes

Professor Jeni Hart

DEDICATION

To my beloved family.

Your unwavering love inspires me.

ACKNOWLEDGEMENTS

I extend my sincerest appreciation and gratitude to my advisor and committee chair, Dr. Stephen Whitney, for his guidance throughout my doctoral studies and the dissertation process. His advice, suggestions, patience, and generosity have influenced every part of my doctoral studies.

I am also grateful to my committee members, Drs. David Bergin, Robbie Scholes, and Jeni Hart. They made themselves available to me throughout my program, and their insight, comments, and criticisms have contributed extensively to this work.

I also thank the sponsors of the Mary Jane Lange Doctoral Scholarship Fund for providing me with financial support for this study.

My heartfelt appreciation goes to all those associated with the MU Career Center, especially Craig Benson and Dr. Joe Johnston, who provided me with an assistantship for all six years of my graduate work. Craig gave me numerous opportunities to explore and enhance my interests and strengths, and Dr. Johnston provided encouragement and support when I needed it most. The MU Career Center is a truly special place to work, and the undergraduates employed there are bright, hardworking, accepting, and the best Mizzou has to offer.

There are far too many loyal friends in my life to name them all here. I could not have come this far without their kindness and understanding, even as I prattled on about efficacy and operant conditioning and eigenvalues, to name a few. It only gets worse from here!

Finally, the most important contributors to my success are my family: my parents, J.D. and Phyllis McCartney, my sister, Laura Beth McCartney, and my husband, Elliott McClelland. There are no words to express my gratitude for your emotional and financial support, faithful confidence in me, and steadfast love in every aspect of this process and my life. You have my heart.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

COLLEGE TEACHING PREPAREDNESS:
CONTRIBUTIONS OF GRADUATE STUDENT EXPERIENCES

Marsha J. McCartney

Dr. Stephen Whitney, Dissertation Supervisor

ABSTRACT

This study establishes the types of teaching experiences that graduate students have in graduate school, their teaching approach, and how these affect teaching efficacy. Data were collected from 327 graduate students from a variety of degree program disciplines at various stages in their degree programs. A sources of teaching efficacy questionnaire was developed using confirmatory factor analysis and exploratory factor analysis. Hierarchical multiple regression was used to determine if a significant amount of variance in teaching efficacy could be explained by the sources of teaching efficacy reported by graduate students. A series of regression analyses was used to determine if a significant amount of variance in teaching efficacy could be explained by the teaching approach. Hierarchical multiple regression was then used to determine if a significant amount of variance in teaching efficacy could be explained by the sources of teaching efficacy and teaching approach, combined. Positive affective states and positive verbal experiences contributed significantly to teaching efficacy. Conceptual change/student focused approaches, for both lecture and discussion class styles, contributed significantly to teaching efficacy. Positive affective states and conceptual change/student-focused (lecture) significantly influenced teaching efficacy in the combined model.

CHAPTER 1: INTRODUCTION

Graduate programs tend to prepare students to be researchers first, and teaching skills are usually developed according to the institutional or faculty needs (e.g., graduate teaching assistant positions), rather than the graduate students' needs (Austin, 2002). The literature that follows documents the lack of teaching preparation that most graduate students have. This study attempts to discover the types of teaching experiences that contribute most to college teaching preparedness. The information provided by this study offers insight into the most efficient ways for graduate students to receive teaching training and experiences, so that they are sufficiently prepared for the teaching roles they will possess as new faculty.

Literature on the topic of preparation and socialization of new faculty, as well as how equipped graduate students feel as they transition to roles as faculty members, shows a major gap in an institutional lack of preparation for teaching, advising, and mentoring. These activities, along with research and service, can account for a considerable portion of a professor's time, depending on the institution (Adams, 2002). In her paper about preparation in academic graduate programs, Adams (2002) noted that, for new faculty members, teaching is the most immediate demand and consumes the most time and energy. Most graduate students do not graduate with broad teaching experience and seldom have the opportunity to perfect their teaching or mentorship skills (Adams, 2002). For new faculty members, teaching can be a surprising demand on their time and energy. To be a successful teacher, one must be dedicated, plan carefully, and be flexible (DeNeef & Goodwin, 2007). In a study of the effects of mentoring new faculty members,

Boyle and Boice (1998) found that less than 25 percent had taught their own classes as graduate students, and less than 10 percent had been in teaching assistant training programs.

The importance of teaching can be confusing for graduate students, as has been found by the following studies. A longitudinal study that followed future faculty found that they received "mixed messages" about teaching (Austin, 2002). Institutional leaders emphasized the importance of high-quality teaching, while the faculty encouraged graduate students to spend less time on teaching and allotted little time to helping them learn to teach. This, along with the university processes of tenure and promotion, perpetuate the impression that teaching is less important than research (Austin, 2002).

As the following studies show, in spite of this, many students who aspire to the professoriate recognize that the roles of teaching and mentoring will be significant in their future careers. For many students, teaching is the reason they initially began pursuing a doctoral degree. In Bieber and Worley's (2006) qualitative study about graduate student perspectives on academic life, they found that respondents viewed faculty members primarily as those who teach and mentor. They noted that personally connecting with others was a meaningful part of how they viewed their future faculty life. A similar study reported that graduate students wanted further support for their professional development as teachers, specifically, "real intellectual and emotional engagement with others about teaching" (Nyquist et al., 1999, p. 24).

In addition, an emphasis on teaching is becoming more prevalent in higher education for many reasons. Student enrollment is increasing while governmental

funding is decreasing, and public scrutiny is causing institutions to turn to more flexible and economical instruction, such as non-tenure-track teaching faculty (Oliff, Palacios, Johnson, & Leachman, 2013; Umbach, 2007). To compensate for this, colleges and universities are increasing tuition and cutting spending, which includes cutting tenure-track faculty positions (Oliff et al., 2013). Currently, adjunct faculty represent almost 70 percent of professors at public and private institutions—a contrast from 30 years ago, when adjunct faculty accounted for only 43 percent of instructors (Finder, 2007). Lawmakers are attempting to pass bills that will appropriate higher education funding on a performance-based model, rewarding schools based on the number of students that graduate or complete credits, instead of enrollment numbers (Kelderman, 2012, 2013). This suggests that in the very near future, higher education institutions will be held accountable for retaining students. All of this points to how critical teaching skills are, and will increasingly continue to be, for those entering the higher education job market.

This brief summary of some key pieces of literature emphasizes two things. First, that teaching is a major responsibility of faculty members. This is not to undermine the importance of research, but simply to note that the emphasis in graduate school preparation is focused more on research than teaching. These two areas should not be seen as disparate, but as complementary processes, as is evidenced by Boice (1991) who found that inexperienced new faculty who were considered exemplary teachers had a superior investment of time spent on scholarly and grant writing. Second, graduate students recognize that they need to be better prepared to teach as they begin their first faculty positions, and that teaching could be a rewarding part of their job. This

dissertation study examines the teaching experiences that are available to graduate students, and shows how these can contribute to teaching preparedness. The results of this study could help to guide graduate programs to develop teaching experiences that are meaningful and add to future faculty's development as teachers.

Because of the lack of preparation that the preceding literature documents, measurement of teaching preparedness in graduate students can illuminate areas of competence and deficiency. To this end, the teaching efficacy levels of graduate students are examined. Greater teaching efficacy has been linked to higher persistence, attribution of failure to external factors, and ability to find obstacles stimulating (Schunk, 1990). Specifically, those with higher teaching efficacy encourage their students' self-directedness and intrinsic interests, create mastery learning experiences, adopt new educational technologies, and their students learn more (Bandura, 1997). Teaching efficacy is one of the few factors that can consistently predict teacher practice and student outcomes, making it particularly applicable to the teaching preparation deficit for many graduate students in higher education (Poulou, 2005).

This study explores the factors that contribute to college teaching preparedness. Study participants were current graduate students at a large public research institution in the Midwest. Data were collected from graduate students about the different sources of teaching efficacy information they have received or experienced, based on Bandura's self-efficacy model—enactive mastery experiences, vicarious experiences, verbal persuasion, and affective states (Bandura, 1977a, 1997). Also collected was the teaching development opportunities in which they have participated, such as teaching practicum

classes, teaching workshops, et cetera. In addition to gathering teaching data, participants completed a measure of teaching approach, which identified their focus as either on conceptual change or information transmission. This teaching approach measure evaluates approach in both discussion-style and lecture-style classes. Participants then completed a measure of teaching efficacy, and the relationships between these data were explored. This study answers the following research questions using a series of regression and hierarchical multiple regression analyses:

1. What do the average levels reported about sources of teaching efficacy, teaching approach, and teaching efficacy show about graduate student teaching?
2. Do the sources of efficacy described by graduate students account for a significant amount of variance in self-reported teaching efficacy?
3. Does the teaching approach reported by graduate students account for a significant amount of variance in self-reported teaching efficacy?
4. When combined, do the sources of efficacy and teaching approach account for a significant amount of variance in self-reported teaching efficacy?

The results of this study show the sources of efficacy that contribute most to teaching efficacy for graduate students, and how teaching approach contributes to self-reported teaching efficacy.

CHAPTER 2: REVIEW OF RELATED LITERATURE

Self-Efficacy

Bandura's (1977a, 1997) concept of self-efficacy is defined as the psychological procedures that affect coping, effort, and persistence when attempting a task or realizing a goal. In his words, "Perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Self-efficacy is important because it describes the mental processes that can affect people's choices about their behavior. It can project whether a coping mechanism will be used, the amount of effort utilized, and how long this effort will be sustained when a person encounters difficulties (Bandura, 1977a).

People with high self-efficacy are more likely to persist on a task in the face of difficulty, and they tend to take a broader view of the task than someone with lower self-efficacy (Schunk, 1990). People with high self-efficacy find obstacles to be stimulating, and when faced with failure, attribute it to external factors (Schunk, 1990). However, people with high self-efficacy might not prepare themselves as well for a task, due to overconfidence (Csikszentmihalyi, 1997). People with low self-efficacy usually perceive tasks to be more difficult than they actually are, and behave erratically and unpredictably while performing the task. Obstacles discourage people with low self-efficacy, and they attribute failure to internal factors, such as ability. However, they might also be more encouraged to learn more about an area in which they have low self-efficacy, as a way to increase their efficacy (Bandura, 1977b). An optimal level of self-efficacy is slightly above a person's actual competency level (Csikszentmihalyi, 1997). High self-efficacy

can lead to less preparation for tasks, and low self-efficacy can discourage even attempting a task (Bandura, 1977b).

Sources of Self-Efficacy

Self-efficacy is affected by factors that contribute to how a person perceives their own capabilities in a specific domain. Bandura states that there are four sources of efficacy information: enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states (Bandura, 1997). People gain information from each of these areas and continuously integrate it into their perceptions of their self-efficacy.

The most powerful source of efficacy information is enactive mastery experiences (Bandura, 1997). These are a person's direct experiences with success or failure at a particular task. As would be expected, direct experience with success leads to increased self-efficacy in that domain, while direct experience with failure lowers self-efficacy. As a person experiences success in more difficult tasks, self-efficacy increases. If an easy task is attempted and failed, this can weaken self-efficacy substantially (Bandura, 1997).

The next most influential source of efficacy information is vicarious experiences. A person's self-efficacy can be influenced as a model is observed succeeding or failing at an activity, and this can indirectly affect a person's self-efficacy. However, the observational process can be complex. There are two areas within vicarious experience that are particularly important: the effectiveness of observational learning, and attending to models. In order for people to benefit from observational learning, they must attend to the model, rehearse the information, be able to produce the outcome, and be motivated to

do the activity. People are more likely to attend to models who appear competent, are perceived as similar to themselves, are credible, are attractive, and show enthusiasm for the task. Models do not need to have all of these traits to be effective, but the more they have, the more likely it is that effective observational learning will occur (Bandura, 1997).

The third most powerful source of self-efficacy information is verbal persuasion—someone verbally reassuring a person could influence his or her self-efficacy. This works with both encouragement and discouragement, but discouragement tends to be more powerful at changing self-efficacy (Bandura, 1997).

The last source is the physiological and affective state of the person. For instance, someone about to give a presentation might experience fatigue, nausea, or nervousness. People with low self-efficacy could interpret these symptoms as indications of their inability, while people with high self-efficacy understand that these are normal reactions before public speaking and not related to ability (Bandura, 1997).

Teaching Efficacy

The importance of efficacy for teachers has been studied, but chiefly in the context of K-12 education, as the amount of research for higher education is not nearly as plentiful. In the absence of similar research on instructors in higher education, a selection of theoretical articles that have concepts about teaching efficacy seem to be broad enough to relate to both K-12 and college education. These studies stress the importance of encouraging and increasing teaching efficacy in order to create meaningful learning experiences for students.

High teaching efficacy has shown many benefits, as is noted by the Bandura and Poulou. Bandura (1997) noted that teaching efficacy beliefs can influence how teachers structure academic activities, as well as influence how their students view their own abilities. Teachers with higher teaching efficacy are more flexible in their classrooms and more open to change. They are more willing to create mastery learning experiences for their students, are more likely to adopt new educational technologies, and are more willing to support students' intrinsic interests and encourage self-directedness (Bandura, 1997). The students of teachers with high teaching efficacy learned more, and teachers viewed difficult students as reachable, with extra effort (Bandura, 1997). Teachers with lower teaching efficacy spend less time on subjects they are not as confident in, allocate a smaller amount time to academic subjects overall, and their students will learn less from them (Bandura, 1997). Teaching efficacy has been shown to be one of the few factors that can consistently predict teacher practice and student outcomes, making its study extremely valuable (Poulou, 2005).

As mentioned previously, these benefits of teaching efficacy come mainly from literature in K-12 education. These claims have not been studied as much in college education, but it is reasonable to expect them to exist in this arena as well, perhaps with some variances in specifics and intensity. Bandura (1997) notes that:

> Socioeducational transitions involving new teachers, regroupings of classmates, and different school structures confront students with adaptational pressures that inevitably shake their sense of efficacy. These adaptational problems are likely to

> be exacerbated if the teachers to whom the students are entrusted doubt they can achieve much success with them. (p. 242)

While he was commenting on the K-12 experience for students, many of the adaptational concerns mentioned may be common occurrences for higher education students as they transition to the many pressures of college life, so it seems even more realistic that teaching efficacy would contribute to student success in higher education as well. In her article on efficacy on college teaching, Woolfolk Hoy (2004) notes several areas that apply to both K-12 and college instructors. Instructors with high teaching efficacy tend to spend more time planning and organizing, and have more enthusiasm in the subject where their efficacy is the highest. They seem to be more committed to teaching, and are more resilient when faced with obstacles. They are also more willing to spend time with students who are struggling, and are less critical of student errors (Woolfolk Hoy, 2004).

Noting these benefits to teaching and student success when teachers have high teaching efficacy, promoting and improving teaching efficacy is valuable and essential. A model of how teaching efficacy can be developed is depicted in Figure 2.1 (Tschannen-Moran, Hoy, & Hoy, 1998).

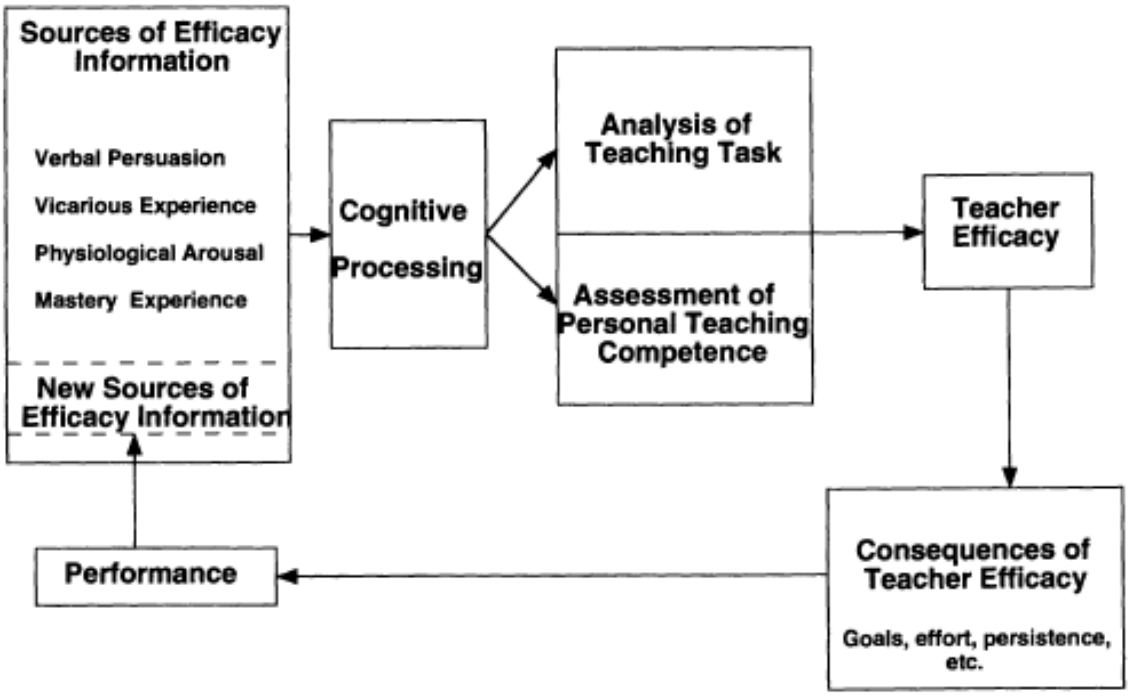

Figure 2.1. The Cyclical Nature of Teacher Efficacy.[1]

This model integrates the four sources of efficacy information that are proposed by Bandura, and shows the cyclical structure of the process of influences on teaching efficacy. As a teacher gains more teaching efficacy in a domain, this can lead to greater persistence and effort. The likely outcome of the process is better performance, which then becomes a mastery experience, boosting teaching efficacy (Tschannen-Moran et al., 1998). This model illustrates the importance of the four sources of efficacy information, as well as having a variety of positive efficacy experiences in order to increase teaching efficacy.

---

[1] From "Teacher Efficacy: Its Meaning and Measure," by M. Tschannen-Moran, A. Hoy, & W. Hoy, 1998, *Review of Educational Research*, *68* p. 228, copyright ©1998 by SAGE Publications. Reprinted by permission of SAGE Publications.

It is important to note that teaching efficacy is context specific (Tschannen-Moran et al., 1998). For instance, a teacher could be highly efficacious for teaching a certain topic or subject, but have low efficacy in creating assessments or grading homework assignments. Even within their own discipline, instructors could be more efficacious in some areas over others. Because of this specific nature of teaching efficacy, creating a measure can be problematic. Many of the available instruments are too general to measure the different nuances of teaching, and end up measuring self-esteem, self-worth, or some other global concept (Bandura, 1997). Besides having a narrow focus within the domain of measurement, the instrument items must be specific. The measure must assess what one would do in a normal situation, and in the face of obstacles. An instrument needs to be multifaceted so that researchers can choose the domains they want to measure (Bandura, 1997). The scale created by Tschannen-Moran and Woolfolk Hoy (2001) describes a range of teaching efficacy tasks over three domains: student engagement, instructional practices, and classroom management, and correlates with other scales of teaching efficacy. It has been adapted in many studies for use with instructors in higher education (Fives & Looney, 2009; Kim, 2009; Young & Bippus, 2008) because the above-mentioned concepts of self-efficacy that it explores in a K-12 context are similar for higher education.

Teaching Efficacy Research in Higher Education

The empirical research on teaching efficacy in higher education varies in many aspects, including analysis, variables investigated, geographic location, and research questions. Unfortunately, the amount of literature on teaching efficacy in higher

education is limited, and the published works include a broad range of topics, including the effects of pedagogical training, contributions to teaching efficacy, and the teaching efficacy of different types of groups, such as graduate students, tenured faculty, tenure-track faculty, non-tenured faculty, and faculty recipients of teaching awards (Fives & Looney, 2009; Heppner, 1994; Morris & Usher, 2011; Nugent, Bradshaw, & Kito, 1999; Postareff, Lindblom-Ylanne, & Nevgi, 2008; Postareff, Lindblom-Ylänne, & Nevgi, 2007; Prieto & Meyers, 1999; Young & Bippus, 2008). Because of the great diversity of studies in this area, the following review of the literature is loosely organized into several broad categories, and only the results that are directly related to teaching efficacy are reported.

Pedagogical Training

Many studies reported results about changes in teaching efficacy after participants were given instruction on improving their teaching, with mixed results. A study from the University of Helsinki found that pedagogical training needed to be at least a one-year process to influence teaching efficacy beliefs, and that shorter courses tended to make teachers more uncertain about their teaching abilities (Postareff et al., 2007). A follow-up study was conducted with the same participants, and found that teaching efficacy increased with pedagogical training the most for groups with the least teaching experience, and that those who did not continue receiving pedagogical training did not show any change in their teaching efficacy (Postareff et al., 2008). In a study of graduate teaching assistants, researchers found significant positive relationships between both prior training and previous teaching experience with teaching efficacy (Prieto &

Altmaier, 1994). In a similar study, it was found that formal training had a statistically significant and positive effect on graduate teaching assistants' teaching efficacy. The most common training experiences reported by this group were observational, as opposed to teaching-based activities that would have been considered enactive mastery experiences (Prieto & Meyers, 1999).

In another study of training graduate teaching assistants, researchers found that they had significantly higher efficacy in instruction management, student involvement, and instructional strategies after training (Young & Bippus, 2008). It was also reported that increases in teaching efficacy were greater for first-year graduate teaching assistants (Young & Bippus, 2008), which is similar to the results reported by Postareff et al. (2008), above.

There were some studies that offered results that conflict somewhat with the outcomes of these studies, indicating that the sources that influence teaching efficacy are complex. In a study of nurse educators, researchers found that teaching efficacy was influenced by formal education courses, but not more than other variables, such as teaching experience in nursing and other teaching experience (Nugent et al., 1999). A mixed-method study that examined students in a psychology teaching practicum found that feedback from students and from the practicum instructor were the primary ways teaching efficacy was increased (Heppner, 1994). It is interesting that these verbal persuasion experiences would be more influential than the direct teaching experiences, as the verbal persuasion category is reported to be the third most influential source of efficacy information (Bandura, 1977a, 1997). In a study of faculty members in Taiwan,

no significant difference was found in teaching efficacy between faculty members with teaching training and those without (Chang, Lin, & Song, 2011).

Qualitative Teaching Efficacy Studies

Some qualitative studies have been conducted to better understand the many nuances that contribute to teaching efficacy. In a study that compared faculty who had won teaching awards with novice lecturers at the University of Sydney, the researcher found that the experts seemed to have more elaborate and deeper thoughts about teaching effectively. These experts also were more receptive to feedback and were more confident in their ability. They believed they could strongly influence their students' learning more than the group of novice lecturers (Dunkin, 1995). In a different study of award-winning professors from research institutions in the United States, the researchers found that the most powerful influences on teaching efficacy were successful teaching experiences and, similar to the Heppner (1994) study, positive feedback from students (Morris & Usher, 2011). Many of these instructors also pointed to vicarious experiences as influential, saying that they observed experienced instructors and had been exposed previously to proficient teaching models, while others noted the lack of available models at research-level institutions (Morris & Usher, 2011). In a study of teachers from universities in Jamaica, the main finding was that the teachers benefited most from a peer-based model of teaching consultation, and that they felt this model was a practical way to improve teaching effectiveness (Penny, 2004). French literature doctoral students were interviewed about their teaching efficacy, and researchers found that they had had extensive vicarious experience observing their own French literature professors.

However, they had no experiences teaching French literature, had received no feedback about their ability to teach French literature, and were unable to describe their emotional experience about teaching. This shows that they could report on only one of the four sources of efficacy information, vicarious experiences. These students felt more confident teaching lower-level courses than upper-division courses (Mills, 2011). Boice (1991) looked at the establishment of teaching styles in inexperienced new faculty and graduate teaching assistants. This study found that they equated good teaching with content knowledge, they taught defensively to avoid failure, and their only strategy for improvement was to expand lecture content and lower their standards.

Contributions of Other Factors (e.g., Gender, Domain, Language Skills)

In addition, research with varying results has been published, contributing to the premise that there are many factors that influence teaching efficacy. In a study that looked at both graduate students and faculty members at a university, the researchers found that significant differences were found in teaching efficacy in gender and academic domain. Overall, women were found to have higher levels of teaching efficacy, and not surprisingly, instructors from the College of Education reported higher levels of teaching efficacy as well (Fives & Looney, 2009). This study also corroborated the results of other studies, finding that faculty members in the education discipline had higher teaching efficacy than other disciplines, and that females had higher teaching efficacy, specifically in the areas of class management and learning assessment (Chang et al., 2011). While the results of the Fives and Looney study do add to the literature, the sample sized used (117 total) is not large enough for the statistical method used (principal

component analysis), limiting the robustness of these findings. In an Australian study that looked at efficacy for both research and teaching, researchers also found that women had higher teaching motivation, as did tutors, instructors with at least a bachelor's degree, and academics with low research productivity. They also found that there was very little correlation between efficacy for teaching and efficacy for research, meaning that improving one would not increase efficacy in the other area (Bailey, 1999).

A study that reported findings on the teaching efficacy of international teaching assistants showed no relationship between English fluency and teaching efficacy. However, it did show a positive association between the number of semesters spent teaching and teaching efficacy (Kim, 2009), which supports the enactive mastery experiences component of self-efficacy (Bandura, 1997). This study also found that international teaching assistants had higher efficacy for managing student behavior and applying instructional strategies, and lower efficacy for motivating students to learn (Kim, 2009). A study that investigated perceptions of teaching efficacy and teaching support in Taiwan in both public and private institutions found that public institution faculty had higher teaching efficacy and perceptions of teaching support. Private institution faculty (but not public) had increased efficacy in the areas of instructional strategy, classroom management, and interpersonal relations when they reported increased teaching resources. However, overall, the relationship between teaching support and teaching efficacy was weak, although positive (Chang, McKeachie, & Lin, 2010).

Teaching Efficacy and Teaching Approach

A few studies examined the relationship between teaching efficacy and teaching approach. In the same study mentioned above by Postareff et al. (2008), the authors reported that the most effective pedagogical training for increasing teaching efficacy was that which focused on changing conceptions of teaching, rather than changing teaching techniques. In two studies from Hong Kong by Gow and Kember, the researchers found that orientations to teaching influenced the methods of teaching, the learning tasks, and the assessment choices, and that departments with a learning facilitation teaching orientation were more likely to encourage meaningful learning (Gow & Kember, 1993; Kember & Gow, 1994). A study from the University of Helsinki compared "hard" (e.g., physical sciences, engineering, medicine) and "soft" (e.g., social sciences, humanities) disciplines found that there were differences in the approaches to teaching, but that there was not significant variation in the teaching efficacy beliefs of teachers in these categories (Lindblom-Ylänne, Trigwell, Nevgi, & Ashwin, 2006).

Limitations of the Previous Studies

Many types of studies on teaching efficacy have been done on a variety of topics. Many of the more robust studies about teaching efficacy in higher education have been done internationally, which does not make them any less valuable, but does raise hesitations about how generalizable these findings are to institutions in the United States, as there are major differences in sources of funding, accessibility of higher education, class sizes, student-teacher ratio, et cetera (Larock, 2012; OECD, 2013). Another drawback for most of these studies is that they do not define the types of teaching

experience in which the participants have engaged, even though there are a variety of formats and levels of teaching in higher education. The strength of some of the studies also came into question, as there were some that did not use an appropriate statistical method for the number of participants, or there was not enough description of the method of analysis to assess the vigor of the study.

The Current Study

The current study is a unique contribution to the literature on teaching efficacy in a few ways. This study provides details about the teaching experiences of graduate students, as well as shows statistically how teaching experiences and teaching approach can significantly affect teaching efficacy. Because efficacy in itself is domain-specific, the teaching experiences of graduate students were assessed in detail, and information about the different types of experiences were examined to see how each contributes to teaching efficacy and teaching approach. It also provides valuable information about teaching in a higher education institution in the United States with a very high level of research activity. These areas are identifiable as gaps in the current research, and this study provides much-needed information in these domains.

This study explores the factors that contribute to college teaching preparedness. Study participants are current graduate students at a large public research institution in the Midwest. Data were collected from graduate students about the different sources of teaching efficacy information they have received or experienced, based on Bandura's self-efficacy model—enactive mastery experiences, vicarious experiences, verbal persuasion, and affective states (Bandura, 1977a, 1997), as well as the teaching

development opportunities in which they have participated. In addition to gathering these teaching data, participants completed a measure of teaching approach, which identified their focus as either on conceptual change or information transmission. This teaching approach measure will evaluate approach in both discussion-style and lecture-style classes. Participants then completed a measure of teaching efficacy, and the relationships between these data were explored. This study answers the following research questions using a series of regression and hierarchical multiple regression analyses:

1. What do the average levels reported about sources of teaching efficacy, teaching approach, and teaching efficacy show about graduate student teaching?
2. Do the sources of efficacy described by graduate students account for a significant amount of variance in self-reported teaching efficacy?
3. Does the teaching approach reported by graduate students account for a significant amount of variance in self-reported teaching efficacy?
4. When combined, do the sources of efficacy and teaching approach account for a significant amount of variance in self-reported teaching efficacy?

The results of this study show what sources of efficacy contribute most to teaching efficacy for graduate students, and how teaching approach contributes to teaching efficacy.

CHAPTER 3: METHODOLOGY

For this study, the factors that contribute to college teaching preparedness were investigated by looking at the experiences, influences, training, and teaching approach of graduate students. Data was collected from graduate students about the types, quality, and duration of their teaching experiences. Study participants were current graduate students at a large public research institution in the Midwest. A questionnaire instrument was developed to capture information about sources of teaching efficacy, and is based on existing self-efficacy literature and the advice of established researchers. In addition to gathering teaching data, participants also completed a measure of teaching efficacy and a measure of their teaching approach. These data were analyzed using a series of regression and hierarchical multiple regression analyses. A model was developed using these methods to show which types of teaching efficacy sources contribute most to teaching efficacy, and how teaching approach, teaching efficacy, and teaching experience are related.

Research Questions

This study investigated the following research questions:

1. What do the average levels reported about sources of teaching efficacy, teaching approach, and teaching efficacy show about graduate student teaching?
2. Do the sources of efficacy described by graduate students account for a significant amount of variance in self-reported teaching efficacy?
3. Does the teaching approach reported by graduate students account for a significant amount of variance in self-reported teaching efficacy?

4. When combined, do the sources of efficacy and teaching approach account for a significant amount of variance in self-reported teaching efficacy?

Data Collection and Participants

Data collection began on November 21, 2013, and continued through March 5, 2014, totaling 104 days. The only requirement for involvement is that participants were graduate students, and they were recruited for participation using four methods. First, participants were recruited via the principle investigator's personal network, using convenience sampling and snowball sampling (Ary, Cheser Jacobs, Razavieh, & Sorensen, 2006). Second, instructors of courses that teach graduate students in the University of Missouri College of Education were asked to provide their students with a link to the instruments. Third, students in the Preparing Future Faculty program at MU were asked to complete the instruments. Finally, an announcement was placed in the weekly MU Info that is emailed to all students on three consecutive dates: February 12, 19, and 26, 2014. Incentives were provided in the form of extra credit (for those who completed the survey for a class) or by entering their contact information for a drawing for one of ten $50 Amazon gift cards. There were 327 participants in this study, which made it robust enough for confirmatory factor analysis, exploratory factor analysis, and hierarchical multiple regression (Field, 2009). Demographic information was collected from each participant, including but not limited to sex, race/ethnicity, geographic origin, undergraduate major, degree program, time until graduation, degree program, and discipline (Appendix A).

Instruments

This study used three different instruments to gather data about sources of teaching efficacy, teaching efficacy, and teaching approach. To collect information on sources of teaching efficacy the "Sources of Teaching Efficacy Questionnaire" was developed for this study. This questionnaire captures information about sources of efficacy experienced by graduate students. In addition, two different instruments were used to measure aspects of teaching efficacy and approach. The first is the "Teachers' Sense of Efficacy Scale (long form)" designed by Tschannen-Moran and Hoy (2001). Although this instrument was intended for K-12 teachers, the concepts of self-efficacy that it explores are similar in higher education. The items on this instrument were modified to reflect the environment in higher education. The second instrument is the "Approaches to Teaching Inventory," developed by Prosser and Trigwell (1999). This scale was specifically developed for use in higher education, and measures how instructors approach teaching. This scale was administered twice, with instructions to participants to complete it first while thinking of lecture-style classes, and next while thinking of discussion-style classes, as there could be differences in approach for the types of classes taught. Both measures have good psychometric properties, as discussed in more detail below.

Sources of Teaching Efficacy Questionnaire

This questionnaire captures information about the sources of efficacy experienced by graduate students, and was developed as a part of this study. This questionnaire is composed of 37 items, and is scored on a 5-point Likert scale, with responses ranging

from “Strongly Disagree” to “Strongly Agree.” It also asks participants to indicate the duration of mastery experiences and teaching development. These items were developed initially by examining the existing literature to define the sources of teaching efficacy (Gehlbach & Brinkworth, 2011). Items were developed to address each source of self-efficacy, according to Bandura (1977a, 1997): enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states. A fifth category was added to capture information about teaching training and development in which graduate students have participated. The information in this section may have an effect on efficacy and approach, and is included to test this assumption. The items were reviewed by a small group of graduate students from various departments, to confirm that the items are relevant to a majority of graduate students (Gehlbach & Brinkworth, 2011). As recommended by Gehlbach and Brinkworth (2011), subject matter experts were utilized in the scale development process to support validity (see below). This questionnaire can be found in Appendix B.

The validity and reliability for the “Sources of Teaching Efficacy Questionnaire” are reported in Chapter 4, and are based on the current sample. Reliability was estimated using internal consistency methods, once participants had completed the questionnaire. The correlations and intercorrelations between the items were calculated, and reliability was established using Cronbach’s alpha. A cutoff score of 0.7 or above was used to ensure reliability of the method for this type of measure (Murphy, 2005). Items that did not contribute to the overall reliability of the questionnaire were removed and the analysis was repeated. (Murphy, 2005).

Validity was determined in a number of ways. According to Messick (1995), establishing validity is important because the measures used in psychological assessment represent meaningful social values; thus, validity should be verified by more than minimal statistical methods. Content validity is established by looking at the items and judging if they appear to measure what the questionnaire is supposed to measure (Murphy, 2005). The items on the questionnaire were developed directly from the definitions of each of the sources of efficacy, and an additional construct, Teaching Development, was added to address any other types of experiences that might not fit well with the sources of efficacy. Four subject matter experts evaluated whether items assess teaching efficacy appropriately, using a modified evaluation form from Gehlbach and Brinkworth (2011).

An effort to establish construct validity by examining structural fidelity was made, which attempted to show that the structure of the questionnaire is consistent with what is known about the structure of the content domain, teaching efficacy (Messick, 1995). This was assessed by performing a confirmatory factor analysis (CFA), which estimated the correlation between the scores on the questionnaire items and the factors related to teaching self-efficacy (Kline, 2011). Each of the factors, described previously, is derived from the literature on self-efficacy, and in the case of the Teaching Development factor, from literature related to teaching in higher education and reflection of experiences that do not logically fit the other sources of efficacy. All associations between the factors were unanalyzed, and assumed to covary (Kline, 2011). Items on the questionnaire were tested for fit with each of the factors. The results of the confirmatory

factor analysis, reported in detail in Chapter 4, showed that the five-factor model was not supported when the factor loadings, factor correlations, and model fit statistics were analyzed (Kline, 2011; Worthington & Whittaker, 2006). As the hypothesized model was not supported, an exploratory factor analysis was performed to establish what factors were in the model.

Construct validity was shown using exploratory factor analysis (EFA). An unconstrained EFA model was used to substantiate the theoretical model and ensure that the items developed are representative of the different sources of efficacy, as defined by Bandura (1977a, 1997). Kaiser's criterion was used to select factors, which retains all factors with eigenvalues over 1 (Field, 2009). After factors were extracted, an orthogonal rotation was used so that variables loaded primarily on one factor. Orthogonal rotation is appropriate because these items had low inter-item correlations, and the confirmatory factor analysis showed low factor correlations as well (Field, 2009).

Teachers' Sense of Efficacy Scale

The Teachers' Sense of Efficacy Scale (long form) (Tschannen-Moran & Hoy, 2001) is composed of 24 items, and is scored as a 9-point Likert scale, with responses ranging from "Nothing" to "A Great Deal." There are three factors that are consistently found within this instrument, Efficacy in Student Engagement, Efficacy in Instructional Practices, and Efficacy in Classroom Management. The categorization of each of these subscales follows:

Table 3.1. *Teachers' Sense of Efficacy Subscales*

Subscale	Items
Efficacy in Student Engagement	1, 2, 4, 6, 9, 12, 14, 22
Efficacy in Instructional Strategies	7, 10, 11, 17, 18, 20, 23, 24
Efficacy in Classroom Management	3, 5, 8, 13, 15, 16, 19, 21

In the original study, the alpha overall for the scale was .94 (n=410), and was .91 for the Instructional Strategies subscale, .90 for the Classroom Management subscale, and .87 for the Student Engagement subscale. These are all above a range of .7-.8, which indicates very good reliability (Field, 2009).

Because this scale was originally intended for K-12 teachers, adjustments to the scale were made. References to "children" were changed to "students" to better represent the population being taught. The term "school work" was changed to "class work" as is more appropriate terminology in college. Several items in the Efficacy in Classroom Management subscale were removed, as they do not apply to the higher education classroom (items 8, 13, 15, 16, and 19), as well as one item from the Efficacy in Student Engagement subscale that references parents (item 22). This instrument, along with the changes discussed above, can be found in Appendix C.

Approaches to Teaching Inventory

The Approaches to Teaching Inventory (Prosser & Trigwell, 1999) has 16 items and is scored as a 5-point Likert scale, with responses ranging from "Only Rarely" to "Almost Always." There are two subscales within the instrument describing different

approaches to teaching: Conceptual Change/Student-Focused Approach and Information Transmission/Teacher-Focused Approach. The categorization of each of these subscales follows:

Table 3.2. *Approaches to Teaching Subscales*

Subscale	Items
Conceptual change/student-focused approach	3, 5, 6, 8, 9, 14, 15, 16
Information transmission/teacher-focused approach	1, 2, 4, 7, 10, 11, 13, 12

The authors have chosen not to publish norms for this scale, as responses to the scale are relational and specific to the sample. However, the study by Postareff et all (2008) reported an alpha of 0.77 (n=187) and 0.75 (n=78) for the eight conceptual change items, and 0.70 (n=191) and 0.70 (n=76) for the eight information transmission items. These all fall within the range of 0.7 and above, which indicates good reliability (Field, 2009).

This instrument is intended to be used to analyze associations within a specific context, which makes it appropriate for use in the current study that compares teaching approach with teaching efficacy. To address the specific context as is the intent of this instrument, it was administered twice—first, as the participants reflected on lecture-style classes, and second, as the participants reflected on discussion-style classes. This instrument can be found in Appendix D.

Data Analysis

After data collection, data were examined and cleaned by running frequency checks to ensure respondents answered the questionnaires within the appropriate range

and to examine any possible missing data patterns. Responses from the Sources of Teaching Efficacy Questionnaire, Teachers' Sense of Efficacy Scale, and the Approaches to Teaching Inventory were analyzed using regression and hierarchical multiple regression. Three different models based on the research questions were analyzed.

Research Question 1: Averages of Scales

For the first research question, "What do the average levels reported about sources of teaching efficacy, teaching approach, and teaching efficacy show about graduate student teaching?" the means for each item on each scale were computed and analyzed. These means give valuable information about the types of teaching experiences available to graduate students, their teaching approach, and how efficacious they are in their teaching skills.

Research Question 2: Sources of Efficacy

For the second research question, "Do the sources of efficacy described by graduate students account for a significant amount of variance in self-reported teaching efficacy?" the following model was tested using hierarchical multiple regression:

Model 2:

$$\text{Teaching efficacy}_i = a + b_1\text{Classroom Mastery Experiences}_i + b_2\text{Online Mastery Experiences}_i + b_3\text{Vicarious Experiences}_i + b_4\text{Positive Verbal Persuasion}_i + b_5\text{Negative Verbal Persuasion}_i + b_6\text{Positive Affective States}_i + b_7\text{Negative Affective States}_i + b_8\text{Teaching Development}_i + e_i$$

where *a* is the intercept, *b* is the regression coefficients associated with each variable, and *e* is the residual error (Pedhazur, 1997). The first eight predictors were entered into the model in the order indicated above, based on previous self-efficacy research (Bandura, 1977a, 1997). The Teaching Development predictor was entered last, as it is a new predictor for this efficacy model (Field, 2009).

Research Question 3: Teaching Approach

For the third research question, "Does the teaching approach reported by graduate students account for a significant amount of variability in self-reported teaching efficacy?" the following models were tested using forced entry multiple regression:

Model 3a:

$$\text{Teaching efficacy}_i = a + b_1\text{Lecture-style Conceptual Change}_i + b_1\text{Lecture-style Information Transmission}_i + e_i$$

Model 3b:

$$\text{Teaching efficacy}_i = a + b_1\text{Discussion Style Conceptual Change}_i + b_1\text{ Discussion Style Information Transmission}_i + e_i$$

Model 3c:

$$\text{Teaching efficacy}_i = a + b_1\text{Conceptual Change}_i + b_1\text{Information Transmission}_i + e_i$$

where *a* is the intercept, *b* is the regression coefficients associated with each variable, and *e* is the residual error (Pedhazur, 1997). The first model used the data gathered while participants considered lecture-style classes, the second while participants considered discussion-style classes, and the final model combined both sets of results. Because previous research using these two scales does not indicate the causal relationship of the constructs, forced entry multiple regression was used to force all the predictors into the model simultaneously (Field, 2009).

Research Question 4: Combined Model

For the fourth research question, "When combined, do the sources of efficacy and teaching approach account for a significant amount of variability in self-reported teaching efficacy?," the following combined model was tested using hierarchical multiple regression:

Model 4:

$$\text{Teaching efficacy}_i = a + b_1\text{Sources of Efficacy}_i + b_2\text{Teaching Approach}_i + e_i$$

where *a* is the intercept, *b* is the regression coefficients associated with each variable, and *e* is the residual error (Pedhazur, 1997). The sources of efficacy predictors (classroom mastery experiences, online mastery experiences, vicarious experiences, positive verbal persuasion, negative verbal persuasion, positive effective states, negative affective states, and teaching development) were entered into the model first, based on previous self-efficacy research (Bandura, 1977a, 1997). The Teaching Approach predictors

(conceptual change, information transmission) were entered last, as they are new predictors for this efficacy model (Field, 2009).

CHAPTER 4: RESULTS

Description of the Sample

A total of 327 graduate students participated in the study. Of those responding to this item, 66.5% identified as female (147), 33% as male (73), 0.5% as transsexual (1), and 106 chose not identify their sex. Of those responding to this item, domestic students accounted for 93.7% (207) of the sample, international students for 6.3% (14), with 106 that did not identify their status. Students who identified as "Domestic" were asked to report their ethnicity from a list of six ethnicities, and were allowed to choose as many groups as they identified with. Students who identified as American Indian or Alaska Native comprised 2.4% (5) of the group; Asian students, 3.4% (7); Black or African-American students, 2.9% (6); Hispanic or Latino students, 4.8% (10); Native Hawaiian or other Pacific Islander, 1.0% (2), and white, non-Hispanic students were 93.2% (193) of this population. Ten students (4.8%) responded as having two or more ethnic identities. International students were asked to report their country of origin; however, no participants responded to this question.

Participants were asked to report their degree program, year in program, and their discipline. Doctoral students were the most frequent participant at 50.2% (111), followed by Master's students, 47.5% (105), and Education Specialist students, 2.3% (5). The majority of students were in their second (33.6%, 74) or first (28.2%, 62) year; see Table 4.1. Students in the College of Arts and Science (33.5%, 74) and the College of Education (26.7%, 59) were the majority of participants; Table 4.2 provides an itemization of each discipline's contributors. Finally, participants were asked if they

planned to enter to professoriate at some point in their career; 69.5% (153) responded that they were considering that option; 30.5% (67) that they were not, and 107 did not respond to the question.

Table 4.1. *Participants' Progress in Degree Programs*

Year in program	Frequency	Percent
1st	62	28.18
2nd	74	33.64
3rd	35	15.91
4th	23	10.45
5th	16	7.27
6th	4	1.82
7th +	6	2.73
Total	220	
Missing	107	

Table 4.2. *Participants' Discipline Representation*

Discipline	Frequency	Valid percent
College of Arts and Science	74	33.48
College of Education	59	26.70
School of Information Science and Learning Technologies	15	6.79
College of Agriculture, Food, and Natural Resources	11	4.98
College of Engineering	11	4.98

College of Business	10	4.52
School of Health Professions	6	2.71
College of Human Environmental Sciences	5	2.26
School of Journalism	4	1.81
School of Natural Resources	3	1.36
School of Medicine	3	1.36
College of Veterinary Medicine	3	1.36
School of Music	2	0.90
School of Public Affairs	2	0.90
School of Nursing	1	0.45
Other	12	5.43
Total	221	100.00
Missing	106	

Missing Data

Participation was voluntary, and participants were allowed to skip items if they did not wish to provide an answer. They may have skipped items due to lack of time or interest, or were unable or unwilling to respond to some items (Schafer & Olsen, 1998). Multiple imputation is a procedure in which missing data are imputed based on the available information, and is preferred over other treatments, such as listwise deletion or mean imputation, which can lead to a biased statistical inference (Schafer & Olsen, 1998). It is a predictive probability distribution used to handle missing data, and is based

on three assumptions that pertain to the population of the data, the prior distribution, and the nonresponse mechanism (Schafer & Olsen, 1998). Missing data for this data set were analyzed for missing patterns using IBM SPSS Statistics for Windows, Version 21.0. There were 327 cases with some missing data, and incomplete data were analyzed to be at 35.64%, which is considered to be a moderate amount of missing data (Schafer & Olsen, 1998). As recommended, the default noninformative prior was used to impute data (Schafer & Olsen, 1998). The data were examined and the missing information was concluded to be missing at random (MAR) (Schafer & Olsen, 1998). As these three assumptions have been met, multiple imputation is an appropriate method for treating missing data. Multiple imputation replaces missing values with predicted scores from a series of multiple regression equations, with random residual included. This step is repeated with the new covariance matrix from the previous step, until the desired number of imputations is reached (Enders, 2006). Five imputations were performed on this data set, which achieves 94% efficiency with approximately 30% missing information, (Schafer & Olsen, 1998). For results that were not pooled by the statistical software used, a range of values is reported, representing the extent of the five imputations.

Instruments

Original data were used for all analyses. Correlation and covariance matrices are available upon request, should independent researchers wish to replicate these results.

Sources of Teaching Efficacy

The Sources of Teaching Efficacy Questionnaire was developed for use in this study, and was theoretically based on Bandura's (Bandura, 1977a) self-efficacy model. It

assumes that the four efficacy factors proposed by Bandura—enactive mastery experiences, vicarious experiences, verbal persuasion, and affective states—along with a hypothesized fifth factor, teaching development, can explain the variance of the items on this questionnaire.

A confirmatory factor analysis was used to examine structural fidelity using IBM SPSS Amos version 21.0.0. To test the theoretical model, a single-factor model was estimated first, to assess fit of a simple model, and will be compared to the five-factor model fit. Results of the suggested fit indices for the one-factor model are in Table 4.3 (Worthington & Whittaker, 2006). For a model with 629 degrees of freedom (df_M), the chi-square for the model (χ^2_M) should be close to 683.52 for p>.01 (Field, 2009). The root-mean-square residual (RMR) should be less than .10 (Kline, 2011). Goodness-of-fit (GFI) and adjusted goodness-of-fit (AGFI) values should be close to .95, and root-mean-square error of approximation (RMSEA) should be less than .05 (Kline, 2011). Overall, these fit criteria indicate the fit of the one-factor model is poor.

The fit of the hypothesized five-factor model was analyzed next. Results of the suggested fit indices for the five-factor model are in Table 4.3 and in Figure 4.1 (Worthington & Whittaker, 2006). As is indicated by the fit indices below, the five-factor model is a better fit than the one-factor model; however, it is still a poor fit to the model. All fit indices exceed the limit for a good fit, except for the RMR values, which are below .10 (Kline, 2011).

Table 4.3. *Comparison of Fit Indices for Confirmatory Factor Analysis*

Model fit criteria	One-factor model	Five-factor model
χ^2_M	3041.93-3279.26	1939.17-2050.85
df_M	629	619
RMR	.10-.11	.08-.09
GFI	.61-.62	.74-.75
AGFI	.56-.58	.70-.71
RMSEA	.11-.11	.08-.08

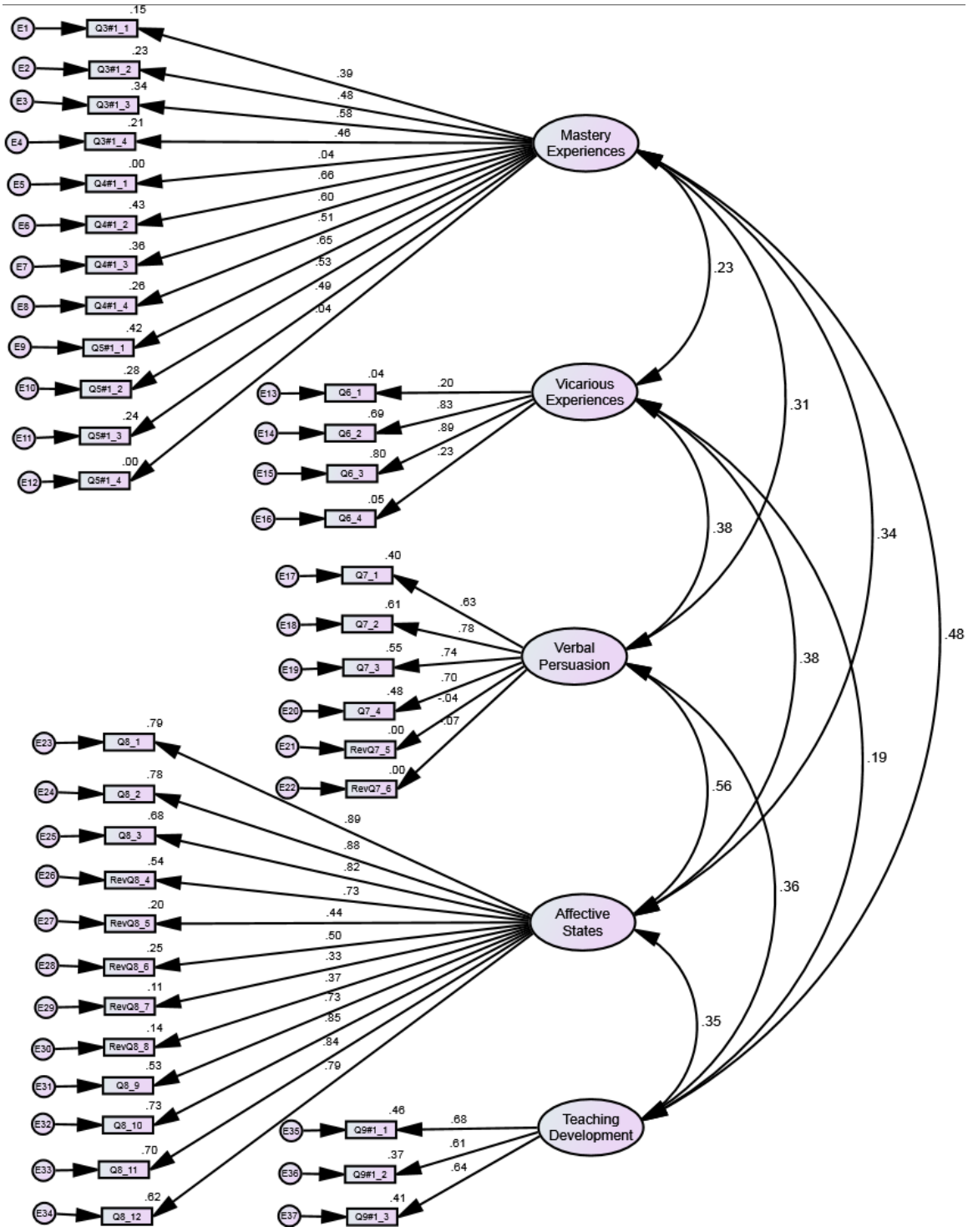

Figure 4.1. Standardized Estimates and Factor Correlations for Confirmatory Factor Analysis, Imputation 2

Table 4.4 shows the highest and lowest correlations between each of the factors for the five imputations. Further analysis of the model shows that the correlations between factors are .85 or below. This indicates good discriminant validity between all other factors (Kline, 2011).

Table 4.4. *Factor Correlations for Sources of Teaching Efficacy*

	Factor	1	2	3	4	5
1	Mastery Experiences	1.00				
2	Vicarious Experiences	.07-.23	1.00			
3	Verbal Persuasion	.18-.31	.33-.38	1.00		
4	Affective States	.26-.36	.37-.39	.54-.60	1.00	
5	Teaching Development	.29-.53	.09-.19	.36-.50	.26-.40	1.00

However, of the 37 indicators in the Sources of Teaching Efficacy Questionnaire, only 16 had standardized regression weights high enough for the factor to explain more that 50% of the variance in the indicator (Table 4.5). The low values of the standardized loadings suggest a lack of convergent validity (Kline, 2011). This lack of convergent validity, along with the good discriminant validity demonstrated by the low factor correlations, indicate that the model may have too few factors (Kline, 2011).

Table 4.5. *Maximum Likelihood Estimates for a Five-Factor Model of the Sources of Teaching Efficacy Questionnaire*

Parameter	Unstandardized		*SE*		Standardized		R^2_{smc}	
	Factor loadings							
	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi
Mastery Experiences								
Q3#1_1	1.00	1.00	---	---	0.30	0.45	9%	20%
Q3#1_2	0.74	1.24	0.17	0.29	0.24	0.48	6%	23%
Q3#1_3	0.46	1.32	0.14	0.29	0.21	0.58	4%	34%
Q3#1_4	0.87	1.33	0.19	0.30	0.25	0.52	6%	27%
Q4#1_1	0.06	0.16	0.07	0.11	-0.03	0.10	0%	1%
Q4#1_2	0.89	1.50	0.17	0.25	0.36	0.66	13%	43%
Q4#1_3	0.31	1.20	0.12	0.27	0.16	0.60	2%	36%
Q4#1_4	1.15	1.56	0.18	0.32	0.37	0.55	14%	30%
Q5#1_1	0.77	1.80	0.12	0.34	0.53	0.84	28%	71%
Q5#1_2	0.68	1.63	0.11	0.28	0.53	0.89	28%	79%
Q5#1_3	0.45	1.01	0.07	0.20	0.49	0.84	24%	71%
Q5#1_4	0.05	0.08	0.03	0.3	0.03	0.04	0%	0%
Vicarious Experiences								
Q6_1	1.00	1.00	---	---	0.18	0.20	3%	4%
Q6_2	4.56	5.18	1.34	1.71	0.82	0.84	68%	70%

Q6_3	4.08	4.65	1.20	1.54	0.89	0.91	80%	83%
Q6_4	0.89	1.17	0.36	0.46	0.20	0.26	4%	7%
Verbal Persuasion								
Q7_1	1.00	1.00	---	---	0.62	0.65	38%	42%
Q7_2	1.05	1.11	0.10	0.10	0.78	0.80	61%	64%
Q7_3	0.87	0.93	0.08	0.09	0.73	0.75	54%	57%
Q7_4	0.94	0.99	0.09	0.10	0.68	0.70	46%	48%
RevQ7_5	0.00	-0.07	0.00	-0.05	0.00	-0.05	0%	0%
RevQ7_6	-0.06	-0.11	-0.04	-0.07	-0.04	-0.07	0%	0%
Affective States								
Q8_1	1.00	1.00	---	---	0.88	0.89	77%	79%
Q8_2	1.09	1.14	0.05	0.05	0.88	0.89	77%	78%
Q8_3	1.02	1.05	0.05	0.05	0.81	0.84	66%	70%
RevQ8_4	0.84	0.91	0.05	0.05	0.73	0.76	53%	58%
RevQ8_5	0.54	0.62	0.07	0.07	0.42	0.45	17%	20%
RevQ8_6	0.69	0.71	0.07	0.08	0.48	0.51	23%	26%
RevQ8_7	0.44	0.46	0.07	0.08	0.32	0.33	10%	11%
RevQ8_8	0.49	0.55	0.07	0.07	0.37	0.40	14%	16%
Q8_9	0.80	0.83	0.05	0.05	0.70	0.74	49%	55%
Q8_10	0.99	1.02	0.05	0.05	0.84	0.85	71%	73%

Q8_11	0.92	0.94	0.05	0.05	0.82	0.84	67%	70%
Q8_12	0.91	0.94	0.05	0.05	0.78	0.80	61%	64%
Teaching Development								
Q9#1_1	1.00	1.00	---	---	0.54	0.76	29%	57%
Q9#1_2	0.69	1.23	0.10	0.19	0.54	0.67	29%	44%
Q9#1_3	0.80	1.26	0.11	0.20	0.51	0.64	26%	41%

As this hypothesized model was a poor fit, an exploratory factor analysis was performed in IBM SPSS Statistics for Windows, Version 21.0 to gain a better understanding of this data set's factor structure. A principal component analysis (PCA) extraction method was used on the 37 items with orthogonal rotation (varimax with Kaiser Normalization). The Kaiser-Meyer-Olkin measure of sampling adequacy reported values of .83-.84 for each of the five imputations, which is considered good, and well above the limit of .5 (Field, 2009). Bartlett's test of sphericity reported χ^2 (666) = 5650.20-5962.55, p<.001, indicating that correlations between items were sufficiently large enough for PCA. Initial analysis showed that there were between 11-12 factors with eigenvalues over Kaiser's criterion of 1 for each of the imputations, and explained 68.72-71.79% of the variance. The ninth through the twelfth factors for each imputation had only 1-2 questions load on each of these factors, and accounted for 10.60-15.19% of the variance. Considering this, and after examination of the content of questions that load onto the same factor, it was determined to retain eight of the factors suggested by the

PCA, as well as delete three questions that repeatedly did not load on any factor (Q4#1_1, Q5#1_4, and Q6_4). These eight factors explain 56.61-58.32% of the variance. The final factor structure and each factor's representation is below, Table 4.6.

Table 4.6. *Summary of Exploratory Factor Analysis Results for Sources of Teaching Efficacy Questionnaire*

Mastery Experiences, Classroom (7 items)	
Q3#1_1	Lecture Experience, Grader
Q3#1_2	Lecture Experience, Discussion Leader
Q3#1_3	Lecture Experience, Co-instructor
Q3#1_4	Lecture Experience, Instructor
Q4#1_2	Discussion Experience, Discussion Leader
Q4#1_3	Discussion Experience, Co-instructor
Q4#1_4	Discussion Experience, Instructor
Master Experiences, Online (3 items)	
Q5#1_1	Online Experience, Grader
Q5#1_2	Online Experience, Discussion Leader
Q5#1_3	Online Experience, Co-instructor
Vicarious Experiences (3 items)	
Q6_1	I have had professors/instructors who make me want to be like them.
Q6_2	I know I can teach better than some of the professors/instructors I've had.
Q6_3	I know I can teach at least as well as some of the professors/instructors I've had.

Verbal Persuasion, Positive (4 items)	
Q7_1	My advisor or other professors have mentored me about teaching.
Q7_2	Professors have told me that I am a good teacher.
Q7_3	Students have told me that I am a good teacher.
Q7_4	My peers and professors have encouraged me to teach.
Verbal Persuasion, Negative (2 items)	
RevQ7_5	Professors have told me that teaching is not an important part of their job.
RevQ7_6	I have been told negative things about teaching.
Positive Affective States (7 items)	
Q8_1	I enjoy teaching.
Q8_2	I look forward to teaching.
Q8_3	Teaching typically puts me in a better mood.
Q8_9	Teaching energizes me.
Q8_10	I feel excited when I think about teaching.
Q8_11	Teaching satisfies me.
Q8_12	I feel inspired when I teach.
Negative Affective States (5 items)	
RevQ8_4	I dread teaching.
RevQ8_5	Teaching drains me.
RevQ8_6	I feel stressed when I think about teaching.
RevQ8_7	My heart pounds when I teach
RevQ8_8	Teaching makes me feel tired.

Teaching Development (3 items)	
Q9#1_1	I have taken a class/classes that met regularly to discuss college teaching.
Q9#1_2	I have attended a multi-day seminar or conference about college teaching.
Q9#1_3	I have attended a workshop or session about college teaching.

(N=327, 5 imputations)

Each of the eight subscales of the Sources of Efficacy Questionnaire was analyzed for reliability. Reliability analysis was performed using IBM SPSS Statistics for Windows, Version 21.0, and Cronbach's alpha and alpha if item deleted were examined for each imputation on each subscale.

The Classroom Mastery Experiences subscale has Cronbach's alpha levels between .68-.76 for the five imputations (see Table 4.7). For two of the imputations, Cronbach's alpha is lower than the .7 that Kline (2011) recommends for adequate reliability; however, Field (2009) notes that while a cutoff of .7 is appropriate for cognitive tests such as intelligence tests, for psychological constructs, values below .7 can be expected due to the diversity of constructs being measured. As this measure is assessing the psychological construct of mastery experiences, the reliability of this subscale will be considered adequate, but it is noted that inferences made should be treated with caution. Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there were no items that, if deleted, would increase the reliability coefficient; thus, all items for this subscale were included for analysis.

Table 4.7. *Reliability for Classroom Mastery Experiences Subscale*

Item #	Classroom mastery experiences (7 items) Cronbach's alpha: .68-.76	Alpha if item deleted
Q3#1_1	Lecture Experience, Grader	.61-.75
Q3#1_2	Lecture Experience, Discussion Leader	.62-.74
Q3#1_3	Lecture Experience, Co-instructor	.66-.74
Q3#1_4	Lecture Experience, Instructor	.64-.74
Q4#1_2	Discussion Experience, Discussion Leader	.65-.72
Q4#1_3	Discussion Experience, Co-instructor	.66-.74
Q4#1_4	Discussion Experience, Instructor	.64-.73

The Online Mastery Experiences subscale has Cronbach's alpha levels between .75-.86 for the five imputations, which is considered "good" (Kline, 2011) (see Table 4.8). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there were no items that, if deleted, would increase the reliability coefficient; thus, all items for this subscale were included for analysis.

Table 4.8. *Reliability for Online Mastery Experiences Subscale*

Item #	Online mastery experiences (3 items) Cronbach's alpha: .75-.86	Alpha if item deleted
Q5#1_1	Online Experience, Grader	.71-.81
Q5#1_2	Online Experience, Discussion Leader	.64-.76
Q5#1_3	Online Experience, Co-instructor	.68-.85

The Vicarious Experiences subscale has Cronbach's alpha levels between .85-.85 for the five imputations which is considered very good (Kline, 2011) (see table 4.9). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there was one item that, if deleted, would increase the reliability coefficient. If item Q6_1 was deleted, it would increase Cronbach's alpha from .60 to .85, .61 to .85, .60 to .85, .61 to .85, and .60 to .85 on its respective imputations. As this occurred on all five imputations and the difference in reliability coefficients was considerable, item Q6_1 was deleted from further analysis.

Table 4.9. *Reliability for Vicarious Experiences Subscale*

Item #	Vicarious experiences (2 items) Cronbach's alpha: .85-.85	Alpha if item deleted
Q6_2	I know I can teach better than some of the professors/instructors I've had.	n/a
Q6_3	I know I can teach at least as well as some of the professors/instructors I've had.	n/a

The Positive Verbal Persuasion subscale has Cronbach's alpha levels between .79-.80 for the five imputations, which is considered "very good" (Kline, 2011) (see Table 4.10). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there were no items that, if deleted, would increase the reliability coefficient; thus, all items for this subscale were included for analysis.

Table 4.10. *Reliability for Positive Verbal Persuasion Subscale*

Item #	Positive verbal persuasion (4 items) Cronbach's alpha: .79-.80	Alpha if item deleted
Q7_1	My advisor or other professors have mentored me about teaching.	.77-.78
Q7_2	Professors have told me that I am a good teacher.	.70-.71
Q7_3	Students have told me that I am a good teacher.	.75-.76
Q7_4	My peers and professors have encouraged me to teach.	.74-.76

The Negative Verbal Persuasion subscale has Cronbach's alpha levels between .61-.64 for the five imputations, and is lower than the .7 that Kline (2011) recommends on three imputations (see Table 4.11). However, the experiences of verbal persuasion for a person can be considered a psychological construct, so values below .7 can be expected (Field, 2009); thus, this scale's reliability will be considered adequate.

Table 4.11. *Reliability for Negative Verbal Persuasion Subscale*

Item #	Negative verbal persuasion (2 items) Cronbach's alpha: .61-.64	Alpha if item deleted
RevQ7_5	Professors have told me that teaching is not an important part of their job.	n/a
RevQ7_6	I have been told negative things about teaching.	n/a

The Positive Affective States subscale has Cronbach's alpha levels between .94-.94 for the five imputations, which is considered excellent (Kline, 2011) (see Table 4.12). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there were no items that, if deleted, would increase the reliability coefficient; thus, all items for this subscale were included for analysis.

Table 4.12. *Reliability for Positive Affective States Subscale*

Item #	Positive affective states (7 items) Cronbach's alpha: .94-.94	Alpha if item deleted
Q8_1	I enjoy teaching.	.92-.93
Q8_2	I look forward to teaching.	.92-.93
Q8_3	Teaching typically puts me in a better mood.	.93-.93
Q8_9	Teaching energizes me.	.93-.94
Q8_10	I feel excited when I think about teaching.	.92-.93
Q8_11	Teaching satisfies me.	.92-.93
Q8_12	I feel inspired when I teach.	.93-.93

The Negative Affective States subscale has Cronbach's alpha levels between .76-.78 for the five imputations which is considered adequate (Kline, 2011) (see Table 4.13). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there was one item that, if deleted, would increase the reliability coefficient. If item RevQ8_7 was deleted, it would increase Cronbach's alpha from .76 to .77, 75 to

.76, .77 to .78, and .76 to .77 on its respective imputations. As this occurred on all five imputations, item RevQ8_7 was deleted from further analysis.

Table 4.13. *Reliability for Negative Affective States Subscale*

Item #	Negative affective states (4 items) Cronbach's alpha: .76-.78	Alpha if item deleted
RevQ8_4	I dread teaching.	.70-.74
RevQ8_5	Teaching drains me.	.70-.72
RevQ8_6	I feel stressed when I think about teaching.	.69-.72
RevQ8_8	Teaching makes me feel tired.	.71-.74

The Teaching Development subscale has Cronbach's alpha levels between .62-.68 for the five imputations (see Table 4.14). Cronbach's alpha is lower than the .7 that Kline (2011) recommends for adequate reliability; however, increasing teaching development can be considered a psychological construct, so values below .7 can be expected (Field, 2009); thus, this scale's reliability will be considered adequate. Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there were no items that, if deleted, would increase the reliability coefficient; thus, all items for this subscale were included for analysis.

Table 4.14. *Reliability for Teaching Development Subscale*

Item #	Teaching development (3 items) Cronbach's alpha: .62-.68	Alpha if item deleted
Q9#1_1	I have taken a class/classes that met regularly to discuss college teaching.	.53-.62
Q9#1_2	I have attended a multi-day seminar or conference about college teaching.	.46-.58
Q9#1_3	I have attended a workshop or session about college teaching.	.51-.59

Teachers' Sense of Efficacy Scale

Each of the three subscales of the Teachers' Sense of Efficacy Scale (Tschannen-Moran & Hoy, 2001) was analyzed to confirm reliability with the current sample and due to the adjustment and deletion of some items on the original scale. The original scale was intended for K-12 teachers, so to make it appropriate for those instructing college students, references to "children" were changed to "students," "school work" was changed to "class work," and six items from the original scale were deleted as they did not pertain to instructing college students. Reliability analysis was performed using IBM SPSS Statistics for Windows, Version 21.0, and Cronbach's alpha for the entire scale ranged from .91 to .92 for all imputations. Cronbach's alpha and alpha if item deleted were examined for each imputation on each subscale, and are reported in Table 4.6.

The Efficacy in Student Engagement subscale has Cronbach's alpha levels between .84-.85 for the five imputations, which is considered "good" (Kline, 2011) (see Table 4.15). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there were no items that, if deleted, would increase the reliability coefficient; thus, all items for this subscale were included for analysis.

Table 4.15. *Reliability for Efficacy in Student Engagement Subscale*

Item #	Efficacy in student engagement (7 items) Cronbach's alpha: .84-.85	Alpha if item deleted
1	How much can you do to get through to the most difficult students?	.82-.83
2	How much can you do to help your students think critically?	.82-.84
4	How much can you do to motivate students who show low interest in class work?	.81-.84
6	How much can you do to get students to believe they can do well in class work	.81-.83
8	How much can you do to help your students value learning?	.81-.83
11	How much can you do to foster student creativity?	.81-.83
12	How much can you do to improve the understanding of a student who is failing?	.81-.83

The Efficacy in Instruction Strategies subscale has Cronbach's alpha levels between .85-.88 for the five imputations, which again is considered good (Kline, 2011) (see Table 4.16). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there was only one item on one imputation that, if deleted, would increase the reliability coefficient. On one imputation, if item 7 was deleted, it would increase Cronbach's alpha by .002. As this was a single occurrence, and the improvement is very small this item was retained.

Table 4.16. *Reliability for Efficacy in Instruction Strategies Subscale*

Item #	Efficacy in instruction strategies (8 items) Cronbach's alpha: .85-.88	Alpha if item deleted
7	How well can you respond to difficult questions from your students?	.83-.87
9	How much can you gauge student comprehension of what you have taught?	.83-.87
10	To what extent can you craft good questions for your students?	.82-.86
13	How much can you do to adjust your lessons to the proper level for individual students?	.83-.86
14	How much can you use a variety of assessment strategies?	.83-.86
15	To what extent can you provide an alternative explanation or example when students are confused?	.83-.87

17	How well can you implement alternative strategies in your classroom?	.83-.86
18	How well can you provide appropriate challenges for very capable students?	.82-.86

The Efficacy in Classroom Management subscale has Cronbach's alpha levels between .63-.65 for the five imputations (see Table 4.17). This is lower than the .7 that Kline (2011) recommends for adequate reliability; however, Field (2009) notes that while a cutoff of .7 is appropriate for cognitive tests such as intelligence tests, for psychological constructs, values below .7 can be expected due to the diversity of constructs being measured. As this measure is assessing the psychological construct of efficacy, the reliability of this subscale will be considered adequate, but it is noted that inferences made should be treated with caution. Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there were no items that, if deleted, would increase the reliability coefficient; thus, all items for this subscale were included for analysis.

Table 4.17. *Reliability for Efficacy in Classroom Management Subscale*

Item #	Efficacy in classroom management (3 items) Cronbach's alpha: .63-.65	Alpha if item deleted
3	How much can you do to control disruptive behavior in the classroom?	.40-.50
5	To what extent can you make your expectations clear about student behavior?	.57-.64
16	How well can you respond to defiant students?	.54-.59

Approaches to Teaching Inventory

The Approaches to Teaching Inventory (Prosser & Trigwell, 1999) is intended for use within a specific context, so it was administered twice: first, it asked participants to consider their approach to teaching in lecture-style classes, and second, to consider their approach to teaching in discussion-style classes. Two subscales, conceptual change/student-focused and information transmission/teacher-focused, were analyzed for reliability with the current sample using IBM SPSS Statistics for Windows, Version 21.0. Cronbach's alpha for the entire lecture-style class scale ranged from .56-.63, and were .62-.73 for the entire discussion-style class, which is expected as this instrument measures whether participants are more likely to be either student-focused or instructor-focused. Cronbach's alpha and alpha if item deleted were examined for each imputation on each subscale.

The Lecture Conceptual Change/Student-Focused subscale has Cronbach's alpha levels between .68-.73 for the five imputations, and is lower than the .7 that Kline (2011) recommends on three imputations (see Table 4.18). However, a person's approach to teaching can be considered a psychological construct, so values below .7 can be expected (Field, 2009); thus, this scale's reliability will be considered adequate. Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there were no items that, if deleted, would increase the reliability coefficient; thus, all items for this subscale were included for analysis.

Table 4.18. *Reliability for Lecture Conceptual Change/Student-Focused Subscale*

Item #	Lecture conceptual change/student-focused (8 items) Cronbach's alpha: .68-.73	Alpha if item deleted
3	In my class/tutorial for this subject I try to develop a conversation with students about the topics we are studying.	.63-.70
5	I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject.	.67-.69
6	We take time out in classes so that the students can discuss, among themselves, the difficulties that they encounter studying this subject.	.63-.70

8	I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	.65-.70
9	In lectures for this subject, I use difficult or undefined examples to provoke debate	.65-.73
14	Formal teaching time is made available in this subject for students to discuss their changing understanding of the subject.	.65-.69
15	I feel that it is better for students in this subject to generate their own notes rather than always copy mine.	.67-.71
16	I feel a lot of teaching time in this subject should be used to question students' ideas.	.64-.70

The Lecture Information Transmission/Teacher-Focused subscale has Cronbach's alpha levels between .66-.75 for the five imputations, and is lower than the .7 cutoff on two imputations (see Table 4.19). Again, this scale's reliability will be considered adequate (Field, 2009). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there was only one item on two imputations that, if deleted, would increase the reliability coefficient. If item 1 was deleted, it would increase Cronbach's alpha by .001-.002 on its respective imputations. As this only occurred on two imputations, and the improvement is very small, this item was retained.

Table 4.19. *Reliability for Lecture Information Transmission/Teacher-Focused Subscale*

Item #	Lecture information transmission/teacher-focused (8 items) Cronbach's alpha: .66-.75	Alpha if item deleted
1	I design my teaching in this subject with the assumption that most of the students have very little useful knowledge of the topics to be covered.	.64-.72
2	I feel it is important that this subject should be completely described in terms of specific objectives relating to what students have to know for formal assessment items.	.65-.75
4	I feel it is important to present a lot of facts in classes so that students know what they have to learn for this subject.	.61-.72
7	In this subject I concentrate in covering the information that might be available from a good textbook.	.64-.72
10	I structure this subject to help students to pass the formal assessment items.	.58-.68
11	I think an important reason for giving lectures in this subject is to give students a good set of notes.	.62-.71
12	When I give this subject, I only provide the students with the information they will need to pass the formal assessments.	.64-.73
13	I feel that I should know the answers to any questions that students may put to me during this subject.	.64-.73

The Discussion Conceptual Change/Student-Focused subscale has Cronbach's alpha levels between .72-.78 for the five imputations, which is considered good (Kline, 2011) (see Table 4.20). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there was only one item on one imputation that, if deleted, would increase the reliability coefficient. On one imputation, if item 3 was deleted, it would increase Cronbach's alpha from .80 to .81. As this was a single occurrence, and the improvement is small (.007), this item was retained.

Table 4.20. *Reliability for Discussion Conceptual Change/Student-Focused Subscale*

Item #	Discussion conceptual change/student-focused (8 items) Cronbach's alpha: .77-.82	Alpha if item deleted
3	In my class/tutorial for this subject I try to develop a conversation with students about the topics we are studying.	.76-.81
5	I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject.	.75-.80
6	We take time out in classes so that the students can discuss, among themselves, the difficulties that they encounter studying this subject.	.75-.81
8	I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	.74-.79

9	In lectures for this subject, I use difficult or undefined examples to provoke debate	.76-.81
14	Formal teaching time is made available in this subject for students to discuss their changing understanding of the subject.	.73-.79
15	I feel that it is better for students in this subject to generate their own notes rather than always copy mine.	.76-.81
16	I feel a lot of teaching time in this subject should be used to question students' ideas.	.72-.77

The Discussion Information Transmission/Teacher-Focused subscale has Cronbach's alpha levels between .77-.82 for the five imputations which is considered good (Kline, 2011) (see Table 4.21). Examination of Cronbach's alpha if item deleted for each item on each imputation showed that there were two items that, if deleted, would increase the reliability coefficient. If item 1 was deleted, it would increase Cronbach's alpha from .75 to .76, .74 to .76, and .78 to .79 on its respective imputations. If item 13 was deleted, it would increase Cronbach's alpha from .75 to .76, .75 to .76, .74 to .77, and .78 to.79. As this occurred on more 3 imputations for item 1 and 4 imputations for item 13, items 1 and 13 were removed from further analysis.

Table 4.21. *Reliability for Discussion Information Transmission/Teacher-Focused Subscale*

Item #	Discussion information transmission/teacher-focused (8 items) Cronbach's alpha: .70-81	Alpha if item deleted
2	I feel it is important that this subject should be completely described in terms of specific objectives relating to what students have to know for formal assessment items.	.70-.78
4	I feel it is important to present a lot of facts in classes so that students know what they have to learn for this subject.	.67-.80
7	In this subject I concentrate in covering the information that might be available from a good textbook.	.67-.77
10	I structure this subject to help students to pass the formal assessment items.	.63-.77
11	I think an important reason for giving lectures in this subject is to give students a good set of notes.	.63-.74
12	When I give this subject, I only provide the students with the information they will need to pass the formal assessments.	.67-.80

Research Question 1: Averages of Scales

Means for the Sources of Teaching Efficacy Questionnaire, Teachers' Sense of Efficacy Scale, and Approaches to Teaching Inventory were computed using IBM SPSS Statistics for Windows, Version 21.0 to analyze the first research question, "What do the average levels reported about sources of teaching efficacy, teaching approach, and teaching efficacy show about graduate student teaching?"

Sources of Teaching Efficacy. Pooled means from all imputations for each item retained in the Sources of Teaching Efficacy are below, in Table 4.22 For Mastery Experiences items, values indicate number of semesters, with 1 = low (1 semester), 2 = mid (2-3 semesters), and 3 = high (4 or more semesters), and participants who indicated "0" or did not respond to the item were not included in the means. Teaching Development items are scored similarly and the questions determines whether the duration was a semester, day, or session. All other items are scored on a Likert scale, with 1 = strongly disagree to 5 = strongly agree. Items in Negative Verbal Persuasion and Negative Affective States have been reverse coded.

Table 4.22. *Subscale Means of the Sources of Teaching Efficacy Questionnaire*

Factor/Items		n	*M*
Classroom Mastery Experiences			
Q3#1_1	Lecture Experience, Grader	164	2.08
Q3#1_2	Lecture Experience, Discussion Leader	166	2.03
Q3#1_3	Lecture Experience, Co-instructor	104	1.63
Q3#1_4	Lecture Experience, Instructor	128	2.31

Q4#1_2	Discussion Experience, Discussion Leader	114	1.79
Q4#1_3	Discussion Experience, Co-instructor	95	1.64
Q4#1_4	Discussion Experience, Instructor	104	2.19
		Subscale Mean	1.98
Online Mastery Experiences			
Q5#1_1	Online Experience, Grader	86	1.66
Q5#1_2	Online Experience, Discussion Leader	66	1.42
Q5#1_3	Online Experience, Co-instructor	49	1.15
		Subscale Mean	1.46
Vicarious Experiences			
Q6_2	I know I can teach better than some of the professors/instructors I've had.	327	4.01
Q6_3	I know I can teach at least as well as some of the professors/instructors I've had.	327	4.23
		Subscale Mean	4.12
Positive Verbal Persuasion			
Q7_1	My advisor or other professors have mentored me about teaching.	327	3.27
Q7_2	Professors have told me that I am a good teacher.	327	3.51
Q7_3	Students have told me that I am a good teacher.	327	3.93
Q7_4	My peers and professors have encouraged me to teach.	327	3.78
		Subscale Mean	3.62

Negative Verbal Persuasion			
RevQ7_5	Professors have told me that teaching is not an important part of their job.	327	3.65
RevQ7_6	I have been told negative things about teaching.	327	2.93
		Subscale Mean	3.29
Positive Affective States			
Q8_1	I enjoy teaching.	327	4.07
Q8_2	I look forward to teaching.	327	3.90
Q8_3	Teaching typically puts me in a better mood.	327	3.67
Q8_9	Teaching energizes me.	327	3.48
Q8_10	I feel excited when I think about teaching.	327	3.65
Q8_11	Teaching satisfies me.	327	3.85
Q8_12	I feel inspired when I teach.	327	3.81
		Subscale Mean	3.78
Negative Affective States			
RevQ8_4	I dread teaching.	327	3.84
RevQ8_5	Teaching drains me.	327	3.16
RevQ8_6	I feel stressed when I think about teaching.	327	3.32
RevQ8_8	Teaching makes me feel tired.	327	3.21
		Subscale Mean	3.38
Teaching Development			

Q9#1_1	I have taken a class/classes that met regularly to discuss college teaching.	140	1.83
Q9#1_2	I have attended a multi-day seminar or conference about college teaching.	104	2.01
Q9#1_3	I have attended a workshop or session about college teaching.	150	1.97
		Subscale Mean	1.93

Teachers' Sense of Efficacy. Pooled means from all imputations for each item in the Teachers' Sense of Efficacy Scale are below, in Table 4.23. All items are scored on a Likert scale, with 1 = nothing, 5 = some influence, and 9 = a great deal.

Table 4.23. *Subscale Means of the Teachers' Sense of Efficacy Scale*

Factor/Items		*M*
Efficacy in Student Engagement		
Q10_1	How much can you do to get through to the most difficult students?	5.60
Q10_2	How much can you do to help your students think critically?	6.70
Q10_4	How much can you do to motivate students who show low interest in class work?	5.73
Q10_6	How much can you do to get students to believe they can do well in class work	6.94
Q10_8	How much can you do to help your students value learning?	6.30
Q10_11	How much can you do to foster student creativity?	6.40

Q10_12	How much can you do to improve the understanding of a student who is failing?	6.20
	Subscale Mean	6.27

Efficacy in Instruction Strategies

Q10_7	How well can you respond to difficult questions from your students?	6.84
Q10_9	How much can you gauge student comprehension of what you have taught?	6.75
Q10_10	To what extent can you craft good questions for your students?	6.90
Q10_13	How much can you do to adjust your lessons to the proper level for individual students?	6.09
Q10_14	How much can you use a variety of assessment strategies?	6.44
Q10_15	To what extent can you provide an alternative explanation or example when students are confused?	7.21
Q10_17	How well can you implement alternative strategies in your classroom?	6.41
Q10_18	How well can you provide appropriate challenges for very capable students?	6.62
	Subscale Mean	6.66

Efficacy in Classroom Management

Q10_3	How much can you do to control disruptive behavior in the classroom?	6.65
Q10_5	To what extent can you make your expectations clear about student behavior?	7.62
Q10_16	How well can you respond to defiant students?	5.99

	Subscale Mean	6.75

(N=327)

Approaches to Teaching. Pooled means from all imputations for each item retained in the approaches to teaching inventory are below, in Table 4.24. All items are scored on a Likert scale, with 1 = only rarely true to 5 = almost always true.

Table 4.24. *Subscale Means of the Approaches to Teaching Inventory*

	Factor/Items	*M*
	Conceptual Change/Student-Focused (Lecture)	
Q11_3	In my class/tutorial for this subject I try to develop a conversation with students about the topics we are studying.	3.88
Q11_5	I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject.	3.62
Q11_6	We take time out in classes so that the students can discuss, among themselves, the difficulties that they encounter studying this subject.	3.08
Q11_8	I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	3.67
Q11_9	In lectures for this subject, I use difficult or undefined examples to provoke debate	2.72
Q11_14	Formal teaching time is made available in this subject for students to discuss their changing understanding of the subject.	3.25
Q11_15	I feel that it is better for students in this subject to generate their own notes rather than always copy mine.	3.64

Q11_16	I feel a lot of teaching time in this subject should be used to question students' ideas.	3.00
	Subscale Mean	3.36

Information Transmission/Instructor-Focused (Lecture)

Q11_1	I design my teaching in this subject with the assumption that most of the students have very little useful knowledge of the topics to be covered.	3.26
Q11_2	I feel it is important that this subject should be completely described in terms of specific objectives relating to what students have to know for formal assessment items.	3.39
Q11_4	I feel it is important to present a lot of facts in classes so that students know what they have to learn for this subject.	3.24
Q11_7	In this subject I concentrate in covering the information that might be available from a good textbook.	3.21
Q11_10	I structure this subject to help students to pass the formal assessment items.	3.16
Q11_11	I think an important reason for giving lectures in this subject is to give students a good set of notes.	2.95
Q11_12	When I give this subject, I only provide the students with the information they will need to pass the formal assessments.	2.09
Q11_13	I feel that I should know the answers to any questions that students may put to me during this subject.	3.31
	Subscale Mean	3.07

Conceptual Change/Student-Focused (Discussion)		
Q12_3	In my class/tutorial for this subject I try to develop a conversation with students about the topics we are studying.	4.17
Q12_5	I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject.	3.77
Q12_6	We take time out in classes so that the students can discuss, among themselves, the difficulties that they encounter studying this subject.	3.77
Q12_8	I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	3.95
Q12_9	In lectures for this subject, I use difficult or undefined examples to provoke debate	3.33
Q12_14	Formal teaching time is made available in this subject for students to discuss their changing understanding of the subject.	3.79
Q12_15	I feel that it is better for students in this subject to generate their own notes rather than always copy mine.	3.90
Q12_16	I feel a lot of teaching time in this subject should be used to question students' ideas.	3.69
	Subscale Mean	3.80
Information Transmission/Instructor-Focused (Discussion)		
Q12_2	I feel it is important that this subject should be completely described in terms of specific objectives relating to what students have to know for formal assessment items.	2.99

Q12_4	I feel it is important to present a lot of facts in classes so that students know what they have to learn for this subject.	2.81
Q12_7	In this subject I concentrate in covering the information that might be available from a good textbook.	2.71
Q12_10	I structure this subject to help students to pass the formal assessment items.	2.73
Q12_11	I think an important reason for giving lectures in this subject is to give students a good set of notes.	2.48
Q12_12	When I give this subject, I only provide the students with the information they will need to pass the formal assessments.	2.15
	Subscale Mean	2.65

(N=327)

Regression Models

Research Question 2: Sources of Efficacy

A hierarchical multiple regression analysis was performed using IBM SPSS Statistics for Windows, Version 21.0 to analyze the second research question, "Do the sources of efficacy described by graduate students account for a significant amount of variability in self-reported teaching efficacy?" The model tested for this question, based on the results of the exploratory factor analysis, reported above, is:

Model 2:

$$\text{Teaching efficacy}_i = a + b_1\text{Classroom Mastery Experiences}_i + b_2\text{Online Mastery Expereinces}_i + b_3\text{Vicarious Experiences}_i + b_4\text{Positive Verbal Persuasion}_i + b_5\text{Negative Verbal Persuasion}_i + b_6\text{Positive Affective States}_i + b_7\text{Negative Affective States}_i + b_8\text{Teaching Development}_i + e_i$$

where a is the intercept, b is the regression coefficients associated with each variable, and e is the residual error (Pedhazur, 1997). The first seven predictors were entered into the model in the order indicated above, based on previous self-efficacy research (Bandura, 1977a, 1997). The Teaching Development predictor was entered last, as it is a new predictor for this efficacy model (Field, 2009).

As is shown in Table 4.25, *F*-values more than 1 indicate that the regression model is a better predictor of the level of Teaching Self-Efficacy than the null hypothesis, using the mean as a predictor. Except for lowest imputation value of *F* in step 1, all other *F*-values indicate that the regression model is significantly better than the null hypothesis. Steps 3-8 are highly significant, indicating that these models explain significantly more of the variance than the models in step 1 and step 2.

The R^2 values in Table 4.25 show the amount of variance in the Teaching Efficacy outcome that is explained by each predictor as it is added to the model (Field, 2009; Pedhazur, 1997). The change is R^2 shows if the variance explained is significantly different than the previous model. For model 2, step 3, step 4, and step 6 explain significantly more of the variance in the outcome than the preceding steps on all imputations. This indicates that the predictors added in steps 7 and 8, Negative Affective

States and Teaching Development, do not contribute significantly to the overall variance explained by the model.

Table 4.25. *Model 2 Summary*

	F		*df*	R^2		R^2 Change	
	Lo	Hi		Lo	Hi	Lo	Hi
Step 1	2.84	9.17**	1, 325	.01	.03	.01	.03**
Step 2	3.26*	8.04***	2, 324	.02	.05	.00	.02**
Step 3	9.28***	12.19***	3, 323	.08	.10	.05***	.06***
Step 4	19.21***	22.90***	4, 322	.19	.22	.09***	.14***
Step 5	16.49***	19.94***	5, 321	.20	.24	.01	.02**
Step 6	22.96***	28.78***	6, 320	.30	.35	.07***	.12***
Step 7	19.73***	24.69***	7, 319	.30	.35	.00	.00
Step 8	17.61***	21.66***	8, 318	.31	.35	.00	.01

*p<.05 **p<.01 ***p<.001

Beta values and their significance for each step in model 2 are reported in Table 4.26. As this was a hierarchical multiple regression, the final step results are examined. Results of the regression indicate that the predictors in step 8 explain 31-35% of the variance in the outcome, Teaching Efficacy. Beta values that significantly predicted Teaching Efficacy for all imputations for this step are Positive Verbal Persuasion and Positive Affective States. This predicts a .17-.27 standard deviation change in Teaching Efficacy for one standard deviation change in Positive Verbal Persuasion, and a .29-.39

standard deviation change in Teaching Efficacy for one standard deviation change in Positive Affective States.

Table 4.26. *Summary of Hierarchical Multiple Regression Analysis for Model 2*

Variable	*B*	*SE B*	β		*t*
			Lo	Hi	
Step 1					
Constant	114.60	1.77			64.75***
Classroom Mastery Experiences	0.53	0.26	.09	.17	2.01
Step 2					
Constant	114.48	1.74			65.68***
Classroom Mastery Experiences	0.31	0.31	.02	.13	1.00
Online Mastery Experiences	1.43	0.87	.08	.17	1.65
Step 3					
Constant	92.55	5.49			16.85***
Classroom Mastery Experiences	0.16	0.31	-.02	.09	0.52
Online Mastery Experiences	1.41	0.85	.07	.16	1.66
Vicarious Experiences	2.76	0.66	.22	.25	4.21***
Step 4					
Constant	73.63	6.19			11.89***
Classroom Mastery Experiences	-0.19	0.31	-.11	.01	-0.60
Online Mastery Experiences	1.44	0.79	.08	.16	1.83
Vicarious Experiences	1.83	0.65	.14	.18	2.82**

Positive Verbal Persuasion	1.96	0.33	.32	.39	5.93***
Step 5					
Constant	64.64	7.75			8.34***
Classroom Mastery Experiences	-0.14	0.30	-.10	.01	-0.45
Online Mastery Experiences	1.20	0.77	.06	.14	1.56
Vicarious Experiences	2.04	0.67	.16	.21	3.06**
Positive Verbal Persuasion	1.95	0.33	.32	.39	5.99***
Negative Verbal Persuasion	1.11	0.54	.10	.16	2.05*
Step 6					
Constant	55.84	7.29			7.66***
Classroom Mastery Experiences	-0.36	0.29	-.13	-.03	-1.22
Online Mastery Experiences	0.86	0.73	.02	.10	1.18
Vicarious Experiences	1.04	0.60	.07	.10	1.73
Positive Verbal Persuasion	1.11	0.37	.16	.25	3.02**
Negative Verbal Persuasion	0.71	0.50	.05	.10	1.40
Positive Affective States	1.26	0.22	.33	.42	5.67***
Step 7					
Constant	55.00	7.40			7.43***
Classroom Mastery Experiences	-0.34	0.29	-.03	-.13	-1.18
Online Mastery Experiences	0.95	0.73	.03	.11	1.30
Vicarious Experiences	1.03	0.60	.07	.10	1.70
Positive Verbal Persuasion	1.13	0.37	.16	.26	3.07**

Negative Verbal Persuasion	0.65	0.51	.05	.10	1.28
Positive Affective States	1.15	0.27	.28	.39	4.19***
Negative Affective States	0.29	0.36	.03	.07	0.80
Step 8					
Constant	54.91	7.48			7.34***
Classroom Mastery Experiences	-0.35	0.32	-.02	-.15	-1.09
Online Mastery Experiences	0.96	0.74	.03	.11	1.29
Vicarious Experiences	1.03	0.61	.07	.11	1.69
Positive Verbal Persuasion	1.13	0.38	.17	.27	3.00**
Negative Verbal Persuasion	0.66	0.50	.05	.10	1.33
Positive Affective States	1.15	0.28	.29	.39	4.17***
Negative Affective States	0.29	0.36	.03	.07	0.80
Teaching Development	0.07	0.66	-.04	.09	0.11

*p<.05 **p<.01 ***p<.001

If we apply the values in step 8 to the regression equation, it becomes:

$$\text{Teaching efficacy}_i = 54.91 + (-0.35\text{Classroom Mastery Experiences}_i) + (0.96\text{Online Mastery Expereinces}_i) + (1.03\text{Vicarious Experiences}_i) + (1.13\text{Positive Verbal Persuasion}_i) + (0.66\text{Negative Verbal Persuasion}_i) + (1.15\text{Positive Affective States}_i) + (0.29\text{Negative Affective States}_i) + (0.07\text{Teaching Development}_i) + e_i$$

This means that as each predictor's value increases by one unit, the value of teaching efficacy will increase by the amount indicated by the b-value associated with each predictor, with the intercept at 54.91.

The difference between the R^2 and adjusted R^2 values is very small, and ranges from .003-.017 for all imputations, indicating that this model is parsimonious (Field, 2009). Durbin-Watson values for all imputations range from 1.88-1.98, which satisfies the assumption of independence of errors, as these values should be close to 2 (Field, 2009).

In normal distribution, 95% of scores should be between ±1.96, and 99% should be between ±2.58. For this sample size of 327, there should be approximately 16 standardized residuals outside of 2.0, and 4 outside of 2.5. For each imputation, the number of values with a standardized residual more than 2.0 ranges from 8 (2.45%) to 11 (3.36%), which is within acceptable limits for a normal distribution. For each imputation, the number of values with a standardized residual more than 2.5 ranges from 3 (0.92%) to 7 (2.94%), which is slightly higher than expected, but not extreme. The maximum Cook's Distance range from 0.19-0.23, with no values above 1, so it is unlikely that an outlying case might be influencing the model (Field, 2009; Pedhazur, 1997). The variance inflation factor (VIF) values for each imputation range from 1.00 to 1.82, which is well below the cutoff of 10, and averages range from 1.17 to 1.18, with no values substantially greater than 1. These values indicate that collinearity is not a problem for this model (Field, 2009). Based on these diagnostics, the sample appears to conform to the expectation of an accurate model.

Research Question 3: Teaching Approach

For the third research question, "Does the teaching approach reported by graduate students account for a significant amount of variability in self-reported teaching efficacy?" the following models were tested using forced entry multiple regression with IBM SPSS Statistics for Windows, Version 21.0:

Model 3a:

$$\text{Teaching efficacy}_i = a + b_1\text{Lecture-style Conceptual Change}_i + b_1\text{Lecture-style Information Transmission}_i + e_i$$

Model 3b

$$\text{Teaching efficacy}_i = a + b_1\text{Discussion Style Conceptual Change}_i + b_1\text{ Discussion Style Information Transmission}_i + e_i$$

Model 3c

$$\text{Teaching efficacy}_i = a + b_1\text{Conceptual Change}_i + b_1\text{Information Transmission}_i + e_i$$

where *a* is the intercept, *b* is the regression coefficients associated with each variable, and *e* is the residual error (Pedhazur, 1997). The first model used the data gathered while participants considered lecture-style classes, the second while participants considered discussion-style classes, and the final model combined both sets of results to test overall how approach affects teaching efficacy. Because previous research using these two

scales does not indicate the causal relationship of the constructs, forced entry multiple regression is used to force all the predictors into the model simultaneously (Field, 2009).

Model 3a investigates lecture-style class teaching approaches. As is shown in Table 4.27, *F*-values more than 1 indicate that the regression model is a better predictor of the level of Teaching Self-Efficacy than the null hypothesis, using the mean as a predictor. *F*-values indicate that the regression model is significantly better than the null hypothesis, at $p<.001$.

The R^2 values in Table 4.27 show the amount of variance in the Teaching Efficacy outcome that is explained by each predictor, Conceptual Change/Student-Focused (Lecture) and Information Transmission/Instructor-Focused (Lecture) in the model (Field, 2009; Pedhazur, 1997). As all predictors were entered in the model simultaneously, the change in R^2 shows if the variance explained is significantly different than the null hypothesis model. These results substantiate the *F*-values, and show that these predictors predict 19-27% of variance in the outcome, Teaching Efficacy.

Table 4.27. *Model 3a Summary*

	F		*df*	R^2		R^2 Change	
	Lo	Hi		Lo	Hi	Lo	Hi
Step 1	37.49***	41.51***	2, 324	.19	.27	.19***	.27***

*$p<.05$ **$p<.01$ ***$p<.001$

Beta values and their significance for model 3a are reported in Table 4.28. One beta value significantly predicted Teaching Efficacy for this step, Conceptual Change/Student-Focused (Lecture). This predicts a .43 to .52 standard deviation change

in Teaching Efficacy for one standard deviation change in Conceptual Change/Student-Focused (Lecture).

Table 4.28. *Summary of Regression Analysis for Model 3a*

Variable	*B*	*SE B*	β		*t*
			Lo	Hi	
Step 1					
Constant	68.59	8.20			8.36***
Conceptual Change/Student-Focused (Lecture)	1.62	0.25	.43	.52	6.48***
Information Transmission/Instructor-Focused (Lecture)	0.22	0.25	.000	.13	0.85

*p<.05 **p<.01 ***p<.001

If these values are applied to the regression equation, it becomes:

$$\text{Teaching efficacy}_i = 68.59 + (1.62\text{Lecture-style Conceptual Change}_i) + (0.22\text{Lecture-style Information Transmission}_i) + e_i$$

Lecture-style Conceptual Change significantly predicts Teaching Efficacy, indicating that a one-unit increase in Lecture-Style Conceptual Change will produce a 1.62 change in the level of Teaching Efficacy.

The difference between the R^2 and adjusted R^2 values is very small, and ranges from .00-.01 for all imputations, indicating that this model is parsimonious (Field, 2009).

Durbin-Watson values for all imputations range from 1.90-2.06, which satisfies the assumption of independence of errors, as these values should be close to 2 (Field, 2009).

In normal distribution, 95% of scores should be between ±1.96, and 99% should be between ±2.58. For this sample size of 327, there should be approximately 16 standardized residuals outside of 2.0, and 4 outside of 2.5. For each imputation, the number of values with a standardized residual more than 2.0 ranges from 8 (2.45%) to 13 (3.98%), which is within acceptable limits for a normal distribution. For each imputation, the number of values with a standardized residual more than 2.5 ranges from 3 (0.92%) to 5 (1.53%), also within acceptable limits for a normal distribution. The maximum Cook's Distance for all imputations range from .46-.75, with no values above 1, so it is unlikely that an outlying case might be influencing the model (Field, 2009; Pedhazur, 1997). The variance inflation factor (VIF) values for each imputation range from 1.00 to 1.02, which is well below the cutoff of 10, and averages range from 1.00-1.02, with no values substantially greater than 1. These values indicate that collinearity is not a problem for this model (Field, 2009). Based on these diagnostics, the sample appears to conform to the expectation of an accurate model.

Model 3b investigates discussion-style class teaching approaches. As is shown in Table 4.29, *F*-values more than 1 indicate that the regression model is a better predictor of the level of Teaching Self-Efficacy than the null hypothesis, using the mean as a predictor. *F*-values indicate that the regression model is significantly better than the null hypothesis, at $p<.001$.

The R^2 values in Table 4.29 show the amount of variance in the Teaching Efficacy outcome that is explained by each predictor, Conceptual Change/Student-Focused (Discussion) and Information Transmission/Instructor-Focused (Discussion) in the model (Field, 2009; Pedhazur, 1997). As all predictors were entered in the model simultaneously, the change in R^2 shows if the variance explained is significantly different than the null hypothesis model. These results substantiate the *F*-values, and show that these predictors predict 6-12% of variance in the outcome, Teaching Efficacy.

Table 4.29. *Model 3b Summary*

	F		*df*	R^2		R^2 Change	
	Lo	Hi		Lo	Hi	Lo	Hi
Step 1	10.95***	20.12***	2, 324	.06	.12	.06***	.12***

**p<.05 **p<.01 ***p<.001*

Beta values and their significance for model 3b are reported in Table 4.30. One beta value significantly predicted Teaching Efficacy for this step, Conceptual Change/Student-Focused (Discussion). This predicts a .25 to .35 standard deviation change in Teaching Efficacy for one standard deviation change in Conceptual Change/Student-Focused (Discussion). Information Transmission/Instructor-Focused (Discussion) did not produce a significant beta value.

Table 4.30. *Summary of Regression Analysis for Model 3b*

Variable	*B*	*SE B*	β		*t*
			Lo	Hi	
Step 1					
Constant	89.95	9.86			9.13***
Conceptual Change/Student-Focused (Discussion)	.94	0.95	.25	.35	3.79**
Information Transmission/Instructor-Focused (Discussion)	-.08	-0.08	-.09	.02	-0.31

**p<.05 **p<.01 ***p<.001*

If these values are applied to the regression equation, it becomes:

$$\text{Teaching efficacy}_i = 89.95 + (0.94\text{Discussion Style Conceptual Change}_i) + (-0.08\text{Discussion Style Information Transmission}_i) + e_i$$

Discussion Style Conceptual Change significantly predicts Teaching Efficacy, indicating that a one-unit increase in Discussion Style Conceptual Change will produce a 0.94 change in the value of Teaching Efficacy.

The difference between the R^2 and adjusted R^2 values is very small, and is .01 for all imputations, indicating that this model is parsimonious (Field, 2009). Durbin-Watson values for all imputations range from 1.95-2.05, which satisfies the assumption of independence of errors, as these values should be close to 2 (Field, 2009).

In normal distribution, 95% of scores should be between ±1.96, and 99% should be between ±2.58. For this sample size of 327, there should be approximately 16 standardized residuals outside of 2.0, and 4 outside of 2.5. For each imputation, the number of values with a standardized residual more than 2.0 ranges from 9 (2.75%) to 11 (3.36%), which is within acceptable limits for a normal distribution. For each imputation, the number of values with a standardized residual more than 2.5 ranges from 3 (0.92%) to 4 (1.22%), also within acceptable limits for a normal distribution The maximum Cook's Distance for all imputations range from .09-.23, with no values above 1, so it is unlikely that an outlying case might be influencing the model (Field, 2009; Pedhazur, 1997). The variance inflation factor (VIF) values for each imputation range from 1.00 to 1.03, which is well below the cutoff of 10, and averages range from 1.00-1.03, with no values substantially greater than 1. These values indicate that collinearity is not a problem for this model (Field, 2009). Based on these diagnostics, the sample appears to conform to the expectation of an accurate model.

Model 3c investigates both lecture-style class and discussion-style class teaching approaches. As is shown in Table 4.31, *F*-values more than 1 indicate that the regression model is a better predictor of the level of Teaching Self-Efficacy than the null hypothesis, using the mean as a predictor. *F*-values indicate that the regression model is significantly better than the null hypothesis, at $p<.001$.

The R^2 values in Table 4.31 show the amount of variance in the Teaching Efficacy outcome that is explained by each predictor, Conceptual Change/Student-Focused (Lecture), Information Transmission/Instructor-Focused (Lecture), Conceptual

Change/Student-Focused (Discussion), and Information Transmission/Instructor-Focused (Discussion) in the model (Field, 2009). As all predictors were entered in the model simultaneously, the change in R^2 shows if the variance explained is significantly different than the null hypothesis model. These results substantiate the *F*-values, and show that these predictors predict 20-28% of variance in the outcome, Teaching Efficacy.

Table 4.31. *Model 3c Summary*

	F		*df*	R^2		R^2 Change	
	Lo	Hi		Lo	Hi	Lo	Hi
Step 1	20.10***	31.00***	4, 322	.20	.28	.20***	.28***

**p<.05 **p<.01 ***p<.001*

Beta values and their significance for model 3c are reported in Table 4.32. One beta value significantly predicted Teaching Efficacy for this step, Conceptual Change/Student-Focused (Lecture). This predicts a .38 to .46 standard deviation change in Teaching Efficacy for one standard deviation change in Conceptual Change/Student-Focused (Lecture).

Table 4.32. *Summary of Regression Analysis for Model 3c*

Variable	*B*	*SE B*	β		*t*
			Lo	Hi	
Step 1					
Constant	64.53	8.78			7.35***
Conceptual Change/Student-Focused (Lecture)	1.44	0.25	.38	.46	5.79***
Information Transmission/Instructor-Focused (Lecture)	0.27	0.34	-.03	.16	0.80
Conceptual Change/Student-Focused (Discussion)	0.37	0.22	.07	.17	1.71
Information Transmission/Instructor-Focused (Discussion)	-0.22	0.29	.00	-.12	-0.77

**p<.05 **p<.01 ***p<.001*

If these values are applied to the regression equation, it becomes:

$$\text{Teaching efficacy}_i = 64.528 + (1.44\ \text{Lecture Style Conceptual Change}_i) + (0.27\text{Lecture Style Information Transmission}_i) + (0.37\text{Discussion Style Conceptual Change}_i) + (-0.22\text{Discussion Style Information Transmission}_i) + e_i$$

Again, it is observed that Lecture Style Conceptual Change significantly predicts Teaching Efficacy, indicating that a one-unit increase in Lecture Style Conceptual Change will produce a 1.44 increase in the value of Teaching Efficacy.

The difference between the R^2 and adjusted R^2 values is very small, between .009 and .010 for all imputations, indicating that this model is parsimonious (Field, 2009). Durbin-Watson values for all imputations range from 1.91-2.08, which satisfies the assumption of independence of errors, as these values should be close to 2 (Field, 2009).

In normal distribution, 95% of scores should be between ±1.96, and 99% should be between ±2.58. For this sample size of 327, there should be approximately 16 standardized residuals outside of 2.0, and 4 outside of 2.5. For each imputation, the number of values with a standardized residual more than 2.0 ranges from 10 (3.06%) to 13 (3.98%), which is within acceptable limits for a normal distribution. For each imputation, the number of values with a standardized residual more than 2.5 ranges from 4 (1.22%) to 5 (1.53%), which is slightly higher than expected, but not extreme. The maximum Cook's Distance for all imputations range from .28-.50, with no values above 1, so it is unlikely that an outlying case might be influencing the model (Field, 2009; Pedhazur, 1997). The variance inflation factor (VIF) values for each imputation range from 1.12-1.47, which is well below the cutoff of 10, and averages range from 1.13-1.39, with no values substantially greater than 1. These values indicate that collinearity is not a problem for this model (Field, 2009). Based on these diagnostics, the sample appears to conform to the expectation of an accurate model.

Research Question 4: Combined Model

For the fourth research question, "When combined, do the sources of efficacy and teaching approach account for a significant amount of variability in self-reported teaching efficacy?," the following model will be tested using hierarchical multiple regression with IBM SPSS Statistics for Windows, Version 21.0:

Model 4:

$$\text{Teaching efficacy}_i = a + b_1\text{Sources of Efficacy}_i + b_2\text{Teaching Approach}_i + e_i$$

where *a* is the intercept, *b* is the regression coefficients associated with each variable, and *e* is the residual error (Pedhazur, 1997). The sources of efficacy predictors (classroom mastery experiences, online mastery experiences, vicarious experiences, positive verbal persuasion, negative verbal persuasion, positive effective states, negative affective states, teaching development) were entered into the model first, based on previous self-efficacy research (Bandura, 1977a, 1997). The teaching approach predictors (conceptual change, information transmission) were entered last, as they are new predictors for this efficacy model (Field, 2009).

As is shown in Table 4.33, *F*-values more than 1 indicate that the regression model is a better predictor of the level of teaching efficacy than the null hypothesis, using the mean as a predictor. *F*-values indicate that the regression model is significantly better than the null hypothesis, at $p<.001$.

The R^2 values in Table 4.33 show the amount of variance in the teaching efficacy outcome that is explained by each predictor, the sources of teaching efficacy and teaching approach items, as they are added to the model (Field, 2009). The change is R^2 shows if the variance explained is significantly different than the previous model. For model 4, step 2 explains significantly more of the variance in the outcome than the preceding step on all imputations. This indicates that the predictors added in step 2, the teaching approach items, contribute significantly to the overall variance explained by the model. These results show that step 1 predicts 31-35% of variance in the outcome, Teaching Efficacy, and step 2 predicts 43-46% of variance.

Table 4.33. *Model 4 Summary*

	F		*df*	R^2		R^2 Change	
	Lo	Hi		Lo	Hi	Lo	Hi
Step 1	17.61***	21.66***	8, 318	.31	.35	.31***	.35***
Step 2	19.63***	22.02***	12, 314	.43	.46	.08***	.15***

**p<.05 **p<.01 ***p<.001*

Beta values and their significance for each step in model 4 are reported in Table 4.34. As this was a hierarchical multiple regression, the values in the final step are of most importance. Results of the regression indicate that the predictors in step 2 explain 43-46% of the variance in the outcome, Teaching Efficacy. Beta values that significantly predicted Teaching Efficacy for this step are Positive Verbal Persuasion and Positive Affective States, which correspond with the significance indicated for these predictors in step 1, and a third is added in step 2, Conceptual Change/Student-Focused (Lecture).

This predicts a .15-.29 standard deviation change in Teaching Efficacy for one standard deviation change in Positive Verbal Persuasion, a .18-.31 standard deviation change in Teaching Efficacy for one standard deviation change in Positive Affective States, and a .24-.38 standard deviation change in Teaching Efficacy for one standard deviation change in Conceptual Change/Student-Focused (Lecture).

Table 4.34. *Summary of Hierarchical Multiple Regression Analysis for Model 4*

Variable	*B*	*SE B*	β		*t*
			Lo	Hi	
Step 1					
Constant	54.91	7.48			7.34***
Classroom Mastery Experiences	-0.35	0.32	-.02	-.15	-1.09
Online Mastery Experiences	0.96	0.74	.03	.11	1.29
Vicarious Experiences	1.03	0.61	.07	.11	1.69
Positive Verbal Persuasion	1.13	0.38	.17	.27	3.00**
Negative Verbal Persuasion	0.66	0.50	.05	.10	1.33
Positive Affective States	1.15	0.28	.29	.39	4.17***
Negative Affective States	0.29	0.36	.03	.07	0.80
Teaching Development	0.07	0.66	-.04	.09	0.11
Step 2					
Constant	22.98	10.37			2.22*
Classroom Mastery Experiences	-0.33	0.28	-.13	-.03	-1.16
Online Mastery Experiences	0.97	0.59	.08	.11	1.65

Vicarious Experiences	1.03	0.59	.06	.11	1.75
Positive Verbal Persuasion	1.04	0.42	.15	.29	2.45*
Negative Verbal Persuasion	0.61	0.44	.05	.09	1.39
Positive Affective States	0.85	0.29	.18	.31	2.99**
Negative Affective States	0.36	0.35	.04	.09	1.04
Teaching Development	0.00	0.49	-.03	.05	0.01
Conceptual Change/Student-Focused (Lecture)	1.11	0.27	.24	.38	4.14**
Information Transmission/Instructor-Focused (Lecture)	0.17	0.35	-.06	.14	0.49
Conceptual Change/Student-Focused (Discussion)	0.17	0.22	.00	.12	0.80
Information Transmission/Instructor-Focused (Discussion)	0.07	0.35	-.06	.11	0.20

**p<.05 **p<.01 ***p<.001*

If we apply the values in step 2 to the regression equation, it becomes:

$$\text{Teaching efficacy}_i = 22.98 + (-0.33\text{Classroom Mastery Experiences}_i) + (0.97\text{Online Mastery Expereinces}_i) + (1.03\text{Vicarious Experiences}_i) + (1.04\text{Positive Verbal Persuasion}_i) + (0.61\text{Negative Verbal Persuasion}_i) + (0.85\text{Positive Affective States}_i) + (0.36\text{Negative Affective States}_i) + (0.00\text{Teaching Development}_i) + (1.11 \text{ Lecture Style Conceptual}$$

$$\text{Change}_i) + (0.17\text{Lecture Style Information Transmission}_i) + (0.17\text{Discussion Style Conceptual Change}_i) + (0.07\text{Discussion Style Information Transmission}_i) + e_i$$

As each predictor's value increases by one unit, the value of teaching efficacy will increase by the amount indicated by the b-value associated with each predictor, with the intercept at 22.98.

The difference between the R^2 and adjusted R^2 values is very small, .020 for all steps on all imputations, indicating that this model generalizes well from this sample to the graduate student population (Field, 2009). Durbin-Watson values for all imputations range from 1.87-1.97, which satisfies the assumption of independence of errors, as these values should be close to 2 (Field, 2009).

In normal distribution, 95% of scores should be between ±1.96, and 99% should be between ±2.58. For this sample size of 327, there should be approximately 16 standardized residuals outside of 2.0, and 4 outside of 2.5. For each imputation, the number of values with a standardized residual more than 2.0 ranges from 8 (2.45%) to 14 (4.28%), which is within acceptable limits for a normal distribution. For each imputation, the number of values with a standardized residual more than 2.5 ranges from 3 (0.92%) to 5 (1.53%), which is slightly higher than expected, but not extreme. The maximum Cook's Distance for all imputations range from .15-.30, with no values above 1, so it is unlikely that an outlying case might be influencing the model (Field, 2009; Pedhazur, 1997). The variance inflation factor (VIF) values for each imputation range from 1.08-2.72, which is well below the cutoff of 10, and averages range from 1.42-1.56

with no values substantially greater than 1. These values indicate that collinearity is not a problem for this model (Field, 2009). Based on these diagnostics, the sample appears to conform to the expectation of an accurate model.

CHAPTER 5: DISCUSSION AND IMPLICATIONS

The purpose of this research was to determine the types of teaching experiences that graduate students have while in graduate school, what their teaching approach is, and how both of these affect their teaching efficacy. Data were collected from 327 graduate students from a variety of degree program disciplines who were at various stages in their degree programs. These data serve to support some areas and challenge other areas noted in previous teaching efficacy and higher education teaching literature. Three research questions were analyzed during this study:

1. What do the average levels reported about sources of teaching efficacy, teaching approach, and teaching efficacy show about graduate student teaching?
2. Do the sources of efficacy described by graduate students account for a significant amount of variance in self-reported teaching efficacy?
3. Does the teaching approach reported by graduate students account for a significant amount of variance in self-reported teaching efficacy?
4. When combined, do the sources of efficacy and teaching approach account for a significant amount of variance in self-reported teaching efficacy?

To answer these questions, a questionnaire that gathered information about the sources of teaching efficacy was created and validated, and a series of regressions and hierarchical multiple regressions were performed.

Sources of Teaching Efficacy Questionnaire Development

In order to collect information about the types of teaching experiences graduate students have, it was necessary to create a questionnaire that was based on research on

self-efficacy and teaching efficacy (Bandura, 1977a, 1997; Tschannen-Moran & Hoy, 2001; Tschannen-Moran et al., 1998; Woolfolk Hoy, 2004). The data collected for this study were analyzed using confirmatory factor analysis concerning the four domains of efficacy: mastery experiences, vicarious experiences, verbal persuasion, and affective states. A fifth category was added to capture the construct of teaching development, which includes classes or workshops attended that provide instruction on teaching methods in higher education. The confirmatory factor analysis was a poor fit for the theoretical five-factor model, but indicated that the model should be expanded to include more factors. An exploratory factor analysis revealed eight factors. The mastery experiences items were split between classroom teaching experiences and online teaching experiences, possibly indicating that the efficacy information accrued from online experiences is a different teaching experience than classroom experiences. The other two additional categories may be due to the negative and positive wording of items, indicating that students have both positive and negative influences and beliefs about teaching in higher education. This eight-factor model was used in subsequent analyses.

Averages of Scales

For the first research question, "What do the average levels reported about sources of teaching efficacy, teaching approach, and teaching efficacy show about graduate student teaching?" the means for each item on each scale were computed and analyzed. These means give valuable information about the types of teaching experiences available to graduate students, their teaching approach, and how efficacious they are in their teaching skills.

Sources of Teaching Efficacy Questionnaire

The mean of the Classroom Mastery Experiences subscale indicates that on average participants had slightly less than 2-3 semesters of classroom teaching experience, in any capacity. Overall, participants reported having much more experience with lecture-style classes than with discussion style classes. The mean of the Online Mastery Experiences subscale indicates that participants had over 1 semester of experiences teaching online classes, and were most often in a grader role. These means are based on participants who provided information for these questions. At most, just under half the participants either did not respond to the Mastery Experiences items, or put null values. This suggests that while around half of the participants reported moderate amounts of mastery teaching experience, others do not have these opportunities.

Means for the Vicarious Experience subscale were very high for these two items. The wording of these items was very similar, and high values seem appropriate, considering that graduate students have probably encountered a wide variety of instructors, and thus, a range of effective teaching ability.

Means from the Positive Verbal Persuasion items show that students are encouraged to teach, and being told they are good at it, but are receiving less mentoring from established instructors. The Negative Verbal Persuasion subscale showed that students are receiving some negative messages about teaching, but this sample reported hearing more positive messages than negative.

On average, students reported having positive affective states regarding teaching. In fact, the highest average was on the item, “I enjoy teaching,” with a score of 4.07 on a

scale of 5.0. This indicates that teaching is enjoyable to these participants, and they view it as important.

For those that reported attending some type of teaching development program, participants had attended 2-3 semesters, seminars, or workshops about teaching. This, along with the positive averages on the items about affective states, seems to support this sample's value of teaching.

Teachers' Sense of Efficacy Scale

The Teachers' Sense of Efficacy Scale (Tschannen-Moran & Hoy, 2001) was used to measure graduate students' teaching efficacy. The scale was modified, as its intended use is for elementary and secondary schoolteachers. This sample of graduate students is extremely confident in their teaching abilities in each of these areas, which is interesting considering the reports for classroom and online teaching experience—considered to be enactive mastery experiences, the most influential source of efficacy (Bandura, 1977a, 1997). The only items that had average scores of less than 6.0 were about getting through to difficult students, motivating students with low interest, and responding to defiant students, which suggests that they have either not had much experience in these situations, and/or that they could use more mentorship and instruction in these areas.

Approaches to Teaching Inventory

On the Approaches to Teaching Inventory (Prosser & Trigwell, 1999), participants' average scores were higher on the conceptual change/student-focused items for both lecture-style and discussion style classes than on the information

transmission/instructor-focused items for lecture-style and discussion-style classes. This suggests that for this sample of graduate students, they seem to be more concerned with student learning than with providing information. This connects well with the general information collected from the positive teaching affective states and quantity of teaching development, as well as the high teaching efficacy levels reported on the other two measures, and further indicates how these participants' value quality teaching. However, these are all just general observations based on the means of values reported on these measures.

Regression Models

A series of multiple regressions were performed on the different sets of data to discover indicators of teaching efficacy. Model 2 was used to analyze the second research question in this study: "Do the sources of efficacy described by graduate students account for a significant amount of variability in self-reported teaching efficacy?" Positive affective states and positive verbal experiences both contribute significantly to this model, which is not surprising considering how highly reported averages were for these predictors. According to the data there is a negative relationship between Classroom Mastery Experiences and Teaching Efficacy—as Classroom Mastery Experiences increase, there is an associated decrease in Teaching Efficacy. There are a few explanations to account for this. First, it is possible that these data challenge Bandura's (1977a, 1997) self-efficacy theory, and mastery experiences may not be the most important predictor of self-efficacy for this population. However there is much research that supports this hypothesis in the domain of teaching (e.g., Bailey, 1999;

Bembenutty, 2009; Bray-Clark & Bates, 2003; Tschannen-Moran et al., 1998; Woolfolk Hoy, 2004).. A more likely explanation is that this sample, which averaged less than 2-3 semesters of teaching, may not have enough direct teaching experience to construct accurate teaching efficacy beliefs. As these graduate students increase the amount of mastery teaching experiences and manage teaching more practically than theoretically, they establish a more accurate representation of their teaching efficacy, which is lower as they realize their inexperience.

Models 3a, 3b, and 3c addressed the third research question, "Does the teaching approach reported by graduate students account for a significant amount of variability in self-reported teaching efficacy?" Teaching approach was considered from a lecture-style class perspective, a discussion-style class perspective, and these two perspectives combined.

The first analysis examined lecture class-style approaches, and indicated that the regression model explained significantly more variance than the null hypothesis, which was based on using the mean as a predictor. This analysis also showed that Conceptual Change/Student Focused factor contributed significantly to this model. This seems to support the general observations the means of the Conceptual Change items indicated above, in that the participants leaned more toward conceptual change than information transmission.

The next analysis examined discussion class-style approaches, and indicated that the regression model explained significantly more variance than the null hypothesis, which was based on using the mean as the predictor. Again, conceptual change is

significantly influencing the model, indicating that those with a conceptual change approach to teaching have higher levels of teaching self-efficacy.

The final model combines both of the previous approaches and indicated that the regression model explained significantly more variance than the null hypothesis, which was based on using the mean as the predictor. In this model, the Conceptual Change/Student-Focused factor for lecture-style class approaches significantly influenced the model. This significant relationship between Conceptual Change approaches and Teaching Efficacy that is observed in each of the previous models supports existing research that suggests that changing conceptions of teaching, instead of techniques, will increase teaching efficacy (Postareff et al., 2008), and that those with a conceptual change orientation are more likely to encourage meaningful learning (Gow & Kember, 1993; Kember & Gow, 1994), an outcome that is associated with high teaching efficacy (Bandura, 1997; Woolfolk Hoy, 2004).

Model 4 was to analyze the fourth research question in this study: "When combined, do the sources of efficacy and teaching approach account for a significant amount of variability in self-reported teaching efficacy?"

The first analysis indicated that the regression model explained significantly more variance than the null hypothesis, which was based on using the mean as a predictor. This first step, with only the sources of efficacy information included, explained 31-35% of variance in the model, which parallels step 8 of the first analysis, above. Step 2, which includes sources of teaching efficacy as well as teaching approach, also describes a significant amount of variance, explaining an additional 8-15% of the variance.

Significant predictors in this model are Positive Verbal Persuasion, Positive Affective States, and Conceptual Change/Student-Focused (Lecture), which supports the results of the previous models.

Again, this model shows a negative relationship between Classroom Mastery Experiences and teaching efficacy. In addition, this model shows that Teaching Development has an insignificant, null relationship with teaching efficacy. All of these findings corroborate the results of the previous, less complex models, and this model significantly predicts 43-46% of the variance in Teaching Efficacy.

Implications

The results of this analysis show that the sources of efficacy as defined by the participant responses in this dataset are more complex than just enactive mastery experiences, vicarious experiences, verbal persuasion, and affective states (Bandura, 1977a, 1997). The nuances of these different types efficacy experiences need to be examined in more detail, and from graduate students with higher levels of mastery experiences, vicarious experiences, and teaching development to confirm that these predictors may not have the influence on teaching efficacy as is projected by self-efficacy theory (Bandura, 1977a, 1997).

The results also show that Positive Affective States and Conceptual Change/Student-Focused (Lecture) have a significant, positive relationship on the outcome of teaching efficacy. This could indicates the most effective way to increase a graduate student's teaching efficacy is to encourage positive affective states and provide information about conceptual change/student-focused approaches to teaching, especially

in lecture-style classes. This concurs with the existing literature that suggests changing conceptions of teaching rather than changing techniques (Gow & Kember, 1993; Kember & Gow, 1994; Postareff et al., 2008).

The results of this study do not concur with what Bandura's (1977a, 1997) theory states about the contributions the sources of efficacy make to teaching efficacy. Positive affective states and positive verbal persuasions were the only significant factors influencing the first regression model. Classroom mastery experiences had a negative relationship with teaching efficacy, and vicarious experiences were not significant, which is surprising, as every graduate student in this study has assumedly observed a considerable amount of teaching, both in their undergraduate courses as well as in their current graduate-level courses. However, these results seem to support findings of other studies that have analyzed teaching efficacy in graduate students in that enactive mastery experiences and vicarious experiences are not the most significant influence on teaching efficacy (Heppner, 1994; Morris & Usher, 2011).

In the final model, Teaching Development had an insignificant, null influence on teaching efficacy, and in the first model had a small, insignificant influence. The effect of teaching development on teaching efficacy seems that it should have an influence, but previous studies have found inconclusive results—development opportunities had to be at least a year in duration (Postareff et al., 2007), or were only significant for those with little teaching experience (Postareff et al., 2008), or had the same contribution as other factors (Nugent et al., 1999). The lack of teaching development's contribution to teaching efficacy in this study adds to these indeterminate results.

The graduate students in this sample seemed to have extremely high levels of teaching efficacy, which are not significantly associated with the mastery experiences or vicarious experiences that Bandura's (1977a, 1997) self-efficacy theory predicts. Even though the results are not significant, in every step except for the first three in model 2, and in both steps in model 4, classroom mastery experiences indicate a negative relationship with teaching efficacy. As hypothesized above, this could be due to inflated levels of teaching efficacy. This could be dangerous, as those with high self-efficacy might be overconfident in their teaching abilities, spend less time preparing for class, or perhaps not even attempt to teach (Bandura, 1977b; Csikszentmihalyi, 1997). The literature states that teaching is not shown to be as important as research in many institutions (Adams, 2002; Austin, 2002), so these students might assume successful teaching does not require much time and skill. Instructors, and those mentoring graduate students, need to reveal the elements of the teaching process, showing it to be a practice that requires dedication, planning, and flexibility (DeNeef & Goodwin, 2007).

Analysis of teaching approach on teaching efficacy has not been studied as extensively as the different sources of efficacy. For discussion-style classes and lecture-style classes considered separately, both the conceptual change/student-focused factors had a significant influence on self-efficacy, and the lecture version of this factor had a significant influence in the final model that combined these approaches. This is supported by the previous research (Gow & Kember, 1993; Kember & Gow, 1994; Postareff et al., 2008), and contradicts the findings of a study that compared the "hard" and "soft" sciences (Lindblom-Ylänne et al., 2006). However, the majority of

participants in this study were from the College of Arts and Science and the College of Education, there may not have been enough representation from the "hard" sciences to influence this study.

Limitations

The current study is not without limitations. Participants were recruited primarily through convenience and snowball sampling, which does not guarantee a representative or diverse sample (Ary et al., 2006). All of the information on the scales was self-reported, which may indicate bias and affect validity (Ary et al., 2006). Also, low reliability was established for the subscales of Negative Verbal Persuasion, Teaching Development, and Efficacy in Classroom Management. The restriction of range for items on the Teachers' Sense of Efficacy Scale could reduce the strength of relations. In addition, participants in this sample were not all considering teaching or expecting to teach in the future. There was also confusion from a small number of participants regarding the definition of a lecture-style class versus a discussion-style class, which could have been made clearer with set definitions. Despite these limitations, the current study is a valuable contribution to the teaching efficacy literature for higher education.

Directions for Future Research

Because the study of teaching efficacy in higher education has not been studied extensively, there are many opportunities for future research in this field. More data from different samples needs to be collected for the Sources of Teaching Efficacy Questionnaire that was developed for this study to test the 8-factor model of sources of teaching efficacy scale for invariance, and to substantiate construct validity via

confirmatory factor analysis (Worthington & Whittaker, 2006). The relationship between enactive mastery experiences for graduate students and teaching efficacy needs to be explored in more depth. Another area of further study would be how the sources of teaching efficacy affect teaching approach. A longitudinal study that measures changes in teaching efficacy as new sources of teaching efficacy are acquired would also be informative to this area, and could include both graduate students and new faculty members. Clearly, there are many opportunities to expand research based on teaching efficacy in higher education.

Conclusions

This study provided information about the sources of teaching efficacy, teaching approach, and their effect on teaching efficacy in higher education. Overall, graduate students reported high levels of teaching efficacy, which was influenced primarily by positive verbal persuasions and a teaching approach that was student-focused and based on conceptual change. This emphasis on a conceptual change teaching approach is encouraging, as this method of "learning facilitation" is more likely to lead to meaningful learning (Gow & Kember, 1993; Kember & Gow, 1994). The high levels of teaching efficacy reported by participants in this study is also encouraging, as high teaching efficacy is correlated with enthusiasm for their subject, commitment to teaching, resiliency, and assisting struggling students (Woolfolk Hoy, 2004). As Bandura (1997) notes, the students of teachers with high teaching efficacy are more likely to learn more. The results of this study suggest that graduate students enjoy teaching, value teaching, and understand the influence they can have through teaching. Graduate students need to

be provided with opportunities to practice teaching and learn about effective teaching, so they can be better prepared as future faculty, and so their students can have meaningful learning experiences.

APPENDICES

Appendix A

Demographic Information

Sex: Male, Female, Transsexual

Domestic student/International student

For domestic students

Race/Ethnicity: Choose all that apply

American Indian or Alaska Native

Asian

Black or African American

Hispanic or Latino

Native Hawaiian or other Pacific Islander

White – non-Hispanic

For international students

Country of Origin:_____

Degree program: Master's, Doctorate, Education Specialist

Year in program: 1st, 2nd, 3rd, 4th, 5th, 6th, 7th+

Discipline:

College of Agriculture, Food, and Natural Resources

School of Natural Resources

College of Arts and Science

School of Music

College of Business

School of Accountancy

College of Education

School of Information Science and Learning Technologies

College of Engineering

School of Health Professions

College of Human Environmental Sciences

School of Social Work

School of Journalism

School of Law

School of Medicine

School of Nursing

School of Public Affairs

College of Veterinary Medicine

Other:_____

Yes, I am considering entering the professoriate (working as a professor at a college or university) at some point in my career.

No, I am NOT considering entering the professoriate (working as a professor at a college or university) in my career.

Appendix B

Sources of Teaching Efficacy

Mastery Experiences (time spent, success/failure)

Lecture

Please indicate experience you have for each of the positions below in lecture-style, traditional (80% or more of content is delivered in person) classes. If your exact role is not listed, please choose the role closest to what your responsibilities were.

		# semesters	This experience has increased my teaching ability.
Q3#1_1	Teaching Assistant – Grader (Typical responsibilities: grade exams or assignments as directed by instructor of record; little interaction with students)		Strongly Disagree Disagree Neutral Agree Strongly Agree

Q3#1_2	Teaching Assistant – Discussion Section Leader/Laboratory Assistant (Typical responsibilities: receive teaching materials/information from the coordinating faculty member, facilitate discussion and problem solving, review information previously introduced)		Strongly Disagree Disagree Neutral Agree Strongly Agree
Q3#1_3	Co-instructor (Typical responsibilities: co-teach course with a faculty member, staff member, graduate student, or undergraduate student, co-prepare teaching materials)		Strongly Disagree Disagree Neutral Agree Strongly Agree
Q3#1_4	Instructor (Typical responsibilities: independently teaching, developing course materials)		Strongly Disagree Disagree Neutral Agree Strongly Agree

Discussion

Please indicate experience you have for each of the positions below in discussion-style, traditional (80% or more of content is delivered in person) classes. If your exact role is not listed, please choose the role closest to what your responsibilities were.

		# semesters	This experience has increased my teaching ability.
Q4#1_1	Teaching Assistant - Grader		Strongly Disagree Disagree Neutral Agree Strongly Agree
Q4#1_2	Teaching Assistant – Discussion Section Leader		Strongly Disagree Disagree Neutral Agree Strongly Agree
Q4#1_3	Co-instructor		Strongly Disagree Disagree Neutral Agree Strongly Agree
Q4#1_4	Instructor		Strongly Disagree Disagree Neutral Agree Strongly Agree

Online

Please indicate experience you have for each of the positions below in online (80% or more of content is delivered online) classes. If your exact role is not listed, please choose the role closest to what your responsibilities were.

		# semesters	This experience has increased my teaching ability.
Q5#1_1	Teaching Assistant - Grader		Strongly Disagree Disagree Neutral Agree Strongly Agree

Q5#1_2	Teaching Assistant – Discussion Section Leader		Strongly Disagree Disagree Neutral Agree Strongly Agree
Q5#1_3	Co-instructor		Strongly Disagree Disagree Neutral Agree Strongly Agree
Q5#1_4	Instructor		Strongly Disagree Disagree Neutral Agree Strongly Agree

Vicarious Experiences (examples/models)

Q6_1	I have had professors/instructors who make me want to be like them.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q6_2	I know I can teach better than some of the professors/instructors I've had.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q6_3	I know I can teach at least as well as some of the professors/instructors I've had.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q6_4	I've learned good teaching techniques from observing my professors.	Strongly Disagree Disagree Neutral Agree Strongly Agree

Verbal Persuasion (mentoring/practicums)

Q7_1	My advisor or other professors have mentored me about teaching.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q7_2	Professors have told me that I am a good teacher.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q7_3	Students have told me that I am a good teacher.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q7_4	My peers and professors have encouraged me to teach.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q7_5	Professors have told me that teaching is <u>not</u> an important part of their job.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q7_6	I have been told negative things about teaching.	Strongly Disagree Disagree Neutral Agree Strongly Agree

Affective States (emotions)

Q8_1	I enjoy teaching.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_2	I look forward to teaching.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_3	Teaching typically puts me in a better mood.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_4	I dread teaching.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_5	Teaching drains me.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_6	I feel stressed when I think about teaching.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_7	My heart pounds when I teach	Strongly Disagree Disagree Neutral Agree Strongly Agree

Q8_8	Teaching makes me feel tired.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_9	Teaching energizes me.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_10	I feel excited when I think about teaching.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_11	Teaching satisfies me.	Strongly Disagree Disagree Neutral Agree Strongly Agree
Q8_12	I feel inspired when I teach.	Strongly Disagree Disagree Neutral Agree Strongly Agree

Teaching Development

		Duration (semesters, days, sessions)
Q9#1_1	I have taken a class/classes that met regularly to discuss college teaching.	
Q9#1_2	I have attended a multi-day seminar or conference about college teaching.	

Q9#1_3	I have attended a workshop or session about college teaching.	

Note: Items Q4#1_1, Q5#1_1, Q6_4 were removed due to low factor loadings. Items Q6_1 and Q8_7 were removed to increase subscale reliability.

Appendix C

Teachers' Sense of Efficacy Scale (long form) (Tschannen-Moran & Hoy, 2001)

Teacher Beliefs		How much can you do?								
Directions: This questionnaire is designed to help us gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about each of the statements below. Your answers are confidential.		Nothing		Very Little		Some Influence		Quite a Bit		A Great Deal
Q10_1	How much can you do to get through to the most difficult students?	1	2	3	4	5	6	7	8	9
Q10_2	How much can you do to help your students think critically?	1	2	3	4	5	6	7	8	9
Q10_3	How much can you do to control disruptive behavior in the classroom?	1	2	3	4	5	6	7	8	9

Q10_4	How much can you do to motivate students who show low interest in class work?	1	2	3	4	5	6	7	8	9
Q10_5	To what extent can you make your expectations clear about student behavior?	1	2	3	4	5	6	7	8	9
Q10_6	How much can you do to get students to believe they can do well in class work?	1	2	3	4	5	6	7	8	9
Q10_7	How well can you respond to difficult questions from your students?	1	2	3	4	5	6	7	8	9
8	How well can you establish routines to keep activities running smoothly?	1	2	3	4	5	6	7	8	9

Q10_8	How much can you do to help your students value learning?	1	2	3	4	5	6	7	8	9
Q10_9	How much can you gauge student comprehension of what you have taught?	1	2	3	4	5	6	7	8	9
Q10_10	To what extent can you craft good questions for your students?	1	2	3	4	5	6	7	8	9
Q10_11	How much can you do to foster student creativity?	1	2	3	4	5	6	7	8	9
13	How much can you do to get children to follow classroom rules?	1	2	3	4	5	6	7	8	9
Q10_12	How much can you do to improve the understanding of a student who is failing?	1	2	3	4	5	6	7	8	9

15	How much can you do to calm a student who is disruptive or noisy?	1	2	3	4	5	6	7	8	9
16	How well can you establish a classroom management system with each group of students?	1	2	3	4	5	6	7	8	9
Q10_13	How much can you do to adjust your lessons to the proper level for individual students?	1	2	3	4	5	6	7	8	9
Q10_14	How much can you use a variety of assessment strategies?	1	2	3	4	5	6	7	8	9
19	How well can you keep a few problem students from ruining an entire lesson?	1	2	3	4	5	6	7	8	9

Q10_15	To what extent can you provide an alternative explanation or example when students are confused?	1	2	3	4	5	6	7	8	9
Q10_16	How well can you respond to defiant students?	1	2	3	4	5	6	7	8	9
22	How much can you assist families in helping their children do well in school?	1	2	3	4	5	6	7	8	9
Q10_17	How well can you implement alternative strategies in your classroom?	1	2	3	4	5	6	7	8	9
Q10_18	How well can you provide appropriate challenges for very capable students?	1	2	3	4	5	6	7	8	9

Note: Items 8, 13, 15, 16, 19, and 22 were removed prior to survey distribution as not applicable to college teaching.

Appendix D

Approaches to Teaching Inventory (Lecture) (Prosser & Trigwell, 1999)

This inventory is designed to explore the way that academics go about teaching in a specific context or subject. This may mean that your responses to these items may be different to the responses you might make on your teaching in other contexts or subjects. For this set of questions, think about how you would teach a **LECTURE-STYLE** class. For each item, please circle one of the numbers (1-5). The numbers stand for the following responses:

1 – this item was only rarely true for me in this subject.

2 – this item was sometimes true for me in this subject.

3 – this item was true for me about half the time in this subject.

4 – this item was frequently true for me in this subject.

5 – this item was almost always true for me in this subject.

Please answer each item. Do not spend a long time on each: your first reaction is probably the best one.

		Only rarely				Almost always
Q11_1	I design my teaching in this subject with the assumption that most of the students have very little useful knowledge of the topics to be covered.	1	2	3	4	5

Q11_2	I feel it is important that this subject should be completely described in terms of specific objectives relating to what students have to know for formal assessment items.	1	2	3	4	5
Q11_3	In my class/tutorial for this subject I try to develop a conversation with students about the topics we are studying.	1	2	3	4	5
Q11_4	I feel it is important to present a lot of facts in classes so that students know what they have to learn for this subject.	1	2	3	4	5
Q11_5	I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject.	1	2	3	4	5
Q11_6	We take time out in classes so that the students can discuss, among themselves, the difficulties that they encounter studying this subject.	1	2	3	4	5
Q11_7	In this subject I concentrate in covering the information that might be available from a good textbook.	1	2	3	4	5
Q11_8	I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	1	2	3	4	5
Q11_9	In lectures for this subject, I use difficult or undefined examples to provoke debate	1	2	3	4	5

Q11_10	I structure this subject to help students to pass the formal assessment items.	1	2	3	4	5
Q11_11	I think an important reason for giving lectures in this subject is to give students a good set of notes.	1	2	3	4	5
Q11_12	When I give this subject, I only provide the students with the information they will need to pass the formal assessments.	1	2	3	4	5
Q11_13	I feel that I should know the answers to any questions that students may put to me during this subject.	1	2	3	4	5
Q11_14	Formal teaching time is made available in this subject for students to discuss their changing understanding of the subject.	1	2	3	4	5
Q11_15	I feel that it is better for students in this subject to generate their own notes rather than always copy mine.	1	2	3	4	5
Q11_16	I feel a lot of teaching time in this subject should be used to question students' ideas.	1	2	3	4	5

Appendix E

Approaches to Teaching Inventory (Prosser & Trigwell, 1999)

This inventory is designed to explore the way that academics go about teaching in a specific context or subject. This may mean that your responses to these items may be different to the responses you might make on your teaching in other contexts or subjects.

For this set of questions, think about how you would teach a **DISCUSSION-STYLE** class.

For each item, please circle one of the numbers (1-5). The numbers stand for the following responses:

1 – this item was only rarely true for me in this subject.

2 – this item was sometimes true for me in this subject.

3 – this item was true for me about half the time in this subject.

4 – this item was frequently true for me in this subject.

5 – this item was almost always true for me in this subject.

Please answer each item. Do not spend a long time on each: your first reaction is probably the best one.

		Only rarely				Almost always
Q12_1	I design my teaching in this subject with the assumption that most of the students have very little useful knowledge of the topics to be covered.	1	2	3	4	5

Q12_2	I feel it is important that this subject should be completely described in terms of specific objectives relating to what students have to know for formal assessment items.	1	2	3	4	5
Q12_3	In my class/tutorial for this subject I try to develop a conversation with students about the topics we are studying.	1	2	3	4	5
Q12_4	I feel it is important to present a lot of facts in classes so that students know what they have to learn for this subject.	1	2	3	4	5
Q12_5	I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject.	1	2	3	4	5
Q12_6	We take time out in classes so that the students can discuss, among themselves, the difficulties that they encounter studying this subject.	1	2	3	4	5
Q12_7	In this subject I concentrate in covering the information that might be available from a good textbook.	1	2	3	4	5
Q12_8	I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	1	2	3	4	5
Q12_9	In lectures for this subject, I use difficult or undefined examples to provoke debate	1	2	3	4	5

Q12_10	I structure this subject to help students to pass the formal assessment items.	1	2	3	4	5
Q12_11	I think an important reason for giving lectures in this subject is to give students a good set of notes.	1	2	3	4	5
Q12_12	When I give this subject, I only provide the students with the information they will need to pass the formal assessments.	1	2	3	4	5
Q12_13	I feel that I should know the answers to any questions that students may put to me during this subject.	1	2	3	4	5
Q12_14	Formal teaching time is made available in this subject for students to discuss their changing understanding of the subject.	1	2	3	4	5
Q12_15	I feel that it is better for students in this subject to generate their own notes rather than always copy mine.	1	2	3	4	5
Q12_16	I feel a lot of teaching time in this subject should be used to question students' ideas.	1	2	3	4	5

Note: Items Q12_1 and Q12_13 were removed to increase subscale reliabilities.

REFERENCES

Adams, K. A. (2002). *What colleges and universities want in new faculty*. Washington, D.C.: Association of American Colleges and Universities.

Ary, D., Cheser Jacobs, L., Razavieh, A., & Sorensen, C. (2006). *Introduction to Research in Education* (7th ed.). Belmont, CA: Thomson Wadsworth.

Austin, A. E. (2002). Preparing the Next Generation of Faculty: Graduate School as Socialization to the Academic Career. *The Journal of Higher Education, 73*(1), 94-122. doi: 10.1353/jhe.2002.0001

Bailey, J. G. (1999). Academics' motivation and self-efficacy for teaching and research. *Higher Education Research & Development, 18*(3), 343-359. doi: 10.1080/0729436990180305

Bandura, A. (1977a). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215. doi: 10.1037/0033-295x.84.2.191

Bandura, A. (1977b). *Social learning theory*. Englewood Cliffs, N.J.: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: the exercise of control*. New York, NY: W.H. Freeman.

Bembenutty, H. (2009). Three Essential Components of College Teaching: Achievement Calibration, Self-Efficacy, and Self-Regulation. *College Student Journal, 43*(2), 562-570.

Bieber, J. P., & Worley, L. K. (2006). Conceptualizing the academic life: Graduate students' perspectives. *The Journal of Higher Education, 77*(6), 1009-1035. doi: 10.1353/jhe.2006.0046

Boice, R. (1991). New Faculty as Teachers. *Journal of Higher Education, 62*(2), 150-173.

Boyle, P., & Boice, B. (1998). Systematic Mentoring for New Faculty Teachers and Graduate Teaching Assistants. *Innovative Higher Education, 22*(3), 157-179. doi: 10.1023/A:1025183225886

Bray-Clark, N., & Bates, R. (2003). Self-Efficacy Beliefs and Teacher Effectiveness: Implications for Professional Development. *Professional Educator, 26*(1), 13-22.

Chang, T. S., Lin, H. H., & Song, M. M. (2011). University faculty members' perceptions of their teaching efficacy. *Innovations in Education and Teaching International, 48*(1), 49-60. doi: 10.1080/14703297.2010.543770

Chang, T. S., McKeachie, W., & Lin, Y. G. (2010). Faculty perceptions of teaching support and teaching efficacy in Taiwan. *Higher Education: The International Journal of Higher Education and Educational Planning, 59*(2), 207-220.

Csikszentmihalyi, M. (1997). Finding flow. *Psychology Today, 30,* 46-48+.

DeNeef, A. L., & Goodwin, C. D. W. (Eds.). (2007). *The academic's handbook* (3rd ed.). Durham, NC: Duke University Press.

Dunkin, M. J. (1995). Concepts of teaching and teaching excellence in higher education. *Higher Education Research & Development, 14*(1), 21-33. doi: 10.1080/0729436950140103

Enders, C. K. (2006). A primer on the Use of Modern Missing-Data Methods in Psychosomatic Medicine Research. *Psychosomatic Medicine, 68,* 427-436. doi: 10.1097/01.psy.0000221275.75056.d8

Field, A. P. (2009). *Discovering statistics using SPSS* (3rd ed.). Los Angeles, CA: Sage Publications.

Finder, A. (2007). Decline of the Tenure Track Raises Concerns at Colleges, *New York Times (1923-Current file),* p. 2. Retrieved from http://search.proquest.com/docview/433720575

Fives, H., & Looney, L. (2009). College instructors' sense of teaching and collective efficacy. *International Journal of Teaching and Learning in Higher Education, 20*(2), 182-191.

Gehlbach, H., & Brinkworth, M. E. (2011). Measure twice, cut down error: A process for enhancing the validity of survey scales. *Review of General Psychology, 15*(4), 380-387. doi: 10.1037/a0025704

Gow, L., & Kember, D. (1993). Conceptions of teaching and their relationship to student learning. *British Journal of Educational Psychology, 63*(1), 20-23. doi: 10.1111/j.2044-8279.1993.tb01039.x

Heppner, M. J. (1994). An empirical investigation of the effects of a teaching practicum on prospective faculty. *Journal of Counseling & Development, 72*(5), 500-507. doi: 10.1002/j.1556-6676.1994.tb00980.x

Kelderman, E. (2012). States push even further to cut spending on colleges. The Chronicle of Higher Education. Retrieved March 19, 2013, 2013, from http://chronicle.com/article/States-Push-Even-Further-to/130416/

Kelderman, E. (2013). College education is expected to remain a high priority for states. The Chronicle of Higher Education. Retrieved March 19, 2013, 2013, from http://chronicle.com/article/College-Education-Is-Expected/136427/

Kember, D., & Gow, L. (1994). Orientations to teaching and their effect on the quality of student learning. *The Journal of Higher Education, 65*(1), 58-74. doi: 10.2307/2943877

Kim, E. (2009). Beyond language barriers: Teaching self-efficacy among East Asian international teaching assistants. *International Journal of Teaching and Learning in Higher Education, 21*(2), 171-180.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: Guilford Press.

Larock, J. D. (2012). Education at a Glance: OECD Indicators 2012 Retrieved 15 June, 2013

Lindblom-Ylänne, S., Trigwell, K., Nevgi, A., & Ashwin, P. (2006). How approaches to teaching are affected by discipline and teaching context. *Studies in Higher Education, 31*(3), 285-298. doi: 10.1080/03075070600680539

Messick, S. (1995). Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *American Psychologist, 50*(9), 741-749. doi: 10.1037/0003-066x.50.9.741

Mills, N. (2011). Teaching assistants' self-efficacy in teaching literature: Sources, personal assessments, and consequences. *The Modern Language Journal, 95*(1), 61-80. doi: 10.1111/j.1540-4781.2010.01145.x

Morris, D. B., & Usher, E. L. (2011). Developing teaching self-efficacy in research institutions: A study of award-winning professors. *Contemporary Educational Psychology, 36*(3), 232-245. doi: 10.1016/j.cedpsych.2010.10.005

Murphy, K. R. (2005). *Psychological testing: principles and applications* (6th ed.). Upper Saddle River, N.J.: Pearson Prentice Hall.

Nugent, K. E., Bradshaw, M. J., & Kito, N. (1999). Teacher self-efficacy in new nurse educators. *Journal of Professional Nursing, 15*(4), 229-237. doi: 10.1016/S8755-7223(99)80009-X

Nyquist, J. D., Manning, L., Wulff, D. H., Austin, A. E., Sprague, J., Fraser, P. K., . . . Woodford, B. (1999). On the road to becoming a professor. *Change, 31*(3), 18. doi: 10.1080/00091389909602686

OECD. (2013). Education at a Glance 2013 Retrieved 15 June, 2013

Oliff, P., Palacios, V., Johnson, I., & Leachman, M. (2013). Recent Deep State Higher Education Cuts May Harm Sutdents and the Economy for Years to Come (pp. 20): Center on Budget and Policy Priorities.

Pedhazur, E. J. (1997). *Multiple regression in behavioral research* (3rd ed.). New York: Thomson Learning, Inc.

Penny, A. R. (2004). Responding to students' views about university teaching: The experience of teachers in Jamaica. *International Journal of Educational Development, 24*(6), 667-676. doi: 10.1016/j.ijedudev.2004.03.004

Postareff, L., Lindblom-Ylanne, S., & Nevgi, A. (2008). A follow-up study of the effect of pedagogical training on teaching in higher education. *Higher Education: The*

International Journal of Higher Education and Educational Planning, 56(1), 29-43.

Postareff, L., Lindblom-Ylänne, S., & Nevgi, A. (2007). The effect of pedagogical training on teaching in higher education. *Teaching and Teacher Education: An International Journal of Research and Studies, 23*(5), 557-571. doi: 10.1016/j.tate.2006.11.013

Poulou, M. (2005). Educational psychology within teacher education. *Teachers and Teaching: Theory and Practice, 11*(6), 555-574. doi: 10.1080/13450600500293241

Prieto, L. R., & Altmaier, E. M. (1994). The relationship of prior training and previous teaching experience to self-efficacy among graduate teaching assistants. *Research in Higher Education, 35*(4), 481-497. doi: 10.1007/bf02496384

Prieto, L. R., & Meyers, S. A. (1999). Effects of training and supervision on the self-efficacy of psychology graduate teaching assistants. *Teaching of Psychology, 26*(4), 264-266. doi: 10.1207/s15328023top260404

Prosser, M., & Trigwell, K. (1999). *Understanding learning and teaching : The experience in higher education*. Buckingham [England]; Philadelphia, PA: Society for Research into Higher Education & Open University Press.

Schafer, J. L., & Olsen, M. K. (1998). Multiple Imputation for Multivariate Missing-Data Problems: A Data Analyst's Perspective. *Multivariate Behavioral Research, 33*(4), 545-571. doi: 10.1207/s15327906mbr3304_5

Schunk, D. H. (1990). Goal setting and self-efficacy during self-regulated learning. *Educational Psychologist, 25*(1), 71-86. doi: 10.1207/s15326985ep2501_6

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: capturing an elusive construct. *Teaching and Teacher Education, 17*(7), 783-805. doi: 10.1016/s0742-051x(01)00036-1

Tschannen-Moran, M., Hoy, A. W., & Hoy, W. K. (1998). Teacher efficacy: Its meaning and measure. *Review of Educational Research, 68*(2), 202-248.

Umbach, P. D. (2007). How effective are they? Exploring the impact of contingent faculty on undergraduate education. *The Review of Higher Education, 30*(2), 91-123. doi: 10.1353/rhe.2006.0080

Woolfolk Hoy, A. (2004). Self-efficacy in college teaching. *Essays on Teaching Excellence: Toward the Best in the Academy, 15*(8).

Worthington, R. L., & Whittaker, T. A. (2006). Scale Development Research: A Content Analysis and Recommendations for Best Practices. *The Counseling Psychologist, 34*(6), 806-838. doi: 10.1177/0011000006288127

Young, S. L., & Bippus, A. M. (2008). Assessment of graduate teaching assistant (GTA) training: A case study of a training program and its impact on GTAs. *Communication Teacher, 22*(4), 116-129. doi: 10.1080/17404620802382680

VITA

Marsha Jean McCartney was born and raised in Coffeyville, Kansas, where she graduated from Field Kindley Memorial High School in 1994. She completed a Bachelor of Arts in English at Fort Hays State University in 2003. After working for the University of Missouri in administrative positions for a number of years, she began work on a Master's degree in 2008. She completed a Master of Education in Educational Psychology with a Certificate in Higher and Continuing Education Administration at the University of Missouri in December 2009. Marsha began work on her Ph.D. in Educational Psychology in 2010, with her concentration area in Cognition and Development. Marsha will also receive a Minor in College Teaching along with her Ph.D. in May 2014. Marsha's research interests include learning in higher education, faculty teaching development, and the achievement gap in K-20 education.