Does It Matter Having Constructivist or Traditional Teaching Beliefs for Academic Achievement: A Study of Preservice Teachers

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Abstract

Conceptions of teaching and learning influence ways of teaching and learning and naturally are associated with students' motivation, self-efficacy, and achievement. Constructivist teaching and learning conceptions provide a productive learning environment to train students equipped with 21st century skills. Therefore, it is still crucial to examine preservice teachers' conceptions. This study investigates preservice teachers' conceptions of teaching and learning regarding gender and undergraduate years and reveals the relationships between preservice teachers' teaching and learning conceptions and their academic performance. Data was collected from 513 preservice teachers using the Teaching and Learning Conceptions Questionnaire. Results indicated that female preservice teachers had more constructive beliefs than males. First-year preservice teachers had the most traditional beliefs, and second and third-year preservice teachers had more constructive beliefs than seniors. Regression analysis showed that preservice teachers' constructive conceptions increased their academic performance while traditional conceptions decreased it.

Keywords: Conceptions of teaching and learning, preservice teachers, pedagogical beliefs, academic achievement

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I have no known conflict of interest to disclose.

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Does It Matter Having Constructivist or Traditional Teaching Beliefs for Academic Achievement: A Study of Preservice Teachers

Preparing the students who will analyze, apply, and evaluate knowledge to think creatively and innovatively in solving real-world problems for society is imperative for teachers to respond to the rapidly changing world (Larson & Miller, 2011; Lemley et al., 2014). Twenty-first century skills become increasingly important as employers need employees who can find and interpret information using multiple sources and transfer the information to make decisions and create new things (Silva, 2009). Therefore, it is essential to train students to be equipped with 21st century skills such as creativity, critical thinking, problem-solving, collaboration, innovation, and decision-making, since they also directly influence teaching and learning (Larson & Miller, 2011). To achieve these instructional goals in the 21st century, teachers and students should work together to make sense of knowledge, solve educational problems, and make effective decisions to get appropriate outcomes (Larson et al., 2010). Educators should not focus solely on students' success; instead, they should focus on improving students' potential to contribute to society.

Students should apply and transfer the knowledge they learn in schools to the authentic contexts of their daily lives (Larson & Miller, 2011). Therefore, they are supposed to think creatively and innovatively, solve authentic problems, and work in collaboration (International Society for Technology in Education, 2007; Partnership for 21st Century Skills, 2009). According to students, an essential element in a 21st century classroom is a respectful, connected, and relevant relationship with their teachers (Lemley et al., 2014). This finding reveals the importance of interaction between teachers and students. Students who experienced studying in a social setting where they actively participated reported that they favored this

experience (Nicholas, 2008). Changes in students' roles and expectations have also affected teacher practices and roles. Teachers are expected to be the classroom designer to provide students with an engaging and successful learning environment (Schlechty, 2011). Teachers are essential in shaping students' learning and in developing education reforms (Anagün, 2018). It is not the learning that needs to be changed, but the delivery of information (Franklin, 2011). Therefore, teachers should improve their teaching methods to promote students' constructive learning (Lemley et al., 2014).

Most research mentions reforms and initiatives to shift from traditional-based approaches to student-centered approaches to prepare students for the 21st century (Alt, 2018). A paradigm shift is necessary for teachers to reconsider how they should teach to help students use their knowledge and skills, solve problems, and develop a way of thinking and questioning that they can use in different disciplines (Galloway & Lasley, 2010). Fullan and Langworthy (2014) claimed that the necessary shift from teacher-led to student-based instruction does not exist yet, and the nonexistence of this shift hinders schools from fostering 21st century skills.

Based on this need to shift instruction from knowledge transmission to knowledge construction, many governments have made reform efforts in their education system. In this context, Turkey's renewed curricula from the Ministry of National Education (MoNE), updated in 2018, emphasizes common competencies in science, mathematics, social sciences, and reading. The competencies listed by MoNE include communication in the mother tongue and foreign languages, mathematical and technological competencies, digital competence, learning to learn, social and citizenship competencies, entrepreneurship, and cultural awareness (2018). Generally, it can be said that the new curricula aim to equip students with 21st century skills, competencies, knowledge, and values to survive in this rapidly changing digital era and

contribute to society. However, achieving the goals of the reforms and the curricula depends on teachers' teaching and learning methods.

Teachers' beliefs may be predictors, reflectors, and determinants of their actual classroom practice (Kagan, 1992; Pajares, 1992; Wilkins, 2008). Therefore, it is essential to consider teachers' beliefs, perceptions, and values to understand how a 21st century learning environment based on the constructivist approach should be structured (Anagün, 2018). Ernest (1989) proposed that teachers might teach differently because of their different beliefs, even if they possess similar knowledge and skills. It may be valuable for educators and policymakers to identify why some teachers teach constructively and others teach traditionally. One of the beliefs that affects teachers' instructional behaviors is their conceptions of teaching and learning (CoTL). This study investigates preservice teachers' CoTL and describes the differences in preservice teachers' conceptions in terms of gender and undergraduate years. I also examined the relationship between participants' academic achievement and teaching and learning conceptions.

Literature Review

Conceptions of Teaching and Learning

Teachers' beliefs play a crucial role in teacher education (Kagan, 1992) and may be more influential than knowledge in shaping their teaching practices (Pajares, 1992). Teachers' beliefs influence their instructional strategies and performance in the classroom (Cheng et al., 2009) and their lesson planning and assessment (Kagan, 1992; Pajares, 1992). Teachers' beliefs are related to their "preferred ways of teaching" and their instructional decisions (Teo et al., 2008), and these decisions affect the teaching and learning process either positively or negatively (Woolfolk, 2006). Therefore, comprehending preservice teachers' beliefs is of great importance for researchers and teacher educators (Chan & Elliott, 2004).

It is essential to note that the terms "conception" and "belief" can be used interchangeably to define ideas about teaching and learning (Kagan, 1992; Kember, 1997; Tigchelaar et al., 2012). CoTL may be regarded as fundamental beliefs that influence how teachers teach (Kim et al., 2013; Lee et al., 2013). CoTL are beliefs related to the teaching and learning methods teachers prefer, the meaning of teaching and learning, and teachers' and students' roles (Chan & Elliott, 2004). CoTL are related to the teacher's opinions about the nature of the content, how they should teach the content best, and how learners learn the content best (Da-Silva et al., 2007). Teachers' CoTL influence their intentions to employ specific teaching strategies (Kember, 2009), affect their instructional decisions (Tillema, 2000), and are closely associated with their actual practices in classrooms (Zhang & Liu, 2014).

Teaching conceptions may be bisected as knowledge transmission and knowledge construction (Chan & Elliot, 2004; Entwistle et al., 2000; Lee et al., 2013). These conceptions are regarded as resting on a continuum ranging from teacher-centered, structured, direct learning environments and traditional approaches to student-centered, unstructured, open-ended learning environments and constructivist approaches (Chan & Elliott, 2004; Kember, 1997; Kim et al., 2013; Tigchelaar et al., 2012). In this study, I use the classification of "traditional conceptions" and "constructivist conceptions." Individuals' perceptions related to knowledge and instruction are compatible. Someone who regards knowledge as content to be transmitted may likely think that teaching is the process of delivering knowledge. Contrary to this, someone who considers knowledge as meanings constructed personally needs a productive learning environment that supports knowledge construction (Teo et al., 2008).

Traditional teaching regards knowledge as unproblematic, verified facts and knowing as absorbing these facts passively (Sing & Khine, 2008), and it may also be considered teacher-

centered. Knowledge transmission is considered a unidirectional process from teachers to students (Cheng et al., 2009; Enwistle et al., 2000). Traditional approaches, known as teacher-centered, focus on teachers' input and the extent to which students receive the content taught (Alt, 2018). The teacher is the source of knowledge, and students passively receive information transmitted from teachers or textbooks in the context of traditional learning (Chan & Elliott, 2004). Teachers with traditional conceptions believe that transmitting knowledge to students is the most efficient and effective learning and teaching method (Cheng et al., 2009). They give attention to drill and practice, rote learning, and teacher authority (Kim et al., 2013; Zhang & Liu, 2014) and usually espouse didactic teaching (Lee et al., 2013; Sing & Khine, 2008). However, the regular practice of mathematical processes promotes procedural mastery that enables the use of these mathematical processes to solve authentic problems (Tularam & Hulsman, 2015). Therefore, it is not appropriate to ignore the effect of traditional approaches on problem-solving skills, which is one of the 21st century skills.

The main disadvantages of the teacher-centered approaches are the lack of feedback about student learning for teachers, the lack in meeting the needs of students with different learning styles, and the expectation that all students learn at the same pace (Schwerdt & Wuppermann, 2011). Despite these drawbacks, the authors also found that students whose teachers devoted more time to lecturing than problem-solving were more successful in TIMMS. Additionally, blended learning consists of 24/7 lectures mainly based on traditional teaching (Tularam & Machisella, 2018). Some researchers assert that the automatic recall of the processes would decrease the cognitive load and help students transfer their prior knowledge to support deeper understanding (Tall, 2004).

On the other hand, constructive teaching regards knowledge as uncertain and knowing as constructing personally meaningful understanding (Sing & Khine, 2008). This approach is learner-oriented. The constructivist conception of teaching is in line with student-centered approaches in which the teacher is a facilitator to improving students' self-motivation, self-reflection, and participation (Cheng et al., 2009; Enwistle et al., 2000; Kim et al., 2013; Sing & Khine, 2008). The primary descriptors of constructivist conceptions are the opportunities to help students think critically, explore and construct knowledge, and collaborate with peers (Marlowe & Page, 1998). Teachers who hold constructivist conceptions give importance to students' ideas, participation, and interaction in the classroom (Chan & Elliott, 2004; Zhang & Liu, 2014). Students' prior experiences and interactions among teachers and students play a significant role in students' knowledge construction (Cheng et al., 2009; Güneş & Bahçivan, 2018). An active learning environment is a requirement for students within the context of constructivist learning (Chan & Elliott, 2004). Students actively participate in decision-making related to instruction, so they take responsibility for their learning.

Student-centered approaches address engaging students with activities that employ innovative pedagogical methods (Alt, 2018). Teachers with constructivist conceptions recognize students' different characteristics and learning styles and respond to students' diverse needs with contemporary teaching methods and techniques (Pritchard, 2017). Teachers' constructivist conceptions encourage them to use digital tools more effectively and efficiently and adopt new technologies in their teaching practices (Güneş & Bahçivan, 2018; Teo et al., 2008). Constructivist teaching improves students' 21st century skills, such as problem-solving, critical thinking, and creativity (Fer & Cirik, 2007; Lee et al., 2013). The more preservice teachers that

hold constructivist beliefs, the more possible it may be to achieve the 21st century goals required to be competitive in the global economy.

Teachers' conceptions can shape how teachers teach and students learn (Cano, 2005; Kember, 1997; Tigchelaar et al., 2012). There is a relationship between teachers' styles of teaching and students' styles of learning. Students tend to have an in-depth learning approach in classrooms where teachers adopt more constructivist beliefs (Entwistle et al., 2000). Teachers' CoTL may be regarded as one of the most significant factors that affects students' academic achievement (Chan & Elliott, 2004). Students in a constructivist classroom are more successful academically than students whose teacher has traditional conceptions (Bas, 2016; Gow & Kember, 1993). Even though it is mainly conceived that constructivist teaching is more efficient than traditional teaching, it is worth noting that there is also no evidence of a significant difference in student achievement between traditional and modern approaches such as computer-assisted instruction (Zhang, 2005) and problem-based learning (McParland et al., 2004). The effect of teachers' conceptions on students' learning increases the importance of examining teacher conceptions.

The importance of constructivism makes researchers and teacher educators interested in better understanding the educational practices that support or hinder constructivist teaching (Alt, 2018). Students and teachers are expected to create a knowledge community where experiences, reflections, and interactions lead to knowledge construction (Howard et al., 2000). Most teachers began their teaching careers with teacher-centered conceptions of teaching (Alger, 2009), although there is a contemporary trend from traditional instruction to constructivist instruction (Bas, 2016; Travis & Lord, 2004). It is crucial to examine preservice teachers' beliefs before they graduate and begin to teach because teacher education is a transition process for their

beliefs. Preservice teachers' previous experiences underlie their beliefs and serve as filters in interpreting new experiences (Alt, 2018; Canbay & Beceren, 2012; Chan, 2004; Kagan, 1992; Pajares, 1992; Tigchelaar et al., 2012). Describing the profile of preservice teachers' CoTL would improve the possibility of achieving 21st century goals (Sing & Khine, 2008). The more preservice teachers become aware of their beliefs, the more they improve their understanding of teaching (Chan & Elliott, 2004). Therefore, many studies have investigated preservice teachers' CoTL. The following section summarizes the research related to preservice teachers' CoTL.

Research Related to Preservice Teachers' Conceptions of Teaching and Learning

CoTL have become a focus of interest for researchers who study teachers and preservice teachers. There are many studies related to teachers' CoTL (Alger, 2009; Alt, 2018; Bas, 2016; Deng et al., 2014; Kim et al., 2013; Lee et al., 2013; Tigchelaar et al., 2012). However, I focus on the research related to preservice teachers' conceptions. Researchers mainly examined the relationship between preservice teachers' CoTL and epistemological beliefs (Chai et al., 2010; Chan, 2011; Chan & Elliott, 2004; Cheng et al., 2009; Güneş & Bahçivan, 2018; Sing & Khine, 2008; Yilmaz & Sahin, 2011). Some also investigated the relationships among beliefs about knowledge, teaching, learning, and the use of technology (Chai et al., 2010; Gurcay et al., 2013; Güneş & Bahçivan, 2018; Teo et al., 2008). Differently, Bilgin and Aykac (2016) studied the relationship between CoTL and attitudes towards teaching. Eren (2010) also looked for the relationships among preservice teachers' efficacy beliefs, achievement goals, and teaching and learning conceptions.

This study aims to describe preservice teachers' CoTL while considering the influence of background variables (gender and undergraduate years). A few studies addressed the effect of background variables (Chan et al., 2007; Eren, 2010; Sing & Khine, 2008). The other aim is to

reveal the relationship between PSTs' CoTL and academic performance. The literature includes studies on the relationship between teachers' CoTL and students' achievement (Bas, 2016; Chan & Elliott, 2004; Gow & Kember, 1993; Trigwell et al., 1999). However, I did not see any study examining the relationship between preservice teachers' academic achievement and teaching and learning conceptions. The research problems guided in providing a closer look at the preservice teachers' teaching and learning conceptions and answering whether academically successful teachers ensure constructivist teaching. The research questions are:

1) What are the conceptions of teaching and learning held by preservice teachers?

2) Are there significant differences in preservice teachers' conceptions of teaching and learning regarding gender and undergraduate years?

3) Are preservice teachers' conceptions of teaching and learning significant predictors of academic achievement?

Methods

Research Design

This study is a descriptive research study and employs a relational survey design. Descriptive research identifies a phenomenon's existing situation, while correlational research statistically reveals the relationship between two or more variables (Cohen, Manion, & Morrison, 2018; Creswell, 2012). This study aims to describe preservice teachers' CoTL based on the independent variables determined for the study (gender and undergraduate years) and reveal the relationship between the CoTL and academic achievement.

Participants

The accessible population of this study was the preservice teachers (PSTs) at a state university in Central Anatolia in Turkey. The sample of the study included 513 PSTs randomly

selected from the accessible population. A sample size of 278 participants is enough to generalize the findings with a significance level of .05 and the deviance level of .05 to a population of 1000 participants (Cohen et al., 2018). Instruments were distributed to 550 PSTs, and 513 of them, which were appropriate for data input, were included in the study. The return rate of the instruments was calculated as 93.2%. The return rate should be in the range of 70%-80% to make valid interpretations (Creswell, 2012). Five hundred thirteen PSTs were enough to generalize this study's findings to the accessible population of the study. Table 1 demonstrates the background variables of the participants.

Table 1

Participants' Demographics in Terms of Gender and Grade Level

Independent Variables		**f**	**%**
Gender	Female	412	80.3
	Male	101	19.7
Undergraduate Years	1st Year	89	17.3
	2nd Year	146	28.5
	3rd Year	122	23.8
	4th Year	156	30.4

Five hundred thirteen PSTs participated in the study. Of these, 80.3% were female and 19.7% were male; 30% of participants were in their 4th year, 23.8% in their 3rd year, 28.5% in their 2nd year, and 17.3% in their 1st year.

Data Collection Tools

The data collection tools were the Personal Information Questionnaire, asking participants information about their demographics of gender and year in school; a "transcript" showing the general academic grade point averages of preservice teachers; and the Teaching and Learning Conceptions Questionnaire (TLCQ).

The Teaching and Learning Conceptions Questionnaire (TLCQ)

The TLCQ was developed by Chan and Elliott (2004) and adapted into Turkish by Aypay (2011). The TLCQ has 30 items and two factors. The first factor refers to constructivist teaching and learning conceptions and includes 12 items. Sample items for the constructivist conception factor are 1) "Learning means students have ample opportunities to explore, discuss, and express their ideas" and 2) "The focus of teaching is to help students construct knowledge from their learning experience instead of knowledge communication." The reliability coefficient was calculated as .88 for this factor.

The second factor is related to traditional conceptions and has 18 items. The reliability coefficient was calculated as .83 for the traditional conceptions factor. Sample items for the factor "traditional conceptions" are 1) "A teacher's major task is to give students knowledge/information, assign them drill and practice, and test their recall" and 2) "The traditional/lecture method for teaching is best because it covers more information/knowledge."

The Cronbach's alpha for the overall questionnaire was calculated as .84. I calculated the fit indices to see whether the instrument's two-factor structure was valid for the sample of this study. The TLCQ was validated with satisfactory goodness of fit indices (GFI=0.87; AGFI=0.83; RMR=0.055; RMSEA=0.09; CFI=0.91), showing that the original two-factor model had acceptable fit indices for the data obtained from the sampled preservice teachers (Jöreskog & Sorbom, 1993). Besides, 10 preservice teachers were asked to read and answer the items aloud (think aloud) to see whether the items were understandable for preservice teachers.

General Academic Grade Point Averages

End-of-year academic grade point averages were used to determine the academic achievement of PSTs. I obtained the academic grade point averages of PSTs from the Faculty of Education by getting legal permission.

Data Analysis

Descriptive and correlational statistics were used to analyze the data. Descriptive statistics used to identify PSTs' teaching and learning conceptions were frequency, percentage, and standard deviation. Normality tests were used before analyzing PSTs' CoTL regarding gender and undergraduate years.

Table 2

The Results of the Normality Test

	The Teaching and Learning Conceptions
Mean	3.77
Median	3.73
Mode	3.56
Skewness	.488
Kurtosis	.176

Table 2 shows that the mean, median, and mode values of PSTs were close to each other. However, the kurtosis value for the questionnaire was .176, and the skewness value was .488. Tabachnick and Fidell (2013) proposed that the skewness and kurtosis values should be in the range of -1.5 to 1.5, while George and Mallery (2010) proposed that the range should be -2.0 to 2.0 for the normal distribution. Additionally, the mean, mode, and median are close in the normal distribution because the normal distribution is also symmetric (Kalayci, 2010). Table 2 reveals that this study's data had a normal distribution since the mean, median, and mode were close to each other, and the skewness and kurtosis values were in the suggested range. A t-test was employed to examine the differences in PSTs' teaching and learning conceptions regarding gender, and an ANOVA was used to investigate differences regarding the undergraduate years. The source of the significant difference was determined via the Scheffe test. Cohen's *d* was calculated to determine the effect size of the significant differences in t-tests, and Eta Squared to estimate the effect size of significant differences found in ANOVA. Lastly, to examine the third

research problem, simple linear regression was performed to see to what extent PSTs' academic achievement predicted their teaching and learning conceptions. The criterion variable was PSTs' academic achievement, and the predictor variables were PSTs' constructivist and traditional conceptions.

Results

The findings are given in a way that responds to each research question.

Preservice Teachers' Conceptions of Teaching and Learning

The first research problem is related to the teaching and learning conceptions held by preservice teachers. Table 3 demonstrates the descriptive statistics of PSTs' CoTL.

Table 3

Means and Standard Deviations of PSTs' Teaching and Learning Conceptions

Dimensions	M	SD
Constructivist conception of teaching and learning	4.422	.488
Traditional conception of teaching and learning	3.128	.731

The mean scores of PSTs with constructive conceptions (M=4.422) are higher than those of PSTs with traditional conceptions (M=3.128).

The second research problem is related to significant differences in PSTs' teaching and learning conceptions regarding gender and undergraduate years. Table 4 shows significant differences in terms of gender.

Table 4

Gender Differences in Teaching and Learning Conceptions

Dimensions	Gender	N	M	Sd	t	p	Cohen's *d*
Traditional	Female	412	3.060	.737	-4.311	.000	0.50
	Male	101	3.404	.636			
Constructivist	Female	412	4.474	.457	5.022	.000	0.53
	Male	101	4.208	.550			

Female preservice teachers' mean scores are higher than male PSTs' in comparing constructivist teaching and learning conceptions, and male preservice teachers' mean scores are higher than female PSTs' in comparing traditional teaching and learning conceptions. The mean differences between groups are statistically significant both in traditional conceptions (t=-4.311; p<.05) and in constructivist conceptions (t=5.022; p<.05). Both significance levels have a moderate effect size ($d_{traditional}$=0.50; $d_{constructivist}$=0.53). Findings reveal that PSTs' CoTL differ due to gender. Male PSTs hold traditional conceptions, and female PSTs hold constructivist conceptions. Table 5 is related to differences in PSTs' teaching and learning conceptions in terms of undergraduate years.

Table 5

Differences in PSTs' Conceptions of Teaching and Learning by Undergraduate Years

Dimensions	Undergraduate Years	M	SS	df	MS	F	p	Source of the significance	η^2
Traditional	1st Year	3.432	11.929	3	3.976	7.731	.000	1>2,3,4	0.04
	2nd Year	2.969	261.800	509	.514				
	3rd Year	3.114	273.729	512					
	4th Year	3.112							
Constructivist	1st Year	4.426	2.755	3	.918	3.920	.009	2,3>4	0.02
	2nd Year	4.489	119.263	509	.234				
	3rd Year	4.474	122.018	512					
	4th Year	4.316							

PSTs' traditional (F=7.731; p<.05) and constructivist (F=3.920; p<.05) conceptions differ statistically regarding their undergraduate years. Significant differences in both dimensions of teaching and learning conceptions have a small effect size. First-year PSTs have the highest score in traditional CoTL. The mean differences between the first, second, third, and fourth-year preservice teachers are in favor of the first-year preservice teachers. Although the freshmen's scores in constructivist conceptions are higher than those in traditional conceptions, freshmen's

traditional beliefs are stronger than other preservice teachers in their second, third, or fourth undergraduate year.

The mean scores of the second (M=4.489) and third-year (M=4.474) PSTs in constructivist teaching and learning conception are closer to each other, and they are higher than the mean scores of first and fourth-year PSTs. The mean differences between groups are statistically significant (F=3.920; p<.05). The significant differences between second, third and fourth-year PSTs are in favor of the second and third-year PSTs. It can be said that second and third-year preservice teachers have more constructivist teaching beliefs than senior PSTs.

The Relationship Between PSTs' Teaching and Learning Conceptions and Academic Achievement

The last research question deals with the relationship between PSTs' teaching and learning conceptions and academic achievement. Table 6 indicates the relationship between the constructs mentioned above.

Table 6

Correlations Between PSTs' Academic Achievement and the Dimensions of Teaching and Learning Conceptions

		Traditional conception of teaching and learning	Constructivist conception of teaching and learning
Grade point averages	r	-.222	.125
	p	.000	.003
	N	513	513

Table 6 points out a negative and weak relationship between PSTs' traditional teaching and learning conceptions and grade point averages (r=-.222) and a positive and weak relationship between PSTs' constructivist teaching and learning conceptions and grade point averages (r=.125). It is worth noting that the effect of traditional conceptions on preservice teachers' academic achievement is stronger than the effect of constructivist conceptions; in turn, the

variance explained by traditional conceptions is more than that explained by constructivist ones. This result implies that the preservice teachers' academic achievement increases with constructivist teaching and learning conceptions and decreases with traditional teaching and learning conceptions.

Table 7

Results Related to the Established Model

Variable	Unstandardized		Standardized	t
	B	Std. Error	β	
Traditional	-.085	.018	-.208**	-4.801
Constructivist	.058	.026	.095*	2.199
F (2, 510)			15.727**	
Constant			2.979	
Durbin-Watson			1.736	
R Square			.058	
R Square Change			.058	
Adjusted R Square			.054	

Note. *p<.05; **p<.001

Model 1 established in the ANOVA table data is significant (F=15.727; p<.001). Also, the value of Durbin-Watson is calculated as 1.736. These findings indicate that PSTs' teaching and learning conceptions predict their academic achievement and have low error values. In other words, the established model is significant. In Table 7, the B value is -.085 (negative value) for traditional teaching and learning conceptions and is .058 (positive value) for constructivist CoTL. It can be said that both dimensions of teaching and learning affect PSTs' academic achievement, and values are significant ($t_{traditional}$=-4.801; $t_{constructivist}$=2.199; p<.05). It reveals that 5.8% of the variation in the academic achievement variable is explained by PSTs' conceptions of teaching (p<.001). The regression model established for Model 1 according to the values in Table 7 can be explained with the following equation:

Grade point average=2.979+(0.058×*Constructivist*)-(0.085×*Traditional*).

As the mean values for constructivist conceptions increased by one, grade point averages increased by .058, and as the mean values for traditional conceptions increased by one, grade point averages decreased by .085.

Discussion and Conclusion

This study examined PSTs' CoTL in terms of the background variables of gender and undergraduate years (see Figure 1 and Figure 2) and the relationship between their academic achievement and teaching and learning conceptions. Data collected from 513 PSTs using the Teaching and Learning Conceptions Questionnaire were included in the data analysis. Chan and Elliott (2004) noted that the participants of their study did not believe in either traditional or constructivist teaching, as their mean scores in both dimensions are below three points. Based on this implication, we can say that our participants believe in both traditional and constructivist teaching since their mean scores in both dimensions are above midpoint three. Besides, they seem to agree with constructivist teaching and learning conceptions more than traditional conceptions. Their mean scores in the constructivist dimension of teaching conceptions are higher than in the traditional dimension. These results are like the results of Chan and Elliott (2004), Sing and Khine (2008), Cheng et al. (2009), Bas (2016), and Alt (2018). It can be said that constructivist teaching was regarded as the most effective and efficient teaching strategy by participants of much research. This result looks promising for the future of the educational community. Sing and Khine (2008) argued that the relatively higher score in the constructivist conception was due to the strong emphasis on constructivism and the contemporary trend from traditional teaching to constructivist teaching (Travis & Lord, 2004). However, a further examination of teaching and learning conceptions based on different demographics is needed.

Gender is a variable that leads to significant differences in participants' teaching and learning conceptions. It is found that male PSTs have a higher level of traditional conceptions, and female PSTs have a higher level of constructivist conceptions. Finding that female PSTs have a higher level of constructivist conceptions is a common result found in most research (Aypay, 2011; Lee et al., 2013). It is also known that female PSTs have more positive attitudes toward teaching and feel more efficacious than their male counterparts (Kartal, 2020). Teachers with a high level of teacher efficacy and positive attitudes towards teaching consider students' different needs and use new and innovative student-centered methods and techniques to promote student learning (Weiner, 2003). These aspects of high teacher efficacy and positive teacher attitudes align with the constructivist CoTL. This may be why female preservice teachers had more constructivist beliefs than males. On the other hand, Sing and Khine (2008) reported that gender leads to no significant differences in their participants' teaching and learning conceptions.

PSTs' teaching and learning conceptions differ due to their undergraduate years. Beginner PSTs have more traditional teaching and learning conceptions. The second and third-year PSTs are found to have more constructivist teaching and learning conceptions. Preservice teachers may be in a transition process in which their beliefs move from naïve to sophisticated in their initial teacher education programs (Cheng et al., 2009). It is seen that the transition process in this study begins with traditional beliefs and then transforms into constructivist beliefs and continues with traditional beliefs.

The undergraduate year differences in PSTs' teaching and learning conceptions may imply that participants came to their initial teacher education programs from a traditional and teacher-centered learning environment. Knowledge transmission from teacher to students may

still dominate the learning environments even though the benefits of constructivist teaching are known, and researchers, policymakers, and educators suggest constructivist teaching.

Senior PSTs are the participants who have teaching experience in schools. The traditional learning environment in their student-teaching schools might still influence fourth-year PSTs' teaching and learning conceptions. The shift from constructivist beliefs to traditional beliefs may be the indicator of teacher-centered instruction in schools. Many studies relate teaching experience to traditional beliefs (Sing & Khine, 2008; Teo et al., 2008; Tillema, 2000). As a result of observing traditional teaching in the actual context of schools, most of the beginning PSTs initiated their teacher preparation programs with teacher-centered conceptions of teaching (Alger, 2009). The other reason for the traditional teaching and learning conceptions in fourth-year PSTs may be their desire to control the classroom in their field experience. It is known that classroom management is a crucial issue for PSTs when they first come to class to teach (Kartal & Çinar, 2018). The teacher is the only authority that manages the classroom effectively in the traditional classroom (Alt, 2018; Bas, 2016; Zhang & Liu, 2014). Therefore, they may mostly hold traditional teaching conceptions. Figure 1 and Figure 2 illustrate the influence of background variables on PSTs' teaching and learning conceptions.

Figure 1

Background Variables (Gender and Grade level) in Traditional Conceptions

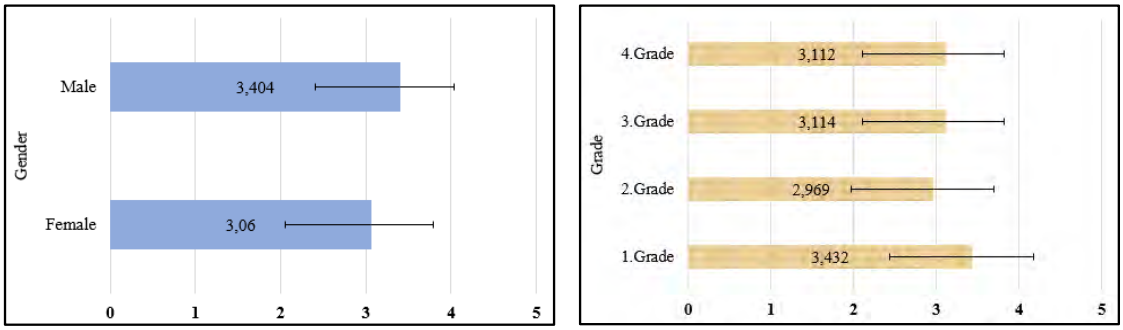
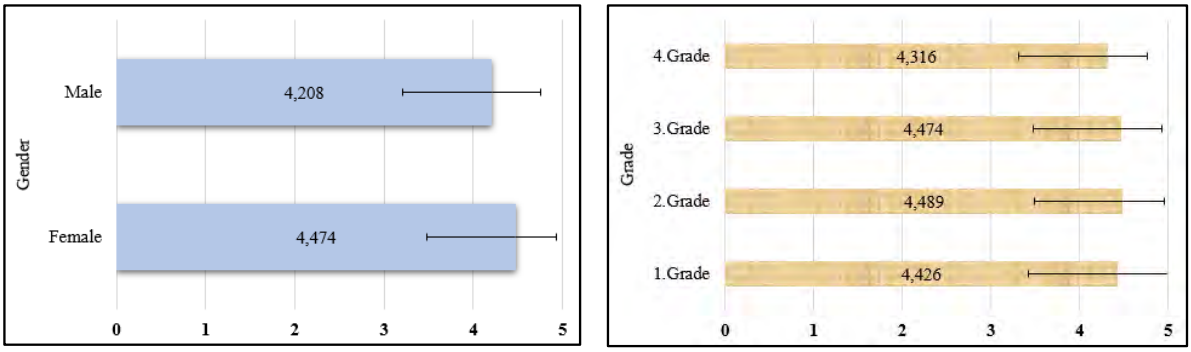


Figure 1 and Figure 2 demonstrate the mean scores and error bars in traditional and constructivist teaching. The error bars demonstrate the range on which participants' mean scores lay. Figures describe the preservice teachers' profiles in both dimensions.

Figure 2

Background Variables (Gender and Grade Level) in Constructivist Conceptions



Teachers' CoTL are related to students' achievement (Bas, 2016; Cano, 2005; Chan & Elliott, 2004; Gow & Kember, 1993) and learning styles (Entwistle et al., 2000; Kember, 1997; Tigchelaar et al., 2012). This study contributes to the literature by revealing the relationship between PSTs' teaching and learning conceptions and their academic performance. Preservice teachers' teaching and learning conceptions are significant predictors of their academic performance. Moreover, there is a weak negative relationship between PSTs' traditional conceptions and academic achievement and a weak positive correlation between PSTs' constructivist conceptions and academic achievement. The established model in this study addresses that PSTs' constructivist conceptions increase their academic performance and traditional conceptions decrease academic performance. Constructivist teaching and learning do not regard knowledge as the passive absorption of information transferred from teachers to students and do not regard learning as remembering and memorizing (Brooks & Brooks, 1999). The deep-learning approach is also associated with constructivist CoTL (Entwistle et al., 2000).

It is possible to say that participants with constructivist teaching and learning conceptions attempt to make sense of knowledge based on their prior experiences.

This study once again demonstrated the importance of constructivist conceptions in academic achievement. Someone with constructivist teaching and learning conceptions is more likely to consider learning as knowledge construction via effort and tends to play the role of knowledge producer as a learner. These features are closely associated with a deep learning approach that leads to higher academic performance (Entwistle & Wilson, 1977). This result shows that teaching and learning conceptions affect students' achievement positively and also affect PSTs' academic performance.

Implications

The results of this study could be addressed from two perspectives: (1) the contributions to literature and (2) the contributions to initial teacher education. This study would be considered evidence of the positive correlation between preservice teachers' constructivist teaching beliefs and academic performance for the former category. In this line, teacher preparation programs should encourage PSTs to make sense of new knowledge based on their prior knowledge and learning experience from the first year of their teacher education programs. This would also help them increase their success and feel more confident and efficient. For the latter category, this study revealed a pattern that begins with traditional conceptions, transforms into constructive conceptions, and ends with traditional conceptions. The pattern that begins and ends with traditional conceptions may be an indicator of traditional approach-based instruction in schools. Fourth-year PSTs should be supported to increase their mastery experiences in which they see that they can teach in a constructivist manner, because mastery experiences have a crucial impact

on teacher beliefs. They should recognize the value of constructivist teaching with mastery experiences and verbal encouragement from teachers and educators.

Limitations

This study is limited to a self-reported measure and one teacher preparation program. We know that different findings can be obtained with varying profiles of participants. Therefore, further research is still needed across countries to comprehend teaching and learning conceptions. Self-reported data needs to be verified with different data types, such as observation, artifacts, or interviews. Further research may examine PSTs' and teachers' conceptions in the same province to compare the conceptions held by PSTs and teachers. This would help us understand why fourth-year PSTs have traditional conceptions and observe whether they practice mainly teacher-centered instruction.

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