What is Teacher Efficacy and How does it Relate to Teachers' Knowledge?

A Theoretical Review

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DRAFT

Teacher efficacy can be defined as teachers' beliefs in their abilities to organize and execute courses of action necessary to bring about desired results (Tschannen-Moran, Woolfolk-Hoy, & Hoy, 1998). Teacher efficacy is considered a future-oriented motivational construct that reflects teachers' competence beliefs for teaching tasks. The construct of teacher efficacy has become a pillar in the research on teachers' beliefs. The resounding interest in this construct lies in its continued predictive and relational power in research on teachers and teaching. Teachers' beliefs in their ability to perform tasks related to teaching have been and continue to be related to student achievement (e.g., McLaughlin & Marsh, 1978), student motivation (e.g., Midgley, Feldlaufer, & Eccles, 1989), teacher valuing of educational innovations (e.g., Cousins & Walker, 2000), classroom management skills (Woolfolk, Rosoff, & Hoy, 1990), and teacher stress (Greenwood, Olejnik, & Parkay, 1990).

Despite the avid interest in this construct and although prior reviews have been conducted, there are still gaps in our understanding of teacher efficacy. First, there are potential inconsistencies in the way teacher efficacy has been defined and variability in the manner in which it is measured. It is imperative not only to recognize these differences but also to understand the theoretical traditions these differences reflect and their implications for research and practice. Second, we know that efficacy is clearly related to a number of important variables but we do not understand the nature of the relationship between efficacy and those variables. Third, little focus has been placed on teacher efficacy as related to teachers' demonstrated knowledge. In other words, it is not clear if high efficacy is in fact related to high levels of teacher knowledge.

Therefore, the purpose of this review is to explore the relationship between teacher efficacy and teacher knowledge as grounded in a deep understanding of the efficacy construct. Specifically, this review seeks to achieve three primary goals.

- Provide a historical overview of the development of teacher efficacy as a theoretical construct.

- Identify how or why teacher efficacy may be linked to student motivation, achievement, and pedagogical variables.
- Consider the treatment of teacher knowledge in the research on teacher efficacy.

In constructing this review, a literature search was conducted using the PsychInfo database for empirical articles related to teacher efficacy or the self-efficacy of teachers. This search was narrowed by investigating only articles from peer reviewed journals for which a quantitative research methodology was employed. Based on these criteria over 150 articles were identified for analysis.

Identified articles were analyzed and organized using the categories of purpose, key findings, related variables, and definitions in order to ascertain the relationship between teacher efficacy and other psychological variables (e.g., teacher beliefs) and educational outcomes (e.g. student achievement).

Teacher Efficacy: Tracing its Roots, Finding its Meaning

From the time of its conception, the construct of teacher efficacy has been closely linked to the measures by which it is assessed; therefore, any discussion of its meaning is linked to measurement issues. The meaning of teacher efficacy carries with it a few alternative understandings. Teacher efficacy was originally developed by Rand researchers using Rotter's (1966) work on locus of control. This meaning was extended by Ashton, Olejnik, Crocker, and McAuliffe (1982), Guskey (1982, 1988), and Rose and Medway (1981), who kept the meaning and measurement of this construct close to these roots. Alternatively, a second strand of research emerged from the work of Albert Bandura (1977, 1986). Bandura's social cognitive theory and the construct of self-efficacy defined therein, served as the basis for the work that followed by Ashton et al. (1984), Gibson and Dembo (1984), and a host of other researchers. Finally, based on the understanding developed by those foundational theories and the work of many researchers, the

construct of efficacy continues to evolve as we seek to understand its meaning and role in the teaching experience.

Given the theoretical and methodological confusion in this work, it is important to begin any investigation of teacher efficacy with a firm grounding in how this and related terms are defined in the research and operationalized in the literature. Specifically, developing a deep understanding of previous and current definitions of teacher efficacy, as well as the evolution of this construct in the research literature, will allow us to better understand the research findings that employ this term and to assess the meaning and importance of the findings reported.

Teacher Efficacy Definitions and Measurement

The development and agreement on the conceptual meaning and parameters of the construct, *teacher efficacy*, has been a theoretical discussion in the literature. Simultaneously, several measures have been created and used to assess these beliefs in teachers, which reflect adherence to different conceptualizations of efficacy. In order to understand the meaning of this construct as it is used in the literature, it is important to outline its history and to ascertain salient features in evolving definitions and related measures. In this section I will present a general overview of the measures focusing on the interpretation of teacher efficacy that is rooted within the measure. For a more detailed treatment of teacher efficacy measures interested readers should see Tschannen-Moran and Woolfolk-Hoy's (2001) piece on the measurement of teacher efficacy.

Locus of Control and the RAND Research

The construct of teacher efficacy has been derived from two separate lines of research, Rotter's (1966) locus of control theory and Bandura's (1977) social cognitive theory. See Table 1 (Appendix A) for an outline of this development. The term *teacher efficacy* was first employed by RAND (Armor et al., 1976) researchers when they included two items in a massive survey that reflected the locus of control constructs proposed by Rotter (1966). *Locus of control* refers to the

degree an individual believes that the perceived cause(s) of an intended outcome are within his or her control (Rotter, 1966). That is, the extent that a person believes that events are determined by his or her actions (Parkay, Greenwood, Olejnik, & Proller, 1988). Because teacher efficacy was conceptualized in terms of locus of control, efficacy was seen as the extent to which teachers' believed that factors, which they could control, had a larger impact on teaching outcomes than beliefs that the environment held greater power (Tschannen-Moran et al., 1998). Thus, with this focus on locus of control and the teacher's perceived role in effecting student outcomes regardless of environmental factors, two items were created to assess the impact of such control beliefs. The combined score on those items became the first assessment of teacher efficacy, and purported to identify the degree to which a teacher believed that the consequences of teaching were within the scope and ability of the teacher, or internally controlled.

The RAND researchers combined the score of the two items to determine one overall efficacy score. The first item asked: "When it comes right down to it, a teacher really can't do much because most of a student's motivation and performance depends on his or her home environment" (Berman, McLaughlin, Bass, Pauly, & Zellman, 1977, p. 137; McLaughlin & Marsh, 1978, p. 85). This item reflected an external control orientation. In effect it highlights the powerlessness of teachers in the face of students' home experiences. The second RAND item asked: "If I try hard, I can get through to even the most difficult or unmotivated students" (Berman et al., 1977, p. 137; McLaughlin & Marsh, 1978, p. 85). This item reflected an internal control orientation, emphasizing the power of the teacher to reach students regardless of their environmental conditions (Tschannen-Moran et al., 1998).

The efficacy items in the RAND research study, seemingly buried in the midst of many others items, were surprisingly strongly related to reading achievement (Armor et al., 1976), student achievement, teacher behaviors known to foster achievement, a willingness to accept change proposals and an increased likelihood of successfully implementing innovation (Berman et al., 1977).

In fact, this belief held by teachers, regarding the extent to which the teacher believed he or she had the capacity to affect student performance, ended up among the most powerful factors examined by RAND researchers in their investigation of teacher characteristics and student learning (Armor et al., 1976).

Other researchers have followed Rotter's tradition and used this first definition and interpretation of the term teacher efficacy in their research on teachers and in the construction of additional measures of efficacy (see Table 1 – Appendix A). For example, Rose and Medway (1981) and Guskey (1981) developed measures to assess teacher efficacy from a locus of control standpoint. Rose and Medway proposed the Teacher Locus of Control Scale (TLC), which required teachers to determine responsibility for student success and failure as within or beyond the control of the teacher. Similarly, Guskey (1981) developed the Responsibility for Student Achievement Scale (RSA), which added to the locus of control framework by incorporating the specifics of Weiner's (1979) attribution theory.

Expanding on the RAND work and Rotter's theory, Guskey (1981) developed a 30-item instrument titled *Responsibility for Student Achievement.* Utilizing this scale, efficacy was defined as "a teachers' belief or conviction that he or she can influence how well students learn, even those who may be difficult or unmotivated" (Guskey, 1987, p. 41). Thus, self-efficacy became equated with a causal explanation for what an individual can do. Guskey's scale measured the amount of responsibility for student learning a teacher felt in general, as well as two subscale scores, which reflected the degree of responsibility felt for student success and student failure.

The understanding of efficacy described by Guskey was deeply rooted in attribution theory (Weiner, 1979, 1992) and conceptions of locus of control (Rotter, 1966). Both theories reflect an individual's willingness to act based on perceived amounts of control over consequences. In this case the consequence referred to achieving positive student outcomes despite the impact of external

sources such as home life, television violence and the media. However, this understanding is qualitatively different from a second line of theoretical inquiry, which is based on Bandura's (1977) social cognitive theory.

Bandura's Social Cognitive Theory

The second strand of the research on teacher efficacy comes as a result of Bandura's (1977) social cognitive theory. In social cognitive theory, Bandura (1977) introduced the concept of self-efficacy as the primary motivational force behind an individual's actions. *Self-efficacy* is one of the most consistently defined motivational constructs used in the research (Murphy & Alexander, 2001). As defined by Bandura (1977), self-efficacy is "the conviction that one can successfully execute the behavior required to produce outcomes" (p. 193).

Sources of Efficacy. Efficacy beliefs have four sources: mastery experiences, vicarious experiences, verbal persuasion, and physiological arousal (Bandura, 1977). Mastery experiences are those instances in which individuals actually perform the act under question. When one teaches a class, has a field experience, or tutors a child, these are instances that provide perspective or practicing teachers with source material for the formation and development of their efficacy beliefs. Efficacy beliefs are formed based on the degree of success or failure one feels in each of these direct experiences.

Another source of efficacy beliefs are vicarious experiences in which individuals observe others and use these observations as a source of information in the beliefs that are formed about the self (Bandura, 1997). The power of vicarious experiences is dependent on the similarity of the model observed to the observer and the actions observed (Bandura, 1997). The third source of efficacy beliefs is verbal persuasion. This is found in the voiced support of our friends and colleagues as they provide verbal support for our attempts to take on and complete tasks (Bandura, 1997). However, verbal persuasion, like vicarious and mastery experience, can be negative as well as positive.

Feedback from the parents of students, colleagues, and the students themselves, may work to convince teachers that they are not succeeding and should give up the effort. The last source of self-efficacy beliefs is physiological cues. The human body can inform its owner of emotions that may not be evident on the surface (Bandura, 1997). Thus, sweaty palms and butterflies in the stomach serve to inform individuals of how they are doing in a mastery experience.

Self-efficacy as Mediator. Self-efficacy beliefs serve as a key motivational force in the cognitive system. Self-efficacy is considered to lead individuals from knowledge to action. Bandura (1986) posited that self-efficacy is the central mediator of effort. That is, increased efficacy beliefs will lead to increased persistence and high levels of performance. With regard to teachers, Dembo and Gibson (1984), Tuckman and Sexton (1990) and Woolfolk and colleagues (1990) have documented the relationship between teachers' efficacy and persistence in the face of difficulty. Similarly, researchers have found a relationship between teachers' efficacy and their performance. For example, Ashton and Webb (1986), as well as Berman and colleagues (1977), have documented the relationship of higher efficacy to the instructional practices known to foster academic achievement.

Raudenbush, Rowan, and Cheong (1992) extended the discussion of self-efficacy as a mediator between knowledge and action. Their research warned against the assumption that the mere possession of knowledge and skills is sufficient for effective teaching. Rather, Raudenbush and colleagues (1992) agree with Bandura's (1986) contention that self-efficacy mediates the relationship between knowledge and action. These researchers highlighted the importance of a teacher's beliefs and motivation in the teaching context, such that knowing the "what" and "how" of teaching does not ensure a successful learning experience. The recognition that having knowledge and skills needed to perform actions, does not, in and of itself, guarantee that an actor will perform said action. In this

conceptualization, the movement from knowledge to actions is mediated by the efficacy beliefs of the actor.

Most individuals have knowledge and skills that are not utilized on a regular basis. Therefore the knowledge alone does not ensure effective practice. Individuals must also be guided by a belief in their ability to effectively use their knowledge in a given context in order to be moved to action. For example, I have read numerous articles on portfolio assessments and I have even created one for myself. I know what such assessments would entail and their potential benefits for students. However, I have never used such an assessment with any group of students. I have doubts about my ability to implement these measures appropriately and effectively. As this example illustrates, there is a great deal of choice in any teaching experience that will be affected not only by teachers' knowledge, but also by their beliefs regarding their ability to use that knowledge effectively.

As a construct, self-efficacy beliefs are an integral aspect of the teaching process. While many authors refer to teachers' sense of self-efficacy for teaching, meaning their beliefs about their ability to perform the actions necessary to teach (e.g., Greenwood, Olejnik, & Parkay, 1990; Guskey, 1982; Lee Dedrick & Smith, 1991; Newman, Rutter, & Smith, 1989; Raudenbush et al., 1992; Ross, 1994; Smylie, 1988), many others have identified a specific form of self-efficacy pertaining to teaching (e.g., Ashton & Web, 1986; McLaughlin & Marsh, 1978; Tschannen-Moran et al., 1998). These have been called teaching or teacher efficacy.

Toward a Combined Model

Several researchers have drawn from the work of both Rotter and Bandura and in doing so have either attempted to reconcile these constructs or have simply ignored their differences. For example, Ashton, Buhr, and Crocker (1984) generated a measure that employed a series of vignettes describing situations common to a teacher's practice. Respondents were asked to judge how well they felt they could perform in each situation on a scale ranging from "extremely ineffective" to

“extremely effective.” Two sets of vignettes were created one set reflecting beliefs about teachers and teaching in general, an outcome expectancy, and a second set related to the personal ability of the respondent. However, the major contributors to this avenue of conceptualization were Gibson and Dembo (1984) with the development of the teacher efficacy scale.

Gibson and Dembo. Among the first researchers to develop the link between teacher efficacy, as conceived under the influence of Rotter (1966) and implemented by the RAND researchers (Armor et al., 1976, Berman et al., 1977), and the theory of self-efficacy presented by Bandura (1977) were Gibson and Dembo (1984). Gibson and Dembo (1984) determined that each of the RAND items reflected a unique type of expectation: an outcome expectation and an efficacy expectation (Gibson & Dembo, 1984). Specifically, the first RAND item (i.e., "When it comes right down to it, a teacher really can't do much because most of a student's motivation and performance depends on his or her home environment.”) was identified as an outcome expectation and served as a measure of *general teaching efficacy*. That means this item measured the extent to which teachers in general could impact student learning regardless of environmental influences. The second RAND item ("If I try hard, I can get through to even the most difficult or unmotivated students.") was interpreted as an example of a *personal teaching efficacy* expectation. In effect this item assessed the individual’s belief in his or her ability to reach students, reflecting an assessment of self-efficacy as described by Bandura (1977).

Using a combined conceptual framework from the foundation provided by the RAND researchers and Bandura's self-efficacy theory, Gibson and Dembo (1984) created a new instrument for measuring teacher efficacy. The measure was developed to assess what they perceived to be the two aspects of teacher efficacy, namely outcome expectations, labeled general teaching efficacy, and efficacy expectations, named personal teaching efficacy. These terms reflected those used by previous researchers to distinguish between the two Rand Items (e.g., Ashton & Webb, 1986).

General teaching efficacy has subsequently been defined as "teachers' expectations that teaching can influence student learning" (Ashton & Webb, 1986, p. 4). Gibson and Dembo (1984) referred to this factor as a teacher's "belief that any teacher's ability to bring about change is significantly limited by factors external to the teacher" (p. 574). Personal teaching efficacy, on the other hand, is considered to be a more specific individual belief of what the individual teacher can accomplish (Tschannen-Moran et al., 1998). Gibson and Dembo (1984) described this as a teacher's "belief that one has the skills and abilities to bring about student learning" (p. 573).

Common definitions. A longstanding tradition in the field of teacher efficacy has been built on the distinction of these two dimensions or factors of teacher efficacy, namely teaching efficacy or general teaching efficacy and personal teaching efficacy (Tschannen-Moran et al., 1998). This distinction separates beliefs about what teachers can do in general from what individual teachers believe themselves to be capable of doing.

Definitions of general teaching efficacy tend to focus on the ability of teachers to help or reach students beyond the external factors that impact the learning process (e.g., Anderson, Greene & Lowen, 1988; Ghaith & Yaghi, 1997; Lin & Gorrell, 1998; Ross, 1994). Rich, Lev, and Fischer (1996) provide a definition that exemplifies this orientation when they describe teacher efficacy as "a teacher's general feeling that the education system is capable of fostering satisfactorily student academic achievement despite negative influences external to the teacher" (p. 1016). This definition, and others like it, have led to the suggestion that this construct is more an assessment of locus of control or outcome expectancy rather than self-efficacy, which is rooted in the individuals' beliefs about their own abilities (Guskey & Passaro, 1994; Tschannen-Moran et al. 1998).

Definitions of personal teaching efficacy focus on two key components, the individual's ability to perform actions and the power of those actions to influence student learning (e.g., McLaughlin & Marsh, 1978; Meijer & Foster, 1988; Ross, 1994, 1992; Soodak & Podell, 1996,

1993). A typical definition of personal teaching efficacy was put forth by Soodak and Podell (1996) this definition states that personal teaching efficacy is "a teacher's belief about his or her ability to perform the actions needed to promote learning or manage student behavior successfully" (p. 406).

Personal efficacy focuses specifically on teachers' belief about their own ability to impact students rather than on the more distant notion of what teaching and teachers can do in general. As such, the perspective of personal teaching efficacy more closely reflects the meaning and understanding of self-efficacy as put forth by Bandura (1977, 1986, 1993, and 1997) and avoids confounding teacher efficacy with locus of control. Therefore, some scholars have suggested that personal teacher efficacy and its subsequent measurement is a more accurate description of teacher efficacy than the construct called general efficacy or some composite of these two belief systems (Guskey & Passaro, 1994; Tschannen-Moran et al. 1998).

Factor structure. The original measure constructed by Gibson and Dembo (1984) contained 30 items. Several researchers used these items and found additional evidence for the existence of the two aforementioned factors, general and personal teaching efficacy (Anderson et al., 1988; Hoy & Woolfolk, 1993; Moore & Esselman, 1992; Saklofske, Michaluk, & Randhawa, 1988; Soodak & Podell, 1993). This measure was eventually narrowed down to a 16-item instrument, which has enjoyed widespread use (Soodak & Podell, 1993; Tschannen-Moran et al., 1998; Woolfolk & Hoy, 1990).

For example, the Gibson-Dembo instrument has been used to confirm that teacher efficacy consists of the two distinct dimensions described previously, general and personal teaching efficacy (Tschannen-Moran et al., 1998). Researchers have also investigated the relationship of this measure and its two factors to the original Rand items. The subsequent research found the first RAND item tended to load on the general teaching efficacy factor, where the second RAND item loaded on the personal teaching efficacy factor (Coladarci, 1992; Woolfolk & Hoy, 1990). Moreover, these two

areas of efficacy have been found to be "only slightly related or not at all correlated" (Tschannen-Moran et al., 1998, p. 213). Many researchers interpret this finding to mean that teacher efficacy is comprised of two distinct constructs of efficacy (e.g. Anderson et al., 1988, Gibson & Dembo, 1984). Gibson and Dembo (1984) interpreted this distinction as reflecting the concepts of outcome expectancy and efficacy as described by Bandura. This conceptualization has received criticism from researchers and theorists in the field (Tschannen-Moran & Woolfolk-Hoy, 2001) that will be discussed in the next section. However, based on the Gibson and Dembo measure, and its widespread usage, the working definition of teaching efficacy came to be understood as the combination of general teacher efficacy (GTE) and personal teacher efficacy (PTE). Each teacher has a combined belief of what teachers can accomplish (GTE) and a personal perception of what he or she as a teacher can achieve (PTE). The two dimensions of the teacher efficacy construct are perceived as unique and each is created over time simultaneously yet independently of the other.

Concerns Regarding the Gibson and Dembo Model

Dissension still remained in the interpretation of the Gibson and Dembo (1984) measure and the understanding of the efficacy construct. For example, Guskey and Passaro (1994) implemented a study with 342 prospective and experienced teachers to examine the difference between efficacy measurement and control interpretations. Upon close review of the items in the Gibson and Dembo (1984) scale, Guskey and Passaro (1994) questioned the true meaning of the factors found by Gibson and Dembo (1984). Specifically, Guskey and Passaro (1994) determined that the items that fell on the personal teaching efficacy factor “all use the referent *I*, all are also positive and have an internal locus (i.e., ‘I can’)” (p. 630). In contrast, the items that fell on the general teaching efficacy factor were found to “nearly all use the referent ‘teachers’ but also are negative and have an external locus (i.e., ‘teachers cannot’)” (p. 630). Given this analysis Guskey and Passaro (1994) questioned the extent to which the two factors confounded the type of efficacy with referent, positive or negative nature, and

locus. Specifically, they questioned whether these factors actually identified two types of efficacy or if the dimension structure instead reflected internal and external locus of control.

For this study, Guskey and Passaro (1984) revised the altered version of the teacher efficacy scale (Gibson & Dembo, 1984) proposed by Woolfolk and Hoy (1990). The altered version included the 16-items from the Gibson and Dembo (1984) measure that were found to be constant, as well at the two RAND items and three additional items which Woolfolk and Hoy (1990) found to yield significant factor loadings. The two subscales reflecting general or teaching efficacy and personal efficacy were each altered to reflect internal and external control dimensions. Thus, the existence of four possible dimensions of efficacy (personal internal, personal external, general internal and general external beliefs) were investigated.

Guskey and Passaro (1994) randomly selected seven out of the 12 personal efficacy items from the Gibson and Dembo scale considered to reflect a personal internal orientation. The items were reworded to reflect either a general teaching-internal or a personal-external orientation. For example, Guskey and Passaro (1994) reworded the personal-internal item “I have enough training to deal with almost any learning problem” (Woolfolk & Hoy, 1990, p. 89) to reflect a personal external orientation (i.e., “I have *not been* trained to deal with *many of the* learning problems *my students have*” (Guskey & Passaro, 1994, p. 638). Similarly, Guskey and Passaro (1994) changed the personal internal item “When a student does better than usually, many times it is because I exert a little extra effort” (Gibson & Dembo, 1984, p. 581) to reflect a general or teaching-internal orientation (i.e., “When a student does better than usually, many times it is because *the teacher* exerts a little extra effort” p. 638). In this way the items thought to reflect a personal internal orientation either remained the same or were altered to reflect a general teaching-internal orientation or a personal-external orientation. Thus, both the referent and locus were altered.

Using the same method, Guskey and Passaro (1994) changed four of the nine general teaching efficacy items. Most of these items were considered to reflect a general teaching-external orientation. For example, Guskey and Passaro (1994) changed an original item "A teacher is very limited in what he/she can achieve because a student's home environment is a large influence on his/her achievement" (Gibson & Dembo, 1984, p. 581) to reflect a personal-external item (i.e., "*I am* very limited in what *I* can achieve because a student's home environment is a large influence on his/her achievement" p. 638).

Guskey and Passaro (1994) performed a principal components analysis on the responses of 283 inservice teachers and 59 preservice teachers. This analysis found that two dimensions of efficacy did exist. However, these factors fell along the lines of internal and external control orientations rather than along the dimensions of general and personal efficacy. Guskey and Passaro (1994) found that "whether the item referent was 'my influence' or 'teachers' influence' made no difference." (p. 637). Instead the factors fell along the lines of control attributions. However, Guskey and Passaro (1994) also noted that their findings are not in complete agreement with the theoretical understanding of the internal-external control component of attribution theory. In attribution theory, locus of control is seen as a bi-polar continuum. That is, the more one contributes to an internal cause, the less one explains outcomes based on external factors. Thus, locus of control should be understood as one factor with responses falling along the internal to external continuum. In Guskey and Passaro's (1994) study, however, two separate, modestly correlated, factors were unearthed suggesting a slightly different interpretation from locus of control. Guskey and Passaro (1994) suggested that this distinction "more accurately represents teachers' perceptions of the strength of different and independent factors" (p. 639).

A concern regarding the acceptance of the external/internal findings put forth by Guskey and Passaro (1994) exists. This concern has to do with the positive and negative nature of the items,

which they discussed at the introduction of their study, but then failed to address in their methodology. The items used by Gibson and Dembo (1984) and Woolfolk and Hoy (1990) were found to fall in two dimensions relating to personal and general teaching efficacy. However, it can also be noted that all of the personal efficacy items reflected a more positive outlook regarding the teacher's abilities (i.e., "When I really try, I can get through to the most difficult students," Gibson & Dembo, 1984, p. 581). In contrast the items assessing general teaching efficacy tended to reflect a more negative orientation regarding teachers abilities (i.e., "The hours in my class have little influence on students compared to the influence of the home environment," Gibson & Dembo, 1984, p. 581).

When Guskey and Passaro (1994) set out to challenge the current meaning of the factor structure using their modified measure, they altered the referent (from I to teachers and the reverse) as well as the locus (internal to external and the reverse). However, they did nothing to address the positive and negative orientation of these items. As a result, the two factors which they found and identified as internal and external can also be interpreted as positive and negative, such that all of the internal items reflected a positive orientation to what teachers can accomplish (e.g. "When a student does better than usually, many times it is because *the teacher* exerts a little extra effort" p. 638). In contrast all of the external items in their analysis represented a more negative orientation (e.g. "When it comes right down to it, a teacher really can't do much because most of a student's motivation and performance depends on his/her home environment." P. 638).

In conjunction with this concern regarding the positive and negative nature of the items, there was an issue of the placement of a seemingly internal item in the external factors. One item states: "When a student is having difficulty with an assignment, I *often have trouble* adjusting to his/her level" (Guskey & Passaro, 1994, p. 638). This item has a factor loading of .42 on the external factor. However, at face value this item seems to reflect an internal, albeit negative, orientation. This

situation highlights the concern that these factors may be more sensitive to the optimistic or pessimistic orientation of the responder than an internal/external or general/personal teaching efficacy.

The work of Guskey and Passaro demonstrated the important need to better clarify and understand the meaning of teacher efficacy from both a theoretical and a measurement perspective. Through this work these researchers started a movement toward a better understanding of teacher efficacy and the development of a new model and measure of this construct.

Tschannen-Moran, Woolfolk-Hoy, and Hoy Model of Teacher Efficacy

Tschannen-Moran and colleagues (1998) proposed a new model of teacher efficacy based on the previous work in the field. This new model is firmly rooted in Bandura's construct of self-efficacy (1977, 1986, and 1997). The Tschannen-Moran et al. (1998) model is based on a five-step circular process through which efficacy beliefs are created, assessed, utilized, and then lead to new beliefs (see Figure 1 – Appendix B). Sources of efficacy beliefs in this model explicitly follow those proposed by Bandura (1977): mastery experiences, vicarious experiences, verbal persuasion, and physiological cues. These sources are considered to provide a backdrop for the mechanisms of cognitive processing, which lead to efficacy in teachers (Tschannen-Moran et al., 1998). Cognitive processing in this model is referred to as the combined examination and evaluation of the task to be completed (i.e., task analysis) and the assessment of the individual's personal competence (i.e., personal competence). The resulting judgment regarding the ability to plan and execute actions necessary to achieve the desired outcome is the individual's teaching efficacy. This belief is then parlayed in to the goals, effort, and persistence teachers employ which in turn impact their performance. The resulting performance then serves as a mastery experience in future efficacy judgments.

Using this model, Tschannen-Moran and Woolfolk-Hoy (2001) proposed a new measure of teacher efficacy. In this measure, both dimensions of the teacher efficacy judgment (i.e., personal competence and analysis of the task) are tapped. Specifically, these researchers developed a measure of teacher efficacy that assessed critical tasks associated with teaching in the domains of engagement, classroom management, and instructional practices. The measure was constructed with the aid of current teachers enrolled in a seminar on self-efficacy in teaching and learning (Tschannen-Moran & Woolfolk-Hoy, 2001).

Tschannen-Moran and Woolfolk-Hoy (2001) consider this new measure to be superior to previous assessments of efficacy for two reasons. First, this measure has demonstrated a unified and stable factor structure. Second, this measure assesses a broad range of important teaching tasks without being so specific that it cannot be used to compare across subjects, levels, or school contexts (Tschannen-Moran & Woolfolk-Hoy, 2001). Additionally, the three-factor structure of the measure enables researchers to identify specific areas of concern in teachers and relationships between these domains of teaching tasks, teacher performance outcomes, and student achievement.

The next step in the development of this model and measure of teacher efficacy is an investigation of the factors which affect task analysis and resulting efficacy beliefs. Specifically, to what degree does the role of the teachers' knowledge and prior experience play in analyzing the task, identifying possible solutions, and assessing teaching efficacy which ultimately affects the decisions and actions made by the teacher?

Based on the overview presented, the following observations and implications can be made with regard to the historical development of teacher efficacy:

- The meaning and definition of teacher efficacy has experience change and diversity throughout the course of its development.

- The analysis of all prior studies of teacher efficacy must give consideration to the underlying theoretical perspective of the researcher and the selection of measurement tool used.
- The current conceptualization of teacher efficacy relies on Bandura's self-efficacy theory and seeks to develop an understanding of teacher efficacy nested in this work.
- The current conceptualization of teacher efficacy recognizes the cyclical nature of this construct and accepts that any teacher's efficacy is in a state of development at any time, as new experiences are encountered.
- Little focus has been given to understanding and demonstrating the process by which efficacy affects teachers' daily practice. Specifically, we must investigate the factors that affect teachers' abilities to analyze tasks as well as their efficacy beliefs, that is the roles knowledge and pedagogical beliefs play in the development of efficacy.

The Power of Teacher Efficacy

Pajares (1992), based on the works of Bandura (1986), concluded that "beliefs are the best indicators of the decisions individuals make throughout their lives" (p. 307). It follows that teachers' beliefs about their personal teaching abilities would be a key indicator of teacher behavior, decisions, and organization of their classroom environments. Pajares (1992) also remarked that while much research has been done on how teachers think, this has been fruitless in determining expectations of teachers' actions, while knowledge of teacher beliefs (teacher efficacy) has had powerful predictive powers.

Previous work in this area has used the Gibson and Dembo instrument (16 item) and variations of the RAND items. These studies have established the distinct dimensions of teacher efficacy, and have found that the construct correlates to areas such as student achievement (e.g., McLaughlin & Marsh, 1978), student motivation (e.g., Midgley, Feldlaufer, & Eccles, 1989), teacher

valuing of educational innovations (e.g., Cousins & Walker, 2000), classroom management skills (Woolfolk et al., 1990) and teacher stress (Greenwood et al., 1990).

The existence and maintenance of high positive teacher efficacy in educators appears to be vital to the existence of successful classrooms and schools (Tschannen-Moran et al., 1998). People who believe in their own abilities as teachers (high personal efficacy) and in teachers as a significant influence on students (high general efficacy) tend to have classrooms that are well run (e.g., Ashton, Webb, & Doda, 1983), less stressful (e.g., Parkay, Greenwood, Olejnik, & Proller, 1988), and have students with higher achievement (e.g., Ross, 1992). The impact that positive teacher efficacy has on the school environment is likewise clear. Positive efficacy in teachers, general teaching efficacy or personal teaching efficacy, creates positive outcomes for students and an enriched learning environment (e.g. Ashton & Webb, 1984).

The following section serves to highlight the research to date that emphasizes the important role efficacy plays in teaching practice. However, when reading this section one must keep in mind three key elements. First, we need to attend to the theoretical base on which the research presented was predicated. Was the study designed from a locus of control understanding of efficacy or from a social cognitive approach? Second, and related to the first element, is the consideration of the measure used to assess efficacy. What is the measure asking and therefore what do the findings mean in light of it? Finally, one must consider the type of analysis that is employed. The majority of research on teachers' efficacy has utilized correlational analysis which precludes any claims of causality or direction of the relationships observed. Thus, as you read the following sections these elements should be kept in mind and considered as the studies are presented. Any causal tone related to correlational research in the following descriptions is derived from the original authors, and the overall presentation of findings that is common in the teacher efficacy literature.

Teacher Efficacy and Positive Student Outcomes

Student Achievement

McLaughlin and Marsh (1978) were among the first researchers to put forth the extended causal chain from teacher efficacy to student achievement. Simply stated these researchers proposed that a teacher's level of efficacy will influence said teacher's behavior which will in turn affect the behavior of the students which leads to changes in student achievement levels (McLaughlin & Marsh, 1978). Several researchers have identified a link between student achievement and levels of teacher efficacy (e.g., Allinder, 1995; Ashton & Webb, 1986; Tracz & Gibson, 1986; Ross, 1992, 1994).

Some researchers using the Gibson and Dembo (1984) measure have found that the proposed two dimensions of teacher efficacy have had differential effects on teacher practice and student outcomes. Specifically teachers with positive personal teacher efficacy have demonstrated an increased willingness to experiment in the classroom with various strategies and curriculum ideas, and have students with higher scores on language arts achievement tests (e.g., Meijer & Foster, 1988; Podell & Soodak, 1993; Tschannen-Moran et al., 1998). Further, teachers who were rated as having high general teacher efficacy were found to have students with high achievement in mathematics and a greater number of students interested in school (e.g., Tracz & Gibson, 1986; Ross & Cousins, 1993).

This research has often found links between teacher efficacy and specific content areas. One example is the work of Anderson and colleagues (1988) who conducted a comparison study in which two groups of teachers were compared based on their levels of personal teaching efficacy. Specifically, the groups were formed by classifying the teachers with the highest and lowest levels of personal teaching efficacy, as measured using the Gibson and Dembo (1984) Teacher Efficacy Scale. The data collected in this study were analyzed using correlation and multiple regressions in an attempt to determine which variables best accounted for student achievement. The analyses revealed

that teacher efficacy contributed to student achievement in language arts and social studies, as well as to student levels of efficacy for achievement. Further, it was determined that the level of personal teaching efficacy held at the beginning of the school year by the teacher had a significant effect on the development of efficacy in the students and their achievement.

Student Motivation

Brophy and Good (1974) documented how teacher expectancies and beliefs influence student motivation and achievement. Teacher efficacy was found to be a belief that guides teacher actions and communication with students and, in turn, influences student motivation and achievement. Thus, teacher efficacy has also been related to non-academic student outcomes. Such outcomes include: increased motivation to learn in students, higher self-perceptions, and better self-management (Midgely, Feldlaufer, & Eccles, 1989; Rose & Medway, 1981; Saklofask, et al., 1988; Ross, 1994; Woolfolk, Rosoff, & Hoy, 1990). Anderson et al. (1988) found that teacher efficacy was related to student efficacy for achievement. Strong positive correlations were found between teacher efficacy and student perceptions of ability and student self efficacy (Ashton, 1984; Ashton, et al., 1983). Connections have also been made linking teacher efficacy to student levels of self-esteem (Borton, 1991). In essence, teachers with higher levels of efficacy for teaching tended to have students who demonstrate greater motivation for school and higher levels of academic self-efficacy (Duncan & Biddle, 1974; Dusek, 1985).

Teacher Efficacy and Positive Teacher Outcomes

Teacher efficacy as a belief is expected to guide teachers in their behaviors, decisions, and motivation with regard to teaching. The power of self-efficacy is rooted in its ability to guide the decisions that teachers make in the course of their role as teachers. If one begins with Bandura's (1977) proposal that self-efficacy "determines whether coping behavior will be initiated, how much effort will be expended and how long it will persist in the face of aversive experiences" (p. 191), one

can see how this same construct can and does aid teachers in the course of their professional life. Specifically, teachers' level of efficacy for teaching affects their daily decisions related to teaching, (e.g., the selection of materials, or the amount of effort used to reach all students) and their willingness to invoke specific strategies and techniques.

This contention has been well supported in the research, where teacher efficacy has been related to high expectations for students (Allinder, 1995; Ashton et al., 1983; Dembo & Gibson, 1985; Ross, 1994), the use of behaviors known to foster academic achievement (e.g., Hoover-Dempsey, Bassler & Brissie, 1987; McKinney, Sexton & Meyerson, 1999; Vanek, Snyder, Hull & Hekelman, 1996; Ross, 1992; Woolfolk et al., 1990), a motivation to teach (Lin & Gorrel, 1988; Parkay, Olejnik & Proller, 1986; Trentham, Silvern, & Brogdon, 1985; Tuckman & Sexton, 1990; Shunk, 1985) and the types of decisions teachers make with regard to student needs (e.g., Emmer & Hickman, 1991; Kim & Corn, 1998; Kruger, 1997; Soodak & Podell, 1993, 1994; Saklofske et al., 1988; Shunk, 1985; Woolfolk et al., 1990).

Teacher Motivation

There is an important relationship between teacher efficacy and the motivation to teach found by many researchers (e.g., Ashton & Webb, 1986; Tschannen-Moran et al., 1998). Specifically, teachers with high levels of teacher efficacy also demonstrate a love or passion for teaching that impacts their practice as teachers (Dembo & Gibson, 1985; Tuckman & Sexton, 1990; Shunk, 1985; Woolfolk et al., 1990). In addition, teacher efficacy has also been linked to a greater commitment to the teaching profession as well as job satisfaction (Parkay et al., 1986; Trentham et al., 1985).

Teachers' level of efficacy has also been related to a willingness to teach children with physical disabilities (Stephens & Braun, 1980). In an investigation of teacher characteristics on the placement recommendations of students with visual impairment, teacher's efficacy was found to be related to these decisions. Teachers with higher levels of efficacy were more likely to recommend

that the child with a visual impairment remain at the local school rather than sending these students out for special services (Kim & Corn, 1998).

Teacher Actions

Teachers with higher levels of teacher efficacy have been found to have higher expectations for their students (Allinder, 1994; Ross, 1994). Allinder (1994) working with special education teachers on the implementation of a new means assessment in mathematics education, found that teachers with higher personal teaching efficacy and general teaching efficacy increased the end of the year goals for their students more than their less efficacious peers. Teachers with higher general teaching efficacy also set more ambitious goals for their students and affected significantly greater academic growth in their students. Thus, efficacy has been linked to both more demanding goals and increased student achievement.

Teaching efficacy has also been related to specific instructional behaviors performed by teachers known to foster academic achievement (Ashton & Webb, 1984; Berman et al., 1977). Such behaviors include maintaining on-task behavior in students, concentrating on academic instruction, and demonstrating "withitness" in the classroom (Ashton et al., 1983; Dembo & Gibson, 1985). Cooper and Burger (1980) investigated the relationship between teaching efficacy and intended teaching behavior in a group of preservice teachers. Using a free response methodology, the preservice teachers were asked to describe how they would respond to 12 possible reasons for student performance, and efficacy was measured by asking each participant to describe the extent of their perceived role in each situation. These researchers found that teacher efficacy was related to the intended behavior of these student teachers.

Teachers with a high sense of efficacy have demonstrated persistence when faced with student failure and school difficulties and have been identified as effective problem solvers with regard to classroom management (Dembo & Gibson, 1985; Tuckman & Sexton, 1990; Woolfolk et al., 1990).

Similarly, teachers with high general teaching efficacy have been found to be less likely to criticize students for giving an incorrect answer (Gibson & Dembo, 1984).

Teacher Decisions

Teacher efficacy beliefs are related to the decisions teachers make with regard to use of time, classroom management strategies, and pedagogical techniques (Gibson & Dembo, 1984; Saklofske et al., 1988; Woolfolk et al., 1990). Emmer and Hickman (1991) investigated the role of teacher efficacy in classroom management and found that efficacy beliefs predict preference for particular strategies to be employed in responding to the behavior problems presented in vignettes.

A series of studies have been done on the relationship between teachers' efficacy and the likelihood of their referring students for special education. Specifically, teachers with high personal teaching efficacy as determined by the Gibson and Dembo measure found to be less likely to refer low socio-economic status students and or students with behavior problems to special services (e.g., Meijer & Foster, 1988; Podell & Soodak, 1993; Soodak & Podell, 1994). Similarly, self-efficacy for resolving problems is predictive of teachers' intervention decisions (Hughes, Barker, Kemenoff, & Hart, 1993). Specifically, the more confident teachers are in their ability to solve the problem (i.e., the higher their self-efficacy), the less likely they are to refer the child to special education or to seek a consultation (Hughes et al., 1993).

Response to Innovation and Change

The valuing, adoption, and successful implementation of new innovation or program are related to teachers' efficacy beliefs (Stein & Wang, 1988). Specifically, teachers who expressed higher levels of efficacy for teaching also tended to express a valuing of educational innovations (Cousins & Walker, 2000; DeForest & Hughes, 1992). More efficacious teachers also rated new practices as more aligned with their current routines, more important for student learning, and less difficult to implement than do teachers with less efficacy (Guskey, 1988). Kruse (1997) found that

teachers who are able to practice focused reflection also reported a greater sense of efficacy. Additionally, these more efficacious teachers directed their searchers for innovations and new pedagogical practices with a specific purpose or goal in mind, thus they used their reflective abilities to identify needed innovations and improvements (Kruse, 1997).

Positive teaching efficacy has revealed teachers who are more willing to experiment in the classroom with various strategies and curriculum ideas, (e.g., Meijer & Foster, 1988; Soodak & Podell, 1993). These high efficacy teachers are more likely to adopt instructional innovations in the classroom (e.g., Berman et al., 1977; Ghaith & Yaghi, 1997; Guskey, 1988; Rohrbach, Graham, Hansen, 1993). Higher efficacy for teaching was also associated with successful implementation of adopted innovations (Berman et al., 1977). Dembo and Gibson (1985) reported that efficacy was one of the best predictors of "the percentage of goal achieved, amount of teacher change, improved student performance, and continuation of both project methods and material" (p. 173).

Many investigations have identified important relationships between teacher efficacy and desirable outcomes within learning environments. The following statements highlight the research findings and identify areas of omission or concern.

- Teacher efficacy has been related to many positive outcomes relating to both student outcomes (i.e., achievement and motivation) and teacher outcomes (i.e., motivation, actions, decisions, and response to innovation and change).
- However, the majority of the empirical work looking as these and other relationships has been correlational or comparative in nature. Future research should include investigations of the process by which efficacy effects behavior.

The Relationship Between Teacher Knowledge and Teacher Efficacy

If one considers teacher efficacy to be a mediator between knowledge and action as suggested by Raudenbush and colleagues (1992), then clearly the understanding of this mediational role should

become a focus of study. Moreover, an understanding of how knowledge and efficacy are related warrants consideration, as an avenue for improving teacher practice. The following section seeks to thoroughly review research that has investigated this relationship.

Conceptualizing Teacher Knowledge

In order to appreciate the relationship between teacher knowledge and teacher efficacy it is important to consider how teacher knowledge is conceptualized in the field. However, a detailed review of the conceptualization of teacher knowledge is beyond the scope of the current review (to find such reviews see: Carter, 1990; Clark & Peterson, 1986; Kagen, 1990; Morine-Dershimer, 1991; Shavelson & Stern, 1981). Provided here is only a cursory outline of the meaning of teacher knowledge as it has been expressed in the literature.

Any work investigating teacher knowledge has often been linked closely with teacher beliefs. In fact, in their 1996 Handbook chapter on learning to teach, Borko and Putnam collapsed knowledge and beliefs into a single category for investigation. Calderhead (1996) clarified these terms, stating that knowledge is generally refered to "factual propositions and the understandings that inform skillful action" (p. 715). In contrast beliefs tend to reflect "suppositions, commitments, and ideologies." Still, knowledge and beliefs are not always clearly delineated in the field. Additionally, a large array of content and structure has been identified to describe teachers' knowledge and beliefs.

Borko and Putnam (1996) organized their discussion of learning to teach around three domains of knowledge they considered relevant to the practice of teaching, namely, general pedagogical knowledge and beliefs, subject matter knowledge and beliefs, and pedagogical content knowledge and beliefs. In this organization general pedagogical knowledge and beliefs includes teachers' knowledge and beliefs with respect to teaching, learners and learning. This domain includes general teaching areas, across subject areas, such as classroom management, instructional strategies, and knowledge of learners and learning. The remaining two categories identified by Borko and

Putnam (1996) focus specifically on knowledge and beliefs regarding specific content area. Namely, the subject matter it self and the specialized pedagogy for instruction of that content area.

The framework put forth by Borko and Putnam (1996) serves to highlight the way that knowledge and beliefs have been considered in the research on teachers and teaching. This structure identifies how knowledge and beliefs can be considered in relation to other constructs of interest such as teachers' sense of efficacy. The next section serves to review the research that has investigated the relationship between knowledge and efficacy, however, the research completed to date does not easily fall into the categories of knowledge described due to the manner in which knowledge was assessed. A challenge to the field at this time is to make an explicit investigation of the relationship across these constructs.

Research Investigating the Relationship between Teacher Knowledge and Teacher Efficacy

Raudenbush et al. (1992) highlighted the important intersection between teachers' efficacy and the knowledge and skills that are necessary to be successful. They contend that neither knowledge nor efficacy alone can generate effective teaching. Rather, these researchers emphasize the role of efficacy as a mediator between knowledge and action, such that efficacy provides the impetus for teachers to utilize their knowledge and skills in new situations and with persistence (Raudenbush et al., 1992). In this light, Raudenbush and colleagues (1992) saw positive feelings of self-efficacy as necessary, but not sufficient, for effective teaching. That is, these positive feelings produce a generative capability that will allow teachers to develop new teaching strategies, increase their effort, and extend their persistence in the face of difficult or uncertain teaching situations. Thus, these authors conclude that "from this perspective feelings of positive self-efficacy cannot guarantee effective teaching, since teachers with high levels of perceived self-efficacy may lack the requisite knowledge or skills to be effective. But low feelings of self-efficacy almost certainly work against

effective teaching by decreasing teachers' generative capability to cope with the uncertainties of classrooms" (Raudenbush et al., 1992, p. 151).

Some researchers have looked at the extent to which teachers' knowledge is related to their efficacy beliefs, however, these investigations were often embedded in larger questions. The research that has investigated the relationship between knowledge and efficacy can be categorized by the manner in which knowledge is assessed, focusing on educational level, explicit learning experiences, and measures of demonstrated knowledge. Each of these categories of studies is based on what I interpret to be an assessment of knowledge. The first group, entitled "education" consists of those studies in which formal education was used as a proxy variable for knowledge in relation to teacher efficacy. In these studies, education was assessed as education level (e.g., Hoy & Woolfolk, 1993) or as courses taken (i.e., Enochs, Scharmann, & Riggs, 1995).

The second category, "specific learning experiences" outlines those studies that investigated specific, usually structured, experiences of teachers or teacher education students. These specific learning experiences were defined in such as way so as to convey an expectation of specialized knowledge (e.g., experience teaching in an inclusive setting, Minke, Bear, Deemer, & Griffin, 1996). The final group of studies, classified as demonstrated knowledge, include investigations that assessed participants demonstrated knowledge through paper and pencil assessment (e.g., Emmer & Hickman, 1991) or teacher performance through supervisor ratings (e.g., Trentham et al., 1985). Each of these categories includes investigations that emphasized the importance of knowledge in understanding teacher efficacy.

Table 2 (Appendix C) provides a skeletal outline of the studies that demonstrated the central features of each of these categories. The table includes the author(s) and title, as well as, the research question(s) that pertain to the relationship between knowledge and efficacy, the measures used, type of analysis, and related findings. The descriptions in this table are intended to provide the reader with

an overview of the work done in this area. In many cases, this is but a snapshot of a larger study. However, this overview will allow us to look closely at the knowledge-efficacy connection. Following the discussion of the tabled studies, unasked questions will be raised and areas for future research will be outlined.

Education

Studies that assessed education focused on either educational level achieved or specific courses taken. Across the studies is the common reliance on participants (pre- and inservice teachers) self-report information regarding the extent of their prior learning. Additionally with these studies, it should be noted that education is being considered a proxy variable for knowledge. Of course, this approach relies on the potentially faulty assumption that higher education levels equate to higher levels of knowledge.

Education level. Benz, Bradley, Alderman, and Flowers (1992) conducted a cross-sectional study to assess the development of personal teaching efficacy in preservice students through college education faculty. Six groups were assessed, entering students (n=95), students in advanced education courses (n=121), student teachers (n=47), practicing teachers (n=38), teacher education faculty (n=29), and non-faculty student teaching supervisors (n=29). Each of these groups responded to the Ashton Vignettes (1984), which measure personal teaching efficacy. This measure presents participants with a detailed scenario of a teaching dilemma and asks how confident they would be in resolving this situation.

Several interesting differences were found across the groups assessed. First, there seemed to be a distinction between groups based on the task for which efficacy was measured. For example, the preservice teachers reported higher levels of efficacy for motivating their future students than did inservice teachers. In contrast, the inservice teachers demonstrated higher levels of efficacy for

planning and evaluating lessons, tasks that the authors felt involved a larger knowledge base (Benz et al., 1992).

Second, when all groups are considered, college faculty demonstrated some of the highest levels of efficacy. College faculty members had higher self-efficacy for motivation and classroom management than all other groups except the student-teaching supervisors. Similarly, with regard to planning, college faculty had higher efficacy than student teachers. Lastly, college faculty also demonstrated higher efficacy for socialization processes than entering students. It is interesting to note that college faculty had high levels of efficacy for these teaching tasks, even though the completion of such work was not part of their daily practice. Although these professionals are committed to training teachers and should, in turn, have extensive knowledge regarding the types of tasks assessed, they are not in reality, confronted–or expected to be confronted–with these dilemmas as part of their daily professional practice. It may be that the lower efficacy beliefs of preservice and inservice teachers are related to the reality of their future and current situations. Moreover, preservice and inservice teachers will have or do have their efficacy beliefs for these tasks tested on a regular basis and, as such, may receive more information with which to make these assessments.

Two other studies looked at the relationship between personal teaching efficacy and educational level (Campbell, 1996; Hoy & Woolfolk, 1993). Both of these studies assessed personal teaching efficacy using the Gibson and Dembo (1984) instrument. The first study, conduced by Hoy and Woolfolk (1993), investigated the relationship between teacher efficacy and the organizational health of schools. In addition to this larger focus, these researchers explored the relationship between personal and demographic characteristics and teachers' sense of personal and general teaching efficacy. Data were collected from 179 practicing teachers. In addition to the efficacy measure, demographic information requested included age, gender, years of teaching experience, and education level. Among the personal variables, education level was the only factor that predicted

personal teaching efficacy. Correlational analysis revealed a significant positive relationship between education level and personal teaching efficacy (r =.21, p<.01). In multiple regression analysis, education level was the only personal variable that had an independent effect on personal teaching efficacy (R^2=.03843, p>.05).

The final study to be assessed was conducted by Campbell (1996) and compared teaching efficacy of preservice and inservice teachers in Scotland (preservice=34; inservice=39) and the United States (preservice=32; inservice=35). Although the development of teacher efficacy was found to be the same across the two countries, differences in efficacy as related to education level differed. Specifically, three education levels were identified, pre-Bachelor's degree, Bachelor's degree, and post-graduate (these included Master's degrees, or other graduate certificates or diplomas). When teacher efficacy was compared across these groups it was determined that teachers with post graduate work both in Scotland and the United States, reported the highest level of teaching efficacy.

Each of these three studies demonstrated a relationship between educational level and teacher efficacy. Most often, higher levels of education were associated with higher levels of efficacy. This may seem like a logical relationship. People who earn more degrees, gain more knowledge about teaching, and feel more confident in their ability to teach successfully. However, these studies do not address two key concerns. First, there is no attention given to the personal characteristics that influence individuals' decisions to pursue graduate study. It could be that these individuals had higher efficacy prior to investing in graduate work, and it was this higher efficacy that pushed them to learn more so that they could fill their own expectations.

The second concern is the assumed link, between education level and knowledge. The actual knowledge base and abilities of these individuals was not tapped, so a true understanding that more education leads to more knowledge and eventually to higher efficacy cannot be verified by this work.

There could be other events happening within the continuing education experience that are increasing efficacy unrelated to knowledge.

Specific courses. Enochs et al. (1995) explored the extent to which preservice teachers' sense of teaching efficacy for science instruction was related to the coursework they had received. Enoch and colleagues (1995) assessed 73 preservice elementary teachers' efficacy for teaching science using the Science Teaching Efficacy Beliefs Instrument-B or STEBI-B, (Enochs & Riggs, 1990), as well as the amount of science education these preservice teachers had received at both the college and high school levels. Significant correlations were found between personal science teaching efficacy and the number of college science courses taken (r = -.21, p<.05) and years of high school science (r = -.22, p<.05). These negative relationships suggest that the more science classes taken in college and high school, the less personal science teaching efficacy was reported by these students.

Enochs et al. (1995) explained the negative relationship between science teaching efficacy and the number of science courses taken, by focusing on the manner in which sciences classes are taught at the secondary and college level. Namely, these courses are often taught in a traditional lecture format with a heavy focus on memorization, which is the antithesis of how preservice teachers are instructed to conduct science lessons in their methods courses. Thus, according to Enochs et al. (1995), the students with more science courses, also had greater exposure to poor models of how to teach science that, in turn, served as a source for efficacy beliefs (vicarious experiences).

I would offer a second explanation for this difference that is, the advanced level of these, courses, in conjunction with the way that they are delivered, may inhibit preservice teachers' beliefs in their ability to reconstruct this material for elementary school children. Further, these preservice teachers may not be able to see or make the connections between college level physics and a second grade unit on simple machines, because the two courses, while rooted in the same science, are at very different levels of understanding. The advanced courses in science may influence how these

preservice teachers view the domain of science, such that their teaching efficacy beliefs are inhibited by their larger scope and understanding of the field. Because they do know, supposedly, the field better, they may in fact be making more informed efficacy judgments, which may reflect their concern for and desire to provide conceptually sound lessons for their future students. Additionally this study also highlights the reality that there are a multitude of other variables embedded in any educational experience that can also influence teacher efficacy.

The preceding section highlighted those investigations that explored the relationship between education level and teachers' sense of efficacy for teaching. In large part, it seems that greater amounts of education are associated with higher levels of teaching efficacy, excluding the case presented by Enochs et al. (1995). However, hidden in these result are the unique reasons these preservice and inservice teachers chose to advance their education. Perhaps personal interest or aptitude led them to pursue additional education, and perhaps these individuals would have demonstrated similar levels of efficacy had they not furthered their education. Additionally, education level does not inform us as to the specific experiences that may have served to build and enhance participating teachers' sense of efficacy. In targeting education level, as a variable we seem be assuming knowledge. However, there may be something else in the educational experience that is increasing efficacy other than knowledge. Clearly, the Enochs et al. (1995) article suggested that the learning experience may serve to enhance or limit individuals' teaching efficacy. The next section outlines a variety of studies that address this issue, investigating the relationship between learning experiences and teaching efficacy of preservice and inservice teachers.

Learning Experiences

A few studies have investigated the relationship between specialized training or unique learning experiences and teacher efficacy. These studies have found that teachers (inservice and preservice) who are given explicit training or experiences with regard to unique teaching tasks tend to

demonstrate higher levels of teacher efficacy for those tasks than their peers who did not have the same learning opportunity. One area where this work has been investigated is special education, specifically, teachers' feelings of efficacy for teaching special needs children (Minke, 1996; Reid, Vasa, Maag, & Wright, 1994). In another direction, however, Parameswaran (1998) investigated the extent to which specific learning experiences in an educational psychology class can influence students' feelings of general teaching efficacy and efficacy for meeting the needs of diverse students. Across these studies we will see the influential relationship that seems to exist between specific training or learning experiences and teachers' sense of efficacy.

Minke and colleagues (1996) investigated differences in teacher efficacy across three teaching groups: regular education teachers (n=189), regular education teachers in an inclusion setting (n=71), and special education teachers in an inclusion setting (n=64). Teacher efficacy was assessed using a modified version of the Gibson and Dembo (1984) measure (Soodak & Podell, 1993). Results from this study indicated that special education teachers and regular education teachers in an inclusion setting demonstrated higher levels of personal teacher efficacy than regular education teachers. Similarly, those regular education teachers, in regular classrooms, who had prior experience in inclusion classrooms, also demonstrated higher levels of personal teaching efficacy. Thus, there seems to be a relationship between feeling more able to perform the actions necessary to create student learning, personal efficacy, and the unique experience of working in an inclusion setting. Perhaps, as the regular education teacher and the special educator work together to meet the needs of the children in the class learning takes place among these teachers. They are able to give and receive important feedback and to discuss potential methods of meeting their students' needs. Therefore, I would contend that teaching in this type of environment would provide the teachers with a unique learning experience that permits them access to a unique knowledge base and set of skills that may, in turn, enhance their overall teaching abilities and efficacy.

Reid and colleagues (1994) also investigated the extent to which teacher efficacy, assessed as confidence to attain goals pertaining to working with children having Attention Deficit Hyperactivity Disorder (ADHD), was related to prior experience or training. These researchers, in addition to gathering demographic data, asked 449 third-grade Nebraska teachers to describe the amount of confidence they felt for accomplishing 10 goals or activities directly relevant to the successful instruction of children with ADHD (e.g., "Teach in such a way that students with ADHD can learn in the classroom." Reid et al., 1994, p. 199). Comparisons were made between teachers with and without prior experience, and with and without prior training. Results of analysis of covariance found unique differences in confidence related to both prior experience and prior training. Specifically, teachers with prior training felt more confident in their ability to teach in such a way that a student with ADHD can learn ($F[1,444]=6.17$ $p=.013$), to determine when a student manifests a behavior requiring intervention ($F[1,444]=9.64$ $p=.002$), and to determine when progress is being made in behavior ($F[1,444]=5.10$ $p=.024$). In contrast, teachers with prior training expressed greater efficacy than those without prior training in their ability to set up an effective behavior contract ($F[1,444]$-10.80 $p=.001$), to adjust lessons or materials for students with ADHD ($F[1,444]=5.02$ $p=.026$), to determine when a student requires an intervention ($F[1,444]=9.65$ $p=.002$), and to assess when progress in behavior is made ($F[1,444]=3.87$ $p=.049$). In essence, this investigation demonstrates the relationship between efficacy and prior training and the experiences in a specialized area of teaching.

A final study assessing a specific learning experience was conducted by Parameswaran (1998). This work investigated the impact of field experiences on educational psychology students' knowledge about problems facing adolescents in the local area and efficacy for meeting the needs of those adolescents. Twenty-nine experimental and 31 control students enrolled in two educational psychology classes. The students in the experimentation condition, in conjunction with the standard

curriculum, also participated in a series of short term site visits to service providers in the community. Pre- and post-assessments of knowledge, general teaching efficacy, personal teaching efficacy, and specific areas of efficacy were gathered from students in both groups. Knowledge regarding issues important to the adolescents in the service area was assessed with a test constructed by the author. The Teacher Efficacy Scale (Gibson & Dembo, 1984) was used to assess general and personal teaching efficacy. Areas of specific interest included efficacy for dealing with multicultural issues in the classroom and efficacy in dealing with classroom problems related to adolescents were also assessed with a measure generated by the author (Parameswaran, 1998). T-tests were used to assess differences between the groups. The experimental group demonstrated greater knowledge, higher levels of general teaching efficacy, and higher teaching efficacy with regard to cultural differences than the control group.

The previous studies have revealed that there is a relationship between specific types of training and experience that can enhance teachers' sense of efficacy. Moreover, the first two of these studies have shown that specialized training in the area of inclusion and ADHD can lead to greater feelings of efficacy overall. The final study demonstrated that positive changes in efficacy can be made in preservice teachers through specific changes in their educational experiences. I would contend that these learning experiences imbued these inservice and preservice teachers with greater knowledge which, in turn, aided them in developing these higher levels of efficacy. However, we still have the unanswered question of why these teachers choose to enter these fields and gain these unique experiences.

Additionally, using these specific learning experiences or educational level as a proxy for knowledge masks the specific content and structure of these teachers' knowledge base. What is this that teachers gained from extended education that allowed them to exhibit increased feelings of efficacy? What knowledge do they hold and how does it affect their efficacy beliefs? In teachers

with lower educational achievements, what knowledge might they be lacking that may be limiting their confidence in their ability to teach? The articles reviewed in the next section attempt to address some of these questions.

Demonstrated Knowledge

Two studies explicitly investigated the link between demonstrated knowledge and teachers' level of content specific efficacy. Schoon and Boone (1998) investigated the relationship between science teaching efficacy beliefs and the specific alternative conceptions of science they held. In a similar study Sciutto, Terjesen, and Bender Frank (2000) investigated the relationship between self-efficacy for teaching a child with ADHD and teachers' knowledge of ADHD. These two studies demonstrated the often assumed relationship between knowledge and efficacy. Moreover, each of these studies also revealed, to some extent, the knowledge that is missing among some teachers with respect to these specific fields. Thus, it may be most appropriate to target interventions and instruction for preservice and practicing teachers at specific areas of knowledge and efficacy.

Schoon and Boone (1998) assessed the science teaching efficacy beliefs and knowledge regarding alternative conceptions of science for 619 university students. Efficacy beliefs were assessed using the Elementary Science Teaching Efficacy Belief Instrument (STEBI-B, Enochs & Riggs, 1990). Alternative conceptions were assessed with a 12-item multiple-choice test. Each of the items on this test was constructed so that there was one acceptable answer, one common alternative conception, and two distracters. These items covered three areas of science: life, physical, and earth/space. The alternative conceptions were selected based on prior research that identified these conceptions as common among respondents. Examples of the alternative conceptions included, "summer occurs when the earth is nearer the sun," "venous blood is blue," "any mineral that scratches glass is a diamond" (Schoon & Boone, 1998, p. 559).

Schoon and Boone assessed the relationship between knowledge and self-efficacy in two ways. First, they compared levels of science teaching efficacy to the number of correct responses on the alternative conceptions measures. Results indicated that the student with the greatest number of correct responses (8 or more) had significantly higher (stronger) levels of self-efficacy than those students with fewer correct answers (3 or less). The second means of analyzing this data was to determine what relationship, if any, existed between having specific alternative conceptions and science teaching efficacy. Comparisons of science teaching efficacy were made per item between students' responding to the item correctly and those who held alternative conceptions. It was determined that five specific alternative conceptions were associated with lower feelings of science teaching efficacy. These conceptions were: "Planets can be seen only with a telescope (p=.03), Dinosaurs lived at the same time as cavemen (p=.03), Rusty iron weighs less than the iron that it came from" (p=.07), electricity is used up in appliances (p=.03), and North is toward the top of a map of Antarctica (p=.00)" (Schoon & Boone, 1998, p. 563).

These results indicated a strong link between the role of knowledge in science and science teaching efficacy beliefs. With regard to the second finding that holding specific alternative conceptions was more often associated with lower science teaching efficacy, Schoon and Boone (1998) offered a reasonable explanation. Specifically they reasoned that these five alternative conceptions are "fundamental barriers to a full understanding of their respective sciences; they are, using Hawkins's (1978) terminology, 'critical barriers'" (Schoon & Boone, 1998, p. 564). These alternative conceptions frequently interfere with the learning process. Thus, these preservice teachers may have to struggle to understand scientific concepts and as a result feel less able to interpret and present this information to others in a meaningful way.

Sciutto et al. (2000) examined teachers' knowledge and misperceptions with regard to ADHD. Specifically, they investigated the knowledge of 149 elementary teachers with regard to the

symptoms, diagnosis, and treatment of this disorder, in addition to some other general information. This information was assessed using the Knowledge of Attention Deficit Disorders Scale (KADDS) consisting of 36 items to which respondents could answer true, false, or don't know. This measure was designed specifically for this study. In addition to this knowledge measure, teachers' sense of self-efficacy was rated along a 7-point scale that gauged the extent to which participants "felt they could effectively teach an ADHD child" (Sciutto et al., 2000, p. 118).

Correlational analyses indicate that teacher self-efficacy [r (145) =.29, p<.001], the number of ADHD children taught [r (128) =.22, p<.011], and years of experience [r (142) =.18, p<.29] were all positively related to ADHD knowledge (Sciutto et al., 2000). Thus, those teachers who were able to demonstrate more extensive and correct information about ADHD also held stronger beliefs in their own ability to teach these children.

The work of Schoon and Boone (1998) and Sciutto et al. (2000) serve as a springboard for this proposed investigation of the relationship between knowledge and efficacy. Specifically, these studies have demonstrated that there exists a strong link between the demonstrated knowledge of teachers and their reported feelings of teaching efficacy. The next major step is to develop an understanding of how teacher efficacy serves to move individuals from knowledge to action. That is, what is the process by which knowledge is sorted, selected and employed within the confines of teachers' daily practice?

Given the exhaustive study of the research investigating the relationship(s) between teacher efficacy and knowledge several statements can be made about this work.

- Studies investigating the relationship between knowledge and efficacy can be organized based on how knowledge was measured (e.g., education level, experience).
- The relationship that exists between knowledge and efficacy demonstrated in these studies suggests that higher levels of knowledge are associated with higher levels of efficacy.

However this was not the case for one study that found that preservice teachers with higher levels of science knowledge had lower levels of science teaching efficacy.

- This research has relied heavily on correlational analyses and has established that a relationship between knowledge and efficacy exists. However, this work does not establish the direction of this relationship or the possible circular process through which efficacy and knowledge interact to affect each other. Further this work does not investigate the potential effects of knowledge and efficacy working in tandem or isolation to impact teaching outcomes.
- The next step for this work is to explore the process by which efficacy and knowledge interact, and to explore how this relationship manifests in teachers' practice.

Significance and Implications for Future Research

This review sought to achieve three goals: to provide an overview of the development of teacher efficacy, to illustrate the power of this construct in relation to both student and teaching outcomes, and to analyze the empirical work that has investigated the relationship between teacher efficacy and teacher knowledge. In meeting the first of these goals, the evolution of teacher efficacy as a motivational construct was detailed. This detailing revealed that teacher efficacy was built on two theoretical frameworks, namely locus of control and self-efficacy theory. These frameworks assessed distinct components of teachers' belief systems and must be recognized when considering any work investigating teacher efficacy. A central way to recognize these frameworks is through the careful consideration of the measurement tools used to assess efficacy as well as the research questions explored. The meaning of teacher efficacy and our understanding of the power of this construct continues to evolve. Specifically, a new model and measure of efficacy has been presented by Tschannen-Moran and her colleagues (Tschannen-Moran et al., 1998; Tschannen-Moran &

Woolfolk-Hoy, 2001). This current model emphasizes teacher efficacy within the theoretical base of self-efficacy theory and highlights the cyclical nature of this construct.

This review also highlighted the research that has been done to illustrate the importance of teacher efficacy with regard to both student and teacher outcomes. While this work has revealed that teacher efficacy has been and continues to be a contributor to positive educational outcomes, we must also recognize the holes in this research. Specifically, the majority of this work has been descriptive in nature, relying heavily on self-report measures and correlational analysis. Considering the model proposed by Tschannen-Moran and colleagues (1998) of teacher efficacy as a cyclical construct, we need to begin to investigate the ways in which efficacy in teachers can be enhanced so that important educational outcomes can be assessed. Currently, the research has demonstrated that efficacy is related to important outcomes, however little work has looked at our ability to influence teachers' efficacy.

The final goal of this paper was to provide a detailed analysis of the empirical work on the relationship between teacher efficacy and teacher knowledge. However, what this systematic search revealed is that this relationship has not been given an in-depth investigation. Rather, in the few studies found that looked at this relationship we see that knowledge has rarely been directly assessed. Instead proxy variables such as education level, courses taken, and specific learning experiences were used as measures of knowledge. In the studies that did assess knowledge, the knowledge assessed was subject matter knowledge or knowledge related to the components of specific learning disabilities, rather then an assessment of teachers' knowledge about teaching.

The preceding review offers several implications for the theory, research, and practice. First, this work highlights the need for efficacy theorists to extend the understanding of teacher efficacy to its relationship with knowledge. Extending this, we must also explore and test the role of efficacy as a mediator between knowledge and action. Efficacy researchers must employ new measures of efficacy

that extend beyond simple self-report responses to identified tasks. We need to consider and assess the role of teachers' knowledge in the interpretation of efficacy items. Further, the relationships that exist between teachers' efficacy and knowledge must be explored empirically. Finally, given our knowledge of teacher efficacy as a powerful contributor to many positive educational outcomes, this construct should be actively encouraged in preservice and practicing teachers. Specifically, efficacy-knowledge research should guide the professional development of preservice and practicing teachers.

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TABLE 1
The Development of Teacher Efficacy

Rotter			Bandura		
Locus of control: the degree an individual believes that the perceived cause(s) of an intended outcome are within his or her control (Rotter, 1966)		Theoretical Framework		*Self-efficacy:* the conviction that one can successfully execute the behavior required to produce outcomes (Bandura, 1977, p. 193)	
Teachers' beliefs in their ability to control factors in order to achieve desired outcomes.		Teacher Efficacy Conceptualization		Teachers' beliefs in their ability to organize and execute courses of action in order to achieve desired outcomes (Tschannen-Moran, et al., 1998)	
Research Trends					
Researcher(s)	Definition	Measurement	Researcher(s)	Definition	Measurement
RAND Researchers McLaughlin & Marsh, (1978); Berman & McLaughlin (1977)	"the extent to which the teacher believed he or she had the capacity to affect student performance" (McLaughlin & Marsh, 1978, p. 84)	RAND Items: Two item measure reflecting internals and external control, described as personal and general teaching efficacy	Ashton, Buhr, & Crocker (1984)	A teacher's belief in his or her ability to have a positive effect on student learning	Ashton Vignettes: Assessed outcome and efficacy expectations.
Rose & Medway (1981)	The extent to which a teacher believes that he or she can control student outcomes.	Teacher Locus of Control (TLC) Scale: Assessed teachers feelings of an internal or external locus of control for student outcomes	Gibson & Dembo (1984)	"a belief that teachers can help even the most difficult or unmotivated students" (p. 569).	Teacher Efficacy Scale (TES): Two factor model of general and personal teaching efficacy.
Guskey (1981)	A teacher's belief or conviction that he or she can influence how well students learn, even those who are difficult or unmotivated.	Responsibility for Student Achievement (RSA) Scale: assessed general responsibility, responsibility for student success and for student failure.	Tschannen-Moran & Woolfolk-Hoy (2001)	"…a judgment of his or her capabilities to bring about desired outcome of student engagement and learning…" (p. 783)	Teachers Sense of Efficacy Scale: Assesses efficacy for student engagement, instructional practices and classroom management.

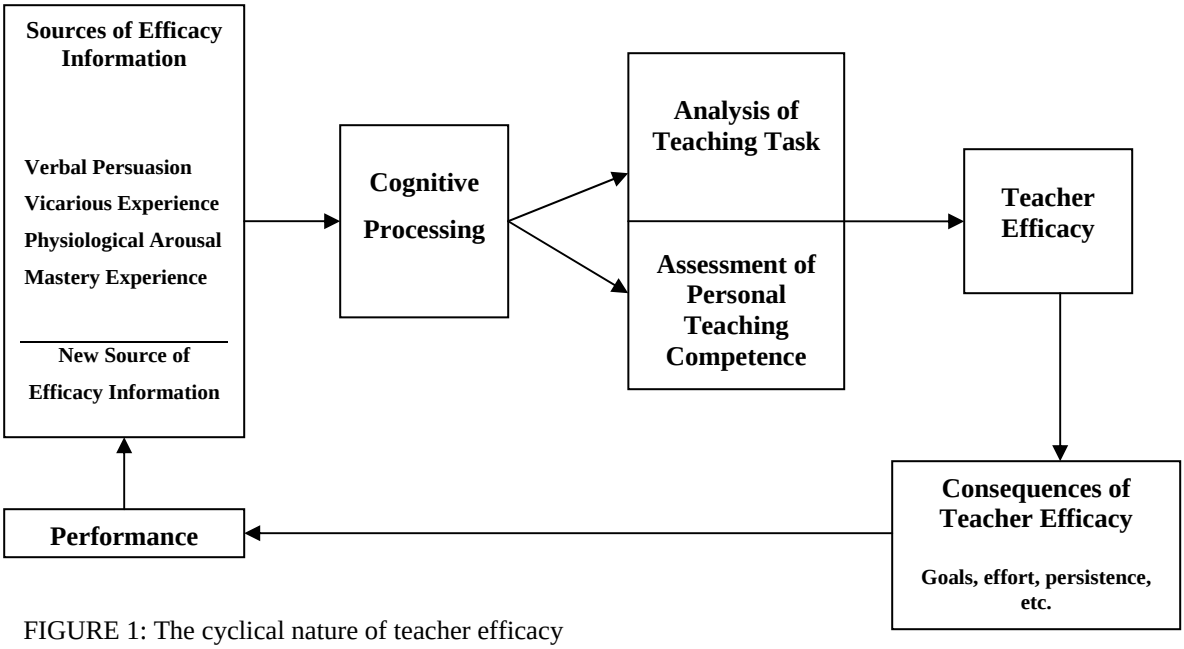

FIGURE 1: The cyclical nature of teacher efficacy
Tschannen-Moran, Woolfolk-Hoy, & Hoy (1998, p. 228)

TABLE 2
Articles Investigating Teacher Efficacy and Knowledge

Education Level

Authors	Title	Purpose/Research Questions	Sample	Measures	Analysis	Key Findings
Benz, Bradley, Alderman, & Flowers (1992) *Journal of Educational Research*	Personal teaching efficacy: Developmental relationships in education	Explored the differences between measures of PTE among several pre-professional groups: a) entering secondary teacher education students; b) students in professional education courses; c) secondary student teachers; d) practicing teachers; c) teacher education faculty; and f) non-college-faculty student teaching supervisors	Entering students=95; students in education courses=121; student teachers=47; inservice teachers=38; college faculty=29; supervisors= 29	Ashton vignettes (1984) measure of personal teaching efficacy	One way ANOVA	o Preservice teachers were more confident than experienced teachers with respect to vignettes involving student motivation. o In planning and evaluating lessons, experienced teachers were more confident. o College faculty had higher levels of motivation for classroom management than all other groups except for supervisors o For planning, college faculty had higher efficacy than student teachers. o For socialization, college faculty had greater efficacy than mid- and entering-students.
Hoy & Woolfolk (1993) *Elementary School Journal*	Teachers' sense of efficacy and the organizational health of schools	Explored the relationships between personal characteristics of teachers and their general and personal teaching efficacy.	179 elementary school teachers in NJ	Teacher Efficacy Scale-(Gibson & Dembo, 1984)	Descriptive data, correlations, regression	o Education level was the only personal variable of the study that uniquely predicted personal teaching efficacy.
Campbell (1996) *Education*	A comparison of teacher efficacy for pre and inservice teachers in Scotland and America	Investigated to the efficacy scores of Scottish and American preservice teachers, compared with the efficacy scores of inservice teachers?	Scottish: 39 inservice, 34 preservice; American: 35 inservice, 32 preservice. 3 groups: Pre-BS, BS and Post-Grad	Teacher Efficacy Scale (Gibson & Dembo, 1984) - 15 items; Questionnaire (Naring, 1984) perception of teachers' ability to execute a specific teaching task (PTE)	One-way ANOVA	o Teachers with graduate work in education or related experiences had more teaching efficacy than preservice teachers. o Teachers in the Post-Grad group had the highest levels of teacher efficacy

TABLE 2 – *Continued*

Specific Courses						
Authors	Title	Purpose/Research Questions	Sample	Measures	Analysis	Key Findings
Enochs, Scharmann, & Riggs (1995) *Science Teacher Education*	The relation ship of pupil control to preservice elementary science teacher self-efficacy and outcome expectancy.	Explored the potential relationship between personal science teaching efficacy and other mediating variables: number of college science courses, number of years in HS science.	n=73 preservice elementary teachers	STEBI-B (Enochs & Riggs, 1990): measure of science teaching self-efficacy and outcome expectancy.	correlations	Significant negative correlations were found between personal science teaching efficacy and o number of college science courses taken, o number of years of HS science taken
Learning Experiences						
Authors	Title	Purpose/Research Questions	Sample	Measures	Analysis	Key Findings
Minke, Bear, Deemer, S. & Griffin, (1996) *Journal of Special Education*	Teachers' experiences with inclusive classrooms: implications for special education reform	Compared teacher efficacy across three professional groups: regular classroom teachers, regular classroom teachers in inclusive classroom, and special education teacher in inclusive classrooms.	Teachers: 185 regular education, 71 Regular Education in Inclusion classrooms, 64 Special Ed in Inclusion Classrooms	14 items modified from Gibson & Dembo's (1984) Teacher Efficacy Scale (Soodak and Podell, 1993).	ANOVAs correlations	o Regular and Special education teachers in inclusive classrooms reported higher levels of PTE than regular teacher in traditional classrooms**.** o Higher personal efficacy was found in regular education teachers in regular classrooms who had had experience in inclusive settings.
Reid, Vasa, Maag, & Wright (1994) *Journal of Research and Development in Education*	An analysis of teachers' perceptions of attention deficit-hyperactivity disorder	Gathered initial data pertaining to teachers' perceptions of instructional barriers and their self-efficacy in working effectively with students with ADHD. 2 perspectives: previous experience & previous training with ADHD students.	449 third grade teachers in Nebraska.	Confidence in attaining goals: 10 items reflecting activities that would be encountered in classroom practice – confidence=self-efficacy	2 x2 ANCOVA	o Both prior experience and training significantly affected perceived confidence. o Teachers with prior experience and training had higher perceived confidence in ability to determine when an intervention is required and when progress is made. o Teachers with prior training had more confidence to: set up behavior contract; adjust lessons; determine behaviors requiring intervention; determining when progress is made.

TABLE 2 – *Continued*

Authors	Title	Purpose/Research Questions	Sample	Measures	Analysis	Key Findings
Parameswaran, (1998) *Journal of Instructional Psychology*	Incorporating multi-cultural issues in educational psychology classes using field experiences	Explored the effectiveness of using short term site visits in enhancing sensitivity to diversity among students. Site visits were incorporated into the broader context of an undergraduate educational psychology class.	29 experimental 31 control	Teacher Efficacy Scale (Gibson & Dembo, 1984) Knowledge-issues important to Springfield adolescents; Efficacy in dealing with multicultural and adolescent issues in the classroom;	t-tests	o Field trips led to a more comprehensive understanding of the problems that adolescents in the region faced and community resources available to them. o Students who participated in the short visits perceived themselves as more confident in dealing with children from diverse backgrounds, as compared to those without the field experience.
Demonstrated Knowledge						
Authors	Title	Purpose/Research Questions	Sample	Measures	Analysis	Key Findings
Schoon & Boone (1998) *Science Education*	Self-efficacy and alternative conceptions of science of preservice elementary teachers.	Investigated the relationship between science teaching efficacy and the number of alternative conceptions held and determined the relationship between science teaching efficacy and the holding of specific alternative conceptions.	619 university students across 10 campuses	Science teacher efficacy: Elementary Science Teach Efficacy Belief Instrument (Enoch & Riggs, 1990); Alternative Conceptions Measure	Rasch model, t-tests	o The students with the greatest number of correct answers had significantly higher science teaching efficacy o There was no relationship between the number of alternative conceptions held and science teaching efficacy. o Holding certain alternative conceptions was associated with persons of low science teaching efficacy
Sciutto, Terjesen, & Bender Frank (2000) *Psychology in the Schools*	Teachers' knowledge and misperceptions of attention-deficit/hyperactivity disorder	Examined teachers' knowledge and misperception of ADHD regarding symptoms/diagnosis, treatment, and general information.	149 elementary school teachers.	Knowledge of Attention Deficit Disorders Scale; Self-efficacy for teaching ADHD child (1 item); Demographic Information	Correlations	o Teacher self-efficacy, prior exposure to ADHD child, and years of experience were all positively related to ADHD knowledge.