



Developing teaching self-efficacy in research institutions: A study of award-winning professors

David B. Morris^{a,*}, Ellen L. Usher^b

^a Department of Educational Studies, St. Mary's College of Maryland, United States

^b Educational, School, and Counseling Psychology, University of Kentucky, United States

ARTICLE INFO

Article history:

Available online 4 November 2010

Keywords:

Motivation
Self-efficacy
Teacher self-efficacy
Sources of self-efficacy
Higher education

ABSTRACT

The purpose of this study was to assess the sources of award-winning research professors' (six women; six men) teaching self-efficacy through the framework of Bandura's (1986) social cognitive theory. Semi-structured interviews revealed that mastery experiences and social persuasions were particularly influential sources of self-efficacy and that these sources tended to be closely related. Professors reported that their self-efficacy had generally stabilized within their first few years of assuming a tenure-track position. Participants framed negative events in adaptive ways that had little cost to their teaching self-efficacy.

© 2010 Elsevier Inc. All rights reserved.

1. Introduction

Many elementary and secondary education programs offer multiple opportunities for preservice teachers to learn and practice pedagogical skills, but institutions of higher learning in the United States tend to underemphasize the instructional training of university teachers and professors (Bess, 1997; Wulff, Austin, Nyquist, & Sprague, 2004). In the absence of state or national mandates for the pedagogical preparation of university instructors, institutions of higher education have been inconsistent in how they train their teachers, if they do so at all (Prieto & Meyers, 1999; Tanner & Allen, 2006). Scholars such as Biggs (1999) and Kreber (2001) have provided suggestions for professional development in higher education, but implementation of such initiatives has been inconsistent. To an extent, this oversight reflects the additional role of the university professor as not only a teacher but a researcher. In most cases, the amount of time allotted to prepare graduate students for their role as researchers is disproportionately greater than the time spent preparing them to instruct college-level classes (Gaff & Pruitt-Logan, 1998). And once employed, professors at research institutions typically find that tenure, promotion, salary, and external funding are more often tied to their research than to their teaching (Fairweather, 1996; Hearn, 1999; Sutz, 1997). The demand for research at these schools may lead professors to feel that the teaching role is undervalued and to concentrate less on their instructional duties (Olson & Einwohner, 2001; Serow, 2000).

Despite the burden of these pressures and their limited pedagogical preparation, many professors at research universities manage to become outstanding teachers. In this study, we examined the psychological journey of such professors by asking them to describe the evolution of their beliefs about their teaching capabilities as they have moved through the professoriate. Self-efficacy, defined as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3), is especially central to the exercise of human agency. Unless people believe they can accomplish desired tasks, they have little incentive to act. Such beliefs have been found to predict the effort people put forth, how well they persevere when faced by obstacles, how effectively they monitor and motivate themselves, what they achieve, and the choices they make in life (Bandura, 1977, 1986, 1997).

Teachers' self-efficacy, which refers to teachers' beliefs about what they can do in terms of a particular teaching task or instructional context, has likewise been shown to influence motivational and behavioral processes (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Self-efficacious instructors typically plan and organize more effectively, are more likely to employ and seek out engaging instructional strategies, put forth greater effort in motivating their students, and are more resilient when faced by obstacles than are teachers with lower self-efficacy (Ashton & Webb, 1986; Midgley, Feldlaufer, & Eccles, 1988; Tschannen-Moran et al., 1998; Woolfolk Hoy & Davis, 2006). Moreover, students of teachers with higher self-efficacy tend to have higher expectations of themselves and perform better on standardized tests (Allinder, 1995; Ross, Hoga-boam-Gray, & Hannay, 2001).

Although a growing body of research attests to the benefits associated with teaching self-efficacy, less is known about how

* Corresponding author. Address: Department of Educational Studies, St. Mary's College of Maryland, St. Mary's City, MD 20686, United States.

E-mail address: dbmorris@smcm.edu (D.B. Morris).

teaching self-efficacy is cultivated. What makes a teacher believe that he or she can be successful in the complex task of teaching? We next provide a theoretical background of the hypothesized sources of self-efficacy and review findings from a small body of research on these sources as they operate within the field of teaching.

2. Sources of teaching self-efficacy

According to Bandura's (1986, 1997) social cognitive theory, individuals develop their self-efficacy by attending to four sources of capability-related information. First, individuals interpret the results of their own actions. Successes are often interpreted as *mastery experiences* that can boost self-efficacy, whereas perceived failure typically lowers it. *Vicarious experiences* provide individuals with an opportunity to witness the successes and failures of others and may thereby alter self-efficacy. The third source of efficacy-relevant information comes from the *social persuasions* individuals receive from others. Evaluative feedback can be particularly useful when a task is ill defined or lacks objective criteria. Finally, *physiological and affective states*, including stress, fatigue, anxiety, and mood can also influence perceived capability.

Little is known about the manner in which university professors might draw on these four informational sources as they develop confidence in their instructional skills and practices (Burton, Bamberg, & Harris-Boundy, 2005; Tschannen-Moran & Woolfolk Hoy, 2007). Nevertheless, research on the sources of teaching self-efficacy in the context of primary and secondary education may offer some indication of how college instructors' efficacy beliefs develop. We therefore summarize what is known about how the four sources of self-efficacy operate within this former context.

2.1. Mastery experience

Research on the sources of teaching self-efficacy has focused primarily on teachers' mastery experience (e.g., Chacon, 2005; Palmer, 2006; Tschannen-Moran & Woolfolk Hoy, 2007; Woolfolk Hoy & Burke Spero, 2005). Such a focus seems merited, as masterful experiences are thought to be the strongest source of self-efficacy (Bandura, 1997) and have likewise emerged as a powerful predictor of instructors' confidence (Poulou, 2007; Tschannen-Moran & Woolfolk Hoy, 2007). The manner in which mastery experience has been assessed has varied considerably, however, which has made its relationship to teaching self-efficacy unclear. For example, scholars who have used previous teaching experiences (e.g., period of time spent as a student teacher) as a mastery experience have reported that actual experience can raise (Gurvitch & Metzler, 2009), lower (Capa Aydin & Woolfolk Hoy, 2005), or have no significant influence (Cantrell, Young, & Moore, 2003) on teachers' self-efficacy. Researchers have not solicited teachers' own appraisals of their student teaching experiences, however, which might explain these inconsistent findings. Without evaluating teachers' interpretations of their experiences, little can be known about whether the experiences were perceived as efficacy-raising or lowering events (Bandura, 1997).

Some researchers have examined mastery experience by exploring participants' interpretations of their past teaching experiences (e.g., Palmer, 2006; Poulou, 2007). Others have asked teachers to rate their level of satisfaction with their professional performance (Tschannen-Moran & Woolfolk Hoy, 2007; Weaver Shearn, 2008; Woolfolk Hoy & Burke Spero, 2005). Correlations between mastery experience measured in this manner and teaching self-efficacy have ranged from .36 to .50. Still other researchers have attempted to show a relationship between proxies for content knowledge (e.g., degree attainment, course completion, linguistic

fluency) and self-efficacy (Chacon, 2005; Enochs, Scharmann, & Riggs, 1995; Milner & Woolfolk Hoy, 2003).

Experiences that lead to changes in teaching self-efficacy may be as diverse and complex as the tasks required for successful teaching and may depend on the context in which teaching takes place. The variation with which mastery experience has been conceptualized and measured in the teaching domain might also indicate that qualitative studies provide a better lens for viewing how interpretations of one's past experiences raise or lower self-efficacy.

2.2. Vicarious experience

Bandura (1997) has shown that individuals rely not only on their direct experiences as indicators of what they can do but on the vicarious experiences they undergo as they observe the actions of models. Although social models of teaching abound during one's own learning experiences and in the media, many teachers-in-training have relatively few opportunities to observe fellow teachers whose experiences they would be most likely to identify with and evaluate (Bandura, 1997; Mulholland & Wallace, 2001). Some scholars have evaluated the comparative appraisals teachers make in reference to their peers (e.g., Woolfolk Hoy & Burke Spero, 2005), but only in one study have researchers reported a relationship between these comparative judgments and self-efficacy (Poulou, 2007).

The vicarious influence of mentor teachers on preservice teachers' sense of efficacy is similarly elusive. Researchers who have measured vicarious experience in terms of teachers' perceptions of their teaching mentor's effectiveness as an instructor or as a mentor have found no relationship between this type of vicarious experience and teachers' self-efficacy (Capa Aydin & Woolfolk Hoy, 2005; Rots, Aelterman, Vlerick, & Vermeulen, 2007). However, students who perceived their mentors to be highly self-efficacious were themselves more confident after completing their student teaching (Knoblauch & Woolfolk Hoy, 2008).

Some researchers have suggested that vicarious experiences may be powerful but subtle, such as when a teacher hears a colleague express ability-related doubts in the workroom (Mulholland & Wallace, 2001). Still others contend that exposing new teachers to competent models during training offers one important means of enhancing their self-efficacy (Bruce & Ross, 2008). However, as Usher and Pajares (2008) pointed out in their review of the literature on the sources of students' self-efficacy, vicarious experiences have proven difficult to measure and their relative influence on self-efficacy is still unclear.

2.3. Social persuasions

Scholars who have investigated the relationship between social persuasions and teaching self-efficacy have typically found that the evaluative messages instructors receive from others affect their perceived capability. However, the measures used to assess this source have also differed markedly. Heppner (1994) reported that, for graduate teaching assistants engaged in a teaching practicum, social persuasions were the most commonly cited source of self-efficacy and were rated as highly influential. On the other hand, some teachers have identified their students' enthusiasm as a socially persuasive source of their efficacy beliefs (Mulholland & Wallace, 2001; Poulou, 2007). Perceived student enthusiasm provides a tenuous measure of social persuasions, however, and may be better categorized as a measure of perceived mastery than as the sort of persuasive influence that Bandura (1997) intended. Researchers who have assessed social persuasions in terms of perceived support from the community, administration, colleagues, and parents have reported a weak or moderate relationship between perceived

support and teaching self-efficacy (Capa Aydin & Woolfolk Hoy, 2005; Tschannen-Moran & Woolfolk Hoy, 2007).

2.4. Physiological and affective states

Few researchers have addressed the direct influence of physiological and affective states on teaching self-efficacy and tend to report that these states provide little ability-related information (e.g., Mulholland & Wallace, 2001) or a weaker relationship to self-efficacy than the other three hypothesized sources (Poulou, 2007). Graduate instructors also rated physiological states as having relatively little influence on their teaching self-efficacy (Heppner, 1994). A professional development program designed by Ross and Bruce (2007) to minimize teachers' stress and anxiety enhanced teachers' confidence to manage classes, but the program had no significant effect on their confidence to motivate students or to employ instructional strategies.

As our review reveals, relatively few efforts have been made to examine the influence of Bandura's (1997) four hypothesized sources on the efficacy beliefs of teachers at any level. Those who have investigated the sources have used quite different methods and measures in doing so. Furthermore, Bandura (1997) contended that self-efficacy beliefs can develop differently according to stage of life or level of experience. It is unlikely that the efficacy-building experiences most salient to K-12 teachers will mirror those reported by university research professors. What little is known about the sources of university instructors' teaching self-efficacy is largely the product of research on graduate teaching assistants (e.g., Heppner, 1994; Prieto & Altmaier, 1994; Prieto & Meyers, 1999). However, not all graduate teaching assistants go on to become professors at research universities, and those who eschew academia altogether may do so because they lack self-efficacy to begin with (Woolfolk Hoy, 2004).

3. Purpose of the study

The purpose of the present study was to investigate the sources of teaching self-efficacy among a select subset of professors who are employed at research universities and who have been recognized for excellence in teaching. We first sought to determine the relative weight that these professors assigned to the sources of their teaching self-efficacy. As a second focus, we asked professors to retrospect about periods of their lives that were particularly critical in the evolution of their teaching self-efficacy. Lastly, we evaluated how these award-winning instructors handled the negative experiences in the classroom that inevitably arise, as there is some evidence that individuals who excel in a domain have psychologically adaptive ways to handle negative events (Helsing, 2007; Winograd, 2003).

The recent emphasis on positive psychology has prompted researchers to investigate the "conditions and processes that contribute to the flourishing or optimal function of people, groups, and institutions" (Gable & Haidt, 2005, p. 103). It is this emphasis that guided us to select award-winning professors for the present study. Exploring positive rather than maladaptive functioning can yield important lessons about resourcefulness, resilience, and psychological well-being (Pajares, 2009; Seligman & Csikszentmihalyi, 2000). Focusing on award-winning professors in research universities can be similarly instructive. We acknowledge that teaching awards do not hold universal meaning and that they should not be viewed as the sole criterion for determining the best teachers. However, they do offer one benchmark by which excellence in teaching has been externally recognized, at least at the research universities we identified for this study. The ways in which skilled instructors make sense of their teaching and the events related to it

may provide clues for how others can persevere in the relative absence of external motivators.

We have selected Bandura's (1986) social cognitive theory as the framework for the study because it provides an expansive and well-established structure from which understandings about psychological functioning can be gleaned. The construct of self-efficacy, in particular, has been studied extensively in the domain of education (Klassen & Usher, 2010). As previously discussed, teaching self-efficacy is associated with a vast array of adaptive functions (Woolfolk Hoy & Davis, 2006). Therefore, the construct provides a valuable lens with which to explore the psychology of teachers. Moreover, an investigation of the antecedents of self-efficacy can be guided by Bandura's (1997) detailed descriptions of the hypothesized sources. Research on both the sources and on teaching self-efficacy has grown, but there have been few studies of the sources of teaching self-efficacy. In this study, we focus on teaching in the research university setting, a context overlooked in most self-efficacy research.

4. Method

4.1. Participants and setting

Participants in the study were 12 associate and full professors (six women; six men) from five universities in the southeastern United States identified by the Carnegie Foundation for the Advancement of Teaching as high research activity universities (i.e., RU/H). Information on the participants' background, including their field of study, age, race/ethnicity, years of teaching experience, and teaching recognitions can be found in Table 1.

4.2. Procedure

The first step in our recruitment procedure was to identify five research-intensive university settings so as to examine self-efficacy within a context that requires most faculty members to juggle high research expectations with the routine demands of teaching. We next combed through online materials from each university to identify professors who had received at least two university-wide teaching awards. We used teaching awards as a selection criterion because they serve as a one index of exceptional teaching. We verified that awards had been contingent on nomination and review by committees composed of students, alumni, faculty, previous winners, and/or administrators who looked for evidence of superior teaching in multiple ways (e.g., student evaluations, letters of nomination, faculty observations). Award-winning professors were invited to participate in the study through a phone call or email from the first author. We recruited participants with the goal of achieving a racially-diverse sample of six women and six men. Professors were contacted incrementally until the desired sample was achieved. Twenty-nine professors were contacted, and most responded. Those who declined to participate cited illness, family emergencies, or time constraints as reasons why they could not become involved. One professor contacted had moved to a new job elsewhere.

Two interviews, one in person and a second by phone, were conducted with each participant. Professors selected the location of the first interview, typically an office or another closed room. Participants' confidentiality was preserved through the use of a pseudonym, and all were given access to interview transcripts and drafts of the study's results. After the professors had signed formal consent documents, the interviews were taped using a digital recorder. First-round interviews lasted about 90 min and were transcribed verbatim. After the initial coding of transcripts, participants were again contacted for a follow-up phone interview that

Table 1
Participants' background.

Pseudonym	Field	Age	Sex	Race	Years of teaching at any level	Years of undergraduate teaching	Teaching recognitions
Lawrence	Philosophy	Late 40s	Male	White	30	23	Two university-wide awards. Distinguished teaching chair. Several additional teaching awards
Clara	Art History	Early 50s	Female	White	35	20	The only two university-wide awards provided by university. Several additional teaching awards
Winston	History	Mid 60s	Male	White	42	42	The only two university-wide awards provided by university (one of only two professors to have won both). Several additional teaching awards
Marie	Modern Language	Early 50s	Female	White	30	28	The only two university-wide awards provided by university. Several additional teaching awards
William	Education	Late 50s	Male	White	35	18	Three university-wide awards. National teacher of the year as a K-12 educator. Several additional teaching awards
Kristine	Microbiology	Mid 60s	Female	White	34	34	Two university-wide awards. Several additional teaching awards
James	English	Early 60s	Male	African American	40	37	Four university-wide awards. Term teaching chair for two terms. Several additional teaching awards
Ruthe	Social Science ^a	Early 50s	Female	White	36	27	Three university-wide awards. Several additional teaching awards
Stephen	Physics	Late 30s	Male	White	17	15	Two university-wide awards. Several additional teaching awards
Virginia	English	Mid 50s	Female	White	31	31	The only two university-wide awards provided by university. Several additional teaching awards
Leonard	Journalism	Mid 40s	Male	Indian American	18	18	Three university-wide awards. National teaching chair. Several additional teaching awards
Jane	English	Early 50s	Female	White	30	30	The only two university-wide awards provided by university. Several additional teaching awards

^a Ruthe requested that she be listed only as a social scientist to ensure anonymity.

lasted approximately 20 min. The second interview was used to clarify certain points from the initial meeting and to provide participants with an opportunity to replicate or modify their previous answers.

4.3. Interview protocol

Qualitative retrospective studies of the antecedents of self-efficacy have been used to explore experiences that influence individuals' motivation and performance (e.g., Milner & Woolfolk Hoy, 2003; Mulholland & Wallace, 2001; Usher, 2009; Zeldin & Pajares, 2000). In consultation with this work, we developed a semi-structured interview protocol (see Table 2) to address the critical questions of the investigation. This protocol was adapted from those used by Usher (2009) and Zeldin and Pajares (2000). We followed a case study format, which was guided first and foremost by our theoretical framework (Merriam, 1998). Therefore, the bulk of our interview questions were squarely aimed at soliciting information related to the four sources identified by Bandura (1997). The semi-structured nature of the interviews permitted us to explore what Stake (1995) referred to as "etic" issues derived from previous research and theory as well as novel "emic" issues expressed by the participants. That is, although most questions were designed to tap the four sources of self-efficacy hypothesized by Bandura (1997), other probes were included to address potential alternative sources that emerged.

All questions used in the protocol were designed to allow for elaborate rather than simplistic answers (Stake, 1995). Because the professors specialized in a variety of disciplines, we avoided using technical terminology to preserve clarity of participant answers (Merriam, 1998). For example, Bandura's (1997) notion of "self-efficacy" was replaced with phrases such as "confidence in your ability." Questions were crafted to ensure that they were neutral rather than leading participants toward a particular conclusion (Patton, 2002).

Questions were ordered to begin with basic descriptive information before addressing information specific to the study (Bogdan & Biklen, 2003; Merriam, 1998). We next asked professors to gauge the relative value they placed on their teaching, research, and departmental duties. How participants contrasted their values with the perceived values of their administration provided insights into the perceived pressures professors faced. We also asked professors to describe their level of teaching self-efficacy. This portion of the introduction (Questions 1–5) was critical because many questions that followed required participants to discuss the basis for this judgment.

We then asked participants to identify the sources of their teaching self-efficacy without regard to any particular source (Question 6). By using this general approach before exploring those sources hypothesized by Bandura (1997), we were able to examine which antecedents were most readily available to participants without first biasing their interpretations in favor of our particular theoretical framework. Remaining questions were crafted to explore how participants interpret and weigh efficacy-relevant information from the four hypothesized sources (Questions 7–10), how that interpretation has influenced their self-efficacy and behaviors (Questions 16 and 17), how they have appraised negative experiences related to teaching (Questions 12 and 15), and how their self-efficacy beliefs have developed and changed over time (Questions 11, 13, 14).

4.4. Analysis

Preliminary analyses followed Merriam's (1998) recommendations for the initial coding of case study data. We began by developing a start list of nine codes (i.e., Mastery Experiences, Vicarious Experiences, Social Persuasions, Physiological and Affective States, Alternative Sources, Sensitive Development Periods, Interpretation Heuristics, Most Powerful Source, Other Sources). The first author transcribed all interviews and assigned codes to line or paragraph of text using multi-colored highlighting and comment balloons. For

Table 2
Interview protocol.

-
1. Background information
 - When and where did you receive your bachelor's degree?
 - When, where, and in what field did you receive your doctorate?
 - Could you briefly take me through your post-doctoral career trajectory?
 - When did you begin teaching undergraduates?
 2. What experiences related to teaching did you have prior to teaching at the college level?
 3. How many undergraduate classes per semester do you usually teach?
 - What undergraduate courses do you typically teach and how many students typically enroll in each?
 4. If you could rate how much value you place on your teaching, research, and service in terms of percentages, what percentage would you allot to each of these duties? For example, if you valued all duties equally, you would allot 33.3% to research, 33.3% to teaching, and 33.3% to service.
 - In terms of percentages, how much value do you think university administrators at this university would place on these three?
 5. If I asked you to rate your confidence in teaching *undergraduate classes in your discipline* on a scale of 0–10, what number would you select?
 6. Can you tell me the reasons that you selected this number?
 - Which of the things you mentioned do you believe had the most powerful influence on your confidence?
 - Why?
 7. What experiences in your professional life as a teacher have made you more confident as a teacher of undergraduates?
 - What experiences in your life as a teacher have lowered your confidence as an instructor?
 - How do you know that a given lesson has gone well?
 - Does that influence your confidence as an instructor?
 - Explain.
 - How do you know that a given lesson has not gone well?
 - Does that influence your confidence as an instructor?
 - Explain.
 8. According to the theory I am exploring in this study, there are many vicarious influences on the confidence we have in our teaching. These may include things we've seen, things we've read, or others we have observed. Can you pinpoint some powerful vicarious influences on your teaching confidence?
 9. Tell me some of the things other people have said about your teaching that you particularly recall.
 - Of the things that people have said, which ones stand out for you as positive comments that boosted your confidence?
 - Why did they boost your confidence?
 - Of the things that people have said, which ones stand out for you as negative comments that decreased your confidence?
 - Why did they decrease your confidence?
 10. Identify for me some of the most prominent feelings and emotions that you experience when you are teaching and when you are preparing to teach.
 - Which of these feelings or emotions would you say have raised your confidence in teaching undergraduates?
 - Which of these feelings or emotions would you say have decreased your confidence?
 - Which feelings or emotions have most profoundly influenced your confidence?
 11. Tell me a memorable story that would help me understand how you developed the confidence that you have for teaching undergraduates.
 12. Even highly recognized teachers like you occasionally run into teaching challenges and setbacks. Tell me about some of the setbacks you have faced in your teaching.
 - How do you deal with these sorts of setbacks?
 - Do they influence your teaching confidence? Explain.
 13. Can you identify the time when your confidence in your teaching solidified? That is, at what point did you begin to have good sense that you were or were not a capable teacher?
 14. Were there specific periods in your life or career that were particularly critical in the development of your confidence as a teacher?
 15. We may have already touched on this but I would like to revisit this if you don't mind. What is the most negative teaching-related experience that you've had?
 - How did you respond?
 - Did it affect your confidence? Explain.
 - Did this negative experience affect your subsequent teaching performances?
 16. Are there other things we have not addressed that you feel influenced your confidence as a teacher of undergraduates?
 17. I would like to close our chat by asking you to think broadly about your confidence as a teacher of undergraduates and give me what you believe have been the three most powerful influences on your teaching confidence in order of the power you believe each of their influences has exercised. Begin with the most powerful influence on your confidence.
-

example, Kristine's comment that "it does boost your confidence when you have former students tell you that they did in fact get a lot out of the class" was highlighted and labeled as a social persuasion.

Once all transcripts were coded, a descriptive, single-case matrix was created for each code. Each matrix included relevant results from the interviews and corresponding line numbers from transcripts. For example, in the Sensitive Development Periods matrix, the cell for one participant, Kristine, included the summative descriptor of her responses: "things that once decreased her confidence no longer do because she has developed a 'thicker skin' [Transcript 1; lines 638–685]." Each themed matrix contained 12 rows, each representing a study participant, to ensure clear presentation of the data and to examine the internal consistency of each professor's response. Separate columns were designated for men and women in the study, permitting us to compare and contrast responses by gender. We based this decision on previous reports that men and women may differ in how they weigh and interpret the hypothesized sources of self-efficacy (Usher & Pajares, 2008; Zeldin, Britner, & Pajares, 2008).

Merriam (1998) has suggested that "a particular unit of data should fit into only one category" (p. 184). However, rigid categorization of an efficacy-relevant experience provides an incomplete picture of the multifaceted and overlapping nature of the sources of self-efficacy described by Bandura (1997, see Chapter 3). For example, a comment on an end-of-course evaluation may be interpreted as both a mastery experience and a social persuasion. In such situations, we initially included the data in both matrixes and later decided which placement was more fitting based on Bandura's descriptions of the sources and consultation with an expert (F. Pajares, personal communication, November 12, 2008). Memos created during data collection and coding were recorded in a journal and used to detect data patterns, cross-matrix codes, and anomalies. Our final step in data analysis was to place all matrices side-by-side horizontally to examine participants' responses across the themes identified. We then organized matrices vertically to examine gender patterns. We followed Miles and Huberman's (1994) guidelines for drawing conclusions from data matrixes to ensure the accuracy and validity of findings. The results of this final level of analysis were documented in a summary matrix that documented key findings.

4.5. Reliability and validity

Stake (1995) suggested that the assertions most critical to a study require the greatest effort toward confirmation. One way in which we substantiated claims about the relationships between sources and teaching self-efficacy was to revisit each transcript to determine whether the relationships were explicitly acknowledged by the participant. Such checks were repeated at designated stages in the analysis and included follow-up e-mail correspondence when necessary. Another way to confirm patterns in the data was to examine whether each participant's statements were replicated in separate interviews.

We used several additional strategies identified by Stake (1995) to maximize validity. First, we relied on "investigator triangulation" in which we asked other researchers familiar with social cognitive theory to look over the data and provide their interpretation, which we compared with our own. In the "theory triangulation" phase, we reviewed findings with individuals outside of our field to determine whether the phenomena could be explained using alternative theoretical viewpoints. We also assessed intercoder reliability by comparing our coding of 34 randomly-selected pages of the transcripts (10% of all transcribed pages) with codes assigned by two graduate students familiar with social cognitive theory and with the start codes assigned in the study. Intercoder reliability,

which was assessed by dividing the number of coding agreements by the total number of agreements and disagreements (Miles & Huberman, 1994), was 91%. Disagreements were resolved by consultation with an expert in the field and with Bandura's (1997) text. Finally, we performed member checks in which we asked participants themselves to examine drafts of the study to evaluate the accuracy of our descriptions. These combined measures helped ensure that our interpretations of the data were consistent with participants' intended meaning and, where applicable, with the social cognitive theoretical framework.

5. Results and discussion

In this section, we present and discuss the results of our qualitative analysis as they pertain to the primary aims of the study. We first present findings related to each of Bandura's (1997) hypothesized sources by examining those sources professors identified as most powerful and most influential in the development of their teaching self-efficacy. We then discuss two other factors pertinent to the development of teaching self-efficacy: sensitive periods in the evolution of these beliefs and professors' interpretations of negative events related to their teaching.

5.1. Sources of self-efficacy

Our primary objective was to examine the relative weight that professors assigned to each of Bandura's (1997) hypothesized sources (i.e., mastery experiences, vicarious experiences, social persuasions, and physiological and affective states) as they referred to how their teaching self-efficacy developed. Our interviews revealed that, when identifying the most powerful sources of their teaching self-efficacy, professors most commonly provided examples of mastery experiences, social persuasions, or a combination thereof. Other sources of self-efficacy were potent for some, though mentioned less frequently. A summary of findings related to the four hypothesized sources is presented in Table 3. We present the results as they relate to each hypothesized source, but, as will be discussed later, these sources were often described in an inter-related manner.

5.1.1. Mastery experience

Mastery experience emerged as a primary source of professors' teaching self-efficacy. In fact, when asked to list the most powerful influences on their confidence, all but one professor mentioned performance-related attainments. However, the types of mastery experiences that participants identified ranged widely, and the degree to which a given event influenced self-efficacy differed according to variables such as the temporal heuristics used in recollection, the manner in which professors defined their role as teachers, and the combinatorial rules they used to integrate information from multiple sources.

Most professors recalled cumulative rather than isolated events when describing the development of their teaching self-efficacy. A single "bad day" was dismissed as an anomaly if they were often experiencing success in the classroom. Instead, the complex history of their experiences, bad or good, influenced their self-judgments. Stephen described his reflective process: "I'm doing enough over-time averaging in my head that daily instances don't shake my confidence, but if it was a repeated pattern in my teaching I would certainly—that would start shaking my confidence." Our findings confirm Bandura's (1997) contention that "repeated performance failures" (p. 81) or successes, not a single event, typically wield the greatest influence on individuals' self-efficacy.

Past experiences did not have to be monolithically framed as either a success or a failure to inform professors' self-efficacy

Table 3
Commonly-identified sources of teaching self-efficacy and interpretative factors.

Source	Types	Interpretative factors
Mastery experiences	<ul style="list-style-type: none"> – Perceived success in past instructional experiences (e.g., “Just having success, that alone made me confident and I was reasonably successful all the way through [my teaching career]” –Lawrence) – Mastery of content (e.g., “Part of the confidence of teaching is that you have a very – you feel very strongly that you know the material. To me that’s basic.” –Kristine) – Mastery of pedagogical skills (e.g., “There’s this bridge between mastering the content and being able to teach content” –Marie) – Students’ Educational and Occupational Attainments (e.g., “When I’m reading their work and I can see breakthroughs . . . that affects my confidence positively” –Virginia) 	<ul style="list-style-type: none"> • Definition of a “good teacher” • Consistency of success or failure
Vicarious experiences	<ul style="list-style-type: none"> – Learning pedagogical skills by observing models (e.g., “The strongest influence on my confidence has been teachers who I had. And when I started teaching what I did was model myself on people who had taught me at college, who I thought were good teachers, who had taught me a lot. I liked the way they engaged with the literature, I like the way they presented it, I like the way they engaged with students; that’s what I set out to do. And then slowly as the years went on out of that modeling came my own style.” –Jane) – Comparisons of oneself to others or to group norms (e.g., “I would see people that were terrible teachers and I would think ‘oh, I could explain what they’re trying to explain much better than this.’ That was where I got my confidence from, actually.” –Ruthe) 	<ul style="list-style-type: none"> • Availability of models • Model similarity • Model effort
Social persuasions	<ul style="list-style-type: none"> – Student comments in the form of informal messages and student evaluations (e.g., “The first time I taught in a class, whenever a class went well, I knew I was a good teacher because the students told me so. So it was not my stupid opinion I was relying on. A lot of students were telling me this.” –Leonard) – Teaching awards (e.g., “getting the awards has helped me because the awards just feel like, you know, markers of success – that even if I teach a slew of bad classes, I know I can teach good classes.” –Jane) – Less explicit social messages (e.g., “It boosts my confidence because [other professors] come to me, and I’m assuming they have some reason to come to me. I mean, why would they come to somebody they thought was a lousy teacher and ask them to give them some pointers on teaching?” –Kristine) 	<ul style="list-style-type: none"> • Perceived sincerity of persuasion • Perceived credibility of persuader • Consistency of persuasions
Physiological and affective states	<ul style="list-style-type: none"> – Nervousness (e.g., “Being nervous would let me know that I was concerned about being effective. I was not nervous, I would be concerned. I would be effective. The nervousness was a good thing. It reaffirmed the confidence.” –James) – Positive physiological states (e.g., “In grad school, I would go and do this recitation section for an hour, and I would leave it feeling energized and that was one of the things that really convinced me I wanted to go into teaching. . . I felt like ‘this is something I’m good at. The students are really glad I’m here. I’m doing a good job.’” –Stephen) 	<ul style="list-style-type: none"> • Ability to self-regulate states

judgments. Simply the knowledge that “I’ve done it before” gave instructors some indication of their present capabilities. For Winston, the information provided by his combined failures and successes was most valuable:

You know how to time the class. You know it’s going to go into an hour and you know where to hit the discussion points. You know where to hit the jokes or the stories. That’s experience . . . obviously the more you do it, the better it’s going to be.

Winston and others were able to translate past experiences into pedagogical knowledge, which in turn influenced their sense of efficacy.

Many professors indicated that their teaching self-efficacy was bolstered by signs that students understood course material and were actively engaged (e.g., asking questions, challenging the instructor). Cues that students were interested in the course (e.g., sending emails to the professor, coming to office hours, talking with the professor after class) or uninterested (e.g., leaving in the middle of class or failing to appear at all) were also cited as indexes of instructional effectiveness.

In addition, professors interpreted students’ body language, both positive (e.g., looking up, smiling, laughing, nodding) and negative (e.g., sleeping, reading newspapers), as they evaluated their teaching performance. Some even construed negative body language in positive ways. For example, Lawrence knew a class was going well when students

asked interested questions, and interesting questions. They leave the class smiling. Attendance is good at an 8:30 class, and as much as they can at 8:30, they’re awake. Their eyes are open, they’re looking at the front of the classroom, that’s a

huge indicator right there. And I know I’m not turning them on when they start to nod off.

James knew he was on track when he saw that students were “flushed” or “sucking [their] teeth” when exploring controversial materials. Such was a good sign “in the sense that they were paying attention.” In his study of accomplished professors, Bain (2004) noted that body language was a critical component of performance evaluation. Other researchers have also reported that students’ nonverbal responsiveness influences college instructors’ sense of efficacy (Mottet, Beebe, Raffeld, & Medlock, 2004).

Some professors we interviewed viewed the accomplishments of their students, such as performances on exams or later professional and personal successes, as the best indicator of their teaching efficacy. For James, teaching is “not just giving information about a subject matter; it’s teaching the whole person and making that person better in some way.” He spoke at length about how his teaching self-efficacy was based largely on his students’ academic and occupational success. The influence of students’ attainments on teaching self-efficacy varied according to how many students succeeded or failed, however. For example, Stephen mentioned that he only begins to question his teaching capabilities when “more than three [students] don’t do as well as I would like them to do” on final exams. Guskey (1987) similarly found that teachers felt less personal responsibility for the failures of one student than for the failures of a group of students, and thus were less likely to report a decrease in their teaching self-efficacy.

Self-efficacy judgments were also linked to how knowledgeable professors felt in their particular content area. Leonard expressed his conviction that the instructor should be “the knowledge expert” and described feeling inefficacious in situations where his

content knowledge was tenuous. In fact, content mastery was central to most participants' self-efficacy. As Kristine put it, "part of the confidence of teaching is that you feel very strongly that you know the material. To me that's basic." Stephen was certain that his self-efficacy would be much lower if he were asked to teach a course tangential to his expertise. As this observation attests, teaching self-efficacy must be viewed as subject-matter specific: Content knowledge is so central to individuals' teaching self-efficacy that instructors may believe themselves capable of teaching one subject well but not another (Tschannen-Moran et al., 1998). Researchers have similarly found that preservice K-12 teachers who had completed extensive content-specific coursework (i.e., science) during their schooling reported higher confidence for teaching science than did those who had taken fewer content area classes (Enochs et al., 1995).

In addition to content knowledge, professors indicated that their self-efficacy was influenced by their pedagogical knowledge, defined as the "principles and strategies of classroom management and organization that appear to transcend subject matter" (Shulman, 1987, p. 8). As Marie aptly put it, "there's this bridge between mastering the content and being able to *teach* content." As previously discussed, pedagogical knowledge can be gleaned from past experiences. Four professors reported that serving on teaching-related committees enabled them to share pedagogical ideas and enhanced or reaffirmed their self-efficacy. For Virginia, being involved in such groups helped her "learn strategies" that enhanced her confidence because she could "really see how [a given technique] is going to work the next time I teach this class." Professional development programs that strengthen instructors' pedagogical skills have been shown elsewhere to enhance teaching self-efficacy (Chacon, 2005; Henson, 2001).

5.1.2. Vicarious experiences

Several professors listed vicarious experiences as the most powerful influence on their teaching self-efficacy. However, relatively few could think of many events in which the success or failure of a model directly influenced their beliefs about their own teaching capabilities. This is not to say that professors did not benefit from vicarious learning opportunities, however. Many claimed that observing capable teachers offered an opportunity to learn techniques and strategies to employ as well as those to avoid. Several also indicated that they made referential comparisons to peers when assessing their teaching efficacy. Factors such as model similarity and availability influenced participants' selection of and attention to vicarious experiences.

Participants' self-efficacy was most commonly enhanced when they had opportunities to learn better instructional strategies and techniques by observing other instructors. Such vicarious learning events equipped participants with better teaching skills, which in turn enhanced their teaching self-efficacy beliefs. Jane described the relationship between this type of vicarious learning and her perceived pedagogical skill:

The strongest influence on my confidence has been teachers who I had. When I started teaching, what I did was model myself on people who had taught me at college, who I thought were good teachers, who had taught me a lot. And then slowly as the years went on, out of that modeling came my own style.

By latching onto the techniques that proved successful in a model's classroom, professors like Jane were able to incorporate these tools in their own teaching. Of course, participants learned not only from the strategies of successful models but from those of unsuccessful models. When asked how he would avoid becoming "like a lousy teacher [he] had," Leonard replied, "Very simple. You don't do all the bad things that they did."

Individuals are particularly influenced by models who they perceive as similar to themselves (Bandura, 1997). One such salient experience came to Virginia by way of her own father's lesson to her about persevering in the face of setbacks. After being "gently let go from his first teaching job," her father became

a fine teacher – someone who really loved teaching and who was much loved. My father's experience certainly gave me the sense that one could do very bad things as a teacher and recover from them . . . Had I not had that family background, there's a good likelihood that after the difficulties I had my first couple of years in English, I wouldn't have gone back. I would have just thought, "You know, I can't do this. I'm just bad at this."

Virginia's father served as a *coping model*, persevering in the face of setbacks and failures, rather than as a mastery model who appeared to perform flawlessly. Such models are especially powerful because they demonstrate how obstacles can be overcome through perseverance (Bandura, 1997; Schunk, 1987).

Professors also relied on referential comparisons made when they evaluated their own performances against those of their peers and colleagues. For example, Ruthe recalled that she "would see people that were terrible teachers, and I would think, 'Oh, I could explain what they're trying to explain much better than this.' That was where I got my confidence from, actually." Professors acknowledged that making social comparisons provided a useful point of reference for interpreting their own teaching experiences and student feedback (e.g., course evaluations). The use of referential comparisons as a tool for self-evaluation may be particularly necessary in the context of college teaching where few objective measures of one's capabilities are available (Fives & Looney, 2009).

Many professors saw few opportunities to watch others teach. Consequently, they often relied on secondhand information from colleagues, such as descriptions of how classes were going or about the student evaluations colleagues had received. As Lawrence remarked, "I never saw my colleagues teach. They'd be telling stories about this difficulty of classroom management and reading, or that students are not coming to class." Although our participants certainly attempted to compare their own performances to those of their peers via available information, rarely did they recall the sort of direct vicarious experience that Bandura (1997) hypothesized would most influence self-efficacy.

5.1.3. Social persuasions

In addition to mastery experiences, social persuasions appeared to be a powerful source of professors' teaching self-efficacy, as has been reported in research with teachers in both K-12 and university settings (Capa Aydin & Woolfolk Hoy, 2005; Heppner, 1994; Poulou, 2007). Persuasive messages in the form of teaching awards, student evaluations, direct comments, and implicit social messages provided college professors with valuable information about their teaching skills. Consistent with Bandura's (1997) postulates, professors generally placed more import on persuasions from observers they believed were sincere and knowledgeable, such as former students.

We were not surprised to find that participants commonly referred to their teaching awards when identifying the most powerful influence on their self-efficacy. Jane explained that "getting the awards has helped me because the awards just feel like, you know, markers of success – that even if I teach a slew of bad classes, I know I can teach good classes." Receiving the award ultimately helped Jane to make adaptive interpretations of other capability-related information. The effect of teaching awards on self-efficacy seemed most palpable for the female professors in the study. Leonard and James similarly described their awards as something "difficult to get" and thus central sources of their confidence as

instructors. Interestingly, however, none of the remaining professors, who were the four White men in the study, identified awards as a powerful source. When questioned specifically about their awards, these professors ascribed them little or no influence on their self-efficacy. For example, when asked whether receiving his first award affected his confidence, Lawrence responded, “None of the teaching awards did that for me. By that time I knew that I could teach.”

This finding might in part reflect the disproportionate conferral of teaching awards in academia to White men (Menges, 1996). As an African American, James viewed the formal recognition of a teaching award as a sure sign of his capability as a teacher.

In the situation that I was in, Black and male and by that time concentrating on African American materials, to get those awards was not easy ... and that reaffirmed that somebody would speak strongly about me to do that.

Receiving teaching awards may hold particular meaning for female and non-White professors who have faced a history of discrimination in research universities (Leap, 1993). Researchers with larger sample sizes could evaluate whether or not this indeed the case.

Aside from teaching awards, professors commonly cited student evaluations as influential efficacy-building factors, although they differed in the importance they placed on numeric versus written evaluative feedback. Ruthe explained that “the numbers don’t mean a lot to me” but that written comments are helpful in diagnosing and correcting problems in her instruction. Lawrence, on the other hand, saw numeric evaluations as a more objective tool that could be used to judge his competency as well as his progress. As previously noted, professors also used these evaluations to compare their performance with those of other instructors.

It bears noting that many professors regarded formal student evaluations with a healthy degree of suspicion. Some pointed to students’ tendency to rate popular professors highly or to assign lower evaluations to professors whose end-of-term work load was heavier. Winston referenced research that demonstrated a favorable evaluative bias from students who expected to receive better grades (Isley & Singh, 2005). Because many professors were aware of such biases, receiving a few negative evaluations did not always lower their self-efficacy. In fact, some construed negative feedback as evidence that their class was appropriately rigorous. Discussing his past evaluations, Lawrence admitted that “there are some students who give me 1s [out of 9] on things and, you know, I’m kind of proud of those 1s.” Pausing to laugh, he shrugged and said, “It shows actually that this was tough for some students, so that’s alright.”

Participants also described direct comments that influenced their teaching self-efficacy. Usually, these persuasive messages came from students. For example, Ruthe indicated that “students’ words of appreciation” were the most powerful source of her teaching self-efficacy.

It could be an evaluation, it could be a card, it could be a phone call ... students’ words of appreciation that they’ve figured something out or that they’ve learned something or that I did a good job or worked hard.

Implicit social messages could be similarly powerful. Kristine explained that being asked for her advice on teaching conveyed others’ beliefs in her instructional ability.

It boosts my confidence because they come to me, and I’m assuming they have some reason to come to me. I mean, why would they come to somebody they thought was a lousy teacher and ask them to give them some pointers on teaching?

Many professors recalled encouraging experiences early in their careers when they were asked to teach a difficult course. Jane described such an experience as “confidence coming from the outside, rather than a feeling of confidence from inside. I did feel [like], *they think I could do this job*, and that was an important spur for me.” Novice teachers with few experiences and tools for self-evaluation often rely on the assessments of others when forming their beliefs about their teaching efficacy (Bandura, 1997).

The strength of social messages often depended on the perceived sincerity of the messenger (Bandura, 1997). For example, Kristine was especially attentive to students’ comments when “class is over and they don’t need a recommendation.” Persuasions received secondhand were also perceived as more sincere. Jane recalled a time when a friend reported overhearing a student say that Jane always made class interesting. That, she said, “actually meant an awful lot to me because it was completely unsolicited. It was an overheard comment. It was pure chance that [the student spoke to a colleague who] knew me, and that moment sticks in my mind and I think it helped me.” Hearing from administrators, colleagues, or even parents that students had sung their praises typically left an indelible mark on professors’ confidence.

Lastly, when messages conveyed information about students’ subsequent attainments, they were particularly powerful because they functioned as both social persuasions and mastery experiences. For example, knowing that her French instruction had helped students succeed in graduate-level courses or during their travels in France boosted Marie’s teaching self-efficacy. She was particularly moved when a student told her, “I was so scared to take French. I thought I would be so bad at it, and I found out I was really good.” Situations such as this provide a clear illustration of reciprocal social cognitive processes: Through successful instruction, Marie raised her student’s confidence (by providing her student with an opportunity for mastery). Her student in turn expressed gratitude by attributing her own success to Marie’s instruction (a social persuasion for Marie). Both teacher’s and student’s self-efficacy were raised, as has been reported in quantitative studies (e.g., Anderson, Greene, & Loewen, 1988).

5.1.4. Physiological and affective states

Although few professors identified physiological and affective states as the most influential source of their teaching self-efficacy, many described how their physiological states conveyed important information about their skill at teaching. In some cases, professors interpreted their affective arousal as an index of how well, or poorly, they were teaching. Typically, they construed feelings of nervousness in neutral or even positive ways, viewing it as normative and transforming it into an adaptive physiological state.

Professors typically interpreted their psychosomatic arousal while teaching as an indication that their instruction was effective. For example, when asked how he knew that a class discussion had been successful, Lawrence responded, “I don’t think I have any reflective clues, so it’s not something I think about. It’s more of sort of a visceral response.” Stephen’s self-efficacy was enhanced in situations where he found himself “feeding off of the energy of the crowd.” Reading the energy of the classroom not only provided him with a sense of teaching efficacy, but also with direction during his years as a novice instructor:

I remember that I could be very tired and worn out by the day. I would go and do this recitation section for an hour, and I would leave it feeling energized, and that was one of the things that really convinced me I wanted to go into teaching ... I felt like, *This is something I’m good at. The students are really glad I’m here. I’m doing a good job.*

As they do with information from any of the four hypothesized sources of self-efficacy, people can construe a given physiological state in multiple ways (Bandura, 1997). Stephen tended to interpret somatic information as a positive rather than a negative index of his capability, and he felt more confident as a result.

Participants were aware of fluctuations in their physiological arousal, but they did not interpret this arousal as a sign of their inefficacy. For example, most professors readily acknowledged that they still dealt with feelings of nervousness, particularly on the first day of class, but none indicated that such states lowered their teaching self-efficacy. In fact, many professors were able to transform their anxiety into performance-enhancing physiological arousal. Clara's description best encapsulates this transformation.

[Feeling nervous at the beginning of my art history courses] kind of gets my adrenaline going Before I speak I'm a little unnerved, but it's almost like getting into a zone, it's like being transported. Once I'm doing that, and talking about what's up there, I mean, I can think, "I am so tired," and "I don't want to do anything," and I get in front of the classroom, and it just takes over.

Researchers have reported that highly successful individuals may interpret somatic information more adaptively. For example, high-achieving students have been shown to interpret the physiological arousal associated with taking a test as facilitative rather than debilitating (Hollandsworth, Glazeski, Kirkland, Jones, & Van Norman, 1979). The professors in our study similarly regarded nervousness as "a positive thing," "a normal feeling," and thus something that made them believe that they were approaching class as they should. As Ruthe explained, "It's not a pleasant-in-your-stomach feeling, but it gives me confidence that I'm myself." In this sense professors may be likened to accomplished actors who attribute their initial anxiety "to normative situational reactions rather than to personal deficiencies" (Bandura, 1997, p. 109).

The ability to regulate their own physiological and affective states also made professors more self-efficacious. Leonard described being able to block out the negative events of the day by taking "on a different self." In this process, which Winograd (2003) compared to a deep level of acting, expert teachers manipulate their affective states to their benefit. To alter or enhance his physiological and affective states, Leonard would have a good meal before class or would dress himself in a tie or a jacket to prepare mentally. "I feel that being professionally attired gives a boost to my confidence . . . I always felt that I was better; I *felt* better going in attire that was professional." Marie, on the other hand, "shut the door" on her feelings when she walked into the classroom. Whatever their approach, participants seemed to have numerous strategies for striking an emotional and psychological balance before entering the classroom. Researchers have similarly found that K-12 teachers who were best able to regulate their emotions felt most effective in the classroom (Sutton, Mudrey-Camino, & Knight, 2009).

In sum, mastery experiences and social persuasions provided the most powerful capability-related information, but vicarious experiences and physiological and affective states also influenced professors' teaching self-efficacy. Professors took into account the context and frequency of a given experience when assessing its relevance to their teaching capabilities.

5.2. Sensitive periods in the development of teaching self-efficacy

Woolfolk Hoy (2004) hypothesized that college instructors who had positive experiences as novices would be more resilient in the face of future obstacles. Unsuccessful early experiences, she argued, "can direct graduate students away from the professoriate" (p. 3). Others have also found that early experiences may hold spe-

cial significance for how one's teaching self-efficacy fares over time (Burton et al., 2005; Heppner, 1994). Consequently, we sought to explore the periods in professors' lives that they deemed significant for their teaching self-efficacy. We also invited professors to assess the degree to which their teaching self-efficacy beliefs had "solidified" by asking them to consider whether they had developed "a stable and accurate sense of personal efficacy" (Bandura, 1997, p. 170).

Participants regarded their earliest experiences in teaching-related roles as crucial in their self-efficacy development. Marie pointed out that "the most powerful [influence on my self-efficacy] was having a very successful first teaching experience my very first semester. It felt satisfying, and I felt I had done a good job." Others described indexes of initial success such as the "flow of the classroom," positive student evaluations, a particular useful strategy, and praise from students and supervisors. James, who began his teaching career in a K-12 school, regarded his six-week student teaching experience as particularly profound to his development. "Going into it," he recalled, "I was worried. I didn't have confidence. When I came out of the six-week period I had confidence. And it has only gone up since then. It has never gone down."

Most participants indicated that their teaching self-efficacy had solidified within the first four years of their professional career, and some claimed that it had stabilized even before they became professors. Early in his career William realized, "This confidence thing stuck at some point and it isn't going anywhere." His experience exemplifies Bandura's (1997) observation that once a healthy self-efficacy is developed, "occasional failures or setbacks are unlikely to undermine beliefs in one's capabilities" (p. 82). "There's a difference," William contended, "between the creation of something and its validation." Whereas initial teaching experiences may have launched participants' self-efficacy, subsequent positive information was usually characterized as having a "reaffirming" effect. Stephen noted that receiving praise from students made him more confident earlier in his career, but "nowadays it's more just like a reaffirmation."

Our findings suggest that within a few years of entry into their career, most professors arrived at a more stable perception of their instructional capabilities, at which point their self-beliefs were much less susceptible to fluctuations based on a bad experience or negative comment. Pajares (1992) noted that teachers' beliefs at early stages of their career serve as filters through which teachers process new experiences. Information that is inconsistent with one's preexisting self-beliefs is typically dismissed, whereas information congruent with one's self-beliefs is "readily noticed, given significance, and remembered" (Bandura, 1997, p. 82). Thus, not only does capability-related information appear to be particularly potent during initial learning, it also becomes an important heuristic through which individuals interpret subsequent events. For this reason, scholars have expressed concern that university instructors who experience early failure may be caught in a downward spiral with regard to their self-efficacy beliefs (Burton et al., 2005; Heppner, 1994).

The effect of early successes on teaching self-efficacy over time was reiterated by several participants. Clara explained, "If I hadn't started off so well, I wouldn't have much confidence at all. I mean, I really feel sorry for people who were never TAs for as long a time as I was because it was very helpful." Kristine, who admitted that her self-efficacy had not solidified until she was eight to ten years into her professorship, felt that she would have gained a lot from early instructional support. Reflecting on her career, she added, "I think the early years are important. And maybe I could have gained confidence more quickly if there had been, you know, teaching effectiveness workshops and things like that. Or more discussions about teaching." Given this finding and the many benefits of instructors' self-efficacy for the successful functioning of their

classroom, universities might be better-served by efforts to enhance novice instructors' competencies and their efficacy beliefs.

Appraisals of one's efficacy are largely contingent on contextual factors (Bandura, 1997). For this reason, radical changes in the context in which teaching takes place (e.g., location, student demographic, content area) should be expected to lead to changes in one's perceived efficacy. This is indeed what we found with Jane, who had experience teaching undergraduate students in three countries. Jane argued that it was difficult to think of her confidence as having stabilized at all. "If you change institutions, and I changed countries, it's a whole new context. I think at least to some degree you renegotiate your confidence with new people, new expectations, and new institutions." Jane's comments offer an important reminder that self-efficacy beliefs are strongly connected to the context in which teachers work and may fluctuate accordingly (Tschannen-Moran et al., 1998). Such changes in the teaching environment led some professors to reassess their instructional capabilities; for most, however, self-efficacy typically stabilized within a short period of time.

5.3. Interpretations of negative events

We were lastly concerned with how the award-winning professors in our study handled the less-than-optimal experiences that occur in the course of even the most talented teacher's duties. All participants admitted to having dealt with setbacks and disappointments in their teaching career, but William's comment nicely summarizes what most told us. "When something not as positive happens, maybe I just interpret it in such a way so that it doesn't touch my confidence." Like William, most participants described a tendency to interpret negative capability-related information in a manner that did not lower their teaching self-efficacy. For example, Lawrence said he took personal blame when a class did not go as well as expected but quickly added, "it never really shakes my confidence because I know as soon as it happens I think about what I would have done. It makes me think I could do it." Leonard described his process of framing even more explicitly:

I have a big feedback box in my mind where I put all of these together so that the next time I do it I won't do it again. I use these negative comments as good solid feedback that would help me improve, not dip my confidence. So rather than feeling that, *Oh, I cannot do this*, I have the feeling that I should do it *this way* the next time.

By approaching negative information diagnostically, participants were more likely to be successful in their subsequent teaching endeavors, and thus to bolster their perceived capability. In this way, self-efficacy may be enhanced simply because the negative experience led to the adoption of more effective strategies (Anderson & Jennings, 1980).

Psychologist Howard Gardner (1997) referred to the ability to construe challenges in the best possible light as "framing" (p. 149). He maintained that, when dealing with negative events, successful people

see not so much the bright side of a setback as the learning opportunity it offers It is the capacity to find meaning—and even uplift—in an apparently negative experience that fuels one to face life confidently and effectively. (pp. 149–152)

Successful individuals focused not on what inabilities led to their failure but rather on what skills would ensure future success. As the examples above illustrate, our participants appeared to be expert framers who channeled difficulties in the most fruitful ways.

Examining the attributions professors made to negative events offers another useful explanatory lens. Weiner (1972) has

contended that motivation and affect are influenced by the attributions people make for their experiences, particularly when those experiences are negative. When professors attributed negative teaching experiences to external factors beyond their control, they typically ignored the information, thereby preserving their teaching self-efficacy. For example, in response to a student who constantly disrupted her class, Virginia told herself, "*This is not about me, this is not about my classroom, this is not something I'm going to be able to fix.*" The realization that she was not the cause of the problem freed her to reflect on the experience as something other than an indicator of her teaching competence. As a result, she suffered no loss of confidence and was able to direct her energy elsewhere. When a particular group of students seemed disengaged, professors attributed the lack of participation to external, uncontrollable factors such as the class's "personality" rather than to their own teaching. As Lawrence observed, "Classes do have personalities, sure. There's things you can't control. But I guess I never worried about that. I used to think that it was sort of out of my control and so you do the best you can."

Professors did not blindly ignore unfavorable information, however, particularly when it surfaced repeatedly. For instance, if several classes had "bad chemistry" or most students performed poorly on assessments or wrote negative evaluations, they were more likely to take responsibility and to view these experiences as opportunities to learn and grow as instructors (see Guskey, 1987). When the cause of a problem was viewed as internal and uncontrollable, lower self-efficacy ensued. Virginia admitted that "the things that really diminish my confidence are the things that I'm not really sure how to address, personal vices that I haven't been able to get under control." Indeed, Bandura (1997) acknowledged that self-efficacy could be lowered when individuals attributed their experiences to internal but uncontrollable causes.

These results point to the necessity for professors to feel confident not only in their instructional capability, but also in their capability to exercise self-regulatory control over the inevitable problems that arise. Lawrence described himself as self-efficacious not only because of his past successes, but also because "in the past when [things did not go well] I've been able to make some kind of adjustment that fixed whatever the problem was." A sense of confidence in his problem-solving capabilities served to carry him through difficult times. By contrast, Virginia's doubt in her ability to regulate her "personal vices" could occasionally endanger her teaching confidence. Teachers' *self-efficacy for self-regulation* may work in tandem with their instructional self-efficacy to optimize their teaching competence, and this may be particularly true during moments of difficulty.

Qualitative inquiry permits researchers to analyze emergent patterns from data that may have been unexpected at the study outset. During our analyses, we were surprised to find that half of our participants—in all cases women—emphasized the importance of the help they received from others as they made sense of teaching challenges. These women described the value they placed on input from colleagues, friends, family members, or supervisors, particularly in the face of challenges. Rather than face a problem in isolation, they engaged in a co-explanatory process with others, who helped them to make external attributions for negative experiences that would in turn safeguard their confidence (e.g., "[Your students] don't know what they're talking about;" "It is not about you;" "Ultimately it really is out of [your] control;" "[This negative event] wasn't because [you are] a monster"). One story Ruthe told us aptly illustrates this process. Ruthe recalled a particular day that she received harsh criticism from a co-instructor. She was furious and confessed that it "would have destroyed my confidence except I had two colleagues, the chairman and a friend, who put it into perspective. A colleague putting it into context is really important." Like Ruthe, the women in our study

appeared to incur a social benefit from soliciting help from others as they framed negative experiences and took an appropriate response.

If, as Gilligan (1982) put forth, women are more relationship-oriented than are men, they may be more likely to consider the opinions of others in judging their own capabilities. Indeed, Zeldin et al. (2008) found that women in math-related careers were influenced more by social persuasions than were men in such fields. In studies of academic self-efficacy, female students tend to report stronger social persuasions than do their male counterparts (Lent, Lopez, Brown, & Gore, 1996; Lopez & Lent, 1992; Usher & Pajares, 2006). Future investigations may examine whether women tend to engage more socially as they are developing and maintaining their confidence in teaching at the university level.

6. Conclusion

The purpose of this study was to explore the ways in which award-winning professors at research universities developed and maintained their sense of teaching efficacy. To this end, we focused on the sources that professors identified as most influential in the evolution of their self-efficacy. We also attempted to understand the developmental trajectory of professors' teaching self-efficacy and to explore how these award-winning teachers interpreted the occasional challenges and setbacks that came their way.

Our findings revealed that professors pointed to successful teaching experiences and positive evaluative feedback from students as the most powerful influences on their teaching self-efficacy. Pajares (2006) suggested that the best way to boost self-efficacy is by helping individuals achieve mastery experiences through their own skill development. Participants described gaining confidence as a result of taking part in such training and structured teaching experiences. These experiences enhanced professors' pedagogical skills as well as their content knowledge, both of which fed professors' sense of teaching efficacy over time.

Many of the professors in our study also recalled the confidence they had gained from having been exposed to proficient teaching models. Others pointed to the detrimental effects of a lack of available models at the university level, an observation advanced by researchers as well (Fives & Looney, 2009). Inviting proficient teaching models to participate in professional development exercises could enhance instructors' self-efficacy (Bruce & Ross, 2008). Several professors in our study sought to learn better instructional strategies by observing the expert instructors with whom they worked. Universities might encourage teaching teams or partnerships to facilitate such observational opportunities, particularly for graduate instructors and junior faculty members.

Bandura's (1997) broad characterization of the sources of self-efficacy made it relatively easy for us to categorize much of our data in terms of his four hypothesized sources. On the other hand, we found that the manner in which professors described the sources of their teaching confidence was rarely in terms of only one type of efficacy-relevant information. The interpretation of success in past teaching performances (mastery experiences) was sometimes informed by the positive comments professors received from supervisors and students (social persuasions). The boost in self-efficacy that some experience after having observed model teachers (vicarious experiences) was often related to the pedagogical skills they had attained as a result of the observation (mastery experiences). Professors obtained more information from their student evaluations (social persuasions) by comparing their numeric scores to the scores earned by their colleagues (vicarious experience). Finally, some professors made favorable interpretations of their students' engagement (mastery experiences) in terms of their own visceral responses and emotions (physiological and affective

states), and this combined information enhanced their self-efficacy. These findings point to the need for researchers to exercise caution when imposing a rigid categorical structure on the sources of self-efficacy, which themselves are complex social cognitive phenomena that are often inextricably linked (A. Bandura, personal communication, October 15, 2009). A qualitative approach enabled us to capture these multiple and complex sources of efficacy information in ways that traditional quantitative approaches typically cannot.

Scholars who wish to investigate the antecedents of teaching self-efficacy should carefully consider how they will define and measure the sources, particularly when describing their relative weight. Ignoring the interactive nature of the sources may lead researchers to faulty conclusions. Our findings suggest that, at least in the context of college teaching, appraisals of past performance are almost always informed by social persuasions. For example, when asked why his first teaching experiences were so critical to his self-efficacy, James replied, "I did it. Experience. I had never had the experience before. I did it and I learned that I did it well." However, when asked how he knew that he had done well, James shrugged, "They told me I did it well. Students told me. Those who observed me told me that I did it well." In such cases, researchers will have more difficulty isolating the unique effects of any one source.

Assessing the sources of self-efficacy may be particularly challenging in domains such as teaching, where the primary task is inherently social. Whether in an elementary school or university classroom, instructors cannot measure their competence, their *efficacy*, using a yardstick or a stopwatch; they must rely instead on their interactions with others to assess whether or not they have achieved their goals. Our findings reveal that the information on which this assessment is based is complex and multifaceted, not always easily classified as emanating from one distinct source or another (see also Usher, 2009; Usher & Pajares, 2008). It may be less instructive for scholars to assess the relative weight of types of sources than to evaluate the independent contribution of specific experiences to individuals' self-efficacy. For example, professional development efforts may be enhanced by research that illuminates the most effective teaching models. Perhaps less may be gained from efforts to document the differential influence of vicarious and mastery experiences.

We also took the opportunity to investigate award-winning professors' retrospective accounts of changes in their teaching confidence over the years. We found that professors typically developed confidence in their teaching capabilities early on, most within their first four years of teaching, and that their efficacy judgments were henceforth relatively stable. Greater attention to this sensitive period during which individuals form and solidify their self-beliefs is warranted. The early training and professional development of college instructors may be a critical factor in their teaching self-efficacy and in their decision to pursue a career in the academy (Heppner, 1994; Woolfolk Hoy, 2004). Unfortunately, implementation of teaching-related professional development efforts has been lacking in institutions of higher education (Cowan, George, & Pinheiro-Torres, 2004).

One might conclude that our data regarding the relative plateau of self-efficacy beliefs after several years is an artifact of the expert professors selected for this study. However, even among these experts, several professors described fluctuations in their teaching confidence over the years as a result of changes in the contextual demands of teaching. This finding should serve as an important reminder of the reciprocal interaction between teaching self-efficacy and local conditions (Bandura, 1993). Self-efficacy does not exist in a vacuum; changes in environmental demands often require a re-evaluation of one's efficacy to handle them. When professors are asked to teach courses outside of their primary area of expertise,

to take on large lectures or small seminars with which they have less experience, or to teach a group of students with whom they have never worked (e.g., undergraduates vs. graduates, majors vs. non-majors), they are required to renegotiate their self-efficacy. University support at such times could help ensure a smoother adjustment.

As previously discussed, the pedagogical preparation of university instructors varies substantially from one institution to the next. This is particularly troublesome because courses and experiences in pedagogy have generally been found to raise the graduate students' teaching self-efficacy (Burton et al., 2005; Prieto & Altmaier, 1994; Prieto & Meyers, 1999). Most participants in the present study described being "thrown into the fire" for their first instructional experiences. Having the right tools to approach initial teaching experiences may make individuals' early success more likely and in turn bolster their nascent self-efficacy beliefs.

The last major finding to emerge from the study was that award-winning professors typically had a self-serving bias when interpreting events related to their teaching. Positive events could raise their teaching self-efficacy, but negative events were unlikely to lower it. As humans typically do, these professors attributed negative events in such a way as to preserve their positive self-image (Weiner, 1986). Remarkably, however, even when professors believed their failures were due to internal, controllable factors, they suffered no loss of self-efficacy. As writer Louis Menand (2001) put it, individuals need "a layer of psychic insulation" because "if we didn't learn how not to care our failures would destroy us" (p. 84). Further research is needed to determine whether any difference exists in the way that less confident and more confident professors reflect on negative and positive information related to their teaching skills, particularly as self-efficacious teachers are thought to reflect on their experiences more adaptively (Woolfolk Hoy & Davis, 2006). If Gardner (1997) is correct, the healthy reframing of negative events demonstrated by our participants might be one reason for their status as extraordinary teachers.

7. Limitations

The issue of whether or not a given sample is representative of other populations is a concern in qualitative research (Huberman & Miles, 2002), particularly when that research may have implications for educational policy. As previously discussed, we took several steps to maximize the reliability and validity of our findings. Nonetheless, the participants in this study are not representative of all award-winning professors in research universities, so care should be taken when extrapolating from these results to professors in other contexts. Our findings are also limited with regard to how self-efficacy is formed by individuals across various racial, ethnic, and gender groups. Furthermore, the study focused only on professors in high-activity research universities, and instructors in institutions that emphasize pedagogy may be exposed to different sources of teaching-related information. With few exceptions, the professional development of these professors took place in the United States and may have differed from that of professors in other nations. Moreover, it would be useful for researchers to explore the sources of professors' teaching self-efficacy in countries where student evaluations or teaching awards are not typically conferred.

Awards may be a biased index of teaching excellence, as politics can influence how teaching awards are distributed (Menges, 1996). In this study, we based our selection of participants on the stringent criteria that they must have received at least two university-wide teaching awards that were both conferred on the basis of judgments from multiple sources (e.g., student evaluations, letters of nomination, faculty observations). Although our sense is that the receipt of two teaching awards serves as one index of

instructional excellence, omitting other criteria of excellence may have led us to overlook other exceptional teachers.

Because it is critical for the investigator to take a central role in the collection of qualitative data (Merriam, 1998), case studies are potentially vulnerable to researcher bias. Although we had scholars analyze our results from alternative theoretical perspectives, our interviews and analysis were guided by a social cognitive orientation. As such, we may have overlooked information that would have been reflected in other theories. Bias may also be present in participants' responses despite our efforts to triangulate data. Professors may not have been forthcoming when discussing such sensitive issues as their failures and may have been less open in discussing certain experiences when interviewed by an investigator of a different gender or ethnic background.

Despite these limitations, this study represents an encouraging step in the examination of the sources of teaching self-efficacy, particularly in the rarely explored context of higher education. If previous research is any indication, teachers' perceived competence is closely aligned with their actual competence, and future qualitative and quantitative investigations can be used to refine understandings of how these important beliefs develop over the course of a professor's career. The pedagogical preparation of university instructors is a subject long overlooked in the United States, and research on the sources of teaching self-efficacy can provide clues as to how professional learning experiences may enhance the confidence and competence of teachers in higher education.

Acknowledgment

We would like to acknowledge the support, guidance, and input of Professor Frank Pajares throughout the conceptualization and execution of this study.

References

- Allinder, R. M. (1995). An examination of the relationship between teacher efficacy and curriculum-based measurement and student achievement. *Remedial & Special Education, 27*, 141–152.
- Anderson, C. A., & Jennings, D. L. (1980). When experiences of failure promote expectations of success: The impact of attributing failure to ineffective strategies. *Journal of Personality, 48*, 393–407.
- Anderson, R., Greene, M., & Loewen, P. (1988). Relationships among teachers' and students' thinking skills, sense of efficacy, and student achievement. *Alberta Journal of Educational Research, 34*, 148–165.
- Ashton, P. T., & Webb, R. (1986). *Making a difference: Teacher's sense of efficacy and student achievement*. New York: Longman.
- Bain, K. (2004). *What the best college teachers do*. Cambridge, MA: Harvard University Press.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191–215.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*, 117–148.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman.
- Bess, J. L. (1997). The motivation to teach: Perennial conundrums. In James L. Bess (Ed.), *Teaching well and liking it* (pp. 424–439). Baltimore: The Johns Hopkins Press.
- Biggs, J. (1999). *Teaching for quality learning at university*. Buckingham: Society for Research in Higher Education and Open University Press.
- Bogdan, R., & Biklen, S. K. (2003). *Qualitative research in education: An introduction to theory and methods*. Boston: Pearson Education Group.
- Bruce, C. D., & Ross, J. A. (2008). A model for increasing reform implementation and teacher efficacy: Teacher peer coaching in grade 3 and 6 mathematics. *Canadian Journal of Education, 31*, 346–370.
- Burton, J. P., Bamberly, N. J., & Harris-Boundy, J. (2005). Developing personal teaching efficacy in new teachers in university settings. *Academy of Management Learning & Education, 4*, 160–173.
- Cantrell, P., Young, S., & Moore, A. (2003). Factors affecting science teaching efficacy of preservice elementary teachers. *Journal of Science Teacher Education, 14*, 177–192.
- Capa Aydin, Y., & Woolfolk Hoy, A. (2005). What predicts student teacher self-efficacy? *Academic Exchange Quarterly, 9*, 123–128.

- Chacon, C. T. (2005). Teachers' perceived efficacy among English as a foreign language teachers in middle schools in Venezuela. *Teaching and Teacher Education*, 21, 257–272.
- Cowan, J., George, J. W., & Pinheiro-Torres, A. (2004). Alignment of developments in higher education. *Higher Education*, 48, 439–459.
- Enochs, L. G., Scharmann, L. C., & Riggs, I. M. (1995). The relationship of pupil control to preservice elementary science teacher self-efficacy and outcome expectancy. *Science Education*, 79, 63–75.
- Fairweather, J. (1996). *Faculty work and public trust: Restoring the value of teaching and public service in American life*. Boston: Allyn and Bacon.
- Fives, H., & Looney, L. (2009). College instructors' sense of teaching and collective efficacy. *International Journal of Teaching and Learning in Higher Education*, 20, 182–191. Retrieved from <http://www.isetl.org/ijtlhe/>.
- Gable, S. L., & Haidt, J. (2005). What (and why?) is positive psychology? *Review of General Psychology*, 9, 103–110.
- Gaff, J. G., & Pruitt-Logan, A. S. (1998). Preparing college faculty. *New Directions for Higher Education*, 101, 77–86.
- Gardner, H. (1997). *Extraordinary minds: Portraits of four extraordinary individuals and an examination of our extraordinariness*. New York: Basic Books.
- Gilligan, C. (1982). In *In a different voice: Psychological theory and women's development*. Cambridge, MA: Harvard University Press.
- Gurvitch, R., & Metzler, M. R. (2009). The effects of laboratory-based and field-based practicum experience on pre-service teachers' self-efficacy. *Teaching and Teacher Education*, 25, 437–443.
- Guskey, T. R. (1987). Context variables that affect measures of teacher efficacy. *Journal of Educational Research*, 81, 41–47.
- Hearn, J. D. (1999). Faculty salary structures in research universities: Implications for productivity. In W. Tierney (Ed.), *Faculty productivity: Facts, fictions, and issues* (pp. 123–173). New York: Falmer.
- Helsing, D. (2007). Regarding uncertainty in teachers and teaching. *Teacher and Teacher Education*, 23, 1317–1333.
- Henson, R. K. (2001). The effects of participation in teacher research on teacher efficacy. *Teaching and Teacher Education*, 17, 819–836.
- Heppner, M. J. (1994). An empirical investigation of the effects of a teaching practicum on prospective faculty. *Journal of Counseling and Development*, 72, 500–509.
- Hollandsworth, J. G., Jr., Glazeski, R. C., Kirkland, K., Jones, G. E., & Van Norman, L. R. (1979). An analysis of the nature and effects of test anxiety: Cognitive, behavioral, and physiological components. *Cognitive Therapy and Research*, 3, 165–180.
- Huberman, A. M., & Miles, M. B. (2002). *The qualitative researcher's companion: Classic and contemporary readings*. Beverly Hills, CA: Sage.
- Isley, P., & Singh, H. (2005). Do higher grades lead to favorable student evaluations? *The Journal of Economic Education*, 1, 29–42.
- Klassen, R. M., & Usher, E. L. (2010). Self-efficacy in educational settings: Recent research and emerging directions. In T. C. Urdan & S. A. Karabenick (Eds.), *Advances in motivation and achievement. The decade ahead: Theoretical perspectives on motivation and achievement* (Vol. 16, pp. 1–33). Bingley, UK: Emerald Publishing Group.
- Knoblauch, D., & Woolfolk Hoy, A. (2008). "Maybe I can teach those kids." The influence of contextual factors on student teachers' efficacy beliefs. *Teaching and Teacher Education*, 24, 166–179.
- Kreber, C. (2001). The scholarship of teaching and its implementation in faculty development and graduate education. *New Directions for Teaching and Learning*, 86, 79–88.
- Leap, T. L. (1993). *Tenure, discrimination, and the courts*. New York: Cornell University Press.
- Lent, R. W., Lopez, F. G., Brown, S. D., & Gore, P. A. (1996). Latent structure of the sources of mathematics self-efficacy. *Journal of Vocational Behavior*, 49, 292–308.
- Lopez, F. G., & Lent, R. W. (1992). Sources of mathematics self-efficacy in high school students. *Career Development Quarterly*, 41, 3–12.
- Menges, R. J. (1996). Awards to individuals. *New Directions for Teaching and Learning*, 65, 3–9.
- Menand, L. (2001). Holden at fifty. *The New Yorker*, 77(29), 82–87.
- Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco: Jossey-Bass Publishers.
- Midgley, C., Feldlaufer, H., & Eccles, J. (1988). The transition to junior high school: Belief of pre-and post-transition teachers. *Journal of Youth and Adolescence*, 17, 543–562.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.
- Milner, H. R., & Woolfolk Hoy, A. (2003). A case study of an African American teacher's self-efficacy, stereotype threat, and persistence. *Teaching and Teacher Education*, 19, 263–276.
- Mottet, T. P., Beebe, S. A., Raffeld, P. C., & Medlock, A. L. (2004). The effects of student verbal and nonverbal responsiveness on teacher self-efficacy and job satisfaction. *Communication Education*, 53, 150–163.
- Mulholland, J., & Wallace, J. (2001). Teacher induction and elementary science teaching: Enhancing self-efficacy. *Teaching and Teacher Education*, 17, 243–261.
- Olson, T., & Einwagner, R. L. (2001). Forming and transforming the teaching self in different institutional environments: Two teachers' experiences. *Teaching Sociology*, 29, 403–422.
- Pajares, F. (1992). Teachers beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62, 307–332.
- Pajares, F. (2006). Self-efficacy during childhood and adolescence: Implications for teachers and parents. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 117–137). Greenwich, CT: Information Age Publishing.
- Pajares, F. (2009). Toward a positive psychology of academic motivation: The role of self-efficacy beliefs. In R. Gilman, S. Huebner, & M. Furlong (Eds.), *Promoting wellness in children and youth: A handbook of positive psychology in the schools* (pp. 149–161). New York: Erlbaum.
- Palmer, D. (2006). Durability of changes in self-efficacy of preservice primary teachers. *International Journal of Science Education*, 28, 655–671.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage Publications.
- Poulou, M. (2007). Personal teaching efficacy and its sources: Student teachers' perceptions. *Educational Psychology*, 27, 191–218.
- Prieto, L. R., & Altmaier, E. M. (1994). The relationship of prior training and previous teaching experience to self-efficacy among graduate teaching. *Research in Higher Education*, 35, 481–497.
- 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, 264–266.
- Ross, J., Hogaboam-Gray, A., & Hannay, L. (2001). Effects of teacher efficacy on computer skills and computer cognitions of K-3 students. *Elementary School Journal*, 201, 141–156.
- Ross, J., & Bruce, C. (2007). Professional development effects on teacher efficacy: Results of randomized field trial. *The Journal of Educational Research*, 101, 50–60.
- Rots, I., Aelterman, A., Vlerick, P., & Vermeulen, K. (2007). Teacher education, graduates' teaching commitment and entrance into the teaching profession. *Teaching and Teacher Education*, 23, 543–556.
- Schunk, D. H. (1987). Peer models and children's behavioral change. *Review of Educational Research*, 57, 149–174.
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, 55, 5–14.
- Serow, R. C. (2000). Research and teaching at a research university. *Higher Education*, 40, 449–463.
- Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57, 1–22.
- Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.
- Sutton, R. E., Mudrey-Camino, R., & Knight, C. C. (2009). Teachers' emotion regulation and classroom management. *Theory into Practice*, 48, 130–137.
- Sutz, J. (1997). The new role of the university in the productive sector. In H. Etzkowitz & L. Leydesdorf (Eds.), *Universities and global knowledge economy: A triple helix of university-industry-government relations* (pp. 11–20). London: Pinter.
- Tanner, K., & Allen, D. (2006). Approaches to biology teaching and learning: On integrating pedagogical training into the graduate experiences of future science faculty. *CBE Life Sciences Education*, 5, 1–6.
- Tschannen-Moran, M., & Woolfolk Hoy, A. (2007). The differential antecedents of self-efficacy beliefs of novice and experienced teachers. *Teaching and Teacher Education*, 23, 944–956.
- Tschannen-Moran, M., Woolfolk Hoy, A., & Hoy, W. K. (1998). Teacher efficacy: Its meaning and measure. *Review of Educational Research*, 68, 202–248.
- Usher, E. L. (2009). Sources of middle school students' self-efficacy in mathematics: A qualitative investigation of student, teacher, and parent perspectives. *American Educational Research Journal*, 46, 275–314.
- Usher, E. L., & Pajares, F. (2006). Sources of academic and self-regulatory efficacy beliefs of entering middle school students. *Contemporary Educational Psychology*, 31, 125–141.
- Usher, E. L., & Pajares, F. (2008). Sources of self-efficacy in school: Critical review of the literature and future directions. *Review of Educational Research*, 78, 751–796.
- Weaver Shearn, N. (2008). Sources of efficacy for first-year teachers. *Dissertation Abstracts International*, 66(11A) (UMI No. 3289293).
- Weiner, B. (1972). *Theories of motivation: From mechanism to cognition*. Chicago: Markham.
- Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.
- Winograd, K. (2003). The functions of teacher emotions: The good, the bad, and the ugly. *Teachers College Record*, 105, 1641–1673.
- Woolfolk Hoy, A. (2004). Self-efficacy in college teaching. *Essays on teaching excellence: Toward the best in the academy* (Vol. 15, pp. 8–11). Fort Collins, CO: The POD Network.
- Woolfolk Hoy, A., & Burke Spero, R. (2005). Changes in teacher efficacy during the early years of teaching: A comparison of four measures. *Teaching and Teacher Education*, 21, 343–356.
- Woolfolk Hoy, A., & Davis, H. A. (2006). Teacher self-efficacy and its influence on the achievement of adolescents. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 117–137). Greenwich, CT: Information Age Publishing.
- Wulff, D. H., Austin, A. E., Nyquist, J. D., & Sprague, J. (2004). The development of graduate students as teaching scholars: A four-year longitudinal study. In D. H. Wulff, A. E. Austin, & Associates (Eds.), *Paths to the professoriate: Strategies for enriching the preparation of future faculty* (pp. 46–73). San Francisco: Jossey-Bass.
- Zeldin, A. L., Britner, S. L., & Pajares, F. (2008). A comparative study of the self-efficacy beliefs of successful men and women in mathematics, science, and technology careers. *Journal of Research in Science Teaching*, 45, 1036–1058.
- Zeldin, A., & Pajares, F. (2000). Against the odds: Self-efficacy beliefs of women in mathematical, scientific, and technological careers. *American Educational Research Journal*, 37, 215–246.