

How Do Sources of Self-Efficacy Predict Preservice Teachers' Beliefs Related to Constructivist and Traditional Approaches to Teaching and Learning?

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Abstract

Guided by Bandura's theoretical construct of self-efficacy, in this study, we attempted to model the relationship between preservice elementary teachers' sources of self-efficacy and their constructivist, and traditional beliefs related to teaching and learning by multiple linear regression analyses. Participants consist of 151 preservice elementary teachers at a state university. Results indicated that while mastery experience is significantly contributed to preservice elementary teachers' constructivist teaching beliefs, physiological/emotional state made a statistically significant contribution to their traditional teaching beliefs. These results suggested that preservice elementary teachers hold more constructivist teaching beliefs as they gain experience with teaching based on the constructivist approach. Moreover, when preservice teachers have high anxiety, fear, or stress, they tend to be more traditional-oriented. The implications were discussed in terms of teacher education programs.

Keywords

self-efficacy, teaching beliefs, preservice elementary teachers, sources of self-efficacy, constructivist teaching, traditional teaching

Introduction and Review of Related Literature

With the curriculum reforms in the last two decades, Turkey adopted a new perspective on learning and teaching. Changing the philosophy of curriculum from behaviorism to constructivism lay a burden on teachers to adapt and modify their teaching. An extensive literature supports the idea that teachers are more inclined to enact the change, implement new ideas, and more eager to utilize different teaching methods when they have high self-efficacy (e.g., Berman, McLaughlin, Bass, Pauly, & Zellman, 1977; Ghaith & Yaghi, 1997; Guskey, 1988; Hatlevik, 2017; Paraskeva, Bouta, & Papagianni, 2008; Soodak & Podell, 1994; Stein & Wang, 1988; Tschannen-Moran & Woolfolk Hoy, 2001). Teachers have also been under less stress when they have high self-efficacy (Schwarzer & Hallum, 2008; Wang, Hall, & Rahimi, 2015). Being aware of these, researchers are increasingly interested in the relation between teacher self-efficacy and their behavior in the classroom (Clark & Newberry, 2019). Berman et al. (1977) defended that teachers' sense of self-efficacy is among the strongest predictor variable of student achievement, the goals set in the classroom, and the amount of teacher effort in implementing new methods. Similarly, Guskey (1988) underlined that teachers with high levels of

efficacy feel confident about their teaching abilities and seem more receptive to the implementation of new instructional practices. That is, as Poulou, Reddy, and Dudek (2019) discussed, teachers' perceptions of self-efficacy are one of the few individual characteristics that predict their practice. Individuals' beliefs about their capacity to produce the desired outcome are known as self-efficacy beliefs. Self-efficacy beliefs have a considerably important role in individuals' actions and strongly predict their behaviors (Bandura, 1977). Albert Bandura, also known as the originator of the construct, summarizes the importance of self-efficacy as follows: based on self-efficacy "people choose what challenges to undertake, how much effort to expend in the endeavor, how long to persevere in the face of obstacles and failures, and whether failures are motivating or demoralizing" (Bandura, 2001, p. 10). With some modifications to the definition of self-efficacy, teacher self-efficacy is defined as "judgments about his or her capabilities to bring about

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desired outcomes of student engagement and learning, even among students who may be difficult or unmotivated” (Tschannen-Moran & Woolfolk Hoy, 2001, p. 783). It is obvious that teachers’ self-efficacy about teaching in the classroom is related to the confidence in their ability to influence students’ learning (Clark & Newberry, 2019).

Bandura (1977) proposed four major sources of information which contribute to individuals’ self-efficacy. These are performance accomplishments (mastery experience), vicarious experiences, verbal persuasion, and physiological and emotional states. According to Bandura (1977), performance accomplishments are the source of information based on personal mastery experiences through which strong efficacy beliefs are developed. An individual’s repeated success on different tasks cultivates a stronger self-efficacy which can be maintained even if failures occur occasionally. Indeed, it is expected that teachers having more successful experiences in the classroom would develop a strong sense of efficacy compared to teachers experiencing more failure in the classroom. Individuals can also develop strong self-efficacy through vicarious experiences in which they observe others while performing challenging and difficult tasks (Bandura, 1977). For example, when preservice teachers (PTs) go to a school setting, they would have an opportunity to observe an experienced teacher who is successful in teaching. Since most human behaviors learned by observation through modeling (Bandura, 1986), they would approach teaching as if they are teaching successfully. In this way, they would boost their self-efficacy beliefs. The third source for developing self-efficacy is verbal persuasion. Verbal persuasion is mostly used due to its ease and ready availability, but it is accepted to be less effective than personal accomplishments in developing efficacy (Bandura, 1977). When teacher educators and their peers encourage PTs during the teaching process, they would feel confident in carrying out their tasks. This would help PTs not only overcome self-doubt, but also convince them to be capable enough in teaching. As a result, they also would develop a high sense of self-efficacy for teaching. The last source Bandura (1977) proposed is the emotional and physiological state. Teachers’ fear, anxiety, and stress may hinder their abilities and result in low self-efficacy. Any stimulus attenuating fear, reducing anxiety, and relieving stress in the teaching process is expected to increase teachers’ self-efficacy.

In this study, we try to establish a connection between preservice elementary teachers’ (PETs’) sources of self-efficacy and their constructivist and traditional beliefs related to teaching and learning. A traditional teaching and learning approach generally matches with the classroom practices in which the teacher presents factual content knowledge and transfer knowledge to the students (Tsai, 2002). On the other hand, constructivism does not accept the view that learning is a one-way process from teacher to students and advocates that learning is an active process in which learners personally construct their knowledge in connection with their prior set

of ideas and interaction with the environment (Millar & Driver, 1987).

Since teachers play an important role in the successful implementation of curriculum reforms and their beliefs influence their classroom implementations, it is critical to understand the impact of self-efficacy on their beliefs. Following above-mentioned early studies, research has continued to build our understanding of sources of self-efficacy and teachers’ constructivist and traditional beliefs; however, many questions concerning how sources of self-efficacy are related to constructivist beliefs as well as traditional beliefs remain unanswered. We targeted to predict whether the sources of self-efficacy contribute to their traditional or constructivist teaching and learning beliefs. To exemplify, teachers engage in constructivist teaching methods, make sense of the result of their actions, and use these understandings to develop beliefs about constructivist teaching. If they observe others while implementing effective constructivist teaching strategies in the classroom, they may persuade themselves that constructivism is an effective way of teaching and learning, and cultivate beliefs in the effectiveness of constructivism. That is developing self-efficacy through different sources may affect how teachers view teaching and learning, and how they behave in the classroom.

Teachers’ beliefs have always become an important focus of educational inquiry. Pajares (1992) refers to personal theories when describing beliefs. Teachers’ beliefs are found to be influential on many instructional decisions such as lesson planning, teaching, assessment, interaction with students, and the implementation of reforms (Jones & Carter, 2007). Especially the international reform movements in science education make researchers feel responsible for studying teachers’ beliefs and their influence on teaching. The shift from behaviorism to constructivism in the educational philosophy have revolutionized learning and teaching. Teachers have faced with the challenges of adapting their teaching and learning to the constructivist approach. Transformation of teachers’ role based on a different approach is difficult and complex (Flores, Lopez, Gallegos, & Barojas, 2000). Many factors exist influencing this transition. Teachers’ self-efficacies, as one of the factors, might have a significant role in their commitments and beliefs. Bandura (1997) stated that “Unless people believe they can produce desired effects by their actions, they have little incentive to act. Efficacy belief, therefore, is a major basis of action” (p. 3). Studies also support that self-efficacy beliefs influence teachers’ opinions and decisions on new implementations. For example, De Mesquita and Drake (1994) found that teachers’ ratings of efficacies were positively related to their attitudes toward innovative reforms. Similarly, Allinder (1994) found that teachers having a greater sense of efficacy are more planned and organized in the classroom. In another study, Tschannen-Moran and McMaster (2009) observed that professional development providing authentic mastery experience with additional coaching increased teachers’ self-efficacy for

Table 1. Background characteristics of the participants.

Grade level	Gender	Frequency distribution		GPA	
		Frequency	Percent (%)	<i>M</i>	<i>SD</i>
Freshman	Girls	26	65.0	2.83	0.47
	Boys	14	35.0	2.78	0.57
Sophomore	Girls	30	65.2	2.76	0.37
	Boys	16	34.8	2.77	0.35
Junior	Girls	16	61.5	3.02	0.28
	Boys	10	38.5	2.87	0.37
Senior	Girls	28	71.8	3.01	0.31
	Boys	11	28.2	2.91	0.29

Note. GPA = grade point averages.

implementing a new teaching strategy. A similar result was found by Gabriele and Joram (2007) who emphasized that increased self-efficacy is required for reform-based education.

Why it is important to investigate the relationship between sources of self-efficacy and teachers' constructivist and traditional beliefs and how this contributes to teacher education programs are important points that need consideration. In the literature, there is not sufficient evidence for making conclusions between sources of self-efficacy and teachers' constructivist and traditional beliefs. Moreover, in the Turkish context, constructivism is a relatively new approach. Although it is accepted to be effective and practical in teaching and learning, our educators are still very much influenced by the behaviorist approach. Having considered the paradigm shift from behaviorism to constructivism—accompanied by the change in national science education curricula—investigating which sources of self-efficacy contribute to teachers' traditional and constructivist beliefs related to learning and teaching is required in the Turkish context. In lights of the related literature search, we assessed the associations between PETs' sources of self-efficacy and teaching beliefs. Specifically, this paper investigated the following research questions:

1. Which sources of self-efficacy (i.e., mastery experience, emotional/physiological arousal, vicarious experience, and social verbal persuasion) contribute significantly to participants' constructivist teaching beliefs?
2. Which sources of self-efficacy contribute significantly to participants' traditional teaching beliefs?

Method

The purpose of this study is to investigate the degree to which sources of self-efficacy predict PETs' constructivist and traditional teaching beliefs.

Sample

The sample of this study consisted of 151 PETs at a small state university in the Northeast Anatolia Region. Among them, 40 (26.5%) were freshmen, 46 (30.5%) were sophomores, 26 (17.2%) were juniors, and 39 (25.8%) were seniors and the majority of the PETs were female (66.2%). Girls ($M = 2.89$; $SD = 0.38$) and boys ($M = 2.82$; $SD = 0.41$) were similar grade point averages (GPAs). More detailed information about the participants is given in Table 1.

Instruments

In order to reveal the association between PTs' self-efficacy and their teaching beliefs, two instruments were used, namely Sources of Self-Efficacy Inventory (SOSI) and Teacher Beliefs Survey (TBS).

Sources of Self-Efficacy Inventory (SOSI). SOSI was originally developed by Henson in 1999 (as cited in Kieffer & Henson, 2000) to explore teachers' self-efficacy resources. In the development process of the inventory, Henson conducted a comprehensive literature search and grounded SOSI on teacher efficacy model proposed by Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) with four self-efficacy sources suggested by Bandura (1997). The inventory contains 35 items in 7-point Likert-type format and its response format ranges from definitely not true for me (1) to definitely true for me (7). In the original form of the inventory, there are four dimensions as mastery experience, emotional/physiological arousal, vicarious experience, and social verbal persuasion. Based on Cronbach's alphas, the reliability coefficients of these dimensions were reported as .71, .60, .78, and .45, respectively.

SOSI was adapted into the Turkish by Çapa-Aydın, Uzuntiryaki-Kondakçı, Temli, and Tarkın (2013). They pilot tested the inventory with 256 PTs and conducted a confirmatory factor analysis of those data. After making necessary

Table 2. Sample Item and the Total Number of Items in SOSI.

Dimension	Sample item	Total number of items	
		Original	Turkish
Mastery experience	I have developed many of my teaching skills by actually teaching.	9	8
Emotional/physiological arousal	The idea of being in a classroom as a teacher makes me nervous.	7	7
Vicarious experience	Watching other teachers make mistakes has taught me how to be a more effective teacher.	9	7
<i>Social verbal persuasion</i>	When people I respect tell me I will be a good teacher, I tend to believe them.	10	5

Note. SOSI = Sources of Self-Efficacy Inventory.

revisions, the authors administered the inventory to a second sample of 302 in-service teachers. Based on the confirmatory factor analysis result, along with other evidence, Çapa-Aydın et al. adapted the inventory into the Turkish which consisted of 27 items in total. They found Cronbach's alphas reliability coefficients of each dimension as follows: mastery experience = .75, emotional/physiological arousal = .75, vicarious experience = .78, and social verbal persuasion = .76, suggesting sufficient reliabilities. Table 2 displays the sample item and the number of items for each dimension of SOSI.

Teacher Beliefs Survey. TBS was developed by Woolley, Benjamin, and Woolley (2004) to measure teacher beliefs related to constructivist and traditional approaches to teaching and learning. The earlier version used in the pilot test of TBS development included randomly ordered 34 items under 7 themes: classroom learning environment, behavior management, curriculum, assessment, teaching strategies, student roles, and working with parents (Woolley et al., 2004). The result of pilot test with preservice ($n = 61$) and in-service ($n = 137$) teachers yielded four categories after the deletion of seven unclear or misleading items and named as Traditional Management (TM), Traditional Teaching (TT), Constructivist Teaching (CT), and Constructivist Parent (CP) by Wooley and his colleagues. In order to validate the four-factor structure of TBS, Wooley et al. performed confirmatory factor analysis to the data from a second sample of PTs ($N = 896$) as well. Related fit indices, which assess the extent to which the hypothesized four-factor structure model fits the data, indicated the inadequacy of the hypothesized model. That is, the four-factor structure of the survey was not confirmed. This result led Wooley and colleagues to further investigate each item and the underlying structure of the survey. The final result showed that the three-factor structure of the survey with 21 items better fit to the data. These factors are TM, TT, and CT.

TBS was adapted into the Turkish context by Yılmaz-Tüzün and Türker (2008). Yılmaz-Tüzün and Türker followed a similar approach with Woolley et al. (2004) in adapting the instrument. They administered the original version of the survey (34-item version) to 411 PTs in two different universities.

The result based on linear structural modeling with LISREL indicated that after deleting unclear or misleading items, the four-factor structure with 19-items fit the data well. Therefore, they retained all four factors in the Turkish version of TBS. These factors with sample items were given in Table 3.

In the course of this study, since we aimed to evaluate PETs' teacher beliefs related to constructivist and traditional approaches to teaching and learning, we used two subscales of the TBS, namely, traditional teaching and constructivist teaching.

Data Analysis

In this study, we run two multiple regression (MR) analyses. With the first MR, we addressed the first research question of the study: which sources of self-efficacy (i.e., mastery experience, emotional/physiological arousal, vicarious experience, and social verbal persuasion) contribute significantly to participants' constructivist teaching beliefs. With the second one, we investigated the second research question: which sources of self-efficacy contribute significantly to participants' traditional teaching beliefs. Moreover, we examined specific sources of self-efficacy which best predicts PETs' constructivist teaching beliefs and traditional teaching beliefs.

Result

Data Screening and Assumption Checking

As indicated by Tabachnick and Fidell (2012), failure of meeting the assumption weakens, if not invalidates, the inferences drawn based on statistical analysis. Therefore, before moving on to analyses, there are a number of assumptions that need to be checked for MR. First, the minimum sample size has to be 15 per each predictor variable (Stevens, 1996). Since we have four predictor variables with 151 participants, our sample size is far above than the recommended minimum sample size. Second, multicollinearity and singularity need to be checked before conducting MR. If multicollinearity or singularity exists, inversion of the matrix among

Table 3. Sample Item and the Total Number of Items in TBS.

Dimension	Sample item	Total number of items	
		Original	Turkish
Traditional Teaching	I generally use the teacher's guide to lead class discussions of a story or text.	9	6
Constructivist Teaching	I prefer to cluster students' desks or use tables so they can work together.	7	7
Traditional Management	I believe students learn best when there is a fixed schedule.	7	4
Constructivist Parent	I invite parents to volunteer in or visit my classroom almost any time.	4	2

predictor variables (which is required to calculate regressions coefficients), is either unstable or impossible (Tabachnick and Fidell, 2012). Correlation coefficients among predictor variables found to be between .15 and .68 which are less than .80 as suggested by Field (2013). Besides, Myers (1990) recommended that the variance inflation factor (VIF) should be less than 10 to avoid a potential multicollinearity problem. In this study, the range of VIF value changes from 1.15 to 3.49. Therefore, it was safe to conclude that there is no serious sign of multicollinearity or singularity. Next, the inspection of normal probability plots did not signal any serious deviation from normality. Moreover, the examination of the scatterplot indicated that there was no clear systematic distribution of the residuals and their distribution was approximately rectangular-shaped. These two indicated that there was no noticeable evidence for non-linearity, non-normality, or heteroscedasticity. Tabachnick and Fidell emphasized that Mahalanobis distance needs to be compared with critical chi-square value to check multivariate outliers. This value (at alpha level = .001) with four predictor variables is 18.47. In our data, only one of the participants has a Mahalanobis distance (19.78) exceeding this critical point. Since this participant's value slightly exceeds the upper limit, we decided to retain her data. Accordingly, this finding provided evidence for the absence of multivariate outliers.

Result for Constructivist Teaching Beliefs

The first MR analysis was used to explain the extent to which PETs' beliefs related to constructivist approaches to teaching and learning can be predicted from a linear combination of mastery experience, emotional/physiological arousal, vicarious experience, and social verbal persuasion. This model explained 18% of the variance in PETs' beliefs related to constructivist teaching beliefs ($R^2 = .18$), and the model was statistically significant, $F(4, 150) = 8.03, p < .001$. Among these four sources of self-efficacy, only mastery experience

made a unique and statistically significant contribution to the prediction of student teachers' constructivist teaching beliefs (beta = .28, $p = .017$). The positive beta value points out that PETs who have high self-efficacy scores emerging from mastery experience tend to be more constructivist-oriented beliefs to teaching and learning. In other words, those PETs who believe that they are going to have many positive opportunities to teach (higher level of self-perceived successful experiences) tend to believe that teaching and learning are more effective when students are actively engaged in the process.

Result for Traditional Teaching Beliefs

Another MR analysis was conducted to test whether the four sources of self-efficacy can predict a significant amount of variance in PET's beliefs related to traditional approaches to teaching and learning. The overall model contributed to the prediction of 11% of the variance in the outcome variable ($R^2 = .11$). This contribution was statistically significant as well, $F(4, 150) = 4.32, p = .002$. A close examination of further evidence indicated that only physiological and emotional states, among four sources of self-efficacy, made a unique and statistically significant contribution to the prediction of student teachers' traditional teaching beliefs ($p = .049$). Moreover, the sign of β weights for physiological and emotional states was positive (beta = .17). This means that there is a positive correlation between PETs' physiological and emotional states and their traditional teaching beliefs. In other words, the direction of this relationship suggests that more traditional oriented beliefs to teaching and learning are observed among PETs who have more emotional and physiological arousal. Table 4 displays related results of the analyses.

Discussion and Implications

In this study, the relationship between PETs' sources of self-efficacy beliefs, and their constructivist and traditional

Table 4. Summary of regression analyses.

Variable	Constructivist beliefs			Traditional beliefs		
	B	SE B	β	B	SE B	β
Mastery experience	0.12	0.05	.28*	0.02	0.06	.03
Emotional/physiological arousal	0.02	0.03	.04	0.08	0.04	.17*
Vicarious experience	0.06	0.06	.13	0.12	0.08	.22
Social verbal persuasion	0.02	0.06	.03	-0.01	0.07	-.02
R ²	.18			.11		
F	8.03*			4.32*		

Note. * $p < .05$.

beliefs related to learning and teaching was explored. The findings of this study revealed that while mastery experience is significantly contributed to the student teachers' constructivist teaching beliefs, physiological/emotional state is significantly contributed to the student teachers' traditional teaching beliefs. The results of this study have important implications for developing elementary teacher education programs, especially in Turkey. The first result suggests that PETs hold more constructivist teaching beliefs as they gain experience with teaching based on the constructivist learning approach. From this result, we need to pay attention to some important issues. First, it is essential that PETs' beliefs should be explored during the teacher education program. Teacher educators should provide those PETs who hold traditional beliefs with more opportunities in which they can practice constructivist teaching strategies more. This is vital in that they can increase the number of successful implementation which, in turn, let them be more constructivist-oriented. The previous studies have also confirmed that mastery experience is the strongest source contributing to one's self-efficacy (Usher & Pajares, 2008; Zimmerman, 2000). "When they believe that their efforts have been successful, their confidence to accomplish similar or related tasks is raised" (Usher & Pajares, 2008, p. 752). This makes them open to new teaching methods as well (Ashton & Webb, 1986). For example, Marshall, Horton, Igo, and Switzer (2009) found that teachers having higher self-efficacy were tended to use inquiry-based teaching in their lessons. One of the sources of PETs' traditional beliefs may be due to their experiences with the traditional teaching method as students (Smith, 2005; Tsai, 2002). Teachers who experienced traditional teaching in early years have difficulties in developing constructivist-based teaching beliefs (Trumbull & Slack, 1991 as cited in Tsai, 2002). Therefore, these teachers may not realize the potential insights about constructivist conceptions of learning and teaching (Tsai, 2002). Therefore, they may live failure with constructivist teaching methods at the beginning, but through integrating other sources of self-efficacy (could be verbal persuasion or vicarious experience), their self-efficacy for utilizing constructivist teaching methods would be developed.

The second result suggested that if teachers have high anxiety, fear, or stress, they tend to be more traditional-oriented. Several studies have already shown that anxiety strongly influences teachers' implementations of teaching methods (e.g., Czerniak & Chiarelott, 1990; Krajewski & Schwartz, 2014). Being aware of a teacher's fear and anxiety toward constructivist teaching is important in that it may drive researchers and teacher educators to seek for ways to lessen PETs' fear as well as to develop their constructivist understanding of teaching and learning. If teacher educators know about PETs' fear or anxiety about the constructivist-oriented approach, they are able to design teaching methods courses to help PETs lessen those feelings. One way to reduce anxiety is the use of microteaching in the teacher education program extensively (Peker, 2009). Microteaching is known as a short lesson taught by PETs to real students or other PETs in a short period of time (Huber & Ward, 1969). The participants in Huber and Ward's study stated that microteaching is a valuable technique, and they felt more confident in instructional strategies after microteaching. Being a constructivist-oriented teacher requires observing models of constructivist practices, implementing teaching methods, and reflecting on teaching by engaging in discussions with others (Czerniak & Lumpe, 1996). In achieving this, microteaching can be a helpful technique in which PETs who compare themselves to their classmates and adults and make judgments about their own capabilities. Increasing teachers' knowledge and skills in student-centered teaching strategies (e.g., inquiry), would help them prefer those strategies to traditional ones (e.g., expository teaching). Therefore, we recommend that teacher educators avoid spending much time on teacher-centered approaches to teaching and learning such as direct instruction, expository teaching, or lecturing. Instead, they should focus on student-centered approaches more, including small group discussions, inquiry, or discovery learning.

Conclusion and Limitations

This study has revealed some insights in terms of preparing PETs to be more competent and confident in their future profession. The results may be valuable in designing teacher

education programs which educate teachers who are equipped with knowledge and skills in teaching their subjects, open to changes in curriculum, and adapt themselves to change. Such well-prepared teachers value reform-based implementations and do not show resistance against curriculum reforms. On the contrary, they become more receptive to be informed about curriculum reforms and eager to invest more time and effort to make reforms successful.

The present study is limited in some aspects that need to be taken into consideration for further research. First, it is limited to the context within which the study was conducted. Participants of this study come from the bottom quartile of all high school graduates—based on their university entrance examination score—who want to be a teacher. Participants were not intended to be representative of a larger population who come from middle or top quartiles. Further research with different context needs to be conducted to establish the generalizability of this study. Second, more studies that focus on PTs from other majors are needed. This is important in that curriculum reforms in Turkey are conducted not only in elementary school level but also in middle and high school levels. Last, intervention studies in which methods courses are designed to align preservice teachers' beliefs in accordance with reforms may add value to current studies.

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