



## The Factors Predicting Pre-Service Teachers' Achievement in Teacher Training Classrooms

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### ABSTRACT

**Purpose:** This study aimed to predict the achievement of pre-service teachers majoring in education through some learner characteristics like gender, self-directed learning readiness dimensions, and course context (being in the flipped learning class and traditional teaching classes). **Research Methods:** This study employed a relational survey research design and involved 271 pre-service teachers who were selected according to the purposive sampling method. Data were collected by implementing an achievement test and Self-directed Learning Readiness Scale and analyzed through the Hierarchical Multiple Linear Regression procedure..

**Findings** The findings of the study showed that in the first model, gender and desire for learning predicted the achievement of pre-service teachers. The second model revealed that being in a flipped learning class predicted the academic achievement of pre-service teachers than being in any other classes taught according to traditional teaching principles

**Implications for Research and Practice:** It is suggested that pre-service teachers are provided with opportunities to apply what they have learned theoretically. Also, it may be suggested that instructors include various computer applications, software, games, and videos from YouTube to increase the pre-service teachers' desire to learn. Lastly, for further studies, it may be suggested to include different variables in predicting the achievement of pre-service teachers.

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## Introduction

Pre-service teacher training needs to be abreast with the demands of the twenty-first century. Due to the swift changes in social, political, and technological areas, most of the knowledge taught in schools becomes invalid in a very short time (Kreber, 1998). In this information age, it is important to select appropriate information among ever-increasing knowledge stack, decide appropriate strategies, and be able to manage the learning process. Moreover, politicians, administrators, employers, and concerned people or groups attribute more value to instruction conducted in higher education institutions and want to have clear evidence that students are learning actually (Berrett, 2012; Ziegelmeier & Topaz, 2015). Hence, investigating different instructional theories, methods, and procedures was seen as essential to detect better and permanent learning ways. With this in mind, universities make changes in terms of instructional materials and ways of teaching by addressing their students' needs (Maycock, Lambert & Bane, 2018). It was suggested that teaching methods for these students should shift from direct instruction and lecturing which results in surface learning to meaningful, cross-disciplinary and real life-related knowledge which results in deep learning through constructive active learning strategies by (Abeysekera & Dawson, 2015; Bergman & Sams, 2012; Phillips & Trainor, 2014).

In addition to these, many countries give special attention to courses involving technology in the training of pre-service teachers because they are the individuals who will educate students having different learning styles, motivation, and pre-requisite knowledge to be able to survive in modern society as being reflective, critical, self-directed learners and good at the use of technology. In this sense, flipped learning was proposed as an active teaching-learning approach to meet the learning needs of next-generation students (Baughman, Hassall & Xu, 2019; Castedo, Lopez, Chiquito, Navarro, Cabrera & Ortega, 2019; Maycock, Lambert & Bane, 2018; Ziegelmeier & Topaz, 2015).

### *Literature review*

Flipped learning requires teachers to move lecture part of teaching out of class and students complete pre-class activities individually at home in order to benefit from in-class tasks efficiently, and conduct activities involving discussions, case studies, problems and group work in class (Abeysekera & Dawson, 2015; Bergman & Sams, 2012; Castedo et al., 2019; Hao, 2016; Mason, Shuman & Cook, 2013; Maycock, 2019; Merlin-Knoblich & Camp, 2018; Shyr & Chen, 2017).

Flipped learning individualizes the instruction (Hamdan, McKnight, McKnight & Arfstrom, 2013), gives students the control of their learning (Hao, 2016) and the opportunity to manage their learning speed (Davies, Dean & Ball, 2013). While quick learners can move faster while watching the videos, slow learners can watch it over and over as needed until the concepts become clear (Fulton, 2012; Khanova, Roth, Rodgers & McLaughlin, 2015). In addition, learning with videos provides pre-service teachers with access to the course content independent of the space. Flipped learning is also useful for students who have enrolled in other courses and are absent from class (Bergmann & Sams, 2012; Enfield, 2013; Fulton, 2012; Lage Platt & Treglia, 2000). In

this way, they get the opportunity to compensate the courses by themselves. Foertsch, Moses, Strikwerda and Litzkow (2002) stated that in flipped learning, engineering students were able to watch video lectures at a time that was most conducive to their learning and best met their schedule. In this way, students could enjoy watching difficult content whenever they were more attentive and focused. Furthermore, flipped learning is proper to teach course material with different teaching methods and involve students with various learning styles (Lage et al., 2000; Mason et al., 2013). Similarly, Zappe, Leicht, Messner, Litzinger and Lee (2009) stated that flipped learning may be beneficial for students who learn in different ways like visual, audial, verbal, active, or reflective. In other words, learners control when, where, and how they want to learn the content, which leads to a stronger sense of autonomy (Castedo et al., 2019; Kim & Choi, 2018). Because of these benefits of flipped learning it was revealed that students obtained higher achievement scores and improved their learning in different undergraduate courses when they learned according to principles of flipped learning including human-computer interaction (Day & Foley, 2006), statistics (Wilson, 2013), introductory excel (Davies et al, 2013), mathematics (Fulton, 2012), and mechanical engineering program (Mason et al., 2013).

The pre-class activities part of flipped learning requires self-directed learning (SDL) skills of learners because of managing their time and learning process (Kim, Park & Joo, 2014). Knowles (1975) defined SDL as an active process where learners attempt to diagnose their own learning needs, decide appropriate learning goals, and identify resources for learning which may either human or material, choose and implement appropriate learning strategies, and evaluate learning outcomes. Guglielmino (1977) indicated the presence of properties for SDL as taking responsibility for one's learning, openness to learning opportunities, love of learning, being attentive and autonomous in the learning process and ability to use basic study and problem-solving skills. Khat (2015) added some other properties of SDL such as goal setting, time, procrastination management, assignment preparation, note-taking, reports, and paper writing and research capability, technical and online class readiness, and stress management.

The extent to which students make decisions about learning needs, content, methods, resources, pace, and assessment determines their degree of self-directedness (Corbeil, 2003; Zainuddin & Perera, 2018). With the advent of instruction through distance learning, hybrid and flipped learning, self-directed learning readiness (SDLR) gains recognition as a critical attribute (Corbeil, 2003). For instance, Altuger-Genc, Genc and Tatoglu (2017) stated that taking part in multidisciplinary projects such as coding and robotics requires the existence of self-directed learning which is especially important to improve the knowledge of students on their own and by asking the help of experts. Acquiring SDLR skill is so important in the educational process when instructors integrate information and communication technologies into the learning process intending to create student-centered educational environments.

In the literature, the results of many studies revealed a significant, positive relationship between students' self-directed learning abilities and their academic performances (Chou, 2012a; Chou, 2012b; Corbeil, 2003; John & Michael, 2018; Khat,

2015; Lai, 2011; Lai & Hwang, 2016; Kim, Park & Joo, 2014). On the other hand, Kim and Choi (2018) grouped students according to their SDLR scores as high and low SDLR group. They found a significantly higher completion rate in the high SDLR group; however, the high SDLR group and the low SDLR group did not differ significantly in their final exam scores. Similarly, although the result of the study conducted by Chou (2012a) revealed a positive correlation between engineering students' SDL abilities and online learning performances, engineering students with high and low SDLR did not differ significantly in gaining factual, conceptual, and principle/rule knowledge. Hence, one of the aims of this study was to investigate whether the SDLR of pre-service teachers predicted their achievement in flipped and traditional classroom environments.

O'Kell (1988) matched the type of instruction with SDLR levels and concluded that students who scored low in the SDLR scale preferred more teacher-led discussions, demonstrations, and lectures rather than projects and case studies. Hao (2016) found that students with lower SDLR have difficulty in catching up with the flipped class and thought that the job of instructors was to lecture, hence they found class tasks difficult to complete as also stated by Strayer (2007). Also, the study conducted by Maycock (2019) found that the traditional instruction group significantly outperformed the flipped learning group in the final exam, and Ziegelmeier and Topaz (2015) revealed insignificant differences in student learning in a multivariable calculus course. For this reason, this study intended to better understand the effect of a context like traditional instruction and flipping learning on learners' achievement.

In addition to SDLR levels of learners and the type of instruction, Hao (2016) identified gender as a factor that influences academic performance and it was stated that female students tended to have better verbal intelligence, higher agreeableness, stronger self-discipline, and adapted to a school environment more effectively. Similarly, in a study conducted by Verniers and Martinot (2015) these properties of female students were found predictive of success in fields such as social sciences, health, and literature more than science, technology, and engineering fields, while assertiveness and effort properties of male students were found as more predictive of success in the technological and engineering fields. It was also stated by Chen, Yang, and Hsiao (2015) that in the flipped learning environment, gender may be one of the important factors because the use of technology and the perceptions of both male and female learners may affect their achievement. Hence, this study also aimed to investigate whether the SDLR of pre-service teachers and their gender predicted their achievement in an educational course.

#### *The Purpose of the Study and Research Questions*

This study aimed to predict the achievement of pre-service teachers in an education course, Principles and Methods of Instruction (PMI) through some learner characteristics. In order to achieve this aim, the following research questions were proposed:

1. How well gender and sub-dimensions of the SDLR scale (self-management, desire for learning, self-control) predict the achievement of pre-service teachers in the PMI course?
2. After controlling for gender and sub-dimensions of the SDLR scale, how well being in the flipped class and traditional teaching classes predicts the achievement of pre-service teachers in the PMI course?

Achievement of learners is one of the most important variables that determine the effectiveness of instruction. In the literature, it was found that different variables such as motivation, attitude, self-efficacy, self-regulation, etc. were investigated in terms of predicting the achievement of learners in different courses (Lai & Hwang, 2016; Pajares, 2002; Pajares & Kranzler, 1995; Pintrich & De Groot, 1990; Valas & Slovik, 1993). However, variables such as gender, SDLR, and context variables which might be related to the achievement of pre-service teachers in a compulsory education course, PMI, were not investigated together. In this regard, the investigation of gender, SDLR scale and context (flipped or traditional classes) variables to predict the achievement of pre-service teachers was thought to contribute to literature related to pre-service teacher training.

## Method

### *Research Design*

This study employed a relational survey research design to describe the characteristics of a sample which has been drawn from a pre-determined population at just one point in time (Creswell, 2012; Fraenkel & Wallen, 2009; Gall, Gall & Borg, 2003).

### *Research Sample*

Data were collected from 271 willing senior pre-service teachers chosen according to the purposive sampling method, mainly the convenience sampling method, (Cohen, Manion & Morrison, 2007; Fraenkel & Wallen, 2009) studying at a public university located in the Aegean Region in Turkey. These participants were chosen from the willing pre-service teachers who took the PMI course in the spring semester of the 2018-2019 academic year. Among the 271 pre-service teachers, 195 (72%) of them were female and 76 (28%) of them were male, 27 (10%) of them from Flipped Elementary Education-Classroom Teaching Department; 48 (17.7%) of them from traditional Elementary Education-Classroom Teaching Department; 69 (25.5%) of them from Science Education Teaching Department; 81 (29.9%) of them from Turkish Language Education Department; and 46 (17%) of them from Elementary Education Mathematics Teaching Department.

### *Research Instruments and Procedures*

Data were collected by implementing an achievement test and a scale at the end of the semester. Before implementing the data collection instruments, the consent of pre-service teachers' was obtained, and they were assured that the data would be used

only for scientific purposes and would not be shared with anyone. Data collection instruments were explained below in detail.

#### PMI Course Achievement Test (AT)

Achievement test (AT) developed by Ozudogru and Aksu (2019) included 40 questions with mean item difficulty of .51, mean item discrimination index of .37, and the Kr-20 reliability coefficient of .78. The test included 39 multiple choice questions and one matching type question with five items.

#### Self-directed Learning Readiness Scale (SDLRS)

This scale was developed by Fisher, King and Tague (2001) and adapted to Turkish by Sahin and Erden (2009) to determine pre-service teachers' SDLR. This scale included three sub-factors: 'self-management' comprised of 13 items, 'desire for learning' comprised of 12 items, and 'self-control' comprised of 15 items. This is a 5-point Likert type scale (ranging from 1=completely disagree to 5=completely agree). The Cronbach's alpha internal consistency coefficient was found .87 for the self-management sub-dimension, .86 for the desire for learning sub-dimension, and .79 for the self-control sub-dimension.

This study was conducted in the PMI course in the spring semester of the 2018-2019 academic year. One of the sections of the Elementary Education-Classroom Teaching Department was taught according to flipped learning principles by providing videos developed by the researcher using Camtasia Studio 8 software. After recordings were completed, they were converted to interactive videos using H5p which is an open-source content collaboration framework based on JavaScript. All videos were developed by the writer as part of her dissertation by obtaining expert opinion. These videos are still in use in the PMI courses as educational technology taught by the researcher and will be used in the future.



**Figure 1.** Sample Interactive Video Screencast

Videos were divided into two, three, or four parts according to the subject by obtaining expert opinion. As shown in Figure 1, interactive videos included multiple-

choice, true/false, or matching type questions shown in purple and extra explanations and example videos shown in blue points. The content of the PMI course, the number of videos created for each subject, and their duration were shown in Table 1.

**Table 1**  
*Course Content and the Number of Videos*

Weeks	Subjects	Number of Videos	Duration of videos (minutes)	Number and type of questions included in videos
1	Orientation week	-	-	-
2	Basic educational concepts (education, teaching, learning, program, etc.)	1	9.21	-
3	Types of plans and importance of planning	1	13.53	-
4	Classification of objectives	1	8.35	2 MC
	Bloom's taxonomy	1	15.37	4 MC
5	Basic teaching principles	2	9.01-9.37	2 MC, 4 TQ
6	Gagne's theory on learning and instruction	1	10.57	4 TF, 1 MC, 1FB
	Keller's individualized instruction, Carroll's model of school learning, Bloom's mastery learning	1	15.28	3 MC
7	Constructivist learning theory and	1	9.56	2 TF, 3 MC
	Multiple intelligence theory	1	10.39	1 MC, 2 FB, 2 TF
8	Teaching Strategies- 1. Teaching through presentation	1	8.17	3 TF, 1 FB, 2 MC
	2. Discovery learning	1	5.24	2 TF, 2 MC
	3. Teaching through research and investigation	1	4.10	4 TF, 2 MC
9	4. Cooperative learning	1	6.48-10.34	2 TF, 1 MC - 1 TF, 4 MC
10	Teaching methods- 1. Lecturing,	1	6.46	2 TF, 2 MC
	2. Discussion	1	10.56	5 MC
	3. Case study, project-based learning, problem-based learning	1	10.11	5 MC
	4. Demonstration, individualized study	1	5.59	2 MC
11-12	Teaching techniques (question and answer, brainstorming, role-playing, concept mapping, different discussion techniques, etc.)	4	6.44-5.41- 6.31-8.01	3 MC, 1 TF - 2 TF, 2MC 2 MC, 3 TF - 3 MC

\*MC stands for multiple choice type questions, TF stands for true-false type questions, FB stands for fill in the blank type questions, TQ stands for pre-thinking questions.

After watching video lessons whenever and wherever they felt confident, pre-service teachers summarized what they learned from the content of the videos according to their learning styles in written form, and shared them on the Moodle system-Edmodo. The Course Management System, Moodle-Edmodo is an online networking application for teachers and students. It is a safer way to increase within-class communication and encourage peer-support and peer-learning both in the classroom and online. In this process, pre-service teachers planned their learning, managed their time and resources while preparing weekly summaries, completing class tasks, and writing questions to be asked in class which are in line with the basic properties of SDLR. Each video lesson included pop questions to test whether they learned the subject or not.

In the face to face part of the course, pre-service teachers took part in online question-answer game activities such as Kahoot or Socrative. In this way, they had the chance to monitor whether they learned the subject or not and asked their instructor about the questions they could not answer as in line with the properties of SDL. Finally, group work such as preparing sample lesson plans about multiple intelligence theory, Gagne's theory on learning and instruction, posters about the type of learning strategies, and their relation with theories and different teaching methods was completed in the class every week. Moreover, they conducted a micro-teaching activity by preparing a 15-minute lesson plan and presenting it to their peers in groups during the last two weeks while learning the types of teaching techniques. In this way, they practiced and observed how a teacher implements different teaching methods such as brainstorming, role-playing, circle, concept mapping, station, etc. During group studies conducted in class, pre-service teachers discussed with peers, gave feedback to each other, and evaluated both their progress and their group' as in line with the basic properties of SDL.

The pre-service teachers in the Elementary Education-Classroom Teaching Department (except flipped group), Science Education Teaching Department, Turkish Language Education, and Elementary Education Mathematics Teaching departments were taught according to the principles of traditional instruction. They were assigned homework from their course books to be read before class time. They gathered in the classroom to listen to the lectures of the instructor. The course subject was presented by the instructor using PowerPoint slides and the questions included in videos and plays were asked to these pre-service teachers during the lesson orally. Although the same assignments were completed in both groups, the traditional instruction group worked on assignments and tasks on their own, outside of the class. For instance, both traditional instruction and flipped learning groups prepared sample lesson plans according to multiple intelligence theory or conducted micro-teaching activities; however, traditional instruction group worked on assignments individually, outside the class.

#### *Data Analysis*

In order to predict the achievement of pre-service teachers in the Principles and Methods of Instruction (PMI) Course, the Hierarchical Multiple Linear Regression



(HMLR) procedures were employed (Tabachnick & Fidell, 2007). According to the theoretical background and related literature, variables which were included in this research have different importance levels in predicting the outcome variable (Field, 2009). In the first step, gender and sub-dimensions of the SDLR scale (self-management, desire for learning, self-control) were entered into the analysis, which comprised the 1<sup>st</sup> Model. In the second step, other variables which were dummy coded department variables were entered into the analysis, which comprised the 2<sup>nd</sup> Model.

In this study, foremost, preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, homoscedasticity, multicollinearity, and the influential observations (Field, 2009; Tabachnick and Fidell, 2007). Before the analyses, categorical predictor variables (department and gender) were transformed into a continuous variable by dummy coding. Since the department is a categorical predictor variable with five levels, it was dummy coded into four new variables, 'classroom vs flipped', 'science vs flipped', 'Turkish vs flipped', and 'math vs flipped' by selecting 'flipped learning' group as reference for each dummy variables because according to the literature, flipped learning increases learning (Berrett, 2012; Day & Foley, 2006; Enfield, 2013) and achievement (Davies et al, 2013; Fulton, 2012; Lai & Hwang, 2016; Mason et al., 2013; Wilson, 2013) of pre-service teachers more than traditional instruction, where classroom, science, Turkish and math stand for Elementary Education-Classroom Teaching Department, Science Education Teaching Department, Turkish Language Education Department, and Elementary Education Mathematics Teaching Departments, respectively. Also, gender was a categorical predictor variable with two levels, it was dummy coded into 'female vs male' variable by selecting 'male' as reference for 'female vs male' variable. Data analyses were conducted using SPSS 22 and the significance of the alpha level was selected at the cut-off value .05.

## Results

In this study, firstly, descriptive analysis results concerning the sub-dimensions of predictor variables, and the outcome variable were explained and shown in Table 2.

**Table 2**  
*Descriptive Statistics for Academic Achievement and Predictor Variables*

	Achievement		Self-Management		Desire for learning		Self-control	
	M	SD	M	SD	M	SD	M	SD
Flipped Classroom Teaching Department	82.85	6.15	53.26	7.41	62.52	9.51	40.93	7.15
Traditional Classroom Teaching Department	76.74	8.40	53.65	8.03	63.04	8.61	41.79	6.36
Traditional Science Education Teaching Department	65.90	7.84	49.25	9.77	56.48	10.34	38.35	7.08
Traditional Turkish Language Education Department	71.31	6.61	53.73	5.72	59.35	7.64	39.64	5.72
Traditional Elementary Mathematics Teaching Department	72.98	7.60	49.33	8.68	56.89	8.89	37.59	7.73

The descriptive analysis revealed the highest academic achievement ( $M = 82.85$ ,  $SD = 6.15$ ) for the Flipped Elementary Education-Classroom Teaching Department and the lowest academic achievement ( $M = 65.90$ ,  $SD = 7.84$ ) for Traditional Science Education Teaching Department as can be seen in Table 2. Although pre-service teachers obtained similar scores from self-management and self-control sub-dimensions of SDLR scale, the highest scores for the desire for learning ( $M = 59.17$ ,  $SD = 9.25$ ) belonged to Traditional Elementary Education-Classroom Teaching Department and lowest scores ( $M = 39.47$ ,  $SD = 6.81$ ) belonged to Traditional Science Teaching Department as shown in Table 2. After presenting the means and standard deviations of predictor and outcome variables, correlations among them were shown in Table 3.

**Table 3**

*The Correlations among Academic Achievement and Predictor Variables*

	Academic achievement	female vs male	self-management	desire for learning	self-control	class vs flipped	science vs flipped	turkish vs flipped	math vs flipped
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	1.00								
(2)	.19*	1.00							
(3)	.09	.12*	1.00						
(4)	.18*	.12*	.79*	1.00					
(5)	.14*	.17*	.76*	.77*	1.00				
(6)	.23*	.03	.11*	.20*	.16*	1.00			
(7)	-.42*	.06	-.18*	-.17*	-.10	-.27*	1.00		
(8)	-.08	-.11*	.16*	.01	.02	-.30*	-.38*	1.00	
(9)	.03	-.02	-.14*	-.11*	-.13*	-.21*	-.26*	-.30*	1.00

\*  $p < .05$

According to Table 3, the correlations among academic achievement and predictor variables changed between  $r = .03$  and  $r = -.42$ . While the highest correlation between the department dummy variable 'science vs flipped' and academic achievement was  $r = .42$ , the lowest relationship between the 'math vs flipped' and academic achievement was  $r = .03$ . In other words, being in the flipped group instead of the science education teaching department moderately related to higher achievement; however, being in the flipped group instead of the math teaching department did not significantly relate to achievement.

In this study, the outcome variable was the academic achievement, while the gender, factors of the SDLR scale, and department dummy variables were predictor

variables. In Table 4, it can be seen that predictors were entered into models to test whether the models were significantly better at predicting the outcome.

**Table 4**

*Summary of the Hierarchical Multiple Linear Regression Analyses for Variables Predicting the Academic Achievement*

Variables	B	SE B	$\beta$	t	Sr <sup>2</sup>	R <sup>2</sup>	$\Delta R^2$	$\Delta F$
Model 1:						.07*	.07*	4.91*
Constant	62.50	3.61		17.31*				
female vs male	3.31	1.19	.17	2.78*	.03			
self-management	-.19	.11	-.17	-1.64	-.01			
desire for learning	.25	.10	.26	2.41*	.02			
self-control	.06	.13	.05	.46	.00			
Model 2:						.36*	.29*	29.68*
Constant	79.26	3.53		22.47				
class vs flipped	-5.98	1.75	-.26	-3.42*	.03			
science vs flipped	-16.68	1.67	-.82	-9.96*	.24			
turkish vs flipped	-10.45	1.65	-.54	-6.36*	.10			
math vs flipped	-9.29	1.78	-.39	-5.22*	.07			

\* $p < .001$

When the F-ratios shown in Table 4 were checked, it was  $F(4, 266) = 4.91$  ( $p < .001$ ) for the Model 1 and  $F(8, 262) = 18.35$  ( $p < .001$ ) for the Model 2. These results revealed that both models were significant in predicting the outcome variable. The gender (female vs male) and sub-dimensions of SDLR scale (self-management, desire for learning, self-control) entered at Step 1, which comprised Model 1, explained 7% of the variance in academic achievement,  $F(4, 266) = 4.91$ ,  $p < .01$ . After the entry of the department dummy variables at step 2, which comprised Model 2, the total variance explained by the model as a whole was 36%,  $F(8, 262) = 18.35$ ,  $p < .001$ . In other words, the department dummy variables explained an additional 29% of the variance in the academic achievement, after controlling for gender (female vs male) and sub-dimensions of SDLR scale (self-management, desire for learning, self-control).  $\Delta R^2 = .29$  and  $\Delta F(8, 262) = 29.68$  ( $p < .001$ ). For this reason, it can be said that the first model significantly improved the ability to predict the pre-service teachers' achievement, but the second model was even better (Field, 2009).

When the t-statistics were checked to control whether the predictor variables contributed to the model significantly (Field, 2009), it can be seen in Table 4 that in the first model, gender  $t(266) = 2.78$ ,  $p < .001$  and desire for learning  $t(266) = 2.41$ ,  $p < .001$  significantly predicted the achievement of pre-service teachers. In the second model, class vs flipped  $t(262) = -3.42$ ,  $p < .001$ , science vs flipped  $t(262) = -9.96$ ,  $p < .001$ , Turkish vs flipped  $t(262) = -6.36$ ,  $p < .001$ , math vs flipped  $t(262) = -5.22$ ,  $p < .001$  were all significant predictors of the academic achievement. From the magnitude of the t statistics, it can be said that being in flipped learning had a higher effect on academic achievement than being in any other classes (Elementary Education-Classroom

Teaching Department, Science Education Teaching Department, Turkish Language Education, and Elementary Education Mathematics Teaching).

### **Discussion, Conclusion and Recommendations**

The purpose of this study was to predict the achievement of pre-service teachers in the PMI course through gender, dimensions of the SDLR (self-management, desire for learning and self-control), and context variables. The regression analysis results showed that gender predicted the achievement of pre-service teachers. In other words, it can be said that if more female students were included in the study, the achievement would be higher. The PMI course mostly requires reading and regular study activities. However, if this course were an engineering course requiring complex mathematical calculations and technical issues, male students might have obtained higher achievement scores as stated in the previous literature (Caprara et. al., 2011; Pajares, 2002; Pajares & Kranzler, 1995; Pajares & Miller, 1994). The findings of the studies conducted by Buccheri, Gurber and Bruhwiler (2011) and Frenzel, Pekrun and Goetz, (2007) confirmed the findings of this study that female students have lower interest in sciences and technology and higher interest in social sciences and language than male students even if they have the same competencies. However, Chen, Yang and Hsiao (2015) evaluated student feedback and gender differences to provide a holistic profile of this flipped mathematics course, and found that 'feelings' which contained the items relating to personal emotions such as confidence, fulfillment and proud during learning process predicted the final grades of males, while course design predicted the final grades in females. It can be concluded that the inclusion of more flipped courses may increase the learning performance of female students even in courses including mathematics because of including cooperative learning opportunities and low competence.

According to the findings of the study, SDLR of pre-service teachers did not predict their achievement in the PMI course except the desire for learning sub-dimension. The reason for this result might be that as stated by Fisher et al. (2001), SDLR exists along a continuum and is present in all individuals to some extent. The pre-service teachers both in traditional and flipped classes might have already been self-disciplined, responsible for their own decisions and actions, in control of their own lives, aware of their limitations, evaluate their performances, and find out the necessary information for them to some degree. Also, Deyo, Huynh, Rochester, Sturpe and Kiser (2011) found no significant relationship between academic performance and the SDLR of medical pharmacy students. It can be inferred that students may be capable of learning foundational knowledge regardless of their SDLR. Hence, all the dimensions of the SDLR scale might not be significant predictors of student achievement.

As for the result that the desire for learning dimension predicted the achievement of pre-service teachers, it can be said that pre-service teachers who are curious and enjoy learning new information, study and overcome challenges during the learning process, open to new ideas, learn from their mistakes, and prefer to set their own goals obtain higher achievement scores. The reason for this finding might be that pre-service teachers in both groups were expected to achieve at least knowledge and

understanding levels according to Bloom's taxonomy before they come to the class through weekly readings or videos as stated by Bergmann and Sams (2012). Due to coming to class prepared, they might be more willing to conduct different activities in the face to face part of the class which might have affected the scores at the 'desire for learning' dimension of the SDLR scale.

Moreover, Song and Hill (2007) stated that learners may exhibit different levels of self-direction in different learning situations. This study was conducted in the PMI course. Since pre-service teachers took pre-requisite educational sciences courses, their SDLR might have been already high to a certain degree for different educational sciences courses. In other words, learners might have a high level of SDLR in an area in which they are familiar, or in areas that are similar to a prior experience. For example, students who like Mathematics may also have a high level of SDLR for Physics but they may not possess the same amount of readiness for English (Fisher et al., 2001). In other words, it can be inferred that SDLR levels of pre-service teachers might change according to courses and departments. Hence, a similar study might be set in different courses to examine whether these variables predict the achievement of pre-service teachers.

Also, the findings of the study showed that being in flipped learning, Elementary Education-Classroom Teaching Department predicted the achievement of pre-service teachers than being in any other traditional classrooms (Elementary Education-Classroom Teaching Department, Science Education Teaching, Turkish Language Education and Elementary Education Mathematics Teaching) which is also revealed in the previous literature (Bergmann & Sams, 2012; Day & Foley, 2006; Kim & Choi, 2018; Khanova et al., 2015; Shyr & Chen, 2017; Wilson, 2013). The reason for this finding might be the tasks conducted during the flipped learning process. Pre-service teachers took part in different tasks such as discussions, games, and group studies, which might have increased their achievement in the course as also stated by Maycock (2019) and Merlin-Knoblich and Camp (2018). While pre-service teachers were conducting these tasks and taking place in group studies and plays, the instructor was able to monitor the flipped group's performance and comprehension. When a misunderstanding or any confusion was noticed, they were cleared up immediately as also revealed in the previous literature (Shyr & Chen, 2017; Ziegelmeier & Topaz, 2015). Moreover, pre-service teachers obtained immediate feedback from their peers as also stated by Baughman, Hassall and Xu (2019), which might have helped pre-service teachers to develop a sense of responsibility for their learning and increased achievement. It can be concluded that instead of traditional teaching methods, if instructors design their courses according to flipped learning principles, the achievement of pre-service teachers can increase.

The findings of this study have important instructional implications for researchers, instructors, and university administrators who are interested in developing higher education. The overall results of this study suggested that pre-service teachers' gender, learning desire, and flipped learning context were some of the important factors in predicting achievement in the PMI course. Hence, it is suggested that pre-service teachers may be provided with opportunities to apply what

they have learned theoretically. Also, it is suggested that instructors may include various computer applications, software, games, and videos from YouTube to increase the pre-service teachers' desire to learn. Furthermore, in this study, the achievement of pre-service teachers was assessed through class tasks and an achievement test which included multiple-choice and matching type questions. If the achievement of pre-service teachers was evaluated through an exam including open-ended questions requiring higher-order learning skills like analysis, synthesis, and evaluation, all dimensions of SDL might have predicted the achievement. For this reason, future research may assess the achievement of pre-service teachers through open-ended questions. Lastly, for further studies, it is suggested to include different variables such as cognitive load, motivation, and retention to predict the achievement of pre-service teachers.

One of the limitations of this study was that SDLR levels of pre-service teachers were not measured at the beginning of the study. Future studies might begin the research process by implementing the scale both at the beginning and at the end of the learning process. Besides, SDLR of pre-service teachers were measured by using a self-response measurement tool, a 5-point Likert type scale (5-strongly agree, 1-strongly disagree), and choosing from restricted response options might not have reflected the difference between the perceptions of pre-service teachers in flipped and traditional groups. The SDLR is a complex construct and it might not be easily revealed through items on questionnaires. Hence, it is suggested that further research should involve interviews including open-ended questions.

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### Öğretmen Eğitimi Sınıflarında Öğretmen Adaylarının Başarılarını Yordayan Değişkenler

#### Atf:

- Ozudogru, M. (2020). The factors predicting pre-service teachers' achievement in teacher training classrooms. *Eurasian Journal of Educational Research, 87*, 157-178. DOI: 10.14689/ejer.2020.87.8

#### Özet

*Problem Durumu:* Sosyal, politik ve teknolojik alanlarda çok hızlı gelişmelerin yaşandığı günümüzde bugün öğretilen bilgiler yarın geçersiz hale gelebilmektedir. Bu bilgi çağında, öğrencilerin sürekli artan bilgi yığını arasından uygun bilgileri seçmeleri, uygun stratejilere karar vermeleri ve kendi öğrenme süreçlerini yönetebilmeleri önemlidir. Bu özellikler derse gelip sadece öğretim elemanının anlattıklarını not alan diğer bir ifadeyle sadece geleneksel yöntemlerle öğrenen öğrenciler tarafından kazanılamayabilir. Gelecek nesilleri eğitecek öğretmen adaylarının kendi öğrenmeleri için sorumluluk almaları, farklı öğrenme fırsatlarına açık olmaları, araştırma ve öğrenmeyi sevmeleri, kendi öğrenme süreçlerini yönetebilmeleri ve problem çözme becerilerini kullanabilmeleri gibi öz-yönelimli öğrenme (ÖYÖ) becerilerine sahip olmaları önemli görülmektedir. Bunu bağlamda, pek çok üniversite bu gereksinimleri dikkate alarak, öğretim materyalleri ve öğretim yöntemleri konusunda değişiklikler yapmaktadır. Teknolojiyi ve sınıf içi aktif öğrenme görevlerini birleştiren ters-yüz öğrenme yaklaşımının öğrencilerin öğretme-

öğrenme sürecini desteklediğini belirten pek çok araştırma bulunmaktadır. Ters-yüz öğrenmenin bir parçası olan ders öncesi etkinlikler, öğrencilerin ÖYÖ becerilerinin önemini vurgulamaktadır. Ayrıca, uzaktan öğrenme, hibrid ve ters-yüz öğrenme yoluyla öğretimin gelişmesiyle birlikte, ÖYÖ kritik bir özellik olarak ortaya çıkmaktadır. Alanyazındaki pek çok araştırma sonuçları, öğrencilerin ÖYÖ becerileri ve başarıları arasında anlamlı ve pozitif bir ilişki olduğunu ortaya koymuştur fakat bazı araştırmalarda da yüksek veya düşük ÖYÖ hazırbulunuşluğu olan öğrencilerin final sınavlarında anlamlı bir farklılık bulunamamıştır. Dolayısıyla, bu çalışmanın amaçlarından biri, öğretmen adaylarının ÖYÖ'ye hazırbulunuşluğu, ters-yüz veya geleneksel sınıf ortamlarında öğrenmelerinin başarılarını yordayıp yordamadığını araştırmaktır. Ayrıca, alanyazında cinsiyet başarıyı etkileyen bir faktör olarak açıklanmıştır ve bu eğitim bilimleri dersinde öğrenci başarısını yordayan değişkenlere dahil edilmiştir.

Öğrencilerin başarısı, öğretimin etkinliğini belirleyen en önemli değişkenlerden biridir. Literatürde motivasyon, tutum, öz yeterlik, öz düzenleme vb. farklı değişkenlerin öğrencilerin farklı derslerdeki başarılarını yordayan araştırmalar bulunmaktadır fakat cinsiyet, öz yönelimli öğrenmeye hazırbulunuşluk (ÖYÖH) ve öğrenme ortamı değişkenleri bir öğretmenlik eğitimi dersinde birlikte incelenmemiştir. Bu bağlamda, çalışmanın hem alanyazına hem de öğretmen adaylarına yönelik yapılan çalışmalara katkıda sağlayacağı düşünülmektedir.

*Araştırmanın Amacı:* Bu çalışmanın amacı, öğretmen adaylarının başarılarının bir eğitim dersinde, Öğretim İlke ve Yöntemleri (ÖİY), cinsiyet, Öz yönelimli Öğrenmeye Hazır Bulunuşları ve ders ortamı (ters-yüz sınıf, geleneksel sınıf) gibi bazı değişkenler ile yordanmasıdır. Bu amaca ulaşmak için aşağıdaki araştırma soruları önerilmiştir:

1. ÖİY dersinde cinsiyet ve Öz yönelimli Öğrenmeye Hazır Bulunuşluk ölçeğinin alt boyutları (öz-yönetim, öğrenme isteği, öz-kontrol) öğretmen adaylarının başarılarını ne kadar iyi yordamaktadır?
2. ÖİY dersinde cinsiyet ve Öz yönelimli Öğrenmeye Hazır Bulunuşluk ölçeğinin alt boyutları kontrol edildikten sonra, ters-yüz öğrenme sınıfında veya geleneksel öğretim sınıflarında olmak, öğretmen adaylarının başarılarını ne kadar iyi yordamaktadır?

*Araştırmanın Yöntemi:* Bu çalışmanın tarama araştırmadır ve amaçlı örnekleme yöntemine göre belirlenen 271 öğretmen adayı araştırmaya dahil edilmiştir. Bu öğretmen adaylarında 195'i (% 72) kadın, 76'sı (% 28) erkek, 27'si (% 10) ters-yüz öğrenme Sınıf Öğretmenliği Bölümü'nde; 48'i (% 17.7) geleneksel Sınıf Öğretmenliği Bölümünde; 69'u (% 25,5) geleneksel Fen Bilgisi Öğretmenliği Bölümünde; 81'i (% 29,9) geleneksel Türkçe Öğretmenliği Bölümünde; 46'sı (% 17) geleneksel İlköğretim Matematik Öğretmenliği Bölümünde öğrenim görmektedir. Veriler başarı testi ve ÖYÖH ölçeği ile toplanmıştır. Başarı testi (AT), ortalama madde gücü .51, madde ayırt edicilik indeksi .37 ve Kr-20 güvenilirlik katsayısı .78 olan 40 soru içermektedir. ÖYÖH ölçeği, Fisher vd. (2001) tarafından geliştirilmiş ve Türkçeye Sahin ve Erden (2009) tarafından uyarlanmıştır. Ölçek üç alt faktörden oluşmaktadır: 13 maddeden oluşan 'öz-yönetim', 12 maddeden oluşan 'öğrenme isteği' ve 15 maddeden oluşan

'öz-kontrol'. Ölçeğin Cronbach alfa iç tutarlılık katsayısı öz-yönetim alt boyutu için .87, öğrenme isteği alt boyut için .86 ve öz-kontrol alt boyutu için .79 olarak bulunmuştur.

Bu çalışma ÖİY dersinde 2018-2019 bahar döneminde Türkiye'de Ege Bölgesi'nde bulunan bir devlet üniversitesinde gerçekleştirilmiştir. Sınıf Öğretmenliği Anabilim Dalı bölümlerinden biri dersi ters-yüz öğrenme ilkelerine göre öğrenmiştir. Bu gruptaki öğretmen adaylarına araştırmacı tarafından Camtasia Studio 8 yazılımı kullanılarak geliştirilen videolar gönderilmiştir. Dersten önce öğretmen adaylarının video dersleri izlemeleri ve videoların içeriğinden öğrendiklerini, kendi öğrenme stillerine göre yazılı olarak özetlemeleri beklenmiştir. Bu süreçte öğretmen adayları öz-yönetimli öğrenmenin temel özellikleri ile uyumlu olarak öğrenmelerini planlamış, zamanlarını ve kaynaklarını yönetmişlerdir.

Dersin yüz-yüze kısmında, öğretmen adayları çevrimiçi soru-cevap aktivitesi olan Kahoot veya Socrative uygulamalarında yer almışlardır. Bu oyunlarda öğretmen adayları konuyu öğrenip öğrenemediklerini gözlemlemiş ve öğretim elemanına cevaplayamadıkları soruları sorabilmişlerdir. Ayrıca, farklı teorilerin uygulanması hakkında örnek ders planları ve posterler hazırlama ile farklı öğretim tekniklerinin uygulanmasını içeren mikro öğretim etkinlikleri yapılmıştır.

Geleneksel öğretim ilkelerine göre öğrenim gören öğretmen adaylarına ders konusunu kitaplardan okumaları için ödev olarak verilmiştir. Sınıf içinde ders konusu öğretim elemanı tarafından PowerPoint slaytları kullanılarak sunulmuştur ve derste sözel olarak ters-yüz öğrenme grubundaki öğretmen adaylarına video derslerde ve oyunlarda sorulan sorular sözlü olarak sorulmuştur. Aynı ödevler her iki grupta da tamamlanmasına rağmen, geleneksel öğretim grubundaki öğretmen adayları ödevleri sınıf dışında kendi başlarına tamamlamışlardır.

Veriler Hiyerarşik Çoklu Doğrusal Regresyon (HMLR) analizi ile incelenmiştir. İlk adımda, cinsiyet ve ÖYÖH ölçeğinin alt boyutları (öz-yönetim, öğrenme isteği, öz-kontrol) değişkenleri analize girmiştir. İkinci adımda, kodlanmış bölüm değişkenleri analize girmiştir. Analizler öncesinde varsayımlar kontrol edilmiştir ve kategorik yordayıcı değişkenler (bölüm ve cinsiyet) yapay kodlama ile sürekli değişkenlere dönüştürülmüştür.

*Araştırmanın Bulguları:* Çalışmanın bulguları, ilk modelde, cinsiyet ve öz-yönelimli öğrenmeye hazırbulunuşluk ölçeğinin alt boyutu olan öğrenme isteğinin öğretmen adaylarının ders başarısını yordadığını göstermiştir. İkinci model, ters-yüz öğrenme sınıfında olmanın, öğretmen adaylarının akademik başarısını, geleneksel öğretim ilkelerine göre öğretilen diğer bölümlere göre anlamlı olarak yordadığını ortaya koymuştur. İstatistiklerin büyüklüğünden, ters-yüz öğrenme sınıfında olmanın akademik başarıyı diğer sınıflarda (Sınıf Öğretmenliği, Fen Bilgisi Öğretmenliği, Türkçe Öğretmenliği ve İlköğretim Matematik Öğretmenliği) olmaktan daha fazla etkilediği belirlenmiştir.

*Araştırmanın Sonuçları ve Öneriler:* Bu çalışmanın bulguları, yükseköğrenimi geliştirmek isteyen araştırmacılar, eğitimciler ve üniversite yöneticileri için önemli

sonular ortaya koymaktadır. Bu alıřmanın genel sonuları ğretmen adaylarının cinsiyetinin, ğrenme isteėinin ve ters-yüz ğrenme ortamının ÖİY dersinde başarıyı yordamada önemli faktörlerden bazıları olduğunu göstermiştir. Bu nedenle, ğretmen adaylarına teorik olarak ğrendikleri konuları uygulama fırsatı verilmesi önerilmektedir. Ayrıca, ğretmen adaylarının ğrenme isteklerini arttırmak için ğretim elemanlarının eřitli bilgisayar uygulamaları, yazılımlar, oyunlar yanında YouTube videolarını derslerinde kullanmaları önerilmektedir. Son olarak öz-yönelimli ğrenme karmařık bir yapıdır ve ölek maddeleri yoluyla tam olarak belirlenemeyebilir. Bu nedenle, gelecekteki arařtırmalarda açık uçlu sorular içeren görüşmelere yer verilmesi gerektiėi önerilmektedir.

*Anahtar Sözcükler:* Akademik başarı, geleneksel ğrenme, ğretmen adayları, öz-yönelimli ğrenme, ters-yüz ğrenme yaklaşımı.