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ABSTRACT

While consistently related to positive teacher behaviors and student outcomes, teacher efficacy as a construct is currently the subject of debate. The present study examined a new model of teacher efficacy (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998) that proposes to more clearly define important variables and integrate two theoretical traditions in the study of teacher efficacy. A new instrument was developed to assess a means-end task analysis and context specific efficacy, both important parts of the model. Task analysis and both global and context specific efficacy were measured in 109 emergency certification teachers since task analysis may be more explicit for novice teachers. Factor analyses of the global and context specific efficacy measures suggested subtle but important distinctions in constructs related to efficacy. Canonical correlation analysis indicated the importance of personal teaching competence to instructional efficacy judgments and external locus of control to classroom management efficacy. Although task analysis was not found to be a significant predictor of either global or context specific efficacy, exploratory results suggested potential value of task analysis in future assessments of teacher efficacy. General support was found for the Tschannen-Moral et al. model. (Contains 32 references.) (Author/SM)

Running Head: TASK ANALYSIS

The Relationship Between Means-End Task Analysis and Context Specific and Global Self-Efficacy in Emergency Certification Teachers: Exploring a New Model of Teacher Efficacy

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Abstract

While consistently related to positive teacher behaviors and student outcomes, teacher efficacy as a construct is currently the subject of debate. The present study examined a new model of teacher efficacy (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998) that proposes to more clearly define important variables and integrate two theoretical traditions in the study of teacher efficacy. A new instrument was developed to assess a means-end task analysis and context specific efficacy, both important parts of the model. Task analysis and both global and context specific efficacy were measured in emergency certification teachers (n = 109) since task analysis may be more explicit for novice teachers. Factor analyses of the global and context specific efficacy measures suggested subtle but important distinctions in constructs related to efficacy. Canonical correlation analysis (Rc^2 = 34% for first three functions) indicated the importance of personal teaching competence to instructional efficacy judgments and external locus of control to classroom management efficacy. Although task analysis was not found to be a significant predictor of either global or context specific efficacy, exploratory results suggested potential value of task analysis in future assessments of teacher efficacy. General support was found for the Tschannen-Moran et al. model.

The Relationship between Means-End Task Analysis and Context Specific and Global Self-Efficacy in Emergency Certification Teachers: Exploring a New Model of Teacher Efficacy

Teacher efficacy has been one of the few variables consistently related to positive teaching behavior and student outcomes. Woolfolk and Hoy (1990) noted that "Researchers have found few consistent relationships between characteristics of teachers and the behavior or learning of students. Teachers' sense of efficacy . . . is an exception to this general rule" (p. 81). Given the current and potential educational value of this construct, much focus has been placed on how to best measure teacher efficacy. Toward this end, Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) proposed a new, multi-dimensional model of teacher efficacy that purports to integrate previously competing paradigms and provide greater precision and construct definition in the measurement of teacher efficacy.

Included in this theoretical model is the claim that a means-end task analysis of the teaching situation is an important contributor to teacher efficacy judgements. As defined by Tschannen-Moran et al. (1998), a means-end task analysis refers to a teacher's assessment of "what will be required of them in the anticipated teaching situation. . . . This analysis produces inferences about the difficulty of the task and what it would take for a person to be successful in this context" (p. 231). They also noted that such an analysis would include weighing the resources (personal and external) available to make teaching successful. This weighing of resources against difficulties results in a means-end task analysis that ultimately impacts a teacher's belief concerning whether he or she can be successful in teaching a student.

Furthermore, Tschannen-Moran et al. (1998) suggested that an assessment of personal teaching competence is important in efficacy judgements. That is, how teachers perceive their skills and abilities, given certain contexts, no doubt impacts whether a teacher believes he or she can carry out the actions necessary to succeed with a student (self-efficacy). Importantly, personal teaching competence is an assessment of current abilities whereas self-efficacy is an assessment of future performance.

Purpose and Research Questions

While this multi-dimensional model promises to further the study of teacher efficacy in both measurement and substantive contexts, the model needs to be empirically tested from multiple perspectives. The present study has several purposes intended to examine some of the dynamics of this model and begin to assess its usefulness in the study of teacher efficacy. First, a new instrument was designed to assess a means-end task analysis. Second, we examined the relationships between (a) teachers' cognitive task analysis of a teaching situation, (b) perceptions of context specific self-efficacy related to this situation, and (c) global self-efficacy beliefs that are not context specific. Third, we investigated the nature of and relationships between these (and other related) variables in emergency certification teachers that are largely in their first or second year of teaching. Specifically, the following research questions guided our investigation:

1. Can a new instrument be developed to measure a teacher's evaluation of the relative resources versus difficulties faced in a teaching situation along with context specific self-efficacy related to the teaching situation?
2. Do teachers vary in context specific self-efficacy based on whether they teach in urban or rural settings?
3. Does the theoretical model proposed by Tschannen-Moran et al. (1998) hold with task analysis as a contributor to context specific self-efficacy?
4. How is task analysis related to context specific versus global self-efficacy judgements?

Theoretical Framework

Albert Bandura (1977, 1997) presented self-efficacy as a mechanism of behavioral change and self-regulation in his social cognitive theory. An efficacy belief refers to one's perceived ability to carry out actions that will successfully lead toward a specific goal. He proposed that efficacy beliefs were powerful predictors of behavior since they were ultimately self-referent in nature and directed toward specific tasks. The predictive power of efficacy beliefs is evidence in the research (Bandura, 1997; Pajares, 1996; Tschannen-Moran et al., 1998). In addition, as self-efficacy beliefs are based on more specific tasks, they tend to have increasing predictive value (Pajares, 1996). Bandura also proposed a related construct, outcome expectancy, that is related to but distinct from self-efficacy. Outcome expectancy refers to one's expectation about what outcomes tend to follow from certain actions. Self-efficacy and outcome expectancy are conceptually distinct. For example, a teacher may believe that certain actions will lead to student learning (outcome expectancy) but have no confidence in his or her ability to perform those actions (self-efficacy).

Among the first to apply Bandura's (1977) social cognitive theory to teachers were Ashton and Webb (1982). They argued that two items that had been previously been used by RAND researchers (Armor et al., 1976; Berman, McLaughlin, Bass, Pauly, & Zellman, 1977) to study teacher efficacy actually corresponded to Bandura's self-efficacy and outcome expectancy dimensions of social cognitive theory. The two dimensions became known as personal teaching efficacy (PTE) and general teaching efficacy (GTE), respectively. Importantly, the RAND items were developed based on Rotter's (1966) locus of control theory rather than Bandura's social cognitive theory. As such, the locus of control perspective has influenced the measurement and definition of teacher efficacy. Tschannen-Moran et al. (1998) argued that their new model of teacher efficacy unifies these theoretical, and potentially competing, models.

In effort to further the study of teacher efficacy, Gibson and Dembo (1984) developed the Teacher Efficacy Scale (TES) to measure self-efficacy and outcome expectancy. Although the RAND items were based on Rotter's (1966) locus of control theory, Gibson and Dembo (1984) also argued that the items actually corresponded to Bandura's self-efficacy and outcome expectancy dimensions. The TES was the first significant attempt to empirically develop a data collection instrument to tap into this potentially powerful variable in teachers. The TES has subsequently become the predominate instrument in the study of teacher efficacy, leading Ross (1994, p. 382) to label it a "standard" instrument in the field. Largely utilizing the TES, researchers have found consistent relationships between teacher efficacy and positive teacher behavior and student outcomes (see e.g., Anderson, Greene, & Loewen, 1988; Coladarci, 1992; Gibson & Dembo, 1984; Moore & Esselman, 1992; Podell & Soodak, 1993; Ross, 1994; Soodak & Podell, 1993).

Recently, however, the TES has come under fire regarding its conceptualization of Bandura's (1997) self-efficacy and outcome expectancy dimensions. While it is generally accepted that the PTE scale assesses teachers' beliefs concerning their ability to positively impact student learning and motivation (self-efficacy), several researchers (cf. Coladarci & Fink, 1995; Guskey & Passaro, 1994; Tschannen-Moran et al., 1998) have argued that the GTE dimension of the TES is a measure of a type of external locus of control as opposed to outcome expectancy. Furthermore, Tschannen-Moran et al. argued that a measure of outcome expectancy, or the belief that certain actions will lead to certain behaviors, should include a means-end task analysis of the teaching situation. With this (and other factors) in mind, Tschannen-Moran et al. proposed a multi-dimensional model of teacher efficacy that purports to more accurately account for Bandura's social cognitive theory while integrating Rotter's (1966) locus of control theory. Figure 1 presents a diagram of their proposed model. Important in this model is the claim that an analysis of the teaching task is a critical contributory element to ultimate self-efficacy judgements by teachers. That is, in any efficacy judgement, a teacher must weigh his or her abilities and resources against the factors that may inhibit student learning or at least make learning difficult. As previously noted, closely related to the task analysis is a teacher's assessment of personal teaching competence. Tschannen-Moran et al. (1998) noted that a teacher's current level of perceived competence influences future expectations about performance.

INSERT FIGURE 1 ABOUT HERE

Furthermore, Tschannen-Moran et al. (1998) hypothesized that a task analysis would be more explicit for preservice and novice teachers as opposed to expert teachers who may have automatized many of their skills and rely on memory of past success more than newer teachers. This assertion follows from the four sources of efficacy building information as presented by Bandura (1997; also shown in Figure 1). Of these four (i.e., mastery experiences, vicarious experiences, social/verbal persuasion, and physiological/emotional arousal), mastery experiences are perhaps the most powerful sources of information that lead to bolstered self-efficacy. Experienced teachers have a history to draw upon in this regard while new teachers may need to weigh the situation more carefully (Gist & Mitchell, 1992). This assumption led Tschannen-Moran et al. to argue that newer teachers would depend more heavily on task analysis when making efficacy judgements.

The model also assumes that teacher efficacy should be a relatively context specific measure of efficacy toward a specific task. Pajares (1996) argued that efficacy is best measured (and most appropriately representative of Bandura's self-efficacy construct) when there is correspondence between the task in question and the items used to assess efficacy. In addition, Pajares indicated that self-efficacy judgments should be made about relatively specific tasks. He noted that,

> Omnibus tests that aim to assess general self-efficacy provide global scores that decontextualize the self-efficacy-behavior correspondence and transform self-efficacy beliefs into a generalized personality trait rather than the context-specific judgment Bandura suggests they are. . . . The problem with such assessments is that students [or teachers] must generate judgments about their . . . capabilities without a clear activity or task in mind. As a result, they generate the judgments by in some fashion mentally aggregating to related perceptions that they hope will be related to imagined tasks. (p. 547)

When measuring efficacy, then, there should exist a reasonable level of specificity for the task in question as well as in the items used to measure efficacy. Tschannen-Moran et al. (1998) agreed with Pajares but cautioned against "developing measures so specific that they lose their predictive power for anything beyond the specific skills and contexts being measured" (p. 219). In the present study, two types of measures were used for teacher efficacy, one of which was global in nature with the other referencing a moderately specific case study.

Methods

Participants

The sample included teachers (n = 109) pursuing emergency certification through a medium sized university in the southwestern United States. Analysis of the teaching task may be more salient for these teachers given their novice or in-training status (cf. Tschannen-Moran et al., 1998). Around 77% of participants were in their first or second year of teaching and 13% were in their third year. Others had taught longer to varying degree. These teachers were pursuing teacher certification while on the job after typically having already attained at least a Bachelors degree in some field (85% Bachelors, 13% Masters, 2% other). In terms of job responsibilities/work load, employers viewed these teachers in the same light as any other certified educator with similar experience. The teachers were given no special consideration (such as that given to student teachers) and maintained an independent and full work load. Teachers were evenly divided based on gender (51.4% female). Mean age was 30.92 (SD = 8.31) and ethnicity was as follows: 76% Caucasian, 13% African American, 4% Hispanic, 4% Native American, and 3% other. Fifty-six percent taught in predominantly rural settings with the rest classified as suburban or urban. These two groups attended their teacher education courses in two locations that corresponded to these settings, one at the university (rural) and the other at an extension site in a major metropolitan area (urban).

Instrumentation

Teacher Efficacy Scale. The Teacher Efficacy Scale (TES; Gibson & Dembo, 1984; see Appendix A) was used to measure global perceptions of self-efficacy. Specifically, the TES contains two subscales: personal teaching efficacy (PTE) and general teaching efficacy (GTE). Given recent dialogue concerning the GTE scale (Coladarci & Fink, 1995; Guskey & Passaro, 1994; Tschannen-Moran et al., 1998), the scale was renamed external locus of control (ELOC) for the present study to more accurately represent the construct (see factor analysis results below). The TES contains 16 items (PTE = 9 items; ELOC = 7 items) to which participants rate their agreement on a Likert-type scale. Although historically a 6-point scale is common, a 7-point scale was utilized in the present study anchored at strongly disagree (1) and strongly agree (7). Sample items include: "When a student does better than usual, many times it will be because I exerted a little extra effort" (PTE) and " The amount that a student can learn is primarily related to family background" (ELOC). In addition to these items, the two original RAND items (cf. Armor et al., 1976; Berman et al., 1977) were added to the TES to bolster the PTE and ELOC subscales, thereby making the entire test 18 items long. Seven ELOC items were reverse scored so low scores would represent increasing amounts of teachers' external locus of control for student learning, which is assumed to be an undesirable trait in the present context. An unweighted average of scale items was used as the score for each scale.

Means-End Teaching Task Analysis. To measure task analysis in a reasonably specific context, the Means-End Teaching Task Analysis (METTA; see Appendix B) was developed by the first author. The METTA consists of a case study and three response sections. A case study approach was used to help build context around task analysis decisions and self-efficacy judgments (cf. Ashton, Buhr, & Crocker, 1984). The case study was specifically designed to provide a context to stimulate thought but was left ambiguous concerning details to allow teachers to bring their own history and experiences to the situation. Three challenges with teaching a particular student are presented in the case study: providing effective instruction, facilitating the student's motivation, and managing the student's behavior.

After reading the case study, respondents complete two sections designed to measure task analysis. In the first section, teachers are asked to list what would make it difficult for them to teach the student and for the student to learn. Respondents are told to answer according to their personal experiences and are cued to potentially list elements such as resources, personal abilities, influences, and/or experiences. After listing these items, each item is then rated concerning its importance in interfering with the student's learning or the teacher's teaching. This scale is anchored at "not very difficult" (1) and "very difficult" (5). The second section asks teachers to list what would help in teaching the student and for the student to learn. Again, respondents are told to answer according to their experiences are given the same cues as above. After listing potentially helpful elements, each item is then rated concerning its importance in contributing to the student's learning and the teacher's teaching. A scale similar to that noted above is also used here.

The rating process is included to allow teachers to differentially weight the perceived importance of elements in helping or making teaching difficult. Resources and constraints vary in how much influence they may exert as perceived by a given teacher. For the present study, two task analysis scores were created by summing the ratings for the helpful items and difficult items. These sums were used as separate variables to examine the relative importance of perceived helpful elements versus perceived difficult elements in the teaching task.

The third METTA response section consists of a 12 item efficacy measure. All items were modeled after the PTE scale of the TES. However, to help maintain correspondence and reasonable specificity in the efficacy measurement (cf. Pajares, 1996), the content of the items were directly related to the student in the case study. Items were also constructed to measure efficacy related to the three areas of challenge reflected in the case study: providing instruction

(4 items), facilitating motivation (4 items), and managing behavior (4 items). Two items from each efficacy subscale were reverse scored to guard against response bias. Unweighted scale means were used as scores for these three variables.

Importantly, the gender of the student in the METTA ("David" v. "Rachel") case study was alternated in the protocol among respondents to help control for potential gender bias (e.g., "that male students are more disruptive and therefore harder to manage"). Additionally, the order in which respondents were asked to list helpful items or difficult items was also alternated in the protocol to help control for primacy or recency measurement artifacts.

Procedures

METTA pilot study and focus group. Ten teachers were used to test the face validity of the METTA. Each teacher independently completed the METTA without prior instruction except to read and complete the instrument completely. Teachers were then debriefed about the experience. Several teachers indicated some confusion concerning one of the cues when listing helpful and difficult items. All teachers indicated that they understood the task that was being asked in the METTA and that the prompts (except for the one noted) were helpful. The teachers were also asked whether they answered from personal experience or from some other perspective, such as giving the "right" answer. Two of the teachers suggested they answered based on what they felt should be the "right" answer and several suggestions were given to change the directions to emphasize that responses should be from one's own experience. No other concerns were noted. Based on this pilot, several minor corrections were made in the instructions of the METTA prior to further administration, including the deletion of one of the prompts.

Data collection. Participant volunteers were solicited and all instruments were administered to participants during their regularly schedule class meetings. The TES was given two weeks prior to the METTA to avoid contamination of responses between the global and context specific efficacy measures. A total of 148 persons completed one of the instruments. However, 24 persons completed the TES but were not in class to complete the METTA; conversely, 11 persons completed the METTA but had not completed the TES. The total number of matched protocols was then 113, four of which were incomplete or unusable, reducing the final sample size to 109.

Data analysis. Both efficacy instruments were submitted to factor analysis. Descriptive discriminant analysis was used to determine if the urban or rural teachers varied on the context specific efficacy measures. A 2X2 MANOVA was used to examine the score validity of the METTA efficacy measure based on the gender of the student and the order of listing helpful and difficult items in the protocol. Finally, canonical correlation analysis was used to explore multivariate relationships between the theoretical model's predictors and efficacy dependent variables.

Results

Data screening indicated only seven missing values, all from different subjects, which were replaced with the variable mean. Multivariate normality was examined with a graphical procedure and determined tenable (Henson, 1999). No outliers were detected.

Factor Analyses

A series of principal components analyses with orthogonal and oblique rotation were conducted on the METTA efficacy scale to evaluate the structure of this new instrument. The scale was developed to potentially tap context specific efficacy in three areas of teaching:

delivering instruction, managing student behavior, and facilitating student motivation. As such, a three factor solution was expected with four items on each factor. In keeping with this expectation, the principal components analysis yielded three factors with eigenvalues greater than one (Kaiser, 1960) that accounted for 55.89% of the variance. However, an examination of the scree plot (Cattell, 1966) suggested the possibility of a two factor solution. Three factors were then extracted and submitted to both orthogonal and oblique rotation. The oblique solution (promax, kappa = 4) yielded the most interpretable structure and honored the theoretical expectation that efficacy in these three areas would be related. When two factors were extracted with oblique rotation, 46.49% of the variance was explained and simple structure was not as tenable as in the three factor case. Table 1 presents the factor correlation matrix. The results indicated that the three factors were moderately correlated but did appear to be tapping somewhat distinct constructs. Table 2 presents the factor pattern and structure coefficients. The coefficients indicated that all items were primarily related to a single factor with a |.40| criterion for pattern coefficients. Five items (1, 8, 10, 11, and 12) had notable correlations with secondary factors and each could have accounted for around 26% of the secondary factor's variance (see squared structure matrix coefficients, r_s^2). However, since no item equally contributed to more than one factor, each item was attributed to its primary factor.

INSERT TABLES 1-2 ABOUT HERE

While items tended to uniquely weight on their respective factors, four of the items (5, 6, 11, and 12) did not behave as expected. These items weighted on the behavioral and motivational efficacy subscales but not in the anticipated fashion. Specifically, the reverse scored items (6 and 12) were associated with the behavioral efficacy subscale and the normally scored items (5 and 11) were associated with the motivational efficacy subscale. This outcome left only reverse scored items for behavioral efficacy and normally scored items for motivational efficacy. An initial interpretation of these results might suggest a measurement artifact and some form of response bias due to wording of the questions. However, it is important to note that all of the instructional efficacy items behaved as expected, including the two items that were reverse scored. It does not appear, then, that reverse wording was the primary cause of the behavioral and motivational efficacy factor pattern and structure coefficients. If wording were the cause, then one would expect the reverse worded instructional efficacy items (4 and 10) to behave similarly.

It is possible that the distinction made in the METTA self-efficacy subscales between efficacy for behavioral management and efficacy for facilitating student motivation is not definite as perceived by the teachers in this study. Certainly, student behavior and motivation are closely related. The factor analysis results support the interpretation that these areas were not perceived by the teachers as unique constructs. What is left, then, is a subscale that appears to assess perceived difficulty in managing both student behavior and motivation (negatively worded items 2, 6, 8, and 12) and another subscale that assessed perceived success in managing these teaching issues (positively worded items 3, 5, 9, and 11). These subscales (factors) were labeled negative classroom management efficacy and positive classroom management efficacy, respectively. Along with instructional efficacy (whose items did behave as expected), mean scores on these three subscales were treated as separate variables in subsequent analyses. Coefficient alphas were .68, .70, and .67, respectively, for scores from the subscales (see Table 3).

Interestingly, negative and positive classroom management efficacy did not appear to be different ends of the same continuum. If they were, one would expect that relative agreement to one of the subscales would correspond to a relative disagreement on the other (of course, one would also expect them to contribute to the same factor). The means for these subscales did not support this assumption, with teachers generally expressing moderate agreement that they would both have difficulty with classroom management issues ($M = 4.64$, $SD = .87$) and succeed at maintaining student behavior and motivation ($M = 5.02$, $SD = .79$; see Table 3 for descriptives of all variables). The interfactor correlation was also moderate at best and the lowest of the oblique solution ($r = .310$, see Table 1). This outcome is somewhat paradoxical. How can teachers simultaneously believe they will both succeed and fail at managing a student's behavior and motivation? The results suggest a possible cognitive dichotomy between teaching success and failure in terms of classroom management, in which the present teachers somehow perceive both as simultaneous outcomes that are not mutually exclusive. Guskey and Passaro (1994) found a similar dynamic, and a corresponding low interfactor correlation, between internal and external locus of control factors when examining the TES. Furthermore, Guskey (1987) claimed that positive and negative performance expectations are not different ends of a continuum, and that they have differential impact on teacher efficacy.

INSERT TABLE 3 ABOUT HERE

Given the inconsistencies historically found in the factor structure of the TES (cf. Tschannen-Moran et al., 1998), the TES was also submitted to principal components analysis with orthogonal rotation. The TES has generally yielded two subscales, PTE and ELOC (formerly GTE), that are largely uncorrelated. Contrary to this expectation, the initial analysis on the present data yielded six factors with eigenvalues greater than one and the scree plot suggested either a three or five factor solution. Two exploratory analyses were then conducted that extracted three and five factors with orthogonal rotation. The three factor solution explained 42.07% of the variance. Again, six eigenvalues were greater than one but the scree plot indicated a three factor solution. With a |.40| criterion, two items (12 and 14) failed to weight on any factor and two items (5 and 16) did not have clear pattern/structure coefficients on only one factor. As expected, the five factor solution explained more variance (57.117%), but again unclear pattern/structure coefficients were noted for the above items.

Items 5, 12, 14, and 16 were then deleted and the data were again submitted to principal components analysis with orthogonal rotation. This time a clear structure emerged for three factors as indicated by the scree plot and unique factor pattern/structure coefficients for all items on one factor (with a |.40| criterion). The three factors explained 49.12% of the variance in the remaining 14 items. Furthermore, the components plot graphically suggested simple structure. Table 4 presents the factor pattern/structure coefficients for the obtained solution. The items were also submitted to principal components analysis with an oblique (promax, kappa = 4) rotation. No changes in the structure were observed and the factors had minimal intercorrelations ($\underline{r}$ = .041, .192, and .189), suggesting the orthogonal solution to be most appropriate (cf. Pedhazur & Schmelkin, 1991).

INSERT TABLE 4 ABOUT HERE

This solution did not correspond to the two factor structure historically attributed to the TES. While many studies have presented two factor solutions, other studies have found results similar to the current structure (see e.g., Guskey, 1988; Woolfolk & Hoy, 1990), along with other inconsistencies. For the present data, the general teaching efficacy subscale remained largely intact and all items weighted as expected. As noted, this subscale was more appropriately labeled for the present study as external locus of control (ELOC) as suggested by Guskey and Passaro (1994) and Tschannen-Moran et al. (1998). Score reliability for the ELOC subscale was .74 (see Table 3).

While the ELOC subscale remained intact, the personal teaching efficacy subscale split into two other factors. Guskey (1988) and Woolfolk and Hoy (1990) also reported two factors for the personal teaching efficacy scale. In the present study, a close examination of the item wording revealed a potentially important distinction between the obtained factors. One factor (items 1, 6, 9, and 10) contained items that are self-referent in nature but are essentially worded in past or present tense. Consider, for example, item 1: "When a student does better than usual, many times it will be because I exerted a little extra effort". While presenting the illusion of future tense, the item seems to assess a historical evaluation of causes for student success (i.e., exerted a little extra effort). This factor may be more of an assessment of personal teaching competence than a futuristic evaluation of self-efficacy. Although different from personal teaching efficacy, personal teaching competence is an important component of Tschannen-Moran et al.'s (1998) teacher efficacy model, in which self-perception of one's competencies is a contributor to efficacy judgments.

The other factor that split from the overall personal teaching efficacy subscale included items (7, 13, 15, and 18) that clearly are futuristic evaluations of whether the teacher will be successful in teaching. Item 7 illustrates this wording: "When I really try, I will be able to get through to most difficult students". Since these items do appear to tap efficacy judgements at a global level (e.g., not concerning any specific teaching situation), and to minimize confusion concerning multiple construct labels, the personal teaching efficacy label was retained in the present study for this construct. However, it must be understood that this measure of efficacy is not specific to any teaching context per se and is best understood to represent a global measure of teaching efficacy. More context specific measures of teaching efficacy are given by the METTA self-efficacy scale as described above.

Though grammatically subtle, it appeared that the two split-off factors of TES's personal teaching efficacy subscale obtained in the present study tapped a past versus future distinction. The two factors were treated as such in the present study, with personal teaching competence used as a predictor of the global personal teaching efficacy (along with other dependent variables). The decision to treat these variables as separate constructs is supported by the low correlation between the factors ($r = .189$). Coefficient alphas were .70 and .60 for scores on personal teaching competence and personal teaching efficacy, respectively (see Table 3).

Score Validity for METTA Efficacy Measures

The METTA protocol was counterbalanced on two variables to control for potential response bias and to examine score validity for the efficacy portion of the METTA. First, the gender of the student (i.e., "David" v. "Rachel") in the referent case study was varied in the protocol. Second, approximately half of respondents were asked to first list elements that would help in teaching the student in the case study with the other half beginning with elements that make teaching difficult.

A 2X2 MANOVA was conducted to examine whether instructional efficacy, negative classroom management efficacy, and positive classroom management efficacy scores varied by the gender of the student used in the METTA case study or the order in which respondents listed elements that would either help or hinder teaching the student. Results indicated no statistical or substantive differences for the gender (F [3, 103] = .518, p = .671) or order of listing main effects (F [3, 103] = 1.058, p = .371), and a non-statistically significant interaction (F [3, 103] = .388, p = .762). Wilks' lambdas were .985, .970, and .989, respectively, for each effect. As such, neither student gender nor order of the protocol appeared to impact the context specific self-efficacy scores, suggesting some limited evidence for score validity when using the METTA.

Substantive Analyses

One of the research questions asked whether teachers from urban and rural school settings would respond differently in their context specific self-efficacy scores from the METTA. Urban and rural schools vary in many ways, and may also have differential influence on teachers and their sense of efficacy (or, possibly, differential selection of teachers who choose to work in urban or rural schools). Descriptive discriminant analysis was conducted to examine if urbanicity (rural v. urban) could be separated by the three METTA self-efficacy measures (i.e., instructional efficacy, negative classroom management efficacy, and positive classroom management efficacy). Results indicated no notable differences between the groups via lack of statistical significance (χ^2 [3] = 5.833, p = .120) and a minimal squared canonical correlation (Rc^2 = .054, Adjusted Rc^2 = .027). Accordingly, responses from teachers from urban and rural areas were combined for subsequent analyses.

Part of Tschannen-Moran et al.'s (1998) theoretical model was examined with canonical correlational analysis. As suggested by Tschannen-Moran et al., personal teaching competence and task analysis are important determinants of teaching efficacy. In the present study, the personal teaching competence factor observed in the TES was used as a predictor of efficacy. In addition, the two new measures of task analysis (METTA) were also treated as predictors (i.e., the sums of the ratings of those elements the teachers listed as helping and hindering teaching the student the in case study). These variables were intended to measure the relative saliency of helpful resources juxtaposed with perceived hindrances. External locus of control (formerly called general teaching efficacy) was also included in the analysis as a predictor. Since an external locus of control orientation is not an efficacy belief (cf. Coladarci & Fink, 1995; Guskey & Passaro, 1994; Tschannen-Moran et al., 1998), the variable is more appropriately treated as a potential predictor. In their model, Tschannen-Moran et al. alluded to this possibility but emphasized the need for a task analysis variable. Given the historic position of the general teaching efficacy subscale of the TES, and the strong influence of Rotter's (1966) locus of control theory on the study of teacher efficacy, the subscale is included here but was renamed to accurately reflect it's content. Tschannen-Moran et al. also suggested the need to integrate the Rotter tradition into the current study of teacher efficacy.

Dependent variables included the global assessment of personal teaching efficacy from the TES and the METTA's context specific efficacy measures: instructional efficacy, positive classroom management efficacy, and negative classroom management efficacy. In sum, the canonical analysis evaluated the joint relationship between the theoretical predictors (personal competence, two measures of task analysis, and external locus of control) and global and context specific self-efficacy. Figure 2 illustrates these anticipated relationships and reflects an expanded portion of the Tschannen-Moran et al. (1998) model (see Figure 1).

INSERT FIGURE 2 ABOUT HERE

Table 5 presents results from the canonical solution. The first canonical correlation was .433, representing 18.80% shared variance between the predictor and criterion synthetic variables on the first function. The second canonical correlation was .314 (9.90% shared variance); the third was .230 (5.30% shared variance). The fourth canonical correlation was negligible. The Wherry (1931) formula was used to adjust the squared canonical correlations, correcting for inflation due to sampling error. Adjusted values were interpretable for the first two functions (12.30% and 2.69%, respectively) but the third effect became negligible. With all four functions included in the model, F (16, 309.20) = 2.500, $p < .01$, and with the first function removed, F (9, 248.39) = 1.919, $p < .05$. With the second function removed, statistical significance was not obtained for the remaining two aggregated functions, F (4, 206) = 1.555, $p > .05$.

INSERT TABLE 5 ABOUT HERE

Both standardized canonical function coefficients and structure coefficients (i.e., correlation between the observed variable and its respective latent composite variable) were examined for interpretation. The first function indicated that the dependent latent variable was primarily related to the context specific instructional efficacy variable and secondarily to the global personal teaching efficacy. While positive classroom management efficacy had a large standardized weight (-.721), its structure coefficient indicated essentially no meaningful relationship with the composite variable (-.038). This dynamic indicated that positive classroom management efficacy was most likely a suppressor variable that facilitated variance contribution of the other dependent measures to the synthetic variable (Lancaster, 1999). Personal teaching competence was the primary contributing independent variable, potentially accounting for 72% of the predictor composite variable. The first function, then, indicated a joint relationship between perceptions of teaching competence and context specific efficacy, primarily, and global efficacy to a lesser degree.

The second function appeared to describe relationships between positive and negative classroom management efficacy as predicted by external locus of control. In keeping with the theoretical expectation, these variables were positively related, as indicated by their simultaneous negative relationships to the independent and dependent latent variables. It is important to remember here that the external locus of control variable was reverse scored so high scores indicated a lack of perceived external control (presumably a positive trait). Thus, as the teachers reported greater tendency to blame external factors for student failure, they reported lower efficacy for both positive and negative classroom management. Tschannen-Moran et al.'s (1998) teacher efficacy model suggested that internal locus of control would be positively related to efficacy beliefs. The present results supported this assumption.

While the third function did not yield a reasonably interpretable squared canonical correlation after correcting for sampling error, it is reported here due to the exploratory nature of the present study and the compelling results obtained in the third function. The task analysis variables only made predictive contributions on this function and did so in a clear fashion with large structure coefficients (.808 and .888). Also of interest was the contribution of two of the context specific efficacy measures to the dependent latent variable, suggesting a potentially important relationship between task analysis and context specific efficacy. While the present results cannot support this hypothesis, they do point to a potentially important relationship in the theoretical model that merits further investigation.

Discussion

The factor analyses yielded interesting, albeit somewhat unexpected, findings. While the METTA efficacy scale was designed to yield three factors, two of the three factors did not emerge as expected in a definitional fashion. The behavioral and motivational efficacy items merged into two classroom management efficacy subscales, suggesting little distinction between student behavioral and motivational issues as perceived by the teachers. Indeed, these issues are closely related and certainly affect each other in complex ways. Factor analysis of the TES yielded three factors, one of which was in keeping with the historical general teaching efficacy scale (renamed external locus of control for the present study). The personal teaching efficacy scale split into two factors, one of which appeared to tap a past or present assessment of teaching competence with the other assessing future functioning. Other researchers (Guskey, 1988; Woolfolk & Hoy, 1990) have also noted three factor solutions that split the personal teaching efficacy.

Although grammatically subtle, the factor distinction made in the present study's personal teaching efficacy subscale has important ramifications for the measurement and study of teacher efficacy. When presenting their model of teacher efficacy, Tschannen-Moran et al. (1998) noted that evaluations of self-efficacy should be in future tense. By definition (see Bandura, 1997), self-efficacy is a perceived evaluation of one's ability to perform actions necessary to reach a given level of attainment. This self-evaluation references one's ability to perform at some point in the future. While historical success and mastery experiences no doubt impact a teacher's level of confidence (Bandura, 1986, 1997), the self-efficacy judgment itself concerns some future replication of behavior. Tschannen-Moran et al. (1998) correctly pointed out that teacher efficacy has traditionally

> been assessed with items that confuse present and future time. Some items ask about current competence as teacher (e.g., "I have enough training to deal with almost any learning problem"), while others present hypothetical situations that imply action in the future (e.g., "If a student did not remember information I gave in a previous lesson, I feel

assured that I would know how to increase his/her retention in the next lesson"). (p. 232-233)

In the present study, factor analysis of the TES split the former personal teaching efficacy subscale into one factor that appeared to deal with present or past competence (called personal teaching competence) and one dealing with a general assessment of future functioning (called personal teaching efficacy). This finding supports Tschannen-Moran et al.'s (1998) position that assessment of personal competence is a separate construct from self-efficacy. Specifically, they indicated that, "Self-perception of teaching competence would be tapped by questions that assess perceptions of current functioning. These [ultimately] contribute to a judgment of teacher efficacy – a prediction of future capability" (p. 233).

It is possible that the two split-off factors of TES's personal teaching efficacy subscale obtained in the present study tap this distinction. They indeed were treated as such in the present study, with personal teaching competence used as a predictor of global personal teaching efficacy (along with other dependent variables). The decision to treat these variables as separate constructs was also supported by the low correlation between the factors ($r = .189$).

We found general support for the Tschannen-Moran et al. (1998) model of teacher efficacy. Specifically, the first canonical function illustrated the anticipated relationship between personal teaching competence and context specific instructional efficacy (see Figure 2). The global measure of personal teaching efficacy made a secondary contribution to the criterion composite. These results support Tschannen-Moran et al.'s hypothesis that personal teaching competence is an important contributor of teacher efficacy. Furthermore, we found differential prediction based of the level of generality of the criterion efficacy variable. Both context specific instructional efficacy and global personal teaching efficacy contributed to the first function but the context specific measure was the primary variance donor. This finding supports the construct validity of the self-efficacy construct, in which more specific measures of efficacy possess greater precision for prediction purposes, with precision decreasing at more general levels of measurement (cf. Pajares, 1996). Interestingly, instructional efficacy and personal teaching efficacy were minimally correlated ($\underline{r} = .283$) even though the instructional efficacy scale was modeled after the TES's personal teaching efficacy subscale. Again, this result suggests that more context specific measures of efficacy (i.e., efficacy for instructional issues for a given child in the METTA case study), may be fundamentally different from global measures. Importantly, the context bound assessment of personal teaching competence was most salient for the corresponding context bound assessment one's efficacy.

The second canonical function captured relationships between perceived external locus of control and the context specific classroom management dependent variables. That is, the more teachers perceived external factors as controlling student learning, the lower was their reported classroom management efficacy. Again, this finding is consistent with the constructs measured. Prior research has found support for a positive relationship between teacher efficacy and perceived internal control as manifested by teacher persistence (Gibson & Dembo, 1984), professional commitment (Coladarci, 1992), and reduced student referral to special education (Podell & Soodak, 1993; Soodak & Podell, 1993).

We did not find explicit support for task analysis as a contributor to either context specific or global teacher efficacy. Given the current sample of emergency certification teachers, and as proposed by Tschannen-Moran et al. (1998), we expected that task analysis would be salient in its relationship to efficacy. The task analysis variables only surfaced in the third function of the canonical solution, which (after correcting for sampling error) added little to the explained variance of the model. However, for the minimal variance explained, the unique contribution of both task analysis variables to the efficacy variables was compelling (see predictor structure coefficients in Table 5). While the present results cannot support this important element of Tschannen-Moran et al.'s model, they do not rule out task analysis as central to efficacy judgments. Instead, they are suggestive that task analysis may indeed impact efficacy. Future research is needed to explore these relationships, perhaps with a more precise measure of task analysis.

It is also important to note that the marginal reliabilities for present scores may have attenuated the observed effects (see Table 3). While the Cronbach's alpha estimates were appropriate for analysis (range .60 to .74), none were indicative of terribly strong score reliability. It must be understood when interpreting substantive findings that score reliability attenuates the maximum effects possible between variables (Cousin & Henson, 2000; Thompson, 1994). As such, it is possible that the squared canonical correlations in the present study were artificially limited by a measurement artifact, perhaps eliminating the third canonical function from interpretation when there may be a true relationship between task analysis and efficacy. At the same time, this issue also points to the need to more clearly specify the variables relevant to the study of teacher efficacy and to develop appropriate instruments for their measurement. Most variables in the present study were measured by only a handful of items, making measurement precision more difficult.

Future research should continue to examine Tschannen-Moran et. al.'s (1998) model of teacher efficacy. The present findings generally support the validity of their model and point to several areas needful of investigation. First, the validity of responses to the METTA instrument as a measure of task analysis requires closer examination. The difficulty with such measures is the cognitive nature of the construct, making it challenging to tease out what elements teachers really do consider as they assess the teaching task. Qualitative research or interview data may provide information to verify or refute the content listed in the METTA instrument. Second, measures for the variables in the present study need to be more precisely developed or expanded. In particular, the personal teaching competence variable that stemmed from the TES should be measured by items that are explicit assessments of present functioning. All of the variables could probably benefit from using more items to measure the construct, hopefully increasing score reliability and validity in the process. Third, other samples of teachers (e.g., preservice, special education, experienced) should be examined to determine the invariance of the model and identify variables that are most relevant to efficacy judgments for different groups of teachers. For example, Tschannen-Moran et al. (1998) proposed that task analysis would be most explicit for novice teachers since they have less experience to draw upon. The present study neither supported nor refuted this assumption. Finally, the present results highlight the multivariate, and complex, relationships among the variables studied. For example, despite low bivariate correlations among most of the variables, the multivariate joint relationship was substantively important (model $\underline{Rc}^2$ = 34% for first three functions). Consistent with the current substantive conceptualization, this analytic result suggests the importance of a multidimensional model of teacher efficacy. In a study of teacher efficacy, Woolfolk and Hoy (1990) also noted "the importance of multivariate analyses in specifying complex relationships among variables" (p. 89). While researchers should always be careful of "analysis over-kill" (see e.g., Wilkinson & Task Force on Statistical Inference, 1999), the study of teacher efficacy will benefit from careful consideration of relevant variables and their complex theoretical relationships to each other.

In conclusion, the present study was conducted to examine the viability of a new multi-dimensional model of teacher efficacy proposed by Tschannen-Moran et al. (1998). General support for this model was found with an observed need for measurement precision of the variables in consideration. As noted by Tschannen-Moran et al., teacher efficacy as a construct now "stands on the verge of maturity" (p. 202). The present study has served to examine a portion of their "mature" model and supports teacher efficacy's move into adulthood.

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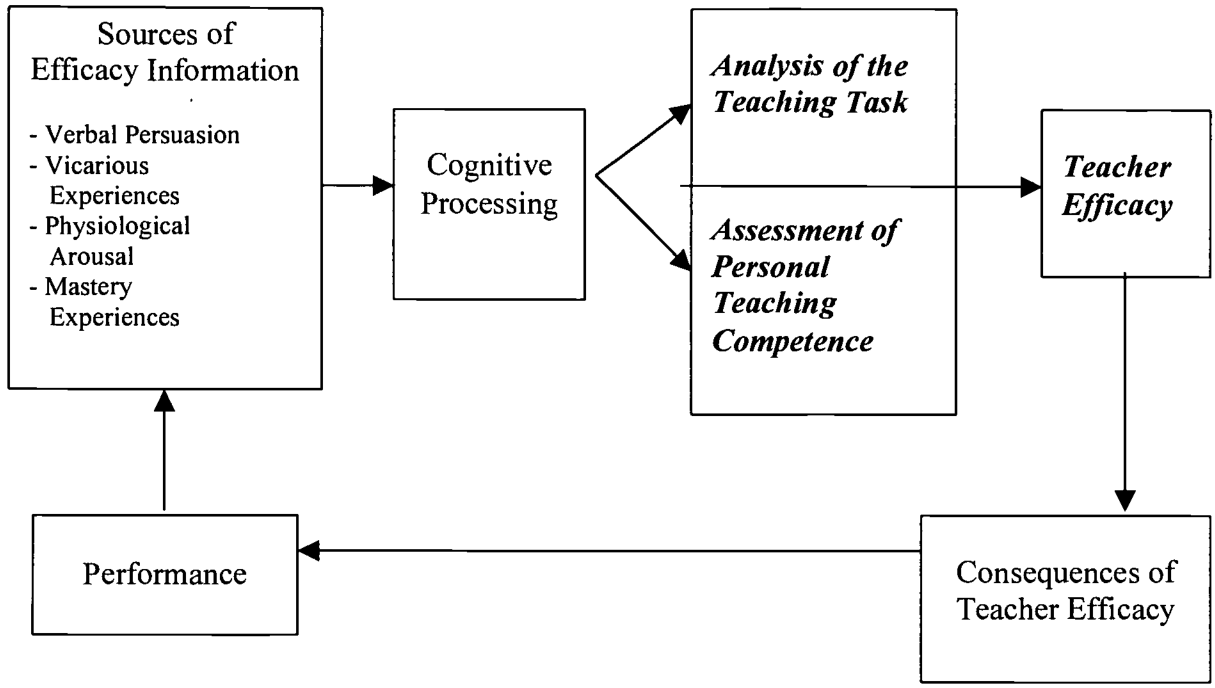

Figure 1. Model of teacher efficacy as proposed by Tschannen-Moran, Woolfolk Hoy, and Hoy (1998).

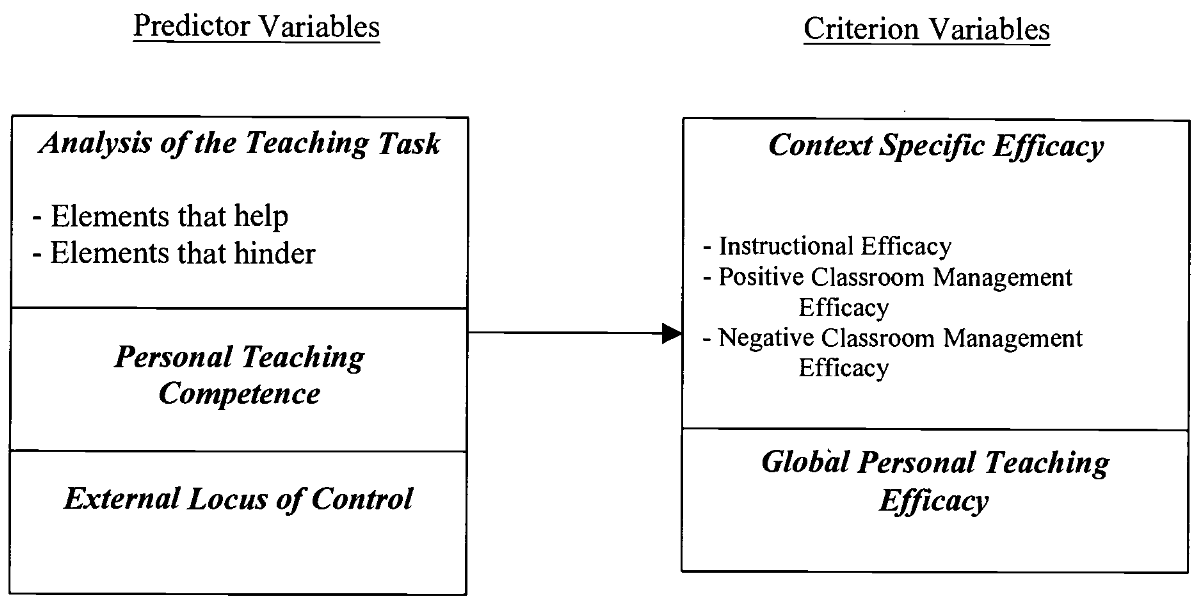

Figure 2. Theoretical predictor and criterion variables tested in the canonical analysis.

Table 1

Factor Correlation Matrix for Context Specific METTA Efficacy Measures.

	Factor		
	1	2	3
1	1.000		
2	.384	1.000	
3	.310	.511	1.000

Note. Factor 1 = negative classroom management efficacy. Factor 2 = instructional efficacy. Factor 3 = positive classroom management efficacy.

Table 2

Factor Pattern and Structure Coefficients from Principal Components Analysis of METTA Efficacy Instrument with Promax (kappa = 4) Rotation.

	Factor								
	1			2			3		
Item	Coef.	r_s	r_s^2	Coef.	r_s	r_s^2	Coef.	r_s	r_s^2
1 (I)	-.327	.025	.001	.667	.700	.490	.311	.550	.303
2 (B)	.854	.717	.514	-.298	-.007	.000	-.073	.039	.002
3 (M)	.156	.388	.151	-.011	.439	.193	.763	.806	.650
4 (I)	.183	.392	.154	.684	.667	.445	-.170	.235	.055
5 (B)	-.084	.086	.007	-.267	.150	.023	.880	.718	.516
6 (M)	.722	.754	.569	.066	.353	.125	.019	.277	.077
7 (I)	-.125	.176	.031	.856	.764	.584	-.086	.312	.097
8 (B)	.530	.659	.434	.319	.533	.284	.022	.349	.122
9 (M)	-.044	.186	.035	.096	.396	.157	.622	.657	.432
10 (I)	.264	.464	.215	.602	.652	.425	-.100	.289	.084
11 (B)	.332	.542	.294	.140	.525	.276	.504	.679	.461
12 (M)	.527	.649	.421	.199	.476	.227	.145	.410	.168

Note. Factor 1 = negative classroom management efficacy. Factor 2 = instructional efficacy. Factor 3 = positive classroom management efficacy. I = Anticipated instructional efficacy item. B = Anticipated behavioral efficacy item. M = Anticipated motivational efficacy item. Coef. = factor pattern coefficients with underlined values greater than |.40|. r_s = structure matrix coefficients. r_s^2 = squared structure matrix coefficients, represents the percentage of shared variance between the observed item scores and synthetic factor scores.

Table 3

Descriptive Statistics and Coefficient alpha for Variables (n = 109).

Variable	M	SD	alpha
	METTA Efficacy Factors		
Instructional Efficacy	5.02	.75	.67
Negative Classroom Management Efficacy	4.64	.87	.68
Positive Classroom Management Efficacy	5.02	.79	.70
	METTA Task Analysis Ratings		
Help Rating	23.97	14.38	--
Difficult Rating	18.45	12.50	--
	TES Factors		
Personal Teaching Efficacy (Global)	5.07	.74	.60
Personal Teaching Competence	4.91	.75	.70
External Locus of Control	3.86	.91	.74

Note. All variables except METTA Task Analysis Ratings measured on a 7 point scale. High scores indicate greater possession of the trait. High scores on External Locus of Control indicate a lack of perceived external locus of control for student learning.

Table 4

Factor Pattern/Structure Coefficients from Principal Components Analysis of the TES with Varimax Rotation.

	Factor					
	1		2		3	
Item	Coef./ r_s	r_s^2	Coef./r_s	r_s^2	Coef./r_s	r_s^2
1	.003	.000	.736	.542	.000	.000
2	.479	.229	-.247	.061	.280	.078
3	.570	.325	-.120	.014	.063	.004
4	.717	.514	-.094	.009	.094	.009
6	.127	.016	.766	.587	.223	.050
7	.055	.003	.315	.099	.776	.602
8	.716	.513	.168	.028	.079	.006
9	.108	.012	.759	.576	.065	.004
10	-.189	.036	.578	.334	-.072	.005
11	.622	.387	.097	.009	-.108	.012
13	.143	.020	-.041	.002	.510	.260
15	-.004	.000	-.073	.005	.524	.275
17	.784	.615	.120	.014	.018	.000
18	-.024	.001	.131	.017	.774	.599

Note. Factor 1 = External locus of control (formerly general teaching efficacy). Factor 2 = Personal teaching competence. Factor 3 = personal teaching efficacy (global measure). Coef./r_s = factor pattern/structure coefficients with underlined values greater than |.40|. r_s^2 = squared factor pattern/structure coefficient.

Table 5

Canonical Solution for Three Functions (Variates).

Variable/ Coef.	Function I			Function II			Function III			
	Stand. Coef.	r_s	r_s^2(%)	Stand. Coef.	r_s	r_s^2(%)	Stand. Coef.	r_s	r_s^2(%)	h^2
INSTR	.805	.705	49.70	-.019	-.489	23.91	.850	.511	26.11	99.72%
PCME	-.721	-.038	00.14	-.711	-.801	64.16	.247	.157	02.46	66.76%
NCME	.204	.437	19.10	-.593	-.750	56.25	-.785	-.469	22.00	97.35%
PTE	.553	.571	32.60	.429	-.056	00.31	-.432	-.367	13.47	46.38%
Adequacy			25.39			36.16			16.01	
Rd			04.77			03.58			00.85	
Rc^2			18.80			09.90			05.30	
Adj. Rc^2			12.30			02.69			-02.28	
Rd			04.80			02.28			02.03	
Adequacy			25.53			23.01			38.31	
HELP	-.054	.095	00.90	-.476	-.330	10.89	.477	.806	64.96	76.75%
DIFF	.089	.092	00.85	.111	-.027	00.07	.623	.888	78.85	79.77%
PTC	.843	.849	72.08	.529	.465	21.62	.016	.132	01.74	95.44%
EASF	.528	.532	28.30	-.778	-.771	59.44	-.217	-.277	07.67	95.41%

Note. INSTR = instructional efficacy. PCME = positive classroom management efficacy. NCME = negative classroom management efficacy. PTE = personal teaching efficacy. HELP = sum of task analysis items that will help teaching the student. DIFF = sum of task analysis items that will make teaching the student difficult. PTC = personal teaching competence. ELOC = external locus of

Table 5 (continued)

control. Stand. Coef. = standardized canonical discriminant function coefficient. r_s = structure coefficient. Adj. Rc^2 = Squared canonical correlation corrected for sampling error using the Wherry (1931) formula. h^2 = communality coefficient.

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