

## Sources of Influence on Teacher Self-Efficacy Among Preservice Teachers

by

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### ABSTRACT

*This study investigates the major sources of influence contributing to teacher self-efficacy among preservice teachers and the relative strength of these sources in predicting teacher self-efficacy. Bandura (1986, 1997) asserted that successful performance depends not only on one's knowledge and skills but, importantly, upon the personal judgment that one can mobilize those knowledge and skills that he/she possesses. This study utilizes a survey design to examine the relationships between various sources of influence and teacher self-efficacy. Participants were preservice teachers from the Graduate Preservice Teachers' Program. Multiple regression analysis revealed that mastery experience, physiological arousal and verbal persuasion were key predictors of teacher self-efficacy. The results of the final regression model revealed that the combined effect of all predictor variables explained 52% of the variance in teacher self-efficacy. The findings of this study provide a framework for teacher educators in providing learning opportunities for preservice teachers to engage in experiences that could foster high teacher self-efficacy and self-regulatory behavior patterns.*

### INTRODUCTION

Pelan Induk Pembangunan Pendidikan (2006–2010) or the National Education Development Plan has, among others, emphasizes the importance of uplifting the teaching profession mainly education and training of prospective teachers. Researchers, practitioners and others who have a vested interest in teacher education are of the view that knowledge of subject matter and of pedagogical methods alone does not guarantee quality teachers or quality teaching, although they are necessary prerequisites (Borko & Putnam, 1996; Feiman-Nemser & Folden, 1986; Pajares, 1992). Bandura (1986, 1997) argued that successful performance depends not only on one's knowledge and skills but, importantly, upon the personal judgment that one can mobilize those knowledge and skills that he/she possesses. This judgment, identified by Bandura as one's *perceived self-efficacy*, is a cognitive process that operates in all learning situations and acts as a mediator between knowledge and action.

Prospective teachers enter the teaching profession bringing with them their own amalgam of beliefs, thoughts, knowledge and personal values. Pajares argued that the beliefs teachers create and develop and hold to be true about themselves will influence their perceptions and judgments, which are vital forces in affecting their behavior in the classroom. Woolfolk Hoy (2000) pointed out that preservice teachers' belief construct, specifically *teacher self-efficacy* is most malleable in their early training. Teacher self-efficacy has been shown to be a powerful construct related to positive teacher behavior and student outcome. In addition, Mulholland and Wallace (2001) found that some of the most powerful influences on the development of

teachers' self-efficacy are experiences during student teaching. Once established, teacher self-efficacy appears to be difficult to impact positively since this internally held belief about oneself tends to solidify with experience and time (Henson, 2002).

### **Statement of the Problem**

In the last two decades, a substantial amount of research has been devoted to understanding the beliefs of teachers with the hope of improving the quality of teacher preparation and teaching performance (Ashton & Webb, 1986; Guskey, 1984, 1988; Lee, 2000; Ross, 1992; Woolfolk & Hoy, 1990). Studies correlate the effects of teacher self-efficacy on student outcome, teachers' classroom management, teachers' willingness to try a variety of materials and enthusiasm for teaching (Ashton, 1985; Guskey, 1984; Ross, 1992; Woolfolk et al., 1990).

There is a growing interest among local researchers who have contributed to the understanding of the role of self-efficacy in affecting teachers' behavior and students' outcome over the past decade (Lim, 1997; Nagamuthu, 1995; Rosna, 1999; Wong, 2001).

Despite the increasing interest in teacher self-efficacy over the years, as far as the researcher is able to determine, there is no published local research that explores the interplay of sources and their influences on the development of teacher self-efficacy, in contrast to the research that focus on correlates and outcomes of teacher self-efficacy. Given that efficacy may be most malleable at early stages of learning (Bandura, 1997), Woolfolk Hoy (2000) pointed out that self-efficacy of preservice teachers are likely subject to change as they have yet to assume real teaching responsibilities. Because teachers use their self-efficacy as "filters" through which they display their teaching behavior, it is essential to understand which of the self-efficacy sources are especially crucial for developing and strengthening their teaching efficacy during their preservice year.

Clearly, an investigation into preservice teacher self-efficacy and how these beliefs are conceived and nurtured can provide meaningful information to teacher educators and professionals responsible for designing and implementing more meaningful teacher preparation programs.

### **Purpose of the Study**

The purpose of this research study is to examine various sources influencing teacher self-efficacy and the relative strength of these sources of influence on teacher self-efficacy.

### **Research Questions**

What is the relative strength of the hypothesized sources of influence (mastery experience, vicarious experience, verbal persuasion, physiological arousal, contextual climate, demographic information) in predicting teacher self-efficacy among preservice teachers?

### **Theoretical Perspective**

#### **Self-Efficacy**

Self-efficacy, defined by Bandura (1986) as "people's judgment of their capabilities to organize and execute courses of action required to attain designated types of performances" p. 391), has important influence on human behavior and affect in goal setting, effort expenditure and the

level of persistence in facing daily tasks. Self-efficacy helps determine what individuals do with the knowledge and skills they possess in order to produce desirable outcomes. Bandura added, "unless people believe they can produce desired effects by their actions, they have little incentive to act" (1997, p. 3). In this respect, even when individuals perceived that certain actions are likely to bring about a desired behavior, they may not engage in the behavior or persist after initiating the behavior if they believe that they do not possess the required knowledge or skills. As a result for some lack of belief in their capabilities, the individual may never exhibit certain acquired skills.

Bandura (1986) argued that successful execution of task is best served by reasonably accurate efficacy appraisal. Furthermore, overestimated efficacy judgment may serve to increase one's effort and persistence. In a similar vein, Tschannen-Moran, Woolfolk Hoy and Hoy (1998) stated that self-efficacy constitutes one's perception of competence rather than the actual level of competence. At times individuals may overestimate or underestimate their capabilities, and this affects the courses of actions they choose to pursue and the effort expended in these pursuits. The stronger the self-efficacy, the more likely people will choose challenging tasks, persist on them and perform them successfully. Hence, self-efficacy focuses on one's belief in the ability to enact a desired behavior. The actual ability is secondary to the perceived ability.

Assor and Connell (1992), (as cited in Pintrich and Schunk, 1996), in their two-year longitudinal study of high school students reported that students who have "inflated" self-perceptions of their competence are related to positive performance outcome; whereas, students who have inaccurate self-perceptions that are lower than they should be, performed at much lower levels.

Social cognitive theory asserts that the most desirable level of self-efficacy is one that slightly exceeds the current skill level. Such "inflated" confidence urges people to put in effort and demonstrate persistence in facing challenging tasks. However, this does not imply that people can accomplish tasks beyond their capabilities just by believing they can. Competent or successful performance of a task generally requires both skills and strong sense of efficacy for a person to deploy his/her resources effectively (Bandura, 1991). Pintrich and Schunk (1996) had cautioned educational researchers to get accurate perceptions that really represent one's self-belief, and not succumb to modesty or socially desirability effects.

### **Teacher Self-Efficacy**

Teacher self-efficacy is a belief construct that has been used to explain motivational processes and achievement in varied academic settings such as: (1) teacher classroom behavior, (2) students' outcome, (3) teacher collaboration with others, and (4) career satisfaction and retention.

The Rand researchers, arguably the earliest researchers of teacher self-efficacy, defined teacher self-efficacy as "the extent to which the teacher believes he or she has the capacity to affect student performance" (McLaughlin & Marsh, 1978, p. 84). Teachers who believe that they can be successful on a given task are more likely to be so because they adopt challenging goals, try harder to achieve them, persist despite setbacks and develop coping mechanisms for managing their emotional states. Following the same concept, Gibson and Dembo (1984) defined teacher self-efficacy as the conviction that one can successfully bring about a desired outcome in one's students. In addition, Gibson and Dembo maintained that two types of beliefs are relevant: the belief that teachers in general can influence students' learning (*general teaching efficacy*) and the belief in one's own teaching ability to affect student outcome (*personal teaching efficacy*).

In a recent development, Tschannen-Moran et al. (1998) proposed an integrated model of teacher self-efficacy purports to bring some coherence to the meaning of teacher self-efficacy and to guide future research. The researchers defined teacher self-efficacy as “the teacher’s belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context” (p. 233). According to Tschannen-Moran and her associates, teachers make efficacy judgments by assessing teaching tasks and personal teaching competence in specific teaching contexts. Further in a related study, Tschannen-Moran and Woolfolk Hoy (2001) found three factor structures that contribute to teacher efficacy judgment: *efficacy for instructional strategies*, *efficacy for classroom management* and *efficacy for student engagement*.

Regardless of the constructs used, studies done on teacher self-efficacy has shown that teacher self-efficacy were mainly assessed using self-reported item, analyzed in two broad categories – high sense of teacher efficacy and low sense of teacher efficacy. Teachers with a reported high sense of efficacy are found to possess a positive set of teaching behavior that can influence students’ outcome or achievement (Armor et al., 1976; Ashton & Webb, 1986, Tschannen-Moran et al., 1998). In contrast, teachers with low sense of teacher efficacy are less positive about their abilities to affect student outcomes. In other words, self-efficacy is characterized as major mediator for our behavior, and importantly, behavior change.

### **Sources of Influence on Self-Efficacy**

Bandura (1977, 1997) postulated that people’s conceptions of their self-efficacy, regardless accurate or misjudged, are developed through four sources of influence which he termed as *sources of efficacy information* consisting of: (1) mastery experience or actual experience, (2) vicarious experience, (3) verbal or social persuasion, and (4) physiological arousal or emotional state.

Bandura (1977, 1997) identified mastery experience as the most important determinant of self-efficacy because it provides the most authentic feedback regarding one’s capabilities. Past successes create a strong sense of efficacy to accomplish similar future tasks, whereas, failures can lower one’s efficacy perceptions particularly if they occur in the early stages of learning. However, if prior experience and success have created a strong sense of efficacy, failure is unlikely to affect it. Therefore, the effects of failure on one’s self-efficacy are partly depended on the timing and the total pattern of experiences in which the failures occur.

Bandura (1977, 1997) identified vicarious experience as the second most potent influence on one’ sense of efficacy. By observing and identifying oneself with efficacious models, the learner gathers information necessary to make judgment about his or her own capabilities. This is especially influential in circumstances where the model is perceived to be similar to the observer or the observer has little experience in performing the task in question.

Verbal or social persuasion such as words of encouragement or moral support from others regarding one’s performance may modify one’s perceptions of efficacy. Such positive verbal messages or social persuasion can influence the individual to exert extra effort or demonstrates persistent behavior necessary to succeed when faced with difficult tasks. On the other hand, negative verbal or social persuasion can impede one’s self-efficacy development if the individual receives critical feedback. Bandura (1977, 1997) viewed verbal persuasion as a comparatively weak source of efficacy information. Then again, if persuaders are important significant others in one’s life, they can play important parts in the development of self-efficacy.

The fourth efficacy information source is the physiological arousal or emotional state experienced by the person. Experiences of stress and anxiety can have a negative effect on the individuals' beliefs about their capabilities. In a taxing situation, physical symptoms such as increased heart beat or sweaty palms can cause the individual to perceive incompetence in performing a task. Typically, self-efficacy is raised in a positive emotional state and lowered in a negative emotional state (Bandura, 1997).

In a concluding note, Bandura (1997) added that sources of efficacy information, whether conveyed enactively, vicariously, persuasively or physiologically will become instructive only after being filtered through cognitive processes and reflective thought, whereby, information are selected, weighted and incorporated into self-efficacy judgments.

### Conceptual Framework of the Study

The conceptual framework of this study draws upon Bandura's (1986, 1997) model of triadic reciprocal causation, whereby personal factors, environment and behavior are complexly interactive sources of influence on efficacy development.

As shown in Figure 1, this triadic model proposes that the self, the social context and behavioral actions, interrelate and give impact to teacher's judgment about whether s/he will be able to execute actions that are necessary to successfully affect students' learning.

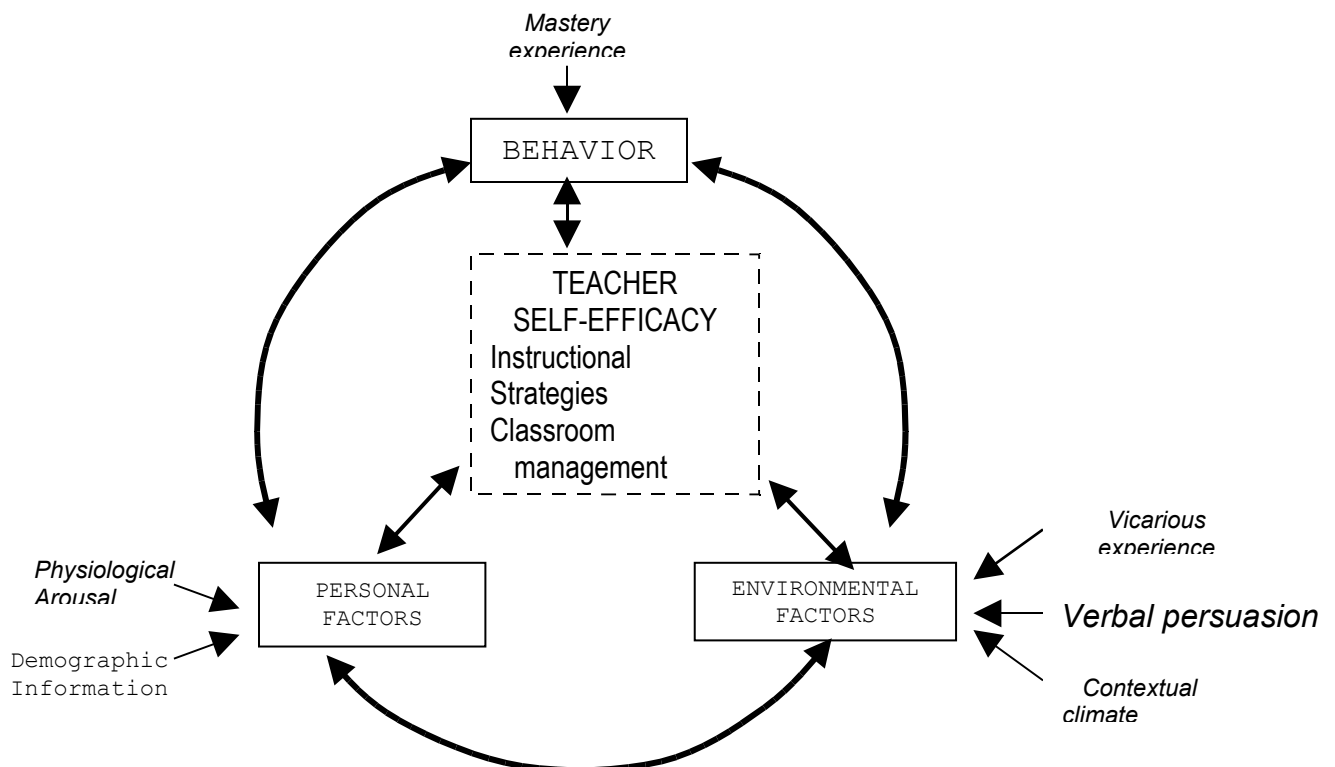


Figure 1. Conceptual Framework of the Study

While acknowledging the interdependent relations among the trio, it is envisioned that the three paradigms (personal factors, environment, behavior) serve as antecedents of teacher self-efficacy and are direct or indirect facilitators of teacher self-efficacy. In addition, certain paradigms may operate through more than one sources of influence. The directional arrows in the framework depict what the researcher believes are crucial sources influencing teachers' sense of efficacy. In essence, the conceptual framework attempts to weave together diverse but interrelated influences on teacher self-efficacy.

The present study attempted to explore sources influencing teacher self-efficacy from the environmental, personal and behavior paradigms that were hypothesized to predict teacher self-efficacy. While the conceptual scheme was modeled after Bandura's (1977, 1997) four sources of efficacy information, contextual climate and teachers' demographic information were included into the framework to add specificity in the exploration of teacher efficacy judgments. These factors were selected for the purpose of this study because the researcher viewed them as empirically promising and theoretically interesting.

### **Significance of the Study**

As teacher self-efficacy is developed and maintained through various sources of influence, it is important to understand the magnitude of these influences because they provide the foundation to the design of educational interventions aimed at strengthening teacher self-efficacy. Since this study focuses on the antecedents of teacher self-efficacy, the findings will supply invaluable knowledge base on the extent to which various source of efficacy information, namely: mastery experience, vicarious experience, verbal persuasion, physiological arousal, contextual climate, and demographic information influence teacher self-efficacy during their preservice year. This information will be beneficial to practitioners involved in the area of teacher preparation, such as supervising lecturers and mentor teachers, to provide a learning environment whereby preservice teachers have opportunities to engage in experiences that foster high teacher self-efficacy. Furthermore, the findings may aid in designing meaningful and workable educational interventions aimed at strengthening teacher self-efficacy.

## **METHOD**

### **Research Design**

This study utilizes a survey design to investigate the relative strength of these sources in predicting teacher self-efficacy. Cross-sectional survey was used because data were collected at just one point in time in order to describe what existed at that point of time. Apart from that, a great deal of information could be gathered in a relatively short period of time. The questionnaire was administered within two weeks after the preservice teachers have completed their college- and school-based training program, which is near the end of their training program (addition one month to completion). Direct administration of questionnaires allows interaction between the researcher and participants while keeping rapport at moderate level.

### **Participants**

The population for this study consists of preservice teachers enrolled in the *KPLI* program of the January 2003 intake at selected teacher training colleges/institutions in West Malaysia. The target population identified comprises preservice teachers to be trained as secondary school

teachers teaching critical subjects such as Science, Mathematics and English Language. Using the proportional stratified random sampling design; ten teacher training colleges/ institutions were randomly selected from the listing of each stratum according to subject specializations to about 50% of the target population. The designed sample comprised 400 preservice teachers drawn from ten teacher training colleges/institutions were from the states of Johore, Malacca, Negeri Sembilan, Federal Territory of Kuala Lumpur, Perak, Penang, Kedah and Kelantan. The achieved sample ( $N = 383$ ) was representative of the *KPLI* preservice teachers with regard to the intended population. After data analysis, there were 20 cases of incomplete responses to certain items in the questionnaire and six cases with incomplete demographic information. Thus, 26 cases with incomplete information were dropped from this study, leaving an achieved sample of 357 participants.

### **Instrumentation**

A questionnaire was utilized in this study to collect the data necessary to provide adequate information regarding sources of influence on teacher self-efficacy and the level of teacher self-efficacy among preservice teachers.

There were three sections in the questionnaire. Section A consisted of the *Sources of Influence on Teacher Self-Efficacy Scale* with 35 self-constructed items. Besides using the data collected from the *Thought-listing Questionnaire* for sources of efficacy information, the researcher also reviewed existing instruments such as the *Sources of Social Efficacy Scale* developed by Anderson and Betz (2001), the *Interview Protocol and Matrix Categories* used by Zeldin (2000), *Interview Protocol* used by Lee (2000), and *Sources of Maths Efficacy Scale* developed by Lent et al. (1991) for constructing the four theorized sources of influence on self-efficacy. Additionally, the researcher made personal correspondence with Professor Robert Lent at the University of Maryland via e-mail to seek better understanding regarding validity of the items. Items for contextual factor, the fifth source of influence on teacher self-efficacy, were adapted from *School-level Environment Questionnaire* (Rentoul & Fraser, 1983), *Measure of Collaboration* (Chester & Beaudin, 1996) and a synthesis of literature on the effect of the social organization of schools on teachers' efficacy and satisfaction. According to Thorndike, Cunningham, Thorndike and Hagen (1991), such steps taken provide supporting evidence for content validity.

Pilot testing revealed the reliability of the factors were mastery experience ( $\alpha = .68$ ), vicarious experience ( $\alpha = .57$ ), verbal and social persuasion ( $\alpha = .62$ ), physiological and emotional arousal ( $\alpha = .82$ ), and contextual factor ( $\alpha = .86$ ).

Section B comprised the *Teacher Sense of Efficacy Scale* developed by Tschannen-Moran and Woolfolk Hoy (2001). Pilot testing of the translated instrument in the Malay Language was conducted on a representative group ( $n = 35$ ) of preservice teachers in November 2002 as described in previous section. The reliabilities of the 12-item teacher self-efficacy scale and subscales for the translated version of the *TSES* were instructional strategies ( $\alpha = .57$ ), classroom management ( $\alpha = .80$ ) and student engagement ( $\alpha = .73$ )

There were eight items in Section C that was aimed at obtaining demographic information of the participants.

## Research Procedures

The researcher personally administered the questionnaire to the participants of this study in groups. Participants were asked to complete the Sources of Influence and Teacher Self-Efficacy questionnaire that consists of three sections. The whole procedure took approximately thirty minutes.

## Data Analysis

The quantitative data were entered into the Statistical Package for the Social Sciences Personal Computer (SPSS/PC) for Windows version 10 for the purpose of analysis. Reversed-coded items were all recoded, frequency run was performed to identify missing data and cases with incomplete responses were excluded in the data analyses procedure.

A correlation matrix was then computed to examine the intercorrelation among predictor variables and the criterion measures. Hierarchical multiple regression strategy was employed to examine the amount of variance contributed by each of the hypothesized sources in determining teacher self-efficacy.

## RESULTS

### Direction of Relationship and Contribution of Sources of Influence to Teacher Self-Efficacy

An examination of zero-order correlations among sources of influence and teacher self-efficacy revealed that each predictor of interest (mastery experience, vicarious experience, verbal persuasion, physiological arousal and contextual climate) was significantly ( $p < .001$ ) and substantially related to teacher self-efficacy.

Table 1  
Pearson Product-Moment Correlations of Sources of Influence and Teacher Self-Efficacy

	5	6	7	8	9
<i>Predictors</i>					
5. Mastery Experience	-				
6. Vicarious Experience	.30***	-			
7. Verbal Persuasion	.38***	.51***	-		
8. Physiological Arousal	.47***	.15**	.35***	-	
9. Contextual Climate	.25***	.25***	.53***	.33***	-
<i>Criterion</i>					
10. Teacher Self-Efficacy	.47***	.27***	.48***	.62***	.41***
Means	6.88	6.61	6.94	6.41	6.22
Standard Deviations	1.05	1.43	1.07	1.09	1.20

*Note.*  $N = 354$  (140 male, 214 female). Predictor variables scores ranged from 1 (strongly disagree) to 9 (strongly agree). Criterion variable scores ranged from 1 (Nothing) to 9 (A Great Deal).

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

### Hierarchical Multiple Regression Outcomes



A five-step hierarchical multiple regression analysis (baseline model with outliers removed,  $N = 354$ ) was used to assess how much additional variance in teacher self-efficacy score was explained by incrementally adding predictor variables to the equation. The collective contribution was assessed in the final model. Hierarchical multiple regression was chosen because theoretical relevance was given priority over statistical considerations.

Table 2 displays the standard beta coefficients ( $\beta$ ), multiple  $R^2$  and the squared semipartial correlation ( $R^2$  Change).

Table 2  
Standardized Beta Coefficients from Hierarchical Multiple Regression Analysis of Teacher Self-Efficacy

Predictors	Step 1	Step 2	Step 3	Step 4	Step 5
5. Mastery Experience	.49***	.45***	.36***	.18***	.18***
6. Vicarious Experience	-	.13**	-.04	-.01	-.01
7. Verbal Persuasion	-	-	.39***	.27***	.20***
8. Physiological Arousal	-	-	-	.43***	.41***
9. Contextual Climate	-	-	-	-	.15**
$R^2$	.26	.27	.37	.50	.52
$R^2$ change	.24	.01	.10	.13	.02

Note.  $N = 354$

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

### Unique Contribution

The significance of the incremental partitioning of variance between each predictor variable and teacher self-efficacy was assessed at each step of the hierarchy. Squared semipartial correlation ( $R^2$  Change) indicates the proportion of variance incremented by the variable in question, after controlling for the other predictor variables. Mastery experience was entered first into the analysis. At the end of step 1, with mastery experience in the equation, the proportion of variance added to teacher self-efficacy account for 24% of unique contribution with  $F(1, 348) = 23.81$  at  $p < .001$ . The process was repeated at step 2 with vicarious experience added to the equation, step 3 with verbal persuasion, step 4 with physiological arousal, and step 5 contextual climate.

### Collective Contribution

Based on the results, the multiple  $R^2$  was .52, which means that the total contribution by the combined set of efficacy sources accounted for approximately 52% of the variance of teacher self-efficacy,  $F(9, 344) = 40.82$  at  $p < .001$ . Thus, the collective relationship between teacher self-efficacy and the set of predictor variables can be characterized as moderately strong.

### The Direct, Indirect and Total Effects of the Variables That Contribute Significant Variance to Teacher Self-Efficacy

Results from the multiple regression analyses have effectively evaluated the individual and collective contributions of the predictor variables to explain teacher self-efficacy. Because the antecedents were themselves correlated, a particular predictor may itself be an antecedent to another predictor (e.g., gender and verbal persuasion). There may be an indirect predictor mediated by other variables. In order to understand the complex interactions of the various sources of influence on teacher self-efficacy, all variables were examined for their direct and indirect effects on teacher self-efficacy.

A path model is used to provide an account of antecedents' interrelations and the relative strength of these antecedents to directly and/or indirectly explain teacher self-efficacy. Path analysis is deemed appropriate in an investigation where the hypothesized relationships have theoretical considerations and empirical support (Anderson & Evans, 1974; Cook & Campbell, 1979). The model is assumed to be recursive, which means that the causal flow is unidirectional.

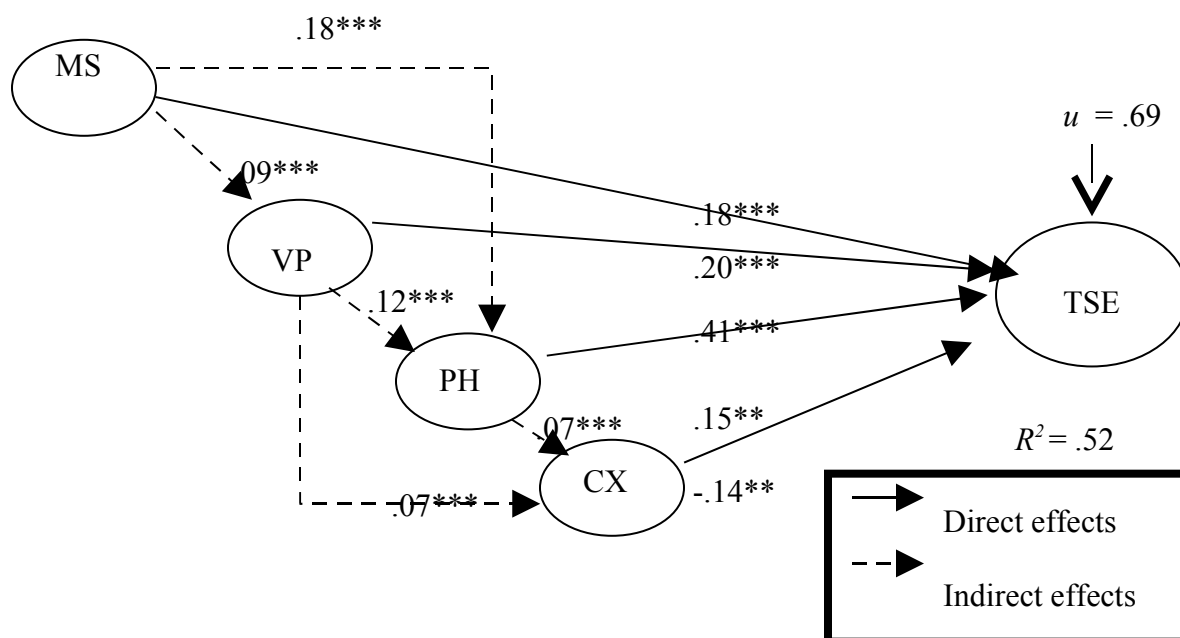


Figure 2. Significant path coefficients between all variables in the study (Full Model)

*Note.* MS = Mastery Experience; VP = Verbal Persuasion; PH = Physiological Arousal; CX = Contextual Climate; TSE = Teacher Self-Efficacy

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ .

Figure 2 illustrates the recursive path model of the final equation with contributions at significant levels of  $p < .01$ . The relationship from one variable to another is represented by the standardized regression coefficients ( $\beta$ ). Teacher self-efficacy is an outcome measure that is dependent on a block of exogenous variables (demographic information) and five endogenous variables (mastery experience, vicarious experience, verbal persuasion, physiological arousal and contextual climate) whose causes lie within the framework of the model.

## SUMMARY OF RESULTS

1. Mastery experience has the highest overall mean scores among all other sources of influence on teacher self-efficacy ( $M = 6.72$ ).
2. Mastery experience contributed the most unique variance to teacher self-efficacy. It also has the largest total effect on teacher self-efficacy. There was a significant direct influence of mastery experience (36.7% of its total effect) on teacher self-efficacy and was mediated by physiological arousal, verbal persuasion and vicarious experience.
3. Physiological arousal contributed the second highest unique variance to teacher self-efficacy. It also has the second largest total effect on teacher self-efficacy. Interestingly, physiological arousal has the largest significant direct influence on teacher self-efficacy (95.4% of its total effect) and was mediated by contextual climate.
4. Verbal persuasion contributed the third largest unique variance to teacher self-efficacy. It also has the third largest total effect on teacher self-efficacy. There was a significant direct influence of verbal persuasion on teacher self-efficacy (51.3% of its total effect) and was mediated by physiological arousal and contextual climate.
5. Contextual climate contributed the fourth largest unique variance to teacher self-efficacy. It also has the fourth largest total effect on teacher self-efficacy. There was a significant direct influence of contextual climate on teacher self-efficacy.
6. Vicarious experience contributed the least unique variance to teacher self-efficacy. It has significant total effect on teacher self-efficacy. However, there was no significant direct influence of vicarious experience on teacher self-efficacy.

## DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

### Effects of Mastery Experience on Teacher Self-Efficacy

Mastery experience remained the most pervasive influence on teacher self-efficacy. The increased teaching skills acquired during the practicum period could have provided opportunities for preservice teachers to gather information about their personal capabilities for teaching and to build a sense of teacher competence. This is congruent with Hoy and Woolfolk (1990) who examined the teacher self-efficacy levels of preservice teachers before and after their practicum experience. The researchers found the personal teaching efficacy scores increased while general teaching efficacy scores decreased. Hoy and Woolfolk concluded that given the exposure, preservice teachers become more confident about their own ability to be effective by learning to maintain classroom order. This suggests that the more mastery experience one has, the stronger the basis on which to judge one's capabilities.

One interesting finding in this study is that the magnitude of direct and indirect effects of mastery experience on teacher self-efficacy is almost equal in strength. The effect of mastery experience on teacher self-efficacy was mediated primarily by physiological arousal. It is evident that mastery experience does not only operate independently to influence preservice teachers' self-efficacy. Mastery experience provides the foundation to influence teacher self-efficacy and is further enhanced through physiological arousal as a crucial mediating variable. Stated differently, preservice teachers who have sufficient direct enactive experience are likely to be subjected to less distress that in turn contribute to an increased in teacher self-efficacy. Therefore, preservice teachers who experienced past success may still lack the confidence to carry out teaching tasks successfully if their cognitive processing of information lead to anxiety or other forms of negative emotional states.

### **Effects of Physiological Arousal on Teacher Self-Efficacy**

An important finding that emerges is that the direct effect of physiological arousal outweighs other variable sources in influencing teacher self-efficacy. In other words, the emotional states of preservice teachers are largely transmitted directly to influence their judgment of capabilities. This appears to be consistent with the earlier bivariate findings whereby physiological arousal demonstrated highest correlation with teacher self-efficacy. Moreover, this confirms Tschannen-Moran et al. (1998) contention that the level of physiological arousal a person experiences in a teaching situation adds to self-perceptions of teaching competence. How people feel about themselves when encountering with a task affects what they believe they can do.

Contextual played a small but significant mediating role between physiological arousal and teacher self-efficacy. This means that preservice teachers' emotional states could be affected indirectly by the organizational climate from which they function. Social cognitive theorists have emphasized the importance of environmental influence on human functioning. An environment that breeds anxiety and stress will have adverse effects on teacher self-efficacy. School organizations with supportive teachers and administrators in the form of collaboration, sharing of ideas and resources could keep one's emotional state at moderate level, thereby, driving them to expend more effort in carrying out their teaching tasks.

Even though physiological arousal is the primary direct cause for teacher self-efficacy, in comparing for total effects, physiological arousal remained the second most important contributor, after mastery experience. The strong direct link between physiological arousal and teacher self-efficacy in this study means that strategies employed by teacher educators to minimize preservice teachers' stress and anxiety would have straightforward effect on their sense of teaching efficacy. On the other hand, interventions for improving mastery experience may demand more effort and are more complex to decipher because of its large indirect effects on teacher self-efficacy mediated by vicarious experience, verbal persuasion and physiological arousal.

### **Effects of Verbal Persuasion on Teacher Self-Efficacy**

Data supported Bandura's (1977, 1997) contention of verbal persuasion as a potent source of influence on the choices that people made, effort they put forth and the degree of perseverance they displayed in face of unforeseen difficulties. Verbal persuasion was found to have direct and indirect effects on teacher self-efficacy. The indirect effects were through its influence on physiological arousal and contextual climate.

It is evident that preservice teachers cognitively and affectively process the feedback they received whereby they selectively attended to the feedback, weighed and interpreted it in accordance to their emotional states. Thus, teacher self-efficacy, to a certain degree, is determined by the extent to which preservice teachers interpret their emotional states as debilitating or challenging. As such, the type of feedback supervising lecturers and mentor teachers give has important effect on preservice teachers' teacher self-efficacy levels.

### **Effects of Vicarious Experience on Teacher Self-Efficacy**

Contrary to the theoretical tenets of social cognitive theory, perceptions of vicarious experience did not add substantially to variance in teacher self-efficacy when all variables were entered into the predictive equation. Although vicarious experience has no significant direct effect on teacher self-efficacy, positive and significant associations were obtained in bivariate correlations, unique variance and total causal effects. These seemingly contradictory findings may be due to the addition of verbal persuasion and physiological arousal variables into the equation that override the effect of vicarious experience causing its influence to cancel out.

In the reduced regression equation, vicarious experience contributed significantly to teacher self-efficacy when it first entered the equation. When verbal persuasion, physiological arousal and contextual climate were added to the model, vicarious experience no longer contributed significantly to teacher self-efficacy. It can be concluded that vicarious experience has an effect on teacher self-efficacy if preservice teachers had only past success to fall back on. When preservice teachers receive verbal feedback and persuasion about their abilities, when preservice teachers are in control of their emotional states, when the context is supportive, vicarious experience no longer play a significant role in affecting their teaching efficacy.

### **Implications for Educational Practice**

It is recommended that teacher preparation programs explicitly address these influences with specific types of training and educational experiences that focus on mastery building through cognitive and metacognitive strategies, cultivating self-regulation competencies, physiological coping and establishing a social support system. Such strategies may offer useful treatment ingredients aimed at modifying self-efficacy percepts.

### **Training for Self-Regulatory Competencies**

Training should focus on acquiring self-regulatory competence so that preservice teachers are able to monitor their own performances. This would provide an important mastery building opportunity for efficacy enhancement. In keeping with Bandura's (1986, 1997) triadic view that personal processes, environmental and behavioral events operate interactively, learners who use self-regulatory strategies are actively involved in regulating three different types of processes: (1) regulating personal processes involved goal setting and planning, managing time, selecting and organizing information (Zimmerman, 1994); (2) learners consciously regulate their own behavior by doing self-evaluation, self-monitoring and self-reaction (Bandura, 1986; Schunk, 1990); and (3) learners actively interact with their learning environment such as seeking peer or adult assistance and social environmental structuring in order to optimize acquisition of skills (Zimmerman & Martinez-Pons, 1990).

Researchers on self-regulated learning advocate that learning goals to be self-set. When preservice teachers are given the liberty to choose their preferred learning goals, motivation to self-regulate will be sustained. Supervising lecturers and mentor teachers could encourage their protégés to interpret teaching tasks and set proximal goals. As preservice teachers expend effort and persistence toward attaining a goal at a given level of difficulty, their efficacy is strengthened. Through careful planning and intentional goal setting, preservice teachers have a guided direction towards controlled learning that will lead to meaningful enactive experience and feedback.

### **The Value of Cognitive and Metacognitive Strategies**

From a social cognitive perspective, individuals are actively analyzing information around them through cognitive and metacognitive processes, causing them to alter their thinking and behavior accordingly. To facilitate improvements in perceived efficacy, preservice teachers can be nurtured to develop an awareness of their own cognitive process. Self-monitoring of performance could be deliberated through self-reflective strategies such as journal writing or during supervisors' pre- and post teaching conferences with preservice teachers by employing metacognitive questions to facilitate the process. Apart from that, journal writing could be content specific. Such strategies will help preservice teachers to focus their attention on past success and failures and discriminate between effective and ineffective performance, hence, monitoring their own progress. There is a substantial body of research that accentuates the importance of journal writing in helping preservice teachers progress through cognitive developmental states and become more reflective (Hanipah, 2001; Lee, 1998; Ross, 1990; Wong et al., 2000; Yinger & Clark, 1981).

### **Physiological Coping Strategies**

The degree of confidence they possess could be gauged by the physiological arousal they experience as they contemplate an action. Strong arousal such as fear and anxiety could lower self-efficacy perceptions and trigger further stress and agitation about their capabilities.

In realizing how strong arousal could adversely affect teacher self-efficacy, teacher educators ought to find ways to reduce physiological arousal among preservice teachers. Therefore, workshops and training sessions on emotional intelligence competence could be conducted as part of the teacher development programs to help preservice teachers exercise control over physiological states, moods and emotions so that their sense of teaching efficacy will not be threatened by potentially anxiety provoking events.

### **Establishing a Social Support System**

Effective teaching goes beyond teachers' academic abilities and pedagogical skills. Perceptions of support available such as from the administrators, colleagues, parents, community and the quality of teaching resources shaped beginning teachers' sense of competence (Woolfolk Hoy, 2000).

Mentor teachers and supervising lecturers who have contact with preservice teachers at a personal level during practicum should take cognizance of these findings because negative appraisals weakened self-efficacy beliefs much easier than the strengthening of self-efficacy through verbal support and encouragement. Mentor teachers could be guided to give authentic feedback and not to confuse preservice teachers with knee jerk praise or empty inspirational homilies. Frequency and immediacy of feedback could also help to create higher perceptions of personal capabilities. In addition, it is recommended for preservice teachers to play a part in the selection of supervising lecturers for their practicum supervision. Bandura (1997) noted that the impact of verbal persuasion on self-efficacy is only as strong as the receiver's confidence in the person who issues them.

A social support system could be encouraged in schools for these preservice teachers as well as for first-year beginning teachers. On site informal social support from peers and colleagues could complement the existing formal support by trained mentors in the schools. Gray and Gray (1985) reported that 92% of new teachers do not directly seek help from colleagues except indirectly by swapping stories about personal experiences. The researchers asserted that "more experience swapping is needed; a sense of community must be established, consisting of

interdependency, shared concern, a sense of common fate, and a sense that others 'stand by' when one is under stress of uncertainty about what to do" (p. 43).

With today's technological and electronic networking advancement, teacher networks and virtual learning communities can be established among teachers to bring together like-minded individuals in a non-evaluative environment for support. In Malaysia, a number of tertiary institutions have created their own support system, both academically and socially. For example, Open University Malaysia initially adopted the WebCT and subsequently created its own learning management system, *myLMS*, to suit the way adult students learn (Open University Malaysia, 2003). It is recommended that The Practicum Unit of the Teacher Training Division, Ministry of Education, Malaysia can initiate an e-learning system whereby educators in general, with novice teachers as beneficiaries, can form groups of learning communities to support each other by exchanging success stories, resources and ideas, air grievances or frustrations, and so on. By using e-mails, online discussion boards or chat sessions, the interrelated communities of learners can provide a forum for meaningful and rewarding teacher growth and development.

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