# THE EFFECT OF FLIPPED LEARNING ON PRE-SERVICE TEACHERS' ACHIEVEMENT AND PERCEPTIONS RELATED TO CLASSROOM ENVIRONMENT

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## ABSTRACT

THE EFFECT OF FLIPPED LEARNING ON PRE-SERVICE TEACHERS' ACHIEVEMENT AND PERCEPTIONS RELATED TO CLASSROOM ENVIRONMENT

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The purpose of this study was to develop and implement flipped learning materials in the Principles and Methods of Instruction course and investigate the effect of flipped learning on pre-service teachers' achievement and perceptions related to the classroom environment. This study was conducted in the fall semester of 2017-2018 for 11 weeks at a public university located in the Aegean Region. This study employed an explanatory mixed method research design. There were 30 pre-service teachers in the experimental group and 26 pre-service teachers in the control group. In the current study, 'Achievement Test (AT)', 'Classroom Environment Perceptions Scale', 'Student Questionnaire' and 'Interview Schedule' were implemented to answer the research questions. The data collected through the achievement test, classroom environment scale and student questionnaire were analyzed by using descriptive and inferential statistical analysis techniques. For the analysis of the data, SPSS 22.0 was used and alpha level was determined as .05. The data obtained from the interviews

were analyzed by using both the content and descriptive analysis techniques. The findings of the study indicated that pre-service teachers in the flipped learning group had significantly higher AT scores and final grades than the pre-service teachers who were in the traditional group. On the other hand, being in the flipped learning group or in the traditional group had no significant effect on pre-service teachers' perceptions of classroom environment. The perceptions of pre-service teachers about flipped learning process, materials and classroom environment after the treatment process were examined and discussed in detail.

**Keywords:** Flipped Learning, Classroom Environment Perceptions, Pre-service Teacher Education

# ÖZ

TERS YÜZ ÖĞRENMENİN ÖĞRETMEN ADAYLARININ BAŞARILARI VE SINIF ORTAMI ALGILARINA ETKİSİ

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Bu çalışmanın amacı, ters yüz öğretim materyalleri geliştirmek ve Öğretim İlke ve Yöntemleri dersinde uygulayarak ters yüz öğrenmenin öğretmen adaylarının başarıları ve sınıf ortamı algılarına etkisini araştırmaktır. Çalışma 2017-2018 Eğitim-Öğretim yılı güz döneminde, Ege Bölgesi'nde bulunan bir devlet üniversitesinde 11 hafta süreyle gerçekleştirilmiştir. Çalışmada açıklayıcı karma yöntem araştırma deseni kullanılmıştır. Deney grubunda 30 öğretmen adayı ve kontrol grubunda 26 öğretmen adayı yer almıştır. Araştırma sorularını yanıtlamak amacıyla 'Başarı Testi (AT)', 'Sınıf Ortamı Algıları Ölçeği', 'Öğrenci Anketi' ve 'Görüşme Formu' uygulanmıştır. Çalışmada, başarı testi, sınıf ortamı algıları ölçeği ve öğrenci anketi ile elde edilen veriler, betimsel ve çıkarımsal istatistiksel analiz teknikleri kullanılarak analiz edilmiştir. Verilerin analizinde SPSS 22.0 kullanılmıştır ve alfa katsayısı .05 olarak belirlenmiştir. Görüşmelerden elde edilen veriler, içerik analizi ve betimsel analiz teknikleri kullanılarak analiz edilmiştir. Araştırma bulguları, ters yüz öğrenme grubunda yer alan öğretmen adaylarının başarı puanlarının ve final notlarının

geleneksel grupta yer alan öğretmen adaylarına göre anlamlı derecede yüksek olduğunu göstermiştir. Diğer taraftan, ters yüz öğrenme grubunda veya geleneksel grupta yer almanın öğretmen adaylarının sınıf ortamı algıları üzerinde anlamlı bir etkisinin olmadığı belirlenmiştir. Öğretmen adaylarının ters yüz öğrenme süreci, materyaller ve sınıf ortamı ile ilgili algıları deney sürecinden sonra ayrıntılı bir şekilde incelenmiş ve tartışılmıştır.

**Anahtar Kelimeler:** Ters-Yüz Öğrenme, Sınıf Ortamı Algıları, Öğretmen Eğitimi

To My Mother, Father and My Sister

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## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

## LIST OF ABBREVIATIONS

| | |
|---|---|
| AT | Achievement Test |
| BMELEI | The Business Management Education Learning Environment Inventory |
| CEPSPT | The Classroom Environment Perceptions Scale of Pre-Service Teachers |
| CES | Classroom Environment Scale |
| CLES | Constructivist Learning Environment Survey |
| CUCEI | College and University Classroom Environment Inventory |
| DELES | Distance Education Learning Environment Survey |
| ICEQ | Individualized Classroom Environment Questionnaire |
| LEI | Learning Environment Inventory |
| MCI | My Class Inventory |
| OLCS | Online Learning Climate Scale |
| QTI | Questionnaire on Teacher Interaction |
| SLEI | Science Laboratory Environment Inventory |
| SQ | Student Questionnaire on Flipped Learning Process |
| TROFLEI | Technology-Rich Outcomes-Focused Learning Environment Inventory Online Learning Environment Survey |
| UMCEQ | University Mathematics Classroom Environment Questionnaire |
| WIHIC | What is Happening in This Classroom |
| YÖK | Higher Education Council |

# CHAPTER 1

# INTRODUCTION

This chapter contains the theoretical background, purpose and significance of the study. The definitions of important concepts were presented at the end of the chapter.

## 1.1. Background of the Study

Since the time teacher education emerged, it has been critiqued, studied, rethought and reformed (Cochran-Smith, 2004). Caillier and Riordan (2009) stated that pre-service teacher education institutions and programs were criticized for not being effective to prepare pre-service teachers for teaching profession and not responding to the changes required in the twenty first century such as teamwork, critical thinking, creativity, problem solving ability and effective use of information technology in a global, technology-rich environment.

Teacher training programs educate pre-service teachers, who are getting prepared to apply the content knowledge, skills and abilities related to teaching profession in real classroom environments (Chiatula, 2015). In other words, pre-service teachers are getting prepared to apply what they have learned in their university-based courses to classroom practices. Although pre-service teachers gain content-area knowledge, take higher grades and even earn honors, they still find it difficult to connect what they have learned during training to actual classroom practices when they enter the world of the public schools (Chiatula, 2015; Eret, 2013). Touchton (2015) stated that undergraduate students in statistics course performed at lower order cognitive tasks such as memorizing a definition, solving a problem or calculating a numerical value well but they performed considerably poorer when they were asked to apply the theoretical knowledge they have about a subject into practice.

Similarly, Eret (2013) indicated that one of the major problems of the current pre-service teacher education programs in Turkey was the lack of bridge between

theory and the practice. De León (2012) stated that teacher preparation programs should be dynamic and effective. If pre-service teachers are not exposed to effective instruction, the bridge between theory and practice may never be built and the gap between the two may remain constant. Hence, it can be said that the gap created between theory and practice during teacher preparation by traditional pre-service teacher education programs is incompatible with the practice required during their professional lives which results in struggle of teachers to implement what they have learned in university to practice (Korthagen, 2001).

It can be said that one of the most important courses in pre-service teacher education is "The Principles and Methods of Instruction" course, as it requires to make connections between theory and practice. Teacher education programs have always struggled with the problem of how to teach to enhance learning and improve teaching-learning process all around the world. In Turkey, pre-service teacher education includes both subject matter courses and teaching courses. The proportion of courses related to subject matter knowledge and skills is 50-60%, the proportion of courses related to knowledge and skills on teaching profession is 25-30% and the proportion of courses related to general culture knowledge is 15-20%. The name of courses pre-service teachers take related to pedagogy are Introduction to Educational Science, Educational Psychology, Principles of Methods of Instruction, Curriculum Development, Measurement and Evaluation, Turkish Education System and School Management, Classroom Management, Guidance and Psychological Counseling, Instructional Technologies and Materials Design, School Experience and Teaching Practice (YÖK, 2007).

Hence, in Turkey, the Principles and Methods of Instruction course took place in pre-service teacher education programs as one of the course to create the connection between what is learned theoretically and what is required for pre-service teachers in their future profession in a real school and classroom environment. This course aims to equip pre-service teachers with the knowledge of basic concepts related to education and instruction, learning and teaching, learning and teaching approaches, methods and techniques. Also, this course aims to provide pre-service teachers with knowledge and skills to implement teaching strategies, methods, comprehend and put principles of planned instruction into practice, use suitable teaching materials and tools, become

aware of teachers' duties and responsibilities and to comprehend relations of these with teacher qualifications (YÖK, 2007). It is one of the compulsory courses aims to achieve the pre-mentioned goals and included in the pre-service teacher education programs.

In Turkey, it has been observed that faculties are not adequate in teaching different teaching methods (Eret-Orhan, 2017; Taskaya & Musta, 2008). Many pre-service teachers indicated that even in the courses that they learned about teaching and learning methods and techniques, they experienced problems and they could not benefit from the courses efficiently (Dikici, Gündogdu, & Yavuzer, 2006; Eret-Orhan, 2017; Kahramanoglu, 2010; Sahin, 2007, Taskaya & Musta, 2008). Dikici, Gündogdu, & Yavuzer (2006) reported the reason for pre-service teachers' not being able to benefit from the educational sciences courses as the teaching methods implemented by their instructors. Similarly, Kahramanoglu (2010) indicated that the content of the courses pre-service teachers had taken about teaching profession was mostly abstract, and the courses were taught only theoretically and were not sufficiently associated with real classroom applications. Ozturk (2004) stated that teachers mostly used lecturing method and question-answer techniques, and that they expressed their inability to apply the project method. Aydede, Caglayan, Matyar and Gulnaz (2006) explained that teachers did not have enough knowledge about how to apply these methods and techniques. Finally, Eret (2013) reported in the study which involved interviews with 43 senior class pre-service teachers that instructors in the faculties used ineffective, traditional, or teacher-centered methods and techniques, often including PowerPoint presentations and lecturing. Moreover, instructors did not include discussions, the used of technological materials in lessons, and finally, instead of constructivist or student-centered approaches, they used techniques that required memorization.

In this technology era, the value of higher education is under careful examination in terms of efficient use of class time and assessment which are quite important for academics and universities than ever (Ziegelmeier &Topaz, 2015). As stated by Berrett (2012), different groups like politicians, administrators, employers and concerned people or groups want to have clear and straightforward evidence that students are truly learning in higher education institutions. These different groups

stressed that "*professors can no longer simply pump out information and take it on faith that students understand it*" (Berrett, 2012, p.2). Hence, there is a need to investigate for different instructional theories, methods and procedures to find out how students learn better, easily and permanently was seen important by researchers and different types of active learning processes were suggested.

When instructors include different activities like working on a question or a task designed to help students understand a concept and apply what they have learned theoretically, active learning occurs (Andrews, Leonard, Colgrove, & Kalinowski, 2011). This case has resulted in the change of educational philosophy. Students are seen as the active discoverers of knowledge who learn best in a social settings encompassing a variety of instructional techniques such as in-class group work, think-pair-share discussions (Andrews et. al., 2011) or "clicker" questions using student response systems (O'Flaherty & Phillips, 2015; Zappe, Leicht, Messner, Litzinger, & Lee, 2009).

This shift in terms of educational philosophy from active instructor to an active learner model has been summed up in the description: "From the sage on the stage to the guide by the side" (Baker, 2000). It takes more time to learn with active learning method and applying theoretical knowledge is more difficult than lecturing method where students are mostly passive receivers of knowledge; however, learning is more permanent and considerably greater. The reason for this may be explained as tasks and assignments involved in active learning increase connections between concepts in students' minds, and knowledge becomes more permanent than by just listening to the teacher or reading the information from the book (Touchton, 2015).

Students who were born between 1982 and 2005 are described as smart, ambitious, ethnically diverse, confident, team-oriented and digitally literate, preferring active and experiential-learning experiences enriched with technology since they were born into a world where technology is ubiquitous (Phillips & Trainor, 2014). Hence, the teaching methods for these students should shift from direct instruction and lecturing which result in surface learning to meaningful, cross-disciplinary and real life-related knowledge which results in deep learning through constructive active learning strategies.

Many action plans were adapted at national and international levels and countries made considerable investments for different teaching methods including information and communication technologies in teacher education (Goktas, Yildirim, & Yildirim, 2008) because of the necessity for educational institutions to review their methods and strategies in order not to lag behind in global education milieu (Gok & Yildirim, 2015).

Moreover, with the new technological developments, students gained flexibility in terms of teaching place and time, had rich learning contexts and benefitted from distance education opportunities. Since the use of technology can enhance understanding of a subject and impact student engagement in learning process, the use of instructional technology by providing multiple learning alternatives for students supports self-directed learning, self-evaluation, peer and teacher assessment, and students demonstrate mastery in learning (Yemma, 2015). In this sense, the Movement of Enhancing Opportunities and Improving Technology (FATIH) project of Turkey was put into action, which indicated the importance and necessity for integrating technology to teaching-learning process (Ocak, Gökcearslan, & Solmaz, 2014). Since students at K-12 schools are expected to learn through technology, it is necessary to develop pre-service teachers' knowledge and application skills about the principles and methods of instruction with the affordances of technology.

Furthermore, according to Horizon 2014 report, education paradigms are shifting from behaviorism to constructivism and including instructions based on the use of technology like online learning, blended and hybrid learning, and also instructions benefitting from the principles of collaborative learning strategies. In this era, students are learning and interacting with each other on the internet. Similar to physical campuses, online learning environments provide different opportunities for students like increased collaboration and self-learning opportunities. Hybrid learning, when designed and implemented successfully, facilitates students' learning by both using the web for some activities and taking part in classroom tasks for other activities. In other words, by taking advantage of the best of both face to face and online environments, students' cognitive and affective skills are developed (Johnson, Adams Becker, Estrada, & Freeman, 2014).

In addition to these, many countries give special attention to courses involving technology in the training of pre-service teachers because of their being the individuals who will educate students having different learning styles, motivation, pre-requisite knowledge to gain skills to be able to survive in a modern society as being reflective learners, critical learners, good at use of technology and being individuals learning to learn. Hence, it is thought that the implementation of flipped learning can help students gain these properties (Davies, Dean, & Ball, 2013; McLaughlin, et al., 2013).

As a result of paradigm shifts towards student-centered learning approaches, flipped learning increases the use of technology in order to prepare students for twenty first century skills such as creativity, collaboration and independent learning (Yemma, 2015). In order to educate next generation students and make them successful professionals, traditional instructional strategies should be replaced with the ones where students are actively involved in tasks in class. For active learning strategies, instructors and students need more time; hence it seems that the contexts of the classroom need to be reversed. The lecturing part of teaching where knowledge is transferred from instructors to students should be conducted outside of the class using technological media, and different tasks that require collaborative learning and students' active involvement should be realized inside the class where the instructor is present to help and direct students (Zappe et al., 2009). This active learning approach is the so-called flipped learning (Zappe et al., 2009; Ziegelmeier & Topaz, 2015). According to Berrett (2012), flipped learning (also known as the "inverted classroom") implies active learning experiences which are the inversion of expectations in the traditional lecture. The inverted classroom model is called so since it inverts or "flips" the traditional classroom design where mostly the low order teaching like knowledge transfer takes place in class, while most higher-order tasks like analysis, synthesis and evaluation of information, and group works are done outside the classroom through homework (Lage, Platt, & Treglia, 2000; Talbert, 2014).

The results of many studies have supplied evidence that the quality of the classroom environment in schools has a significant effect on student development and learning (Afari, Aldridge, Fraser, & Khine, 2013; Dorman, Adams, & Ferguson, 2003; Fraser & Treagust, 1986; Fraser, 1998; Velayutham & Aldridge, 2013). Students learn better when they perceive their classroom environment positively (Chionh & Fraser,

2009). Classrooms that are perceived by students as supportive and non-threatening in terms of teacher-student interaction increase achievement and also enjoyment of the courses (LaRocque, 2008). In other words, students learn better when they perceive the classroom environment positively (Dorman, Aldridge, & Fraser, 2006). On the other hand, the classrooms that are perceived by students as having fewer opportunities for student choice, cooperation and collaboration with peers result in the decline in the students' involvement levels and achievement scores (Wang, 2012).

Haertel, Walberg, & Haertel (1981) conducted a meta-analysis study to investigate the correlations between student perceptions of classroom environments and learning outcomes. The study included 17.805 students from 12 studies conducted in four different nations. The results of the study showed that classroom environment dimensions of cohesiveness, satisfaction, task difficulty, formality, goal direction, democracy and the material environment were positively related to the learning outcomes. On the other hand, they stated that classroom environment dimensions of friction, cliqueness, apathy and disorganization were negatively related to learning.

Similarly, the study that was conducted by O'Reilly (1975) investigated the relationship between the classroom environment dimensions and student achievement in 48 mathematics classes in Ontario. By implementing Fraser's (1986) 15 scales of Learning Environment Inventory, 67% of variance was found to account for the students' achievement scores. While higher achievement was found in classes which were characterized by high scores on the cohesiveness, satisfaction, difficulty, organization dimensions; low achievement was found in classes which were characterized by high scores on friction dimension.

It was stated that although students' personal and social characteristics were importantly related to the achievement, psychosocial classroom environment created by teachers is a more important factor. Similarly, Fraser, Pearse & Azmi (1982) stated that Indonesian students in Grades $8^{th}$ and $9^{th}$ were satisfied in classes which were perceived as having more involvement opportunities and less independence. They also found that students perceived the level of anxiety lower in classes which were perceived as having more differentiation, involvement and affiliation. Moreover, the involvement of students in classroom discussions and arguing their ideas and understandings with their peers rather than just listening to and receiving information

sent by teacher passively is an important aspect of classroom environment. Similarly, the findings of the study conducted by Dotterer & Lowe (2011) support the notion that classroom context is an important predictor of school engagement. Furthermore, a better classroom environment takes the personal relevance property into account. In order to increase students' involvement during the learning process, teachers or instructors should make the content relevant to students' lives outside of the school.

In addition to these, Afari et al. (2013) indicated that teacher support and personal relevance properties of classroom environment were positively related to students' enjoyment of their mathematics lessons. Furthermore, if students are persuaded that the learning activity is important for their life, appealing and useful for their future professions, they are involved in activities, put in more effort and persevere longer towards completing tasks (Velayutham & Aldridge, 2013). Moreover, in classroom environments where students perceive greater participation and involvement in activities, their enjoyment of lessons is enhanced (Rentoul & Fraser, 1980). Atbas (2004) investigated the effect of several affective, characteristics of preparatory class students and their experiences of the psychosocial classroom environment in accounting for learning outcomes. The findings revealed that teacher support and involvement were significant predictors of achievement. Chien (2007) found that business management students' perceptions of teacher support, task orientation and equity properties of classroom environment were positively associated with attitudes towards a subject. Similarly, Chionh & Fraser (2009) stated that Singaporean Grade 10 students' the attitudes and self-esteem in geography and mathematics courses were more favorable in classrooms which were perceived to have more teacher support, task orientation and equity.

Ozdemir & Rahimi (2013) revealed that students expected a constructive classroom environment where they felt relaxed and stress-free with sincere, kind, friendly and tolerant teachers. They expected their teachers to establish a good rapport with them, which indicated that communication with teacher was one of the most motivating factors that affected learning. On the other hand, Peters (2013) examined the relationships among classroom environment, self-efficacy and student achievement in undergraduate mathematics course. It was revealed that in teacher-centered classroom environments students in algebra course had greater mathematics

self-efficacy levels than student-centered classroom environments and classroom environment was not a significant predictor of mathematics achievement. Similarly, Kingir, Tas, Gok & Vural (2013) found that students who interacted with each other to improve their understanding demonstrated higher academic performance.

Additionally, the way students perform academically may alter their perception of the environment, which should be taken into consideration by teachers when trying to create an advantageous learning environment. In the study conducted by Wang (2012), it was observed that students' math classroom experiences predicted the number of high school mathematics courses taken by students and their desires for a future profession related to mathematics. It can be said that if students do not perceive their environments in a positive way, it may not be beneficial for the learning and choices for future professions.

In the current study, the focus was also on students' perception of different dimensions of classroom environment. Since much of the learning takes place in a context where students interact with the teacher, among themselves and the learning materials, it is crucial to explore the impact of different classroom environment variables on learning outcomes.

### 1.2. Purpose of the Study

The purpose of this study was to develop and implement flipped learning materials in the Principles and Methods of Instruction course and investigate the effect of flipped learning on pre-service teachers' achievement and perceptions related to classroom environment.

Based upon the main purpose of the study, the following research questions were proposed:

1) Is there a significant difference between the experimental and control groups according to achievement test scores and final grades?
2) Is there a significant difference between the experimental and control groups according to the perceptions of classroom environment (satisfaction, cooperation, involvement, task orientation, student cohesiveness, difficulty) scores?

3) What are the perceptions of pre-service teachers about flipped learning and classroom environment?

### 1.3. Significance of the Study

When the previous studies related to flipped learning are revised, although the results of many research studies suggest that student learning is better in the flipped learning environment compared to traditional classrooms, it is still an open issue. Moreover, students' perceptions about the pre-class preparation, flipped learning activities, videos and teacher- student interaction and their effect on student achievement, involvement, satisfaction and perceptions are also not clear. Hence, this study intends to better understand the effect of flipping a classroom on student achievement and students' perceptions related to classroom environment.

The purpose of this study was to develop and implement flipped learning materials in the Principles and Methods of Instruction course and investigate the effect of flipped learning on pre-service teachers' achievement and perceptions related to classroom environment. Achievement of students is one of the most important variables that determine the effectiveness of a new teaching method. In this regard, the examination of the impact of flipped learning on pre-service teachers' achievement is thought to contribute both to literature and studies related to pre-service teacher training since there is not enough satisfaction about the findings of research studies to be able to say exactly about the contribution of flipped learning on pre-service teachers' achievement. Hence, there is still a need for research about the contributions of flipped learning on pre-service teachers' achievement.

This study was conducted in the Principles and Methods of Instruction course with the use of flipped learning approach. The primary reason for applying flipped learning is that this course is one of the compulsory courses that pre-service teachers from all departments have to take. This course requires knowledge related to teaching profession. Moreover, Principles and Methods of Instruction course includes various concepts that students often find difficult to learn and apply. Since traditional classrooms provide direct instruction in class and mostly expect students to practice what they have learned later in their future professions without applying them during training, this is a problematic situation for pre-service teachers. Moreover, it is stated

by Smith (2015) that teachers teach the way they have been taught. Hence, flipping the Principles and Methods of Instruction course may create an opportunity for pre-service teachers both to observe and experience this new pedagogical approach at firsthand and deepen their understanding of the course content by presenting the knowledge outside of the class time.

The psychosocial aspect of the classroom has received considerable interest over the last few decades and it focuses on the importance of creating positive classroom environment for the cognitive and affective development of the students. Hence, it is thought that the psychosocial aspects of the classroom environment should be investigated in both flipped learning and traditional classroom environment to learn the perceptions of pre-service teachers and design instruction accordingly.

Moreover, there is a need for studies which investigate classroom environment in flipped model with pre-service teachers. Hence, this study is one of the first studies which provide valuable results about the flipped learning. Also, this study provide important results about the psychosocial aspect of the classroom promoting or inhibiting learning in pre-service teacher training. In addition to these, although there are many studies related to classroom environment at the elementary and secondary level, little corresponding work has been conducted at the tertiary and university level. Hence, this experimental study is of great importance in terms of being one of the first studies related to classroom environment of pre-service teachers and aiming to increase the effectiveness of teacher training.

In the literature, it was stated that active learning strategies impacted the learning environment and increased engagement (Yemma, 2015). On the other hand, the practices involved in active learning strategies consume a large portion of class time which is required to present the course content. The flipped learning model presents a solution to this issue besides other benefits. However, many instructors and teachers do not prefer to implement active learning strategies and they continue to teach according to traditional instructional methods because there is a gap in the literature about the resources and the course design process of flipped learning. In order to implement flipped learning, the kinds of resources that will be included and the course design process of it should be planned in a detailed way. In this regard, this study filled the gap in terms of providing knowledge about materials, pre-class tasks

and how the class activities and videos should be prepared and used in the learning process.

It is also important to examine the classroom environment from the perspectives of students to understand the processes that students experience about the flipped learning. Students can provide more information about the environment since they are themselves participants. An observer in this process may miss or consider some information as unimportant. In this study, the experiences of pre-service teachers about the learning environment and their impressions about attributes of a specific classroom were investigated.

This study is also important because it is one of the first experimental studies about learning environments in Turkey and it represents the learning environment studies that have focused specifically on Principles and Methods Instruction course for pre-service teachers. In addition, because of lack of suitable, reliable and practical instruments for the use of pre-service teacher education classrooms, this research made a noteworthy contribution by developing a new classroom environment instrument with a strong factor structure for pre-service teachers. The instrument was validated with a large sample and is easy to apply and use in the future by researchers.

Apart from these mentioned, the validity of findings of the study was verified by a wide range of quantitative analyses and enrichment with qualitative methods. It can be said that this study contributed to the literature by combining both qualitative and quantitative methods.

Finally, the findings of this research provided useful information related to classroom environment for teachers and instructors in order to familiarize themselves with both positive and negative characteristics of the classroom environment. Also, the evaluation of classroom environments informed instructors about the effects of classroom environment on pre-service teachers' learning. Hence, the findings of this study may be used by teachers while designing learning environments for their students to stimulate and optimize student learning addressed in this study.

### 1.4. Definition of Important Terms

**Flipped Learning:** "implies the inversion of expectations in the traditional lecture. That is, through the use of computer technology and the Internet (e.g., video-recorded

lecture available online or on a CD/DVD), the information-transmission component of a traditional lecture is moved out of class time and replaced by a range of interactive activities designed to entice active learning" (Abeysekera & Dawson, 2015, p. 2).

**Traditional Instruction:** Traditional instruction is a teacher-centered instruction which involves the dissemination of knowledge from teacher to students through one-way discourse, mostly involves presentations and restricted question-answer strategies as in-class activities and homework as outside of the classroom (Caudill, 2014).

**Classroom Environment:** "The concept of environment, as applied to educational settings, refers to the shared perceptions of students and teachers in that environment" (Fraser, 1986, p. 1).

**Academic Achievement:** It is the total level of cognitive learning determined according to the results of achievement test applied at the end of the semester and grades taken from reflection papers and quizzes.

**Experimental Group:** Experimental group involves pre-service teachers taught the content of Principles and Methods of Instruction course according to the principles of flipped learning.

**Control Group:** Control group involves pre-service teachers taught the content of Principles and Methods of Instruction course according to the principles of traditional instruction.

**Principles and Methods of Instruction Course**: "This course aims to equip pre-service teachers with the knowledge of basic concepts related to education and instruction, explain concepts related to learning and teaching, acquire main learning and teaching approaches, methods and techniques, implement teaching strategies, methods, comprehend and put principles of planned instruction into practice, use suitable teaching materials and tools, become aware of teachers' duties and responsibilities and to comprehend relations of these with teacher qualifications" (YÖK, 2007).

# CHAPTER 2

# REVIEW OF THE LITERATURE

This chapter presents a review of the relevant literature about flipped learning and classroom environment and tries to explore the differences between flipped learning and traditional instruction on students' learning and other outcome variables. In this chapter, mainly the background of flipped learning, definitions, positive and negative sides of flipped learning were explained. Moreover, the definition of classroom environment and the effect of it on student learning in different classroom contexts were explained. Research studies about flipped learning and classroom environment were also included in this chapter. The summary of the reviewed literature was given at the end of the chapter.

## 2.1. The Flipped Learning

Flipped learning was first used in the 1990s in elementary and secondary education and later it was referred to as the flipped learning (Missildine, Fountain, Summers, & Gosselin, 2013). A professor of physics from Harvard University, Eric Mazur defined learning as a two-step process. In the first step, it includes transfer of information and in the second step learners should make sense of that information by connecting it to people's own experiences (Demski, 2013). Lage et al. (2000) defined it "inverting the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa" (p. 32). The idea of flipped learning is that instead of allocating time to present a concept through lecturing, the instructor can use limited and significant class time for more involving activities and group work. Bishop and Verleger (2013) stated that flipped learning represents an expansion of the curriculum, rather than a mere re-arrangement of activities.

The flipped learning is defined by the Flipped Learning Network (2014) as "a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter". The fundamental principle of the flipped learning is that students begin to interact with new concepts outside of the traditional classroom and then they apply what they have learned in the classroom (Bergman & Sams, 2012; Mason, Shuman, & Cook, 2013; Milman, 2012; Phillips & Trainor, 2014). By confirming this definition, Butt (2014) indicated the definition of flipped learning as "at the heart of the flipped learning is moving the "delivery" of material outside of formal class time and using formal class time for students to undertake collaborative and interactive activities relevant to that material." Bishop and Verleger (2013, p. 6) showed the graphic representation of flipped learning in Figure 2.1. They defined the flipped learning as "an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom (p. 5)". However, while defining flipped learning they did not involve the designs that did not use videos as an outside of the classroom task.

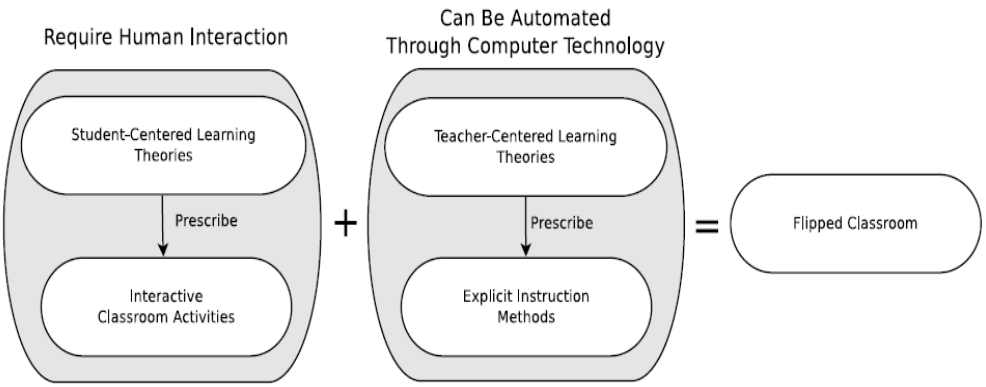


Figure 2.1. The Graphic Representation of Flipped Learning

In addition to these, Foertsch, Moses and Strikwerda (2002) defined a flipped learning conducted in Computer Sciences course for engineering majors as "in-class lectures were replaced with videotaped lectures and other materials that students

viewed on the internet on their own schedule, making it possible to use the live class periods for small, team problem-solving sessions facilitated by the professors and a teaching assistant (p. 267). In this definition, they reversed the sequence of lecture and homework type instruction included in a traditional course. In this way, they freed face-to-face class time for active problems. In order to free class time for these activities, instructors record their own videos or screencasts, use online videos (i.e., Khan Academy), PowerPoints or lecture notes that teach students the concept (McLaughlin et al., 2013).

The term flipped learning is attributed to Jonathan Bergman and Aaron Sams. They were high school teachers in Colorado and they created screencasts and podcasts for their students in 2006 (Milman, 2012). In the literature, flipped learning is included as one of the strategies of blended learning and researchers have used different terms for flipped learning like flipped classroom, inverted classroom, flipped lessons, flipped learning or flipped thinking (Sams & Bergman, 2013).

According to the literature, there are some shared properties of flipped learning. Flipped learning is characterized by a change in the use of in-class and out-of-class time; pre-class activities and post-class activities. As a pedagogical approach, flipped learning requires teachers to move lecture part of teaching out of class and students complete pre-class activities in order to benefit from in-class tasks efficiently and students complete assignments and conduct activities involving group work and peer support in class (Abeysekera & Dawson, 2015).

### 2.2. The Limitations of Traditional Pre-Service Teacher Education

In traditional pre-service teacher training classrooms, while students gather at the class meetings to learn the content of lectures from instructors and take notes, they work on assignments, projects, tasks and other activities, usually on their own, outside of the class (Bergman & Sams, 2012; Hamdan, McKnight, McKnight, & Arfstrom, 2013; Talbert, 2012). The role of instructors is mainly the transfer of information in class. (Love, Hodge, Grandgenett & Swift, 2014; Talbert, 2014). Foertsch et al. (2002) stated that the traditional instruction was an ineffective way of teaching because of being a passive one-way flow of information from professor to students. Moreover, during traditional instruction if they have time, they pay attention to the questions of

students outside of class. On the other hand, flipped learning integrates new technologies to provide students with audiovisual options while they are learning the subject. More importantly, it redefines class time as a student-centered environment (Missildine et al., 2013). In the flipped learning, besides teacher-created videos that students watch at home, the most essential factor is about the effective use of videos and in-class time with students (Davies et al., 2013; Sams & Bergmann, 2013).

According to Talbert (2014), traditional pre-service teacher training classes have many disadvantages for them. First of all, in a traditional university class, instructors have limited time and they are hardly available out-of-class to answer the questions of students and correct their mistakes immediately while they are working on an assignment, a project or a task. The flipped learning includes multiple communication opportunities between the instructor and students, hence students can ask questions and instructors give immediate feedback which facilitate learning (Ziegelmeier & Topaz, 2015). For example, the inclusion of social media and the online discussion boards in which students can ask questions to the instructor and their peers at any time and get help from both sides diminish the feeling that students are being made to learn on their own (Talbert, 2014).

Sams & Bergmann (2013) question 'in which stage in the learning cycle do students most need instructor face-to-face? When instructors introduce the subject through lecturing? or while they are trying to make sense of that information and make applications related to the topic?' In traditional classes, students have to perform higher level tasks outside of classes on their own and remote from their instructors' help. However, in traditional classes, instructors are available in class to help students, when they take the information which is according to Bloom's taxonomy at the lowest cognitive level. Hence, it seems that changing the order of instruction might be an improvement for pre-service teacher education classes (Talbert, 2012).

Moreover, during traditional instruction, instructors have limited time to differentiate. In a flipped learning, there is enough time to work with students in person and meet their specific needs (Caudill, 2014). There are students who become bored and need to be given additional resources to go deeper into the topics (Caudill, 2014). On the other hand, during traditional lectures, students cannot pause or repeat important segments of the lecture, they lack control over the flow of information being

presented during lectures (Talbert, 2014). The traditional instruction is not beneficial for students who lack self-regulation skills because of not being able to manage their time to conduct some tasks or assignments after the class (Talbert, 2012). In the flipped learning, instruction can be personalized to each student's needs (Bergman & Sams, 2012; Talbert, 2012; Zappe et al., 2009). In the flipped learning, students can rewind to hear the online lectures again, listen as much as they need, pause to reflect on what is being said and view the lectures on a mobile device rather than in a fixed location.

Finally, the traditional classroom limits the use of hands-on experiences (Caudill, 2014). The term 'hands-on' has been used to describe occurrences in the classroom as the use of manipulatives, experiments, authentic learning experiences, inquiry bases problem solving, real-life problem solving and collaborative experiences. In the study conducted by Caudill (2014), the average retention rate for a lecture-based classroom is stated 5%, demonstration (30%), practice by doing (75%), and teaching each other (90%). Flipped learning, by freeing up most of the class time to implement student-centered activities including collaborative learning activities, has the highest average rate of retention (Caudill, 2014). As also stated by Foertsch et al. (2002), in this way, face-to-face class time may be used for interactive exercises in which the students can apply their new knowledge under the guidance of their instructor. In other words, in flipped learning in-class activities involve focusing on and internalizing the material with the direct help of peers and the instructor. The consequence can be a more interactive, effective, productive and more student-centered classroom instead of a passive traditional classroom (Talbert, 2012).

### 2.3. How to Design an Instruction According to Flipped Learning Principles

Although flipped learning is seen easy to implement, there are important differences while designing and implementing real classroom practices (Bergmann & Sams, 2012). It changes according to the course, grade level, institution and the instructor (Ziegelmeier & Topaz, 2015). Flipped learning is typically implemented by watching the videos at home and doing tasks or assignments in class instead of doing them at home. However, flipped learning is more than that simple vision. This approach involves two different modes of learning and it does not mean simply combining the two or laying one on top of the other, but it means integrating the two

different modes of learning by maximizing the advantages of each environment (Lee, Lim & Kim, 2016).

The common approach is that the lecturing part of the course is transported to outside of the classroom in forms of watching videos, reading articles, exploring online materials, reflecting about them or small quizzes (Abeysekera & Dawson, 2015; Bormann, 2014; Talbert, 2014). In this way, face to face part of the class can be allocated for discussions, answering students' questions which were uncovered during pre-class preparation and engaging in collaborative learning activities (Ziegelmeier & Topaz, 2015). At this point, Sams & Bergmann (2013) stress the fact that flipped learning is not about watching teacher-created or internet videos at home. Also, it is not about preparing videos in different courses and transferring instruction time outside of the classroom. It is about how to best use instruction time with students. Similarly, as also stated by Milman (2012), this approach involves more than just the video lecture. Besides video lectures or screencasts, it should also incorporate meaningful face-to-face learning activities as well as formative and summative assessment. As it was seen in the findings of Davies et al. (2013), how the technology was integrated to learning made the difference not just the inclusion of technology.

In the flipped learning, teachers or instructors provide materials, which are around 20 minutes short videos, screencasts or podcasts, created or selected by themselves for students to be studied when and where students feel most comfortable out of the classroom and considering their own learning speed (Phillips & Trainor, 2014). Bergman suggested the one to 1½ minutes per grade level rule to address the problem of videos' length. It means that for a sixth-grader, videos should not be longer than nine minutes; and for a 12$^{th}$-grader, the length of videos should not be longer than 18 minutes (Raths, 2014).

There are many tools which are easy-to-use to record video lectures or create content. There are different Learning Management Systems (Butt, 2014; Kecskemety & Morin, 2014; Strayer, 2012; Talley & Scherer, 2013; Wilson, 2013) or YouTube to distribute videos, video resources, formative and summative assessment and analysis tools which may help instructors to adapt teaching for new generation students (Gaughan, 2014; Mason et al., 2013; Thiele, 2013).

Bishop and Verleger (2013) stated that face-to-face part of the flipped learning was quite important and student-centered active learning theories provide the philosophical basis for the design of these activities. Inside the classroom, before the application phase, students receive a brief lecture which stresses the important points stated in the video lessons. During the brief lecture, instructors review students' performance about pre-class activities and address any confusion during this time and answer students' questions that arise during the pre-class preparation (Lage et al., 2000; Milman, 2012). Moreover, during the face to face part of the course students should conduct well-designed sense-making activities through increased communication with their peers and instructors (Talbert, 2014).

In addition, some flipped learning designs assess student pre-class preparation thorough in-class student response systems like Socrative or Kahoot, peer discussions and presentations (Lage et al., 2000; Talbert, 2012). Students can present a summary of their reflections or face-to-face class time can begin with a short quiz about the content of online lecture or readings. Many of in-class activities require the utilization of smartphone apps and tablets to answer clicker questions using Socrative or Kahoot to provide immediate feedback about misconceptions or learning gaps as formative assessment (O'Flaherty & Phillips, 2015). It is suggested that the assessment questions should be narrowed to lower level cognitive tasks like remembering and understanding to check whether the students completed the pre-class tasks (Morin, Kecskemety, Harper, & Clingan, 2013). Furthermore, while some studies included quizzes outside of the classroom (Enfield, 2013; Mason et al., 2013; Strayer, 2007), others included them in face-to-face part of the class (Morin et al., 2013; Talley & Scherer, 2013). Moreover, while some instructors evaluated them and graded (Tune, Sturek, & Basila, 2013), others regarded them just as a way to check whether students were ready in terms of knowledge for class activities, hence they did not attach a grade (Butt, 2014; Gaughan, 2014).

Following the brief lecture and small quizzes, the real application activities begin. These activities aim to expand on the preparation activities to reach higher cognitive levels such as application, analysis and synthesis. During the class activities, instructor answers questions, provides feedback and checks student progress (Bergman & Sams, 2012; Morin et al., 2013). Touchton (2015) stated that flipped

learning activities should be completed when students perform assignments and activities under the inspection of instructor with peers in class.

On the other hand, there are some different flipped learning designs. For instance, in the study conducted by Davies et al. (2013), in a college-level information systems spreadsheet course, students who were taught according to flipped learning approach learned the course content on their own, and they were not required to come to class unless they needed help. Class time was only used to provide help for a few students who needed extra help. In other words, during face-to-face part of the flipped course, students did not conduct activities, discussions or group works.

In another study conducted by McLaughlin et al. (2013), freshman pharmacy students were taught Basic Pharmaceutics II course according to two different delivery methods for two concurrent years. In the first year, 13 satellite students learned the course according to the principles of traditional instruction. The second year, 22 students on two different satellite campuses learned the course according to flipped learning principles. The course was delivered synchronously through video teleconferencing to satellite classrooms during both years. Also, since students' desks were equipped with microphones and video cameras, all students could view each other at each campus when asking questions or engaging in discussion.

In addition, in the flipped learning literature, details regarding the design of videos have not been mentioned (Umutlu, 2016). However, the videos which are designed by using different modalities might result in differently in terms of learning gains in education. Umutlu (2016) examined the effect of which modality of flipped videos, including animation/diagram, narration and on-screen text presented either simultaneously or sequentially in a system-paced or user-paced design on the writing achievement of students. In this study, it was found that groups studying the animation with simultaneous narration and sequenced text in a whole presentation and in a part-by-part presentation outperformed the control group in the essay writing posttest. In other words, it can be said that videos which are designed by using different modalities may result in differently in terms of cognitive and affective outcomes. However, some other factors which were explained below might have played important role on the results.

## 2.4. The Pillars Associated with the Acronym Flip

Bergmann & Sams (2012) distinguished differences between flipped learning and flipped classroom. They indicated that flipping a class did not always constitute flipped learning. Many teachers have flipped their class by assigning text reading outside of class besides watching videos or other assignments like problem solving. This procedure in itself does not constitute flipped learning. Bergmann & Sams (2012) identified four pillars that should be incorporated into classroom practice to constitute flipped learning.

The acronym FLIP has four main pillars and was defined as "Flexible Environment", "Learning Culture", "Intentional Content", and "Professional Educator" (Hamdan et al., 2013). The flexible environment, besides the reorganization of learning space to support group or independent work, includes the flexibility of learning times and evaluation methods. In other words, students can choose when and where to learn and flipped learning provides multiple means for mastery of content (Bergmann & Sams, 2012). Therefore, teachers are expected to define learning objectives, tasks and evaluation process clearly.

The learning culture of flipped learning requires the active involvement of students while processing the information and also active participation in group activities. The activities are challenging and beyond the comfort zone of students like producing a sample product. In flipped learning, students are supported by teachers who help them in the conceptual understanding of the concepts. Scaffolding activities and the use of differentiated learning are provided to engage students in the learning (Bergmann & Sams, 2012).

As for the intentional content dimension, during the flipped learning process, teachers have to identify the competencies of students and the difficulties of the content. In this way, they can evaluate which part of the content they need to include in face-to-face part of the teaching and which part of it they leave to students for self-study or group study. The intentional content is important to maximize the effective use of classroom time and involve different student-centered and active methods (Bergmann & Sams, 2012).

As for the professional educator dimension, since flipped learning is more demanding than the traditional instruction, in order for teachers or instructors to apply

this model successfully, they have to be qualified as a reflexive professional in their practices and flexible in managing their lesson plan. Also, they should be able to deal with changing and unpredictable classroom processes. Moreover, they should be sensitive about taking different learning rhythms, contributions and interests into account. Finally, it is necessary for teachers to understand the proper moment to involve lecturing, self-learning resources and group work (Hamdan et al., 2013).

In the literature, it was questioned that whether only FLIP –"Flexible Environment, Learning Culture, Intentional Content and Professional Educators"– was enough. Educators tried to answer whether positive results were guaranteed when all four pillars of FLIP existed. It was concluded that FLIP needed an extension such as "FLIP-PED", where "PED" stood for "Progressive Networking Activities, Engaging and Effective Learning Experiences and Diversified and Seamless Learning Platforms" (Umutlu, 2016).

Bergmann & Sams (2012) emphasized that what created a difference in flipped learning was not about assigning online lectures to home, but designing meaningful in-class activities for students. Flipped learning should emphasize the link between the video lectures and in-class tasks. The more they are linked, the more students engage. In a flipped learning environment, students can conduct a variety of activities such as discussions, student presentations, micro-teaching activities, individual or paired computer based applications, role plays, case studies, group investigations, problem solving activities, creative scenarios and simulations in order to transfer the video content to hands-on tasks, which results in deep learning in contextualized and meaningful learning environment (Umutlu, 2016).

### 2.5. Theoretical Frameworks Related to Flipped Learning

The flipped learning does not use classroom time to deliver lectures. Instead the class time is separated for involving and active learning experiences. Hence, it is important to examine the existing theoretical frameworks, models and pedagogical approaches underlying the flipped learning. In Figure 2.2, the relationships among different student-centered learning theories were presented.

It was stated by Bishop and Verleger (2013) that Piaget who contributed to constructivism and Vygotsky's zone of proximal development had an important effect on cooperative learning. Also, peer-assisted learning was stated as an umbrella term to

accommodate both cooperative and collaborative learning. Constructivism is considered as the source for the theories of problem-based and active learning. Kolb's theory of experiential learning draws on the works of Piaget, Dewey and Lewin.

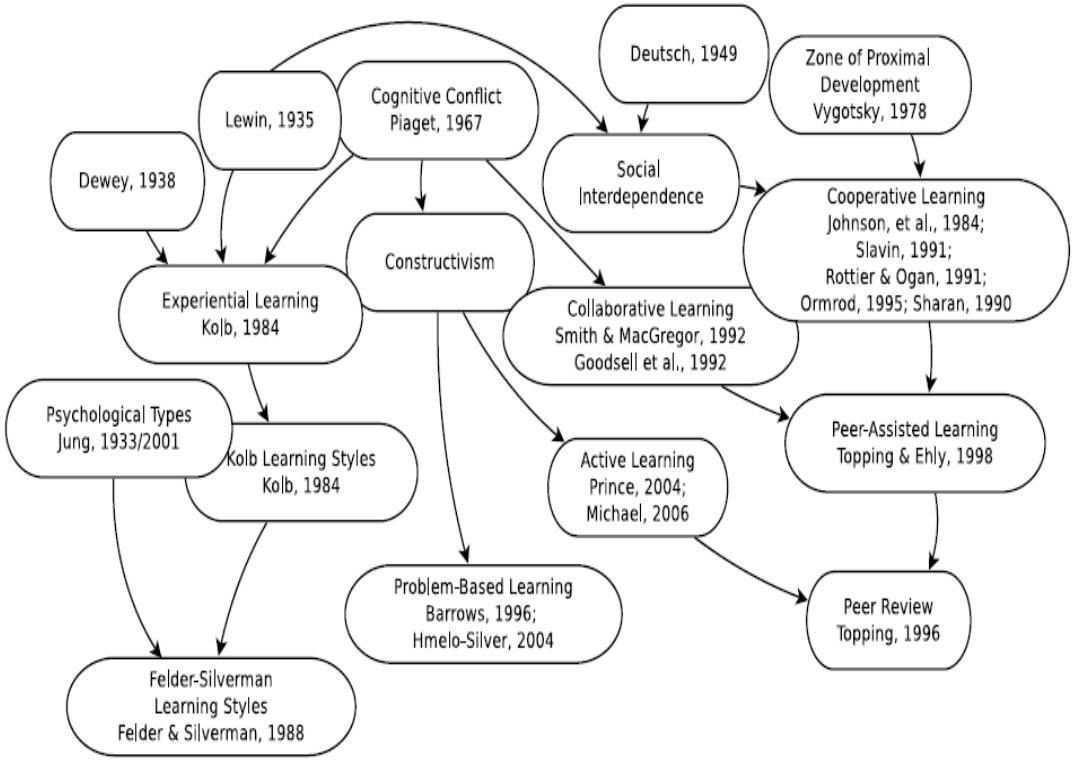


Figure 2.2. The Relationships among Student-Centered Learning Theories (Source: Bishop and Verleger, 2013, p. 7).

As shown in Figure 2.3, flipped learning requires a shift from a teacher-centered instruction to a student- centered one, a change in pedagogical practices and the use of technology that focus on individualized and active learning structures such as differentiated learning, mastery learning, cooperative learning and collaborative learning in which students are engaged in their learning. The extensive exploration of all of these is beyond the scope of the current work; however, each of these theories, models and different pedagogies are briefly explained below.

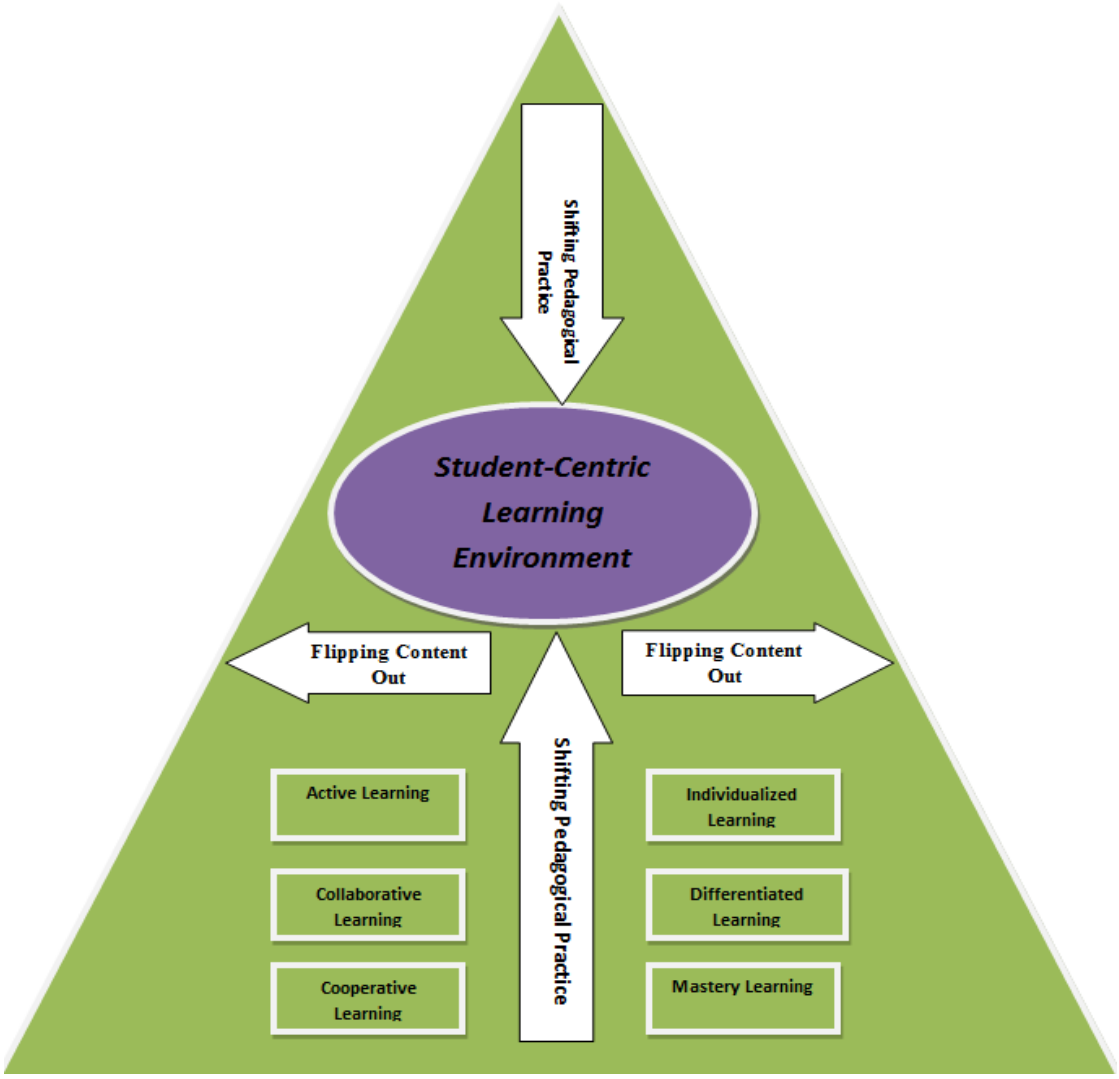


Figure 2.3. Pedagogical Framework for Flipped Learning
(Source: Reinhardt, 2014, p. 23).

### *2.5.1. Constructivism*

The foundations of Constructivism has its roots in philosophy, anthropology, psychology, sociology and education, and was promoted by Piaget, Vygotsky, Bruner, Dewey and Glasersfeld (Paily, 2013). One of the important elements of constructivism is the active construction of new knowledge by the learner based on his/her experiences. Constructivism defines learning as self-innovative and nonlinear building process that emerges as a result of students' active interaction with their physical and social surroundings, interiorizing information and comparing the previously acquired

information with the new one (Uredi, 2013). According to constructivism, information is gained through participation and social interaction. As students interact with one another, they exchange meaning and develop their own understanding of concepts and behaviors, which shapes students' understanding (Schreiber & Valle, 2013).

According to constructivism, in teaching process, the questions asked have changed from "What should we teach?" "How should we teach?", "With what should we teach?" which emphasize the receiving and memorization of information to a perspective where "What would s/he like to learn?", "What will s/he do to learn?", "What would assist him/her in the learning process?" and 'To what extent did s/he learn?" (Cubukcu, 2012). Bose (2010) stressed that traditional education which was based on behaviorism, assigned students passive roles in learning and emphasized memory-based, short-term information accumulation and teachers conveyed the information to students mostly through lecturing. Similarly, Knight & Wood (2005) stated that traditional methods like lecturing is a comparatively inefficient method for building up conceptual learning. On the other hand, constructivist approach supports student-centered learning and teaching which takes students' interests, demands and needs into consideration, hence, establishes an efficient learning environment (Cubukcu, 2012; Uredi, 2013). Instruction in a constructivist classroom should rely on a student's readiness. The organization of the curriculum should be in a spiral fashion, and go beyond the curriculum mandated by the school or district (Ramaglia, 2015).

According to constructivism, learners construct new ideas and concepts based upon their current knowledge and experiences (Bruner, 1960 as cited in Smith, 2015). Hence, learners must have a solid foundational base of knowledge before conducting student-centered learning activities, and learning occurs through the processes that assimilate new experiences to the existing ones (Yemma, 2015).

According to constructivism, teachers adhere to student-centered classrooms and they are influenced by constructivism, social learning theory, humanism, and progressive philosophies (Cubukcu, 2012). Student-centered learning places the students in the center of the learning process in which they play an active role in their own learning (Cubukcu, 2012). In a constructivist learning environment, active participation of students to the real life experiences is provided to achieve deep and meaningful learning (Uredi, 2013). In the constructivist environment, teachers or

instructors emphasize different tasks in meaningful contexts, support and guide students' learning cooperatively and reflect upon students' experiences, hence, students can be capable of their own knowledge production (Schreiber & Valle, 2013). Teaching practices which were based on constructivism help learners to internalize, reshape or transform new information for deep understanding and learning (Brooks & Brooks, 1993). In constructivist environment, students discuss the topic in different paired or group activities, share their opinions with their peers, find solutions to real life problems and discover new concepts. According to constructivism, the role of the instructor is not to solve the group's problem but to monitor, coach, guide and facilitate learning by asking leading questions and helping the students generate a list of potential solutions (Schreiber & Valle, 2013). In constructivist learning environments, teachers are in close interaction with the students and their role is to help students to construct their own information (Uredi, 2013).

Moreover, constructivism emphasizes assessment of process rather than product. Alternative assessment techniques like student portfolio, self-evaluation, observation forms, peer evaluation and rubrics are attached more importance than multiple choice tests or written exams. According to constructivism, since class time is used to apply what students have learned from the videos, it allows instructors to use various formative techniques to assess whether students understand the content or not. Moreover, instructors have the opportunity to correct misconceptions before a summative exam as also stated by Berrett (2012).

### *2.5.2. Social Learning Theory*

According to social learning theory, knowledge is built in a social context and then taken over by individuals. According to Bandura, most human behavior is learned through observing and modelling (Bandura, 1977). When the learner is attentive to instruction, retention, reproduction, and motivation will likely occur (Saunders, 2014).

According to Vygotsky (1978), successful cognitive growth is dependent on the social interaction between a learner and other peers. Vygotsky's theory proposed the term "the zone of proximal development" which is "the distance between the actual developmental level as determined by independent problem solving and the higher level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). In

other words, this term implies the fact that it is the difference between what a learner can learn on his/her own and what the learner can learn with the support of others. Vygotsky refers to this support from others as scaffolding. De León (2012) stated that scaffolding is a manner of delivering instruction where the teacher provides guidance or support as learning occurs and gradually removes these supports as the learner becomes increasingly more independent. Instructors or teachers provide guidance and support for different tasks that are beyond the students' capability until they can complete the tasks autonomously (Schreiber & Valle, 2013). Social learning theory, supports learning because students are helped by a teacher, an instructor or more knowledgeable peer to develop students into the zone of proximal development.

### *2.5.3. Experiential Learning Theory*

Chan (2012, p. 405) has defined experiential learning as "learning by actual experience". The transfer of learning has been stated as one of the conclusive aims of teaching (Furman & Sibthorp, 2013). Students can transform knowledge learned in the classroom and from textbooks into their understanding by participating in real-life activities. Experiential education places focus on learning, constructing personal meaning and pulling knowledge from prior experiences (Furman & Sibthorp, 2013). According to experiential education, by shifting from behaviorism and passive learning to cognitive, social, constructivist and active learning strengthens meaningful, active and practical learning.

Experiential learning builds on constructivism and the work of John Dewey (1938). It involves experiences that draw upon Kolb's (1976) all four modes of learning including concrete experiences, abstract conceptualization, reflective observation and active experimentation (cited in Chan, 2012). When students take part in active experiences and tasks, concrete experience is gained. When students reflects and draw conclusions from their experience, they perform the process of reflective observation. Based on their experiences and learning, students can conceptualize a theory or model during the abstract conceptualization stage, and finally, they utilize their generalizations as a guide to take place in additional activities in different occasions. In experiential-learning environments several strategy, methods and techniques such as problem-based, project-based learning, collaborative learning, discovery learning, guided learning with feedback, self-directed learning, reflective

learning and active learning were proposed to enhance the learning transfer (Furman and Sibthorp, 2013; Tamim & Grant, 2013). Moreover, Chan (2012) stated that experiential learning activities can be designed in different ways such as cooperative activities, hands-on laboratory activities, field studies and community service works. In the experiential learning environments, students demonstrate their learning through activities and are assessed based upon their performance not through their ability of memorizing information. In this way, students can be equipped with life skills and learning to learn. Furman and Sibthorp (2013) stated that by providing feedback together with support and remediation opportunities, experiential learning can be an effective way to increase the possibility of transfer of learning.

### *2.5.4. Mastery Learning*

During teacher-centered lectures, knowledge is transferred from teacher to students. Teacher-centered learning implements the same method for all students (Munir, Baroutiana, Younga, & Carter, 2018). During traditional lecture, "students for whom the instructional methods and amount of time are appropriate learn well, and those for whom the methods and time are less appropriate learn less well" (Guskey, 2007, p. 9). Because of providing little variation in the instruction for students who have different properties in terms of gender, family background, socio economic status, pre-knowledge and learning styles, some students find traditional lecture slow-moving and get bored, others get left behind. Bloom proposed varying instructional approaches and differentiating student learning through the strategy of mastery learning (Guskey, 2007).

According to mastery learning, Bloom suggested that educators at all levels must differentiate instruction to better meet the individual learning needs. However, the challenge was to find practical ways to apply mastery learning within group-based classrooms so that all students could learn well. Bloom stated one of the critical elements of mastery learning as one-to-one tutoring for students who need extra help and individualized instruction (Guskey, 2007).

According to mastery learning, feedback through formative assessment on students' learning progress is important. It identifies what students have learned well, and describes what needs to learn better. Moreover, it provides immediate feedback

while determining conceptual misconceptions and providing opportunities for instant remediation. Students who master the objectives of the initial assessment are provided with enrichment activities to extend their learning (Guskey, 2007). Enrichment activities involve educational games, cooperative group activities, projects require higher order cognitive skills and engaging tasks. In this way, students may learn deeply and truly master the unit concepts or learning goals.

Finally, Bloom stated that mastery learning is not limited to development of cognitive outcomes. It results in improvements in a variety of other affective measures such as attitudes toward learning and course, self-confidence in learning, school attendance rates and involvement in class tasks (Guskey, 2007).

### *2.5.5. Differentiated Instruction and Differentiated Learning*

Tomlinson (2005, p. 263) defined differentiated instruction as "a philosophy of teaching that students learn well when teachers address the variance of student readiness levels, interests and learning preferences". Differentiated instruction provides multiple methods of instruction and provides proper level of challenge and support for each learner's unique needs. Even though there is no certain determined ways for differentiated instruction, there are some effective guides to respond to the needs of diverse learners. Davies et al. (2013) stated differentiation of instruction as one way to improve learning. In this way, specific learning needs of individual students can be addressed and instruction is personalized. In this process, the capabilities of individual learners are identified and instructors provide flexibility in the pace, time, teaching learning materials, instructional strategies and content being presented in order to make instruction meaningful for each student. In this way, students do not have to advance at the same pace (Reinhardt, 2014).

Students are categorized according to learning styles. While some students learn best when they receive direct instruction, others learn well when they are involved in cooperative tasks. In addition to these, some students learn best when they work on their own (Smith, 2015). According to differentiated instruction, different teaching-learning activities including individual, small group and whole class tasks are conducted. Differentiation provides multiple means for students to access the content as well as multiple options to learn different concepts and skills. Differentiated instruction by implement new strategies, contributes active engagement of individual

learners' (Broad, Matthews and McDonald, 2008). Hence, the instruction is individualized based on student needs. As stated by Knight and Wood (2005) students learn considerable amount of knowledge via active teaching-learning methods than just listening to lectures. They stated that learners at all levels attain meaningful understanding of concepts by engaging actively with the learning process and application of new information, not by listening to verbal presentations passively. Also, classrooms become communities of learning in which students share responsibility with the teacher and learn from each other for maximum individual growth (Tomlinson, 2005).

### *2.5.6. Cooperative and Collaborative Learning*

Cooperative learning which is proposed by Slavin, Vygotsky, Bandura, Dewey and Kagan. It proposes that students work together in small groups of heterogeneous ability to achieve their individual and group learning goals through peer feedback and discussion (Johnson et al., 2007 as cited in Munir et al., 2018). While cooperation and collaboration may involve distributed tasks, cooperative learning is characterized by activities requiring individuals to work collectively by dividing the responsibility among group members to attain common goals. (Bose, 2010). Collaboration involves mutual engagement of participants and a coordinated effort to solve the problem or complete tasks.

According to Johnson & Johnson (1998), cooperative learning has some important features as positive interdependence, individual evaluation, face-to-face supportive interaction, individual accountability, interpersonal and small-group skills and evaluation of the group process (as cited in Erbil & Kocabas, 2018).

### *2.5.7. Peer Instruction*

Eric Mazur proposed an active-learning teaching method called peer instruction which can be employed to increase student understanding and deep learning. It involves explanations of students' to each other about how they understand core concepts via problems (Simon & Cutts, 2012). Peer instruction was explained by Fagen, Crouch, & Mazur (2002) as an instruction involving lectures which are interspersed with short conceptual questions to reveal common misunderstandings and actively engage students in lecture courses. The important part of peer instruction is

not getting the right answer for problems; instead, students' using main concepts appropriately in their attempts to understand and solve problems (Simon & Cutts, 2012).

Peer instruction is a pedagogical approach providing small group instruction that can be implemented in conjunction with the traditional techniques (Snyder, Elijah-Carter, & Wiles, 2015). According to Keppell, Au, Ma, & Chan (2006), peer instruction may involve cooperative activities and encourages students to take responsibility for their own learning by providing feedback to other students and receiving feedback from other students in group studies. In a many studies, it was revealed that peer learning improved learning more than lecturing (Keppell, Au, Ma, & Chan, 2006; Schreiber & Valle, 2013; Snyder, Elijah-Carter, & Wiles, 2015).

According to peer instruction, as stated by Simon & Cutts (2012), students attain knowledge about course content before class through textbook reading and complete a quiz to get information about the learning level of a subject before conducting class tasks. During class, lecturing is supported with problems and discussions. The problems asked in class are designed to reveal students' misconceptions and engage them in thinking about deep conceptual issues.

Peer instruction involves group learning activities in the classroom and the practice of self-teaching. Students consider a question individually and select an answer which is usually reported via using a clicker like Kahoot or Socrative. Then, students discuss problems in groups through a cooperative learning technique. For instance, the jigsaw technique builds upon peer instruction and cooperative learning by creating student interdependence, accountability and interactivity with others to promote student learning. After group discussion, students vote again on the same questions. Finally, discussions about the problems conducted class wide (Simon & Cutts, 2012). During peer instruction discussions, instructor can wander around the room, and clarify problems for groups who need help. Moreover, during the class wide discussions, even if the other groups get the correct answer, it is important for the students to hear how others solve and explain the problem. When students' explanations and discussions are not sufficient, the instructor can explain the topic through a mini-lecture.

## 2.6. Research Studies on Flipped Learning

It was found that flipped learning has an important effect on many affective and cognitive outcomes such as student learning, achievement, satisfaction, involvement, self-directed learning, cooperation, communication with the instructor and peers in a wide variety of courses. Some of the studies related to the flipped learning were listed in Appendix C. The table included information about authors of the research study together with the year of publication, course, study type, sample size, data collection instruments, in-class activities, out-of-class activities and findings.

### 2.6.1. Research on Achievement

In the literature, most of the studies investigated the effect of flipped learning on students' achievement together with other cognitive and affective variables. It was determined that flipped learning improved student learning and achievement in a wide variety of courses including statistics (Touchton, 2015; Wilson, 2013); physiological psychology (Talley & Scherer, 2013); cardiovascular, respiratory and renal physiology (Tune et al., 2013); introductory excel (Davies et al, 2013); mathematics (Fulton, 2012a); applied linear algebra (Love et al., 2014); mechanical engineering program (Mason et al., 2013); history (Murphree, 2014) and chemistry (Talbert, 2014).

In addition, Mason et al. (2013) stated that flipped learning allowed the instructor to include more content and provide better performance of students on quizzes and exams than traditional approach in a Control Systems course in the Department of Mechanical Engineering. Students pointed out how they benefitted from online videos, examples that took place in the face to-face-part of the class and how these contributed to their understanding of concepts. While students initially struggled because of learning by themselves and intensive activities that stemmed from the new design, they quickly adapted to it and found the flipped learning to be effective and satisfactory.

Fulton (2012a) stated significant increases in student achievement after the implementation of flipped learning in the Accelerated Algebra II course. Students were provided with videos, notes, homework and extra links to help them visualize mathematics. It was also stated that students' mathematics scores on standardized external exams (the Minnesota Comprehensive Assessment) increased highly.

Day & Foley (2006) implemented flipped learning approach in human–computer interaction course. While one of the sections were taught according to the flipped approach, the other section was taught according to traditional lectures. According to the results of the study, students who were taught according to flipped learning approach performed better on every course assignment.

On the other hand, some of the studies indicated insignificant differences in student learning (pharmaceutics, McLaughlin et al., 2013; engineering, Morin et al., 2013; Introduction to Business Administration-Findlay-Thompson & Mombourquette, 2014; multivariable calculus, Ziegelmeier & Topaz, 2015). Clark (2013) indicated that there was not a significant difference between the performance of ninth grade students who were in the flipped learning group and those who were in the traditional group.

### 2.6.2. Research about Student Satisfaction

Satisfaction was defined by Fraser & Treagust (1986) as the extent to which students enjoy class work. Touchton (2015) reported that flipped learning increased students' satisfaction. The results of the study conducted by Lage et al. (2000) expressed the satisfaction of students who learned according to flipped learning in the microeconomics course and Lee et al. (2016) stated that the implementation of the flipped learning increased satisfaction of Korean students in the algebra course. On the other hand, the results of the study conducted by Kecskemety and Morin (2014) suggested dissatisfaction with the flipped learning approach for the engineering students and Missildine et al. (2013) reported that nursing students were significantly less satisfied with the flipped learning than traditional method. Finally, in the study conducted by Findlay-Thompson & Mombourquette (2014), students were undecided about their responses that they stated both positive and negative ideas about the flipped learning in a business course.

### 2.6.3. Research on Involvement

Although engagement and involvement are used interchangeably, they refer to the same concept. Fraser & Fisher (1994) defined involvement as the extent to which students have clear interest, participation in class activities like discussions, projects, group tasks, do additional work and enjoy the class. It was defined by McLaughlin et

al. (2013, p.2) as "the extent of participation, on behalf of the instructor and the learner, in educationally purposeful activities." In the literature, involvement is positively related to academic achievement and measured through class participation, contributions to group discussions, completion of assigned tasks, and frequency of watching online videos or other material access. Dotterer & Lowe (2011) stated classroom environment and involvement in school related tasks as significant predictors of academic achievement.

O'Flaherty & Phillips (2015) stated one of the multiple justifications for flipped learning that it was seen as a way to promote more participatory and empowering learning experiences for students. Similarly, according to the study conducted by Enfield (2013), students reported that flipped learning provided students with engaging learning activities and it was effective in helping students to learn the content by themselves, hence it improved self-efficacy perceptions of students. In the study conducted by Clark (2013), the ninth grade students stated that flipped learning encouraged their involvement in mathematics and increased their participation in the Algebra I when compared to the prior teaching method.

### 2.6.4. Research about Self-Learning and Differentiation

Baker (2000) stated that flipped learning provided greater sense of responsibility and more control over students' own learning. Flipped learning supports students who learn slowly and have concentration problems and it is also beneficial for quick learners who get impatient when teachers lecture slowly or repeat some parts again (Fulton, 2012a). While a successful student can move faster while watching the videos, others can watch it over and over as needed until the concepts become clear. In addition to these, Caudill (2014) stated that flipped learning lets students control when, where and how they want to learn the content, thus leading to a stronger sense of autonomy.

Yoshida (2016) conducted a study with 66 Japanese pre-service teachers who took educational technology course to find out what they found useful about flipped learning. The results of the study revealed that studying through the videos over and over again, studying at their own pace, whenever they want and stopping the video

whenever it was necessary was found useful because of enhancing the effectiveness of face to face part of the course.

Flipped learning is also useful for students who have enrolled in other courses and have little time to study (Bergmann & Sams, 2012; Lage et al., 2000). In addition to these, when students are absent from class, videos permit students to watch them at proper speeds and as much as they need (Bergmann & Sams, 2012; Enfield, 2013; Fulton, 2012b). Foertsch et al. (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.

Mason et al. (2013) stated that flipped learning is proper to teach course material with different teaching methods and involve students with various learning styles. Similarly, Zappe, et al. (2009) stated that flipped learning may be beneficial for students who learn in different ways like visual, audial, verbal, active or reflective.

Furthermore, in the study conducted by Lage et al. (2000) in the Microeconomics course, students were provided with multiple pre-class preparation alternatives like reading assigned sections of the textbook, viewing videotaped lectures or PowerPoint lectures with sound before coming to class. In other words, students had opportunity to choose among different alternatives to learn the course content. They were given the chance to use all of them or combine some of them according to their individual preferences. By this way, students are able to learn economics according to their individual learning styles. The findings of the study provided evidence that students preferred the flipped learning to a traditional lecture and they indicated that they would prefer to take future economics courses designed according to flipped learning.

### 2.6.5. Research on Cooperation

The increasing popularity of flipped learning stems from using the class time effectively by integrating necessary technology and providing collaborative learning opportunities and increasing engagement in the course (Findlay-Thompson & Mombourquette, 2014). Caudill (2014) stated that flipped learning provides opportunities for collaborative learning activities more than traditional instruction and

as learning becomes more collaborative in nature, students are more readily responsive to becoming active rather than passive in their educational endeavors. Similarly, Millard (2012) added that the collaboration-based tasks, strengthening of team-based skills and increased understanding by using technology to the advantages of flipped learning. Walker (2003) stated that when students shared information in collaborative activities, both communication opportunities among peers and their enjoyment of learning increased. Mason et al. (2013) found that flipped learning when combined with active learning methods does not require the instructor to lessen the amount of course content. Hence, it results in better student performance in learning process.

Cooperation is one of the important components of student-centered classroom environments. Teachers who focus on nurturing students' interests, implement more cooperative activities in classes. During the cooperation based tasks, students work in groups with peers to produce a joint product (Durik & Eccles, 2006). Caudill (2014) stated that during flipped learning pre-service teachers shared their perspectives about the subject in group tasks. In this way, both listeners and speakers understand the subject better. When students were involved in sharing ideas, worked in small-group activities and helped others, the cooperation among them was promoted (Wang, 2012). In addition to these, in cooperative environments, students perceive support from their classmates in terms of feeling cared both as a person and issues related to the course (Patrick, Ryan, & Kaplan, 2007).

### 2.6.6. Research about Communication with the Instructor and Peers

Flipped learning increases the communication between both students and instructor as well as among students (Talbert, 2012). Similarly, Foertsch et al. (2002) found that lecture videos increased the amount of interaction and communication between students and teachers. Also, students have immediate access for help which clears up misconceptions early while working through difficult problems or cases (Berrett, 2012). Some of the advantages of the flipped learning from teachers' point of view was stated as in the following:

1) By doing homework or assignments in class, instructors can observe students' difficulties and learning styles (Fulton, 2012b),

2) Instructors can provide the curriculum to students more easily even out of the class schedule (Fulton, 2012b),

3) Teachers can intervene and answer when questions about the assignments arise (Touchton, 2015),

4) Teachers can structure learning through frequent feedback (Touchton, 2015),

5) Classroom time can be used more productively (Baker, 2000).

Touchton (2015) stated that the flipped learning stimulated peer instruction. By working in groups students exchange information, which lets them the opportunity to teach one another and requires them to learn the material more thoroughly than doing homework individually by coping and pasting from the internet. Hence, it can be said that flipped learning may increase a sense of teamwork among students. This can also be matched up with the property of flipped learning that supports cooperation and student cohesiveness properties of classroom environment.

### 2.6.7. Research about the Perceptions Related to Flipped Learning

In the literature, there are many studies indicating students' positive perceptions about flipped learning (Bergman & Sams, 2012; Berrett, 2012; Ceylaner, 2016; Findlay-Thompson & Mombourquette, 2014; Kurt, 2017; McLaughlin et. al., 2013; O'Flaherty & Phillips, 2015; Reinhardt, 2014; Turan, 2015). The results of the study conducted by O'Flaherty & Phillips (2015) indicated that flipped learning contributed to building lifelong learning and other twenty first century skills in undergraduate education and skills that will lead them in future professions (Findlay-Thompson & Mombourquette, 2014; Kecskemety & Morin, 2014**).** Similarly, in the study conducted by Ceylaner (2016), it was determined that the flipped learning approach had a higher positive effect on the self-directed learning readiness of students in the ninth grade English course.

McLaughlin et. al. (2013) stated that flipped learning reduced distance effectively created by the satellite locations and can enhance the quality of student learning through carefully planned course design, enriched communication among students and instructors and promotion of learner autonomy.

Furthermore, in flipped learning environments, students are able to access content outside of the classroom by using technology and they get better prepared for the activities that will be conducted in the face-to face part of the classroom. Teachers assign videos for watching outside of class time and some tasks such as summarizing the content and writing questions related to the subject. Each of these provides greater opportunity for the students to prepare for the "in class" time conducted with their teachers and peers (Reinhardt, 2014). By extending class time, elementary school students could save time for different activities which were mostly spent for taking notes from the board during class time (Reinhardt, 2014). In the study of Clark (2013), ninth grade mathematics students also stated improvements in the effectiveness of teaching-learning process and valuable use of class of time according to flipped learning.

Moreover, Berrett (2012) stressed the benefit of flipped learning on economic issues. Because of limited budget, many universities cannot decrease class size to form more seminars in which there is low student-to-instructor ratio with increased personal attention for each student. On the contrary, universities find it cheaper to continue instruction through lecturing method by including almost hundreds of students in a lecture room with only a professor. At this point, flipped learning together with peer learning and cooperative activities provide an effective way to reverse the traditional lecture and make the instruction more productive for crowded university classes (Berrett, 2012).

### 2.6.8. Research about the Challenges Related to Flipped Learning

The design of courses using the flipped learning involves some challenges. It requires a heavy responsibility in terms of preparing materials and pre-class assignments (Enfield, 2013). Moreover, instructors may not produce high quality videos technically or instructionally (Milman, 2012). Furthermore, while instructors can determine the pace of the courses in traditional classes, in a flipped learning the activities of students in the face-to-face part of the course are significantly less predictable. Hence, it can be said that instructors may lose some degree of control over what happens in the classroom (Talbert, 2014).

Besides, passing forward or backward in the video with long delays in loading, freezing of the video and downloading the videos sometimes take a long time. Poor streaming and difficulty in navigation are other typical concerns also mentioned by Milman (2012). Furthermore, students, who are especially less accountable, often find the initial experience with the flipped learning troubling and uncomfortable. Students who are accustomed to traditional instruction and take introductory level courses think that the job of instructors is to lecture, hence they find out-of-class tasks difficult to complete (Strayer, 2007; Talbert, 2014). Hence, instructors in a flipped learning environment should provide scaffolds to support students not to be overwhelmed with the complexities or difficulties of activities and content (Caudill, 2014). Finally, as it was stated by Butt (2014), there is always going to be room for improvement. Whether these improvements take place in lecture videos, learning activities, organization or students' learning experiences, instructors should be open to making changes when necessary.

### 2.6.9. Research on Flipping Teacher Education

As mentioned before, during the flipped learning, online lecturing is combined with face-to-face part of the course in which pre-service teachers can collaborate and enhance their learning anytime and from anywhere (Thiele, 2013).

Teaching and learning need to keep up with the requirements of twenty first century. Students who are currently attending elementary schools, secondary schools and colleges have never known a time when the cell phones or social media such as Facebook and Twitter have not existed. With this in mind, it was suggested that schools, colleges and universities should make changes in terms of instructional materials and ways of teaching by addressing their students' needs (Caudill, 2014). Hence, it can be said that students are often more technology savvy than teachers, which is an issue that might be addressed if technology is used in teacher preparation programs.

In the study conducted by Davis et al. (2010), pre-service teachers noticed that knowing about technology is not sufficient but also they felt the need for applying technology effectively. This is a strong indicator that technology alone is not the answer; support and meaningful interactions with instructors lead pre-service teachers

to feel competent, at least enough to try, in the areas of technology and innovation. If pre-service teacher education courses are flipped, time can be allocated to address integration of technology in order to have time for active in-class tasks. The flipped learning allows for support for the integration of technology and active in-class tasks since students might feel threat and resistance to integration without support if courses are heavily integrated with technology (Caudill, 2014).

According to the literature, flipped learning increases awareness of pre-service teachers about the needs of their prospective students by increasing self-efficacy beliefs and achievement of pre-service teachers, different learning outcomes and decreasing their levels of cognitive load (Alsancak-Sırakaya, 2015; Caudill, 2014; Kurt, 2017; Turan, 2015).

The purpose of this study conducted by Caudill (2014) was to investigate pre-service teachers' perceptions about flipped learning. The study was conducted in the Applied Child Development course during the fall semester of 2013. The qualitative interview results indicated that attitudes and commitment of pre-service teachers to the course influenced their perceptions to the effectiveness of the flipped learning. While two pre-service teachers stated that they would consider implementing flipping in their future classroom, one of the pre-service teachers stated an opposite response.

The purpose of the study conducted by Turan (2015) was to reveal the effect of the flipped learning on student achievement, cognitive load, motivation and perceptions about flipped learning. The sample of the study composed of 116 pre-service teachers (58 control, 58 experimental) who were selected through convenience sampling method from the Early Childhood Education Department at Ataturk University in Turkey. The results of the study indicated that student achievement increased in favor of the flipped learning group and students conveyed positive views about flipped learning.

Alsancak-Sırakaya (2015) conducted a study which aimed to investigate the effect of flipped learning on academic achievement, self-directed learning readiness and motivation in the Guidance and Psychological Counseling Department. The participants were fourth grade pre-service teachers enrolled in Scientific Research Methods course. While an instruction based on flipped learning principles was implemented in the experimental group, blended learning was implemented in the

control group. For the study, an online learning environment was developed by the researcher. The data were collected by an achievement test, self-directed learning readiness scale, motivation scale, and a semi-structured interview form. The results of the study indicated that academic achievement and motivation scores of the students in flipped learning group were higher than those of the students in the blended learning group and students demonstrated positive views about the flipped learning. However, there was not a significant difference between groups according to self-directed learning readiness score.

The study conducted by Kurt (2017) compared the effectiveness of flipped learning with traditional instruction in Classroom Management course for pre-service English teachers. The aim was to find out whether there were significant differences between two groups in terms of self-efficacy beliefs and learning outcomes. The results of the study revealed that the pre-service English teachers in the flipped learning had higher self-efficacy beliefs and learned better than the pre-service teachers who were taught according to traditional classroom principles. The pre-service English teachers who were in the flipped learning had positive perceptions about the approach and felt that they were well prepared and confident about dealing with classroom management issues in their future classes.

The use of instructional technologies to move the lecturing part of the course outside of the class and active learning activities during class time are basic features of flipped learning (Bishop & Verleger, 2013). The two basic properties of flipped learning influence student learning environments. According to Schwab (1969), the curriculum should rely more on practical methods and principles applicable in concrete situations than theory. Schwab (1969) stressed the need to imply the learning environment as one of the important properties that should be taken into account during teaching-learning practices. These concepts and the framework of this study were shown in Figure 2.4.

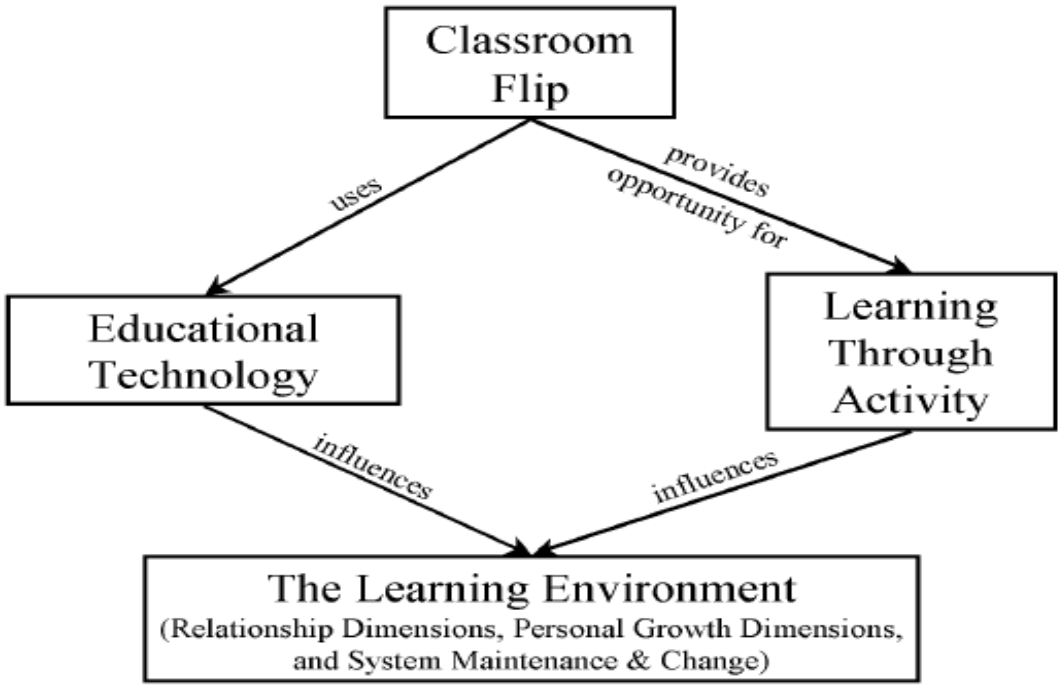


Figure 2.4. *The Framework of the Study*

Source: Strayer (2007, p. 16).

**2.7. Classroom Environment**

The study of classroom environments is concerned with "conceptualizing, assessing and investigating what happens to students during their schooling (Fraser & Fisher, 1994, p.23). In addition to cognitive and demographic characteristics that students bring into the educational settings, it is also important to consider the psychosocial aspects of classroom environment.

**2.7.1 Background of the Classroom Environment**

In the history of learning environment research firstly social psychologists studied and investigated variables related to proper learning environment. Thomas conducted the earliest research about classroom environment in the 1920s in the United States. The main focus was on the observation and recording of the events that took place in the classroom environment rather that the psychological meaning of them (Chavez, 1984). Then Lewin (1936) improved the research related to classroom environment by proposing the field theory which defined the behavior as a function of

person and the environment. However, according to these this definition personal needs of an individual were not taken into account (Coll, Taylor, & Fisher, 2002; Fraser, 1987). Hence, Murray (1938) put forward the needs-press model (Coll, et al., 2002). In this model, it was explained that behavior of an individual was affected by characteristics of personality (needs) internally and the environment itself externally (Afari et al., 2013; Fraser, 1987). According to Murrey (1938), while personal needs related to personality characteristics which motivate people for certain goals, environment is an external situation for the expression of personality needs since the needs of individuals are evoked by the environment (Fraser, 1987). The terms alpha press and beta press were introduced by Murrey (1938). Alpha press refers to an external observer's perception of the environment and the beta press refers to the perceptions held by the members of the environment (Fraser, McRobbie, & Fisher, 1996). Then, Stern, Stern, & Bloom (1956) elaborated these terms stating private beta press and consensual beta press (cited in Fraser, et al., 1996). While private beta press means an individual's perceptions of the environment, consensual beta press means the perceptions of an environment shared among the group. In the current study, private beta press perspective was employed by conducting interviews with the pre-service teachers that took part in flipped learning group. Also, the consensual beta press perspective was employed by collecting data through surveys from both the experimental and control group students. In addition to these, in terms of classroom environment studies Stern (1970) proposed person-environment congruence theory and stated that appropriate personal needs and environmental press enhance student outcomes (Goh & Fraser, 1998).

Walberg (Walberg & Anderson, 1968) and Moos initiated the modern period of classroom environment research in the USA. Moos (1974) described three dimensions that characterized any human environment which were relationship, personal development and system maintenance and system change (Fraser & Treagust, 1986; Velayutham & Aldridge 2013). The relationship dimension of classroom environment is about the disposition of relationships and intimacy among the members of the environment. It contains support, affiliation, cohesiveness, satisfaction, friction, favoritism, cliqueness and involvement aspects of classroom environment. Personal development is concerned with the existance of chances for betterment of members of

classroom environment and their improvement. It includes investigation, speed, difficulty, task orientation, cooperation, independence, competition, self-discovery, autonomy and personalization aspects of classroom environment. The system maintenance and system change are concerned with the extent to which the environment is orderly, clear in expectations, maintains control and is responsive to change. It contains democracy, order, organization, goal direction, rule clarity, teacher control, innovation, diversity and formality aspects of classroom environment. Then, although many researchers have studied the classroom environment, comprehensive and detailed studies have been conducted by Fraser and his colleagues.

According to Fraser (1986, p. l), the word "environment" is defined as "shared perceptions of students and teachers in that environment". In addition to this, Dorman (2002, p. 2; Dorman et al., 2006, p. 906) stated that the concept of environment, as applied to educational settings, refers to "the atmosphere, ambience, tone or climate that pervade the particular setting". According to them, without a comprehensive consideration of classroom environments, educational productivity cannot be provided.

The classroom environment has been studied generally in terms of the physical environment (furniture, lighting, materials seating arrangements, etc.) and the psychosocial environment (properties of classroom environment in shaping the quality of classrooms). The psychosocial aspect of the classroom environment has received considerable interest over the last few decades, and most of the research point out the importance of positive classroom environment for cognitive and affective development of students (Afari et al., 2013; Fraser, 1986; LaRocque, 2008).

Classroom environment involves different psychosocial aspects such as satisfaction, cooperation, student involvement, task orientation, student cohesiveness, difficulty and teacher support. They were defined by Fraser and his colleagues and indicated in Table 2.1. Satisfaction property of classroom environment was stated as students' enjoyment of class work. Cooperation property of classroom environment is about the cooperation of students rather than being in a race during learning tasks. The involvement property of classroom environment is about students' participate in activities and discussions, interest in the course, do additional research and enjoy being in class. In addition to these, when the task orientation property of classroom

environment was taken into consideration, it is important to follow planned activities and continue working on the content of the course. Student cohesiveness is about the intimacy of relationships and related to students' know each other closely, help when it is asked and support each other. Difficulty property of classroom environment is stated as whether students find work hard or not. Teacher support property of classroom environment was related to the extent that teachers help, befriend, trust and are interested in students.

Researchers developed numerous validated instruments to assess the qualities of the classroom environment across different grade levels, subjects and classroom contexts like constructivist classroom environments, online learning environments, computer-assisted learning environments, or laboratory learning environments (Fraser & Fisher, 1983). The main classroom environment instruments are 'Classroom Environment Scale (CES)' (Trickett & Moos, 1973), 'Individualized Classroom Environment Questionnaire (ICEQ)' (Rentoul & Fraser, 1980; Fraser, 1980), 'My Class Inventory (MCI)' (Fraser, Anderson & Walberg, 1982), 'Learning Environment Inventory (LEI)' (Fraser, Anderson et al., 1982), 'College and University Classroom Environment Inventory (CUCEI)' (Fraser & Treagust, 1986), 'Questionnaire on Teacher Interaction (QTI)' (Wubbels & Levy, 1993), 'What is Happening in This Classroom (WIHIC)' (Fraser, et al., 1996), 'Constructivist Learning Environment Survey (CLES)', (Taylor, Fraser & Fisher, 1997). The main classroom environment instruments were modified and used to investigate specific classroom environments like 'Science Laboratory Environment Inventory (SLEI)' (Fraser, Giddings & McRobbie, 1992), 'Distance Education Learning Environment Survey (DELES)', 'The Business Management Education Learning Environment Inventory (BMELEI)', 'University Mathematics Classroom Environment Questionnaire (UMCEQ)', 'Online Learning Climate Scale (OLCS)', 'Technology-Rich Outcomes-Focused Learning Environment Inventory Online Learning Environment Survey (TROFLEI)'. Each of these classroom environment instruments were adapted for different populations of students and contexts. Main classroom environment instruments were shown in Table 2.1.

Table 2.1.

*The Classroom Environment Instruments (LEI, CES, ICEQ, MCI, CUCEI, QTI, CLES and WIHIC) and the Scales*

| Instrument | Level | Items per Scale | Scales classified according to Moos' Scheme | | |
|---|---|---|---|---|---|
| | | | Relationship Dimensions | Personal Development Dimensions | System Maintenance and Change Dimensions |
| Classroom Environment Scale (CES) | Secondary | 10 | Involvement<br>Affiliation<br>Teacher Support | Task orientation<br>Competition | Order and organization<br>Rule clarity<br>Teacher control<br>Innovation |
| The Individualized Classroom Environment Questionnaire (ICEQ) | Secondary | 10 | Personalization<br>Participation | Independence<br>Investigation | Differentiation |
| Learning Environment Inventory (LEI) | Secondary | 7 | Cohesiveness<br>Friction<br>Favoritism<br>Cliqueness<br>Satisfaction<br>Apathy | Speed<br>Difficulty<br>Competitiveness | Diversity<br>Formality<br>Material Env.<br>Goal direction<br>Disorganization<br>Democracy |
| The My Class Inventory (MCI) | Elementary | 6-9 | Cohesiveness<br>Friction<br>Satisfaction | Difficulty<br>Competitiveness | |
| What is Happening in This Classroom (WIHIC) | Secondary | 8 | Student cohesiveness<br>Teacher Support<br>Involvement | Investigation<br>Task orientation<br>Cooperation | Equity |
| Constructivist Learning Environment Survey (CLES) | Secondary | 7 | Personal relevancy<br>Uncertainty | Critical voice<br>Shared control | Student negotiation |
| College and University Classroom Environment Inventory (CUCEI) | Higher Education | 7 | Personalization<br>Involvement<br>Student Cohesiveness<br>Satisfaction | Task orientation | Innovation<br>Individualization |
| Questionnaire on Teacher Interaction (QTI) | Secondary/ Primary | 8-10 | Helpful/friendly<br>Understanding<br>Dissatisfied<br>Admonishing | | Leadership<br>Student responsibility and freedom<br>Uncertain strict |

Source: Fraser (1998, p. 10).

### 2.7.2. Development of Learning Environment Instruments

The major instruments used in classroom environment research were presented in Table 2.1. The grade level, number of items and scales of instruments were classified according to Moos' Scheme (Fraser, 1998; Moos, 1974). Different research studies used these instruments or modified versions of them to assess a particular environment under investigation (Fraser & Fisher, 1983). It was seen important to investigate different learning environment instruments besides main instruments deeply to determine whether they are appropriate to be used in the pre-service teacher education classroom environment. The development, validation of instruments and their implementation in different learning environments, grades and courses were explained below.

#### 2.7.2.1. Classroom Environment Scale (CES)

Trickett & Moos (1973) developed CES by focusing on the social system perspective. It measures both teachers' and students' perceptions about the preferred and the actual classroom environment. In Indonesia, Fraser, Pearse et al. (1982) implemented a modified version of the CES to high school students.

#### 2.7.2.2. Individualized Classroom Environment Questionnaire (ICEQ)

The long form ICEQ was developed by Rentoul & Fraser (1980) and Fraser (1980). The dimensions of ICEQ were chosen according to criteria of individualized education, including open and inquiry-based classrooms (Fraser & Fisher, 1983). ICEQ was validated in different studies (Fraser, Pearse et al., 1982; Wheldall, Beaman, & Mok, 1999).

#### 2.7.2.3. Learning Environment Inventory (LEI)

The LEI was developed by Fraser, Anderson et al. (1982) as part of the evaluation and research on Harvard Project Physics relevant to social psychological theory. The disadvantages of the inventory was stated as the length of the

questionnaire, complex language used in the inventory and also being based on traditional teacher-centered classrooms (Fraser & Fisher, 1983).

Walberg, Singh, & Rasher (1977) administered 15 LEI scales in randomly selected general science and social science classes in India. The findings showed that there were statistically significant associations between students' perceptions of classroom environment and achievement.

#### 2.7.2.4. My Class Inventory (MCI)

The LEI has been simplified to form the MCI which is suitable for at the elementary school students (Fraser, Anderson et al., 1982). It contains only five of the LEI's 15 scales in order to minimize fatigue among elementary school students.

MCI was included in different studies (Goh, Young, & Fraser, 1995; LaRocque, 2008; Majeed, Fraser, & Aldridge, 2002). Although the MCI was used traditionally with a yes–no response format, the response format of MCI was changed from yes–no to a three-point response format (seldom, sometimes and most of the time) by Goh et al. (1995) and was used by including a task orientation dimension to evaluate students' classroom environment perceptions.

In addition to these, MCI was included in the study conducted by Majeed et al. (2002). They included the satisfaction dimension of the classroom environment as outcome variable; the cohesiveness, friction, difficulty and competition dimensions of classroom environment were included as independent variables.

#### 2.7.2.5. What Is Happening In This Class? (WIHIC) Questionnaire

The WIHIC questionnaire was developed by Fraser et al. (1996) in order to provide unity to the field of classroom environment by combining existing questionnaires and adding scales to accommodate the contemporary educational concerns (e.g., educational inequality, constructivist approach to learning) (Fraser, 1998).

The WIHIC questionnaire was validated by Dorman et al. (2003) in mathematics classes in Australia, Canada and the United Kingdom and has been used in many studies to investigate the classrom environments in a number of studies (Aldridge & Fraser, 2000; Aldridge, Fraser, & Huang, 1999; Chionh & Fraser, 2009;

Kim, Fisher & Fraser, 2000; Telli, Cakiroglu & den Brok, 2006; Velayutham & Aldridge, 2013; Wahyudi & Treagust, 2004; Zandvliet & Straker, 2001).

Allen & Fraser (2007) used a modified six-subscale 39-item WIHIC with 520 elementary science students in Florida (with the exclusion of the involvement sub-scale). Picket & Fraser (2002) administered a modified version of the WIHIC to a sample of 573 science students attending to the 3rd, 4th and 5th grades in Florida. During analysis, some items were reworded, some of the response alternatives were changed from five to three and six subscales survived the statistical analyses.

In another study conducted by Chapman (2012), WIHIC was applied to 512 5th-8th graders in Georgia by merging the student cohesiveness and cooperation subscales, as well as the involvement and investigation subscales by rewording several items. The analysis end up with the additional removal of some items and the exclusion of the newly introduced student cohesiveness-cooperation subscale.

Finally, Charalampous & Kokkinos (2017) conducted a qualitative a deductive research study to review the existing empirical evidence on the WIHIC in Greek elementary school classrooms with a sample of 24 students and six teachers. The results of the study showed the existence of the classroom psychosocial environment indicators, reflected in the WIHIC subscales, since students and teachers described clearly the basic characteristics of all indicators except from the investigation dimension. Since the investigation dimension of the classrooms environment was seen more appropriate to science classrooms, they suggested examining the relationship among these subscales in a more statistically powerful fashion.

#### 2.7.2.6. Constructivist Learning Environment Survey (CLES)

CLES was developed to investigate the extent that classroom environments support constructivist approach of learning. According to constructivism, students construct their own knowledge according to their experiences. Instead of viewing knowledge as fixed and independent of the learner, constructivist approach views knowledge in the interaction of learner's existing knowledge and beliefs with their new experiences (Kingir et al., 2013). The learning process in constructivist learning environments are characterized by active involvement such as inquiry, critical and

reflective thinking, questioning, problem solving and collaboration with peers and teachers (Kesal, 2003).

Before the development of CLES, most of the studies related to classroom environment were conducted within the traditional classroom contexts. Most of the classroom environment dimensions such as satisfaction, difficulty, involvement and personalization were included to assess and redesign the classroom environments consistent with the traditional pedagogical paradigm rather than carrying out a real reform (Taylor & Fraser, 1991). Hence, a new learning environment instrument was developed to inform teachers about the degree to which their classrooms reflect constructivist approach and restore their methods of teaching to be in line with constructivist approach (Taylor & Fraser, 1991). The dimensions included in the final form of the CLES were stated in Table 2.1. The dimensions of CLES had six items with five possible responses which were almost never, seldom, sometimes, often and almost always (Taylor et al., 1997).

The CLES has been used in many studies to assess the learning environment in a number of studies (Kesal, 2003; Kim et al., 1999; Ozkal, Tekkaya, & Cakiroglu, 2009). In Turkey, Kucukozer, Kirtak-Ad, Ayverdi & Egdir (2012) conducted an adaptation study related to the CLES. They included 619 students from primary education and obtained a 25-items, Likert type, valid and reliable adapted measurement tool to be used in the classrooms of Turkey.

#### 2.7.2.7. The College and University Classroom Environment Inventory (CUCEI)

CUCEI is developed to investigate small higher education classes which are referred as seminars or tutorials (Fraser, Treagust, & Dennis, 1986). It was based on the existing inventories which were modified by writing new items or rewriting the existing items to be suited to seminar classes of higher education institutions (Fraser & Treagust, 1986). The seven dimensions of CUCEI were stated in Table 2.1 (Fraser, 1998; Fraser, Treagust et al., 1986).

The CUCEI was included in different studies (Coll, et al., 2002; Fraser, Treagust et al., 1986; Myint & Goh, 2001). Myint & Goh (2001) conducted a study to validate the CUCEI in the Singapore classroom context. In the study conducted by

Fraser & Treagust (1986), the satisfaction dimension of the classroom environment was included as outcome variable and the other dimensions were included as independent variables.

#### 2.7.2.8. Questionnaire on Teacher Interaction (QTI)

QTI was developed by (Wubbels & Levy, 1993 and Wubbels & Brekelmans, 1998) to assess the characteristics and disposition of interpersonal relationships between teachers and students (cited in Fraser, 1998). It was included in different studies (den Brok, Fisher & Scott, 2005; Kim et al., 2000; Koul & Fisher, 2005). Goh & Fraser (1997) validated QTI with Singaporean students in mathematics classes. The study conducted by den Brok et al. (2005) investigated student teacher interpersonal relationships in primary science classes in Brunei.

Besides the main classroom environment instruments, there are different instruments which were modified to better investigate the specific classroom environments with particular research purposes and contexts.

#### 2.7.2.9. The Science Laboratory Environment Inventory (SLEI)

Laboratory environment is one of the most important dimensions in science education where students work to investigate scientific phenomena (Arisoy, 2007). Hence, Fraser et al. (1992) developed and validated SLEI to investigate science laboratory environments for the upper secondary schools or higher education level. Wong & Fraser (1994) used a modified version of SLEI to investigate relations between secondary school students' attitudes towards chemistry and their perceived laboratory environments in Singapore.

#### 2.7.2.10. Distance Education Learning Environment Survey (DELES)

Walker (2003) developed and validated DELES to investigate asynchronous distance education post-secondary classroom environments. It merged psychosocial learning environments research and distance education research. The DELES assesses instructor support, student interaction and collaboration, personal relevance, authentic learning, active learning and student autonomy dimensions of classroom environment.

#### 2.7.2.11. The Business Management Education Learning Environment Inventory (BMELEI)

BMELEI was developed and validated by Chien (2007) to investigate the business management students' perceptions about the classroom environment. It was drawn on the WIHIC questionnaire by excluding the involvement dimension and modifying most of the items to suit the business management learning environment.

#### 2.7.2.12. Technology-Rich Outcomes-Focused Learning Environment Inventory (TROFLEI)

Aldridge, Dorman & Fraser (2004) developed and validated TROFLEI in Australian secondary schools to assess students' perceptions of their actual and preferred classroom learning environments in technology-rich learning settings. Seven of the 10 TROFLEI scales are from the WIHIC instrument (Dorman et al., 2006).

#### 2.7.2.13. Online Learning Environment Survey (OLES)

Trinidad, Aldridge & Fraser (2005) validated the Online Learning Environment Survey (OLES) to investigate e-learning environments. The Online Learning Environment Survey (OLES) incorporated scales from four existing instruments, which are the WIHIC, CLES, DELES and TROFLEI. The validity of the OLES was examined by Ozkok, Yurdugül & Askar (2011) in Turkish context.

#### 2.7.2.14. Online Learning Climate Scale (OLCS)

Kaufmann, Sellnow & Frisby (2016) developed to examine the perceptions of students and instructors in online environments. The findings of the same study indicated that for a positive online classroom environment instructors should demonstrate understanding, availability, support and sympathy, and students should be provided with more involvement and collaboration with peers.

In addition to these, Lee, Lee and Wong (2003) developed 'The Hong Kong Classroom Environment Scale (HKCES)' to assess upper primary and junior secondary school students' perceptions. Cohn & Fraser (2015) developed and validated the 'How do you Feel about This Class?' questionnaire with $7^{th}$ and $8^{th}$ grade science students. It included enjoyment, involvement, task orientation, cooperation,

equity and comfort scales. Also, 'Constructivist Learning in Higher Education Settings scale (CLHES)' was developed and validated by Alt (2014) to measure constructivist learning environments in face-to-face based environments, seminars and distance learning environments in higher education settings. Yin & Lu (2014) developed and validated the University Mathematics Classroom Environment Questionnaire (UMCEQ) for assessing tertiary students' perceptions of mathematics classroom environment in China.

After examining different classroom environment instruments, it was seen that they were not appropriate to be used in the pre-service teacher education classrooms. Hence, in this study a new classroom environment scale was developed in order to investigate pre-service teachers' perceptions.

### 2.7.3. Learning Environment Research

Researchers use different classroom environment instruments to investigate the perceptions of students about the classroom environment and relationships between the perceptions of classroom environment and other outcome variables (McRobbie, Roth & Lucus, 1997).

Learning environment research mostly included the development of classroom environment instruments which firstly started in Western countries, and then they were translated into other languages and cross-validated in British Columbia, Canada and Australia (Zandvliet & Straker, 2001), Brunei (den Brok et al., 2005; Majeed et al., 2002), Indonesia (Fraser, Pearse et al., 1982; Wahyudi & Treagust, 2004), Israel (Fresko, Carmeli & Ben-Chaim, 1989), India (Walberg et al., 1977), Korea (Kim et al., 1999), Taiwan and Australia (Aldridge, et al., 1999), Pacific Islands (Coll, et al., 2002), Singapore (Chionh & Fraser, 2009; Goh & Fraser, 1998; Teh & Fraser, 1995; Wong & Fraser, 1994), and Turkey (Ozkok et al., 2011; Telli et al., 2006).

Many studies were conducted in the field of classroom environment including program evaluation (Fraser, 1987; Fresko et al. , 1989), Goh & Fraser, 1995; Kim et al., 1999; 2000; Teh & Fraser, 1995; Wahyudi & Treagust, 2004) stated), differences between students' and teachers' perceptions of the same learning environment (Ben-Chaim, Fresko & Carmeli, 1990; Chien, 2007; Fisher & Fraser, 1983; Fraser & Treagust, 1986; Kim et al., 1999; McRobbie et al., 1997; Roth 1998; Zandvliet, 1999)

and cross-cultural studies (Aldridge & Fraser, 2000; Aldridge et al., 1999; Fraser, Pearse et al., 1982).

The relationships between outcome variables and classroom environment perceptions of students and teachers have been replicated for a variety of cognitive and affective outcomes like achievement (Chionh & Fraser, 2009; Goh & Fraser, 1995; Roth 1998), attitude (Goh & Fraser, 2000), autonomy and student-centeredness (Roth 1998), engagement (Dotterer & Lowe, 2011), motivation (Arısoy, 2007), satisfaction (Fraser & Treagust, 1986; Zandvliet, 1999), self-esteem (Chionh & Fraser, 2009), academic self-efficacy (Dorman et al., 2003), self-regulation (Velayutham & Aldridge, 2013) by using different classroom environment instruments in different countries and grade levels (Fraser, 1998).

#### 2.7.3.1. Differences between Perceptions of Actual and Preferred Environment

Students' and teachers' perceptions of their actual and preferred classroom environments was investigated in many studies by using different classroom environment instruments to identify the discrepancies and improve teaching and learning (Fisher & Fraser, 1983; Fraser & Treagust, 1986). While the actual forms measure students' and teachers' perceptions of the current classroom environment, the preferred forms measure what they would ideally prefer (Fraser, 1998).

The results of many studies revealed that students and teachers preferred a more optimal classroom environment than the actual classroom environment (Fisher & Fraser, 1983; Fraser & Treagust, 1986). However, teachers viewed their classroom environment more positive than their students (Chien, 2007; Kim et al., 1999; McRobbie et al., 1997; Zandvliet, 1999).

In the study of McRobbie et al. (1997), it was stated that students preferred more interactions and take part in decision making process. Also, it was unearthed that teachers did not know the diverse properties of classroom environment and the constraints of classroom environments were related to student learning. In addition to these, it was found that many teachers were unaware of the fact that their beliefs related to teaching, learning and context constrained student learning.

Furthermore, in the study of Roth (1998), teachers stated that the learning environment provided students with many opportunities like negotiation, being

autonomous and engaging in student-centered environments. However, students indicated that such opportunities existed only to a limited degree.

Ben-Chaim et al. (1990) indicated that teachers perceived classroom environment as slow-paced, more diverse and less formal than their students perceived, but both groups also perceived it as more competitive and difficult.

#### 2.7.3.2. Uses of Classroom Environment Instruments in Educational Evaluation

A variety of classroom environment instruments were used to evaluate the curricula (Fraser, 1987). For instance, a Korean version of the CLES was used by Kim et al. (1999) to investigate the science curriculum reform efforts in Korea. The results of the study showed that students who followed inquiry and negotiation based curriculum perceived classroom environment more positive than the students who was trained through academic-centered science curriculum. They also revealed significant relationships between classroom environment and student attitudes, and stated that appropriate student attitudes could be promoted in constructivist classes where students shared responsibility with the teachers, discussed topics with their peers and instructors and perceive the content and instruction relevant to them.

Nix, Fraser and Ledbetter (2005) evaluated the impact of a professional development program, which was based on constructivist principles of classroom environment, on teachers who attended the program by using a modified form of CLES with secondary students. The findings indicated that teachers who attended the program implemented the principles of constructivism in their classes contrary to teachers who did not attend the program. In these classes, students whose science teachers had attended the program perceived the content instruction and classroom relevant to them when compared to the classrooms of other science teachers.

Teh & Fraser (1995) used Geography Classroom Environment Inventory (GCEI), which is an adapted version of the CES, with high school geography students who were exposed to computer assisted classroom environment or non-computer instruction in Singapore. They investigated the associations among classroom environment, student achievement and attitudes. According to results of the study, the computer instruction classes were perceived to have greater innovation, investigation and resource adequacy properties in contrast to non-computer instruction classes.

Moreover, classroom environment perceptions were found to vary with certain variables such as gender, grade level, type of school, teacher qualifications and class size. (Fraser, 1987). For example, many studies indicated gender differences in terms of classroom environment perceptions. Girls generally perceived their classroom environment more favorably than boys (Goh & Fraser, 1995; Kim et al., 2000). Similarly, in the study conducted by Lee et al. (2003), it was revealed that girls had higher preferences in areas of collaboration and teacher support than boys. They also indicated that primary school students tended to have significantly higher levels of collaboration, teacher support and involvement in the actual classroom environment than those of secondary schools.

Furthermore, Anderson (1970) conducted a study and the findings of it showed that students of low ability found the school difficult and establish a norm of not learning. Such students found school-work uninspiring and when banded together in a cohesive group, they tended to resist learning; however, cliques helped low ability females since for females cliques were considered school-oriented. Classroom intimacy was positively related to learning for high-ability girls and had negative effects on lower ability girls. According to the findings of the study, classroom characteristics affected learning differently depending on the students' characteristics.

The study conducted by Fresko et al. (1989) investigated teacher credentials such as pedagogical training and teaching experience observed teaching effectiveness and school size as variables to explain differences in students' perceptions. The findings of the study showed that students perceived the classes as more satisfying, less difficult, slow paced, more diverse, and more inquiry oriented when they were taught by effective teachers. Moreover, students perceived the classes as more diverse when they were taught by teachers who had received pedagogic training compared to teachers with no pedagogic training. With respect to experience, students perceived the classes as the least satisfying and fast paced, but most diverse when they were taught by teachers with more than 15 years teaching experience. Students' grade level was also related to their perception of classroom environment. While students in the seventh grade perceived the classroom environment as more satisfying, ninth grade students perceived the classroom environment as more difficult than seventh and eighth students, and diversity decreased as grade level rose. With regard to school size,

students perceived the classroom environment of large schools as more difficult, more inquiry oriented and less diverse.

Zandvliet (1999) indicated strong relations between the classroom environment scales of autonomy, independence, task orientation and satisfaction. These factors influenced students' satisfaction while learning. These associations indicated a positive relationship between the degree of autonomy and independence allowed in a class and students' overall satisfaction in their learning.

Majeed et al. (2002) used MCI to assess the lower secondary students' perceptions in mathematics classroom environment in Brunei Darussalam. The findings indicated that less difficulty and less competition were associated with more satisfaction and a strongest positive association was found between student cohesiveness and satisfaction.

Coll et al. (2002) administered the CUCEI and QTI instruments to science students from 12 different ethnicities in the Pacific Islands classes. The findings unearthed that tertiary level science students perceived their classes to be highly teacher dominated, teachers being perceived as highly authoritative instead of valuing student freedom and responsibility.

Wahyudi & Treagust (2004) found the perceptions of students in rural schools as less favorable than those of the students in urban and suburban schools. Students perceived their classrooms as having greater cooperation but less teacher support in urban schools.

Finally, LaRocque (2008) examined the effect of elementary school students' perceptions of classroom environment on mathematics and reading achievement in a large urban school district. The researcher found that the grade of a student altered students' perception slightly. Students with lower grades perceived their classroom as more competitive and less cohesive than the students with higher grades. Also, it was determined that as students' grade levels increased, they became less satisfied with their classroom environment. These findings indicated the importance of students' perception to inform teachers about structuring their classrooms in a way that even lower-scoring students felt more comfortable and confident.

#### 2.7.3.3 Associations between Student Outcomes and Learning Environment

Students' perceptions of the classroom environment influenced their cognitive and affective outcomes (den Brok, Brekelmans & Wubbels, 2004). Many researchers showed the relationships between the perceptions of classroom environment and student outcomes (Arisoy, 2007; den Brok et al., 2004; Fraser & Fisher, 1983).

Wong & Fraser (1994) used a modified version of SLEI to investigate relations between secondary school students' attitudes towards chemistry and their perceived laboratory environments in Singapore. While integration and rule clarity scales of classroom environment were found to have a strong and positive relationship with students' attitudes; open-endedness property of classroom environment was negatively associated with the attitude scale. It can be stated that students' attitudes to science seem to become less favorable in laboratory classes with more open-ended activities.

Roth (1998) found that the unit test scores correlated significantly with three environment scales which were autonomy, student-centeredness and students' prior knowledge measures. The final examination correlated with the autonomy scale significantly. Also, it was found that negative classroom environment perceptions were related to lower achievement.

Goh & Fraser (1995) stated that classroom environment including enjoyment, cohesion and less friction enhances student achievement and improves students' attitudes. Similarly, Goh & Fraser (2000) indicated that student achievement and positive attitudes toward the courses were observed in classes where students perceived higher level of teacher leadership, helping/friendly teacher behaviors and perceived less uncertain teacher behavior. Dorman et al. (2003) investigated associations between classroom psychosocial environments and academic efficacy in secondary schools mathematics classrooms. They included different dimensions of classroom environment from WIHIC and CLES. The findings revealed significant correlations between these classroom environment dimensions and academic efficacy.

The study conducted by den Brok et al. (2005) investigated the relationships between teachers' interpersonal behaviors perceived by students and their subject-related attitude in primary science classes in Brunei by using the QTI. The findings of the study showed the strong and positive effects of influence and proximity on students' enjoyment of their science class. The more dominant and cooperative the

teacher was perceived by students, the greater enjoyment by students in science was obtained. It was stated that teachers should be able to set clear rules and high standards for achievement, provide structure in activities and content, listen to students' explanations and be willing to repeat their explanations.

Telli et al. (2006) conducted a study to investigate relationships between Turkish high school students' perceptions of biology course classroom environment and their attitudes toward biology by using Turkish version of the WIHIC questionnaire. The results indicated that high school students perceived their classes as highly task oriented, moderately cohesive, cooperative and equitable. They perceived teacher support, involvement and investigation properties of classroom environment less. The investigation and task orientation properties of classroom environment were positively related to students' attitudes.

In addition to these, Arısoy (2007) found that the higher scores students got from the CLES scales, the higher levels of goal orientation, task value, control of learning, performance, science attitudes, enjoyment of the lessons, interest in the course and career interest about the course were obtained.

Chionh & Fraser (2009) investigated the relationships between classroom environment and student outcomes with high school students in Singapore.The findings of the study showed that the classroom environment dimensions were associated with higher achievement. Higher exam scores were found in classrooms which were perceived to have more student cohesiveness. Also, the classrooms which were perceived to have more teacher support, task orientation and equity promoted attitudes to course and self-esteem.

In the study conducted by Velayutham & Aldridge (2013), WIHIC was used to investigate the perceptions of science classroom environment on student motivation and self-regulation in science learning. For this study, they included 1360 students in grades eight, nine and 10 from five public schools of Western Australia. The findings indicated that student cohesiveness, investigation and task orientation dimensions of classroom environment were the important predictors of student motivation and self-regulation.

This chapter presented a theoretical background and a review of the relevant literature about flipped learning and classroom environment. The following chapter provided detailed information about the methods of the study.

## 2.8. Summary of the Literature Review

In this section, the reasons to implement flipped learning approach in teacher training was presented. In the literature, it was stated that traditional teacher training lacked the bridge between theory and the practice which is required for pre-service teachers in their future profession in a real school and classroom environment. Hence, the implementation of active teaching learning strategies were seen important in order to connect what is learned theoretically and what is required in real classroom context. For active learning methods, instructors and students need more time; hence it seemed that the contexts of the classroom need to be reversed. Hence, the "flipped learning" also known as the "inverted classroom" was thought important. The flipped learning inverts or flips the traditional classroom design. In this way, low order teaching like knowledge transfer takes place out of class, while most higher-order tasks like application, analysis, synthesis and evaluation of information are done inside the classroom through homework, projects and group tasks where the instructor is present to help and direct students (Lage, Platt, & Treglia, 2000; Talbert, 2014).

Also, in this section different theories, approaches and models that constitute the theoretical foundations of the flipped learning were presented. First of all, the development process of flipped learning, its benefits and the implementation of it in different subjects, courses and grade levels were presented. In addition, this part included research studies about flipped learning conducted in abroad and in Turkey. It was observed that there were quite limited study which included the implementation of flipped learning in teacher education and its effect on different cognitive and affective characteristics of pre-service teachers.

Then, the definition of classroom environment, the development of classroom environment instruments and research studies related to classroom environment in different subjects, courses and grade levels conducted in abroad and in Turkey were presented. It was noticed that the results of many studies have provided evidence that the quality of the classroom environment in schools has a significant effect on student

development and learning (Afari, Aldridge, Fraser, & Khine, 2013; Dorman, Adams, & Ferguson, 2003; Fraser & Treagust, 1986; Fraser, 1998; Velayutham & Aldridge, 2013). It was indicated that students learn better when they perceive their classroom environment positively (Chionh & Fraser, 2009).

It was observed that there is a gab in the literature, in terms of investigating the classroom environment in flipped learning environments and traditional teacher training environments. Hence, the purpose of this study was determined as investigating the effect of instruction on pre-service teachers' achievement and perceptions related to classroom environment. In this way, it was thought that pre-service teachers' perceptions about the pre-class preparation, flipped learning activities, videos and teacher-student interaction and their effect on student achievement and perceptions of classroom environment might be better understood. In addition, it was thought that by designing such a study in teacher training level, an opportunity for pre-service teachers may be created both to observe and experience this new pedagogical approach at firsthand and deepen their understanding of the course content by presenting the knowledge outside of the class time and implementing the newly learned knowledge in the face to face part of the course.

Moreover, after conducting a comprehensive literature review, it was observed that the vast majority of the studies about flipped learning and classroom environment have utilized survey research design in order to learn the ideas of a pre-specified sample. There were limited studies which have utilized experimental research design triangulated with qualitative methods.

Furthermore, in the literature there were many studies which included elementary and secondary students as the participants of the studies related to flipped learning and classroom environment, however there were limited studies which included pre-service teachers. Also, many of these research studies have not reported sampling method.

In addition to these, it was observed in the literature that most of the studies conducted related to flipped learning and classroom environment have utilized a questionnaire and only some of them also included interviews as supplementary instruments. However, the triangulation of data collection instruments to investigate the research questions in detail is not present in most of these studies.

Finally, a remarkable shortage of instruments for assessing classroom environment in higher education institutions was noticed since many of the classroom instruments were developed to evaluate the psychosocial environment of primary or secondary schools rather than higher education institutions. Also, it was observed that although some of the instruments was developed to be used in higher education institutions, they were basically to evaluate the post-graduate or seminar classes not specifically for undergraduate classes (the CUCEI), others were identified as less appropriate for students majoring in arts and humanities other than natural sciences (science laboratory environment inventory). In addition, most of the instruments provided information about pre-service teachers' general perceptions about the classroom environments in higher education institutions rather than the perceptions of pre-service teachers' classroom environment for a specific course. When these diverse scales were considered, it was thought that none of these instruments were appropriate to be used in pre-service teacher education classes in Turkish context. Hence, it gave the researcher the idea of developing a proper classroom environment scale to be used in teacher training classrooms.

All in all, after conducting a comprehensive literature review, it was decided that this study was conducted in the Principles and Methods of Instruction course through flipped learning approach in order to connect theory and the practice required for pre-service teachers in their future professions thus, to create time to implement active teaching learning strategies. Moreover, it was decided that this study utilized mix methods research. Also, the triangulation of data collection instruments, including achievement test, classroom environment instrument, student questionnaire and interviews, were provided to investigate the research questions in detail. For this reason, it was decided that instruments which were in line with the aims of the study were developed by the researcher.

# CHAPTER 3

# METHOD

This chapter presents research design of the study. Then, research questions, hypotheses that were tested and variables were introduced. Then the subjects of the study, data collection instruments and procedures, and data analysis were introduced. Finally, the limitations of the study, the control of internal and external validity threats for the quantitative part of the study and the trustworthiness of the qualitative part of the research were explained.

## 3.1. Research Design

The purpose of this study was to develop and implement flipped learning materials in the Principles and Methods of Instruction course and investigate the effect of flipped learning on student achievement and perceptions related to classroom environment. In this study, both qualitative and quantitative data were collected. Hence, this study employed mixed method. An explanatory mixed method research design was used to explore the research questions and interpret the findings for the study (Creswell, 2012). Explanatory mixed method research gives opportunity to the researcher to explain the results that are unexpected and occurs in two distinct phases. In the first stage, quantitative data is collected and analyzed around the quantitative-focused questions. After conducting deep analyses of qualitative data, the results were used to identify patterns and themes as a means to explain and better understand the findings. Researchers may begin by collecting quantitative data using test scores. In the second phase, they may gather data through interview or student work samples.

In the quantitative part of the study quasi-experimental research design was used. The pre-service teachers were taught the same content by the researcher; the instruction which was designed according to the principles of flipped learning was implemented in the experimental group, while traditional instruction was implemented

in the control group of this study. The flipped learning is defined as the independent variable; pre-service teachers' achievement and perceptions of classroom environment are defined as the dependent variables. The study was conducted during the fall semester of 2017-2018 for 11 weeks at a public university located in the Aegean Region. The study was implemented in 33 class hours (The Principles and Methods of Instruction course is a three-hour a week course).

In this study, random selection of participants from the population was not possible because pre-service teachers chose different sections of the course at the beginning of the semester. However, the equality of experimental and control groups were checked by the application of Principles and Methods of Instruction Course pre-achievement tests at the beginning of the semester in order to strengthen the design as stated by Cohen, Manion & Morrison (2007).

Table 3.1.

*Research Design of the Study*

| Groups | Pre-Test | Treatment | Post-Test |
|---|---|---|---|
| Experimental Group | AT | Flipped Learning | AT |
| Control Group | AT | Traditional Instruction | AT |
| Experimental Group | - | Flipped Learning | CEPSPT |
| Control Group | - | Traditional Instruction | CEPSPT |
| Experimental Group | - | Flipped Learning | SQ |
| Control Group | - | Traditional Instruction | - |
| Experimental Group | - | Flipped Learning | Interview |
| Experimental Group | - | Traditional Instruction | - |

### 3.2. Research Questions

The purpose of this study was to develop and implement flipped learning materials in the Principles and Methods of Instruction course and investigate the effect of flipped learning on student achievement and perceptions related to classroom environment.

Based upon the main purpose of the study, the following research questions were proposed:

1) Is there a significant difference between the experimental and control groups according to achievement test scores and final grades?
2) Is there a significant difference between the experimental and control groups according to perceptions of classroom environment (satisfaction, cooperation, involvement, task orientation, student cohesiveness, difficulty) scores?
3) What are the perceptions of pre-service teachers about flipped learning, materials and classroom environment?

### 3.3. Hypotheses

The hypotheses that are stated in null form test the research questions of this study.
Null Hypothesis 1. There is no significant difference between the experimental and control groups according to achievement scores.
Null Hypothesis 2. There is no significant difference between the experimental and control groups according to perceptions of classroom environment (satisfaction, cooperation, involvement, task orientation, student cohesiveness, difficulty).

### 3.4. Variables

In the current study both independent and dependent variables were included. The variables were described below:
*Independent Variables:* Instruction designed according to the principles of flipped learning implemented in experimental group.
*Dependent Variables:* Principles and Methods of Instruction Course Achievement and pre-service teachers' perceptions of classroom environment (satisfaction, cooperation, involvement, task orientation, student cohesiveness, difficulty).

### 3. 5. Context

The current study was conducted during the fall semester of 2017-2018 for 11 weeks at a public university located in the Aegean Region. The university offers over 60 degree programs at undergraduate and postgraduate level. In the running of the university, more than 2779 people (1333 administrative staff and 1649 academic staff

and 55 foreigners working on agreement) are involved. The university has 55.000 students and is involved in the Bologna process since it aims to achieve better standards in all areas of education and supports educational programs around the world.

As for the faculty of education in which the study was conducted, it has 6 different departments and approximately 1.900 pre-service teachers. In the faculty, pre-service teachers are trained to have the scientific knowledge and skills needed in their profession. Hence, all courses are carried out in accordance with the framework program set by Higher Education Council. The duration of training is determined as eight semesters in four academic years.

This study was conducted in the Principles and Methods of Instruction Course which aims to equip pre-service teachers with the knowledge of basic concepts related to education and instruction, explain concepts related to learning and teaching, acquire main learning and teaching approaches, methods and techniques, implement teaching strategies, methods, comprehend and put principles of planned instruction into practice, use suitable teaching materials and tools, become aware of teachers' duties and responsibilities and to comprehend relations of these with teacher qualifications (YÖK, 2007). Hence, the content of the Principles and Methods of Instruction course that the current study was conducted includes: Basic concepts of education (education, teaching, learning, program etc.), goals and objectives of education (determination of goals and objectives in education, types of objectives, the classification of objectives and Bloom's taxonomy), planning of instruction (types of plans, importance of planning, etc.), teaching theories and models (Gagne's theory on learning and instruction, Mastery learning, Keller's individualized instruction, Carroll's model of school learning, Bloom's mastery learning, constructivism, multiple intelligence theory etc.), teaching strategies (teaching through presentation, discovery learning and teaching through research and investigation and cooperative learning), methods of teaching (lecturing, discussion, case study, demonstration, project based learning, problem based learning etc.), teaching techniques (question and answer, brainstorming, role playing, concept mapping, different discussion techniques etc.).

### 3.6. Subjects of the Study

This study was conducted in the Principles and Methods of Instruction Course at the Elementary Education-Classroom Teaching Department. Out of three sections of the department, one section was chosen as the experimental and one section was chosen as the control group randomly. Pre-service teachers were not informed before they enroll in the course about the instructional method to be used. There were 30 pre-service teachers in the experimental group and 26 pre-service teachers in the control group. Among the 30 pre-service teachers, 25 (83.3%) of them were female and 5 (16.7%) of them were male. Among the 26 pre-service teachers, 18 (69.2%) of them were female and 8 (30.8%) of them were male.

The equivalency of experimental and control groups was controlled by administering the Principles and Methods of Instruction Course Achievement Test (AT). After using independent samples t-test at the beginning of the semester, groups were compared according to their Principles and Methods of Instruction Course Achievement Test scores. The results of independent samples t-test was shown in Table 3.2.

Table 3.2.

*The Results of the Independent Samples t-test for Determining Equivalency of Groups (n=56)*

| Group | M | SD | T | df |
|---|---|---|---|---|
| Experimental | 32.33 | 6.60 | -1.63 | 54 |
| Control | 35.67 | 8.70 | | |

p>.05

According to the results of the independent samples t-test the assumption of whether the population variances for the two groups were equal or not assessed by Levene's test and it was found that the equality of variances were not violated ($p$=.58 >.05). The t-test results presented in Table 3.2 showed that pre-service teachers' knowledge about Principles and Methods of Instruction course were not statistically significant in both experimental ($M$= 32.33, $SD$ = 6.60) and the control group ($M$ =

35.67, *SD* = 8.70), t (56) = -1.63, p = .11. Thus, it can be said that both groups were equal at the beginning of the treatment in terms of achievement.

In the qualitative part of the study, twelve pre-service teachers was selected for the interviews according to their results in the Principles and Methods of Instruction Course Achievement Test (AT). The participants for the qualitative part of the study were selected according to maximum variation sampling method. The sample was selected in order to represent the diversity of perspectives or characteristics (Fraenkel & Wallen, 2009; Gall, Gall, & Borg, 2003). In this way, the strength and richness of the data, their applicability and interpretation were ensured better (Cohen et al., 2007). The interviewees were selected purposefully based on their achievements in the Principles and Methods of Instruction course and gender. Among the twelve pre-service teachers nine of them were female and three of them were male. The codes of pre-service teachers and their grades were indicated in Table 3.3.

Table 3.3.

*The Codes of Pre-Service Teachers Chosen for Interviews and Their Course Grades*

| Code of the Pre-Service Teachers | Achievement Test Scores | Final Grade |
|---|---|---|
| Ga (High Achiever) | 83 | 90 |
| Nu (High Achiever) | 63 | 82 |
| Ra (High Achiever) | 75 | 86 |
| En (High Achiever) | 78 | 82 |
| Me (Low Achiever) | 65 | 73 |
| Fa (High Achiever) | 78 | 87 |
| En (Medium Achiever) | 70 | 79 |
| Mu (High Achiever) | 85 | 88 |
| Bu (High Achiever) | 78 | 87 |
| Ha (Low Achiever) | 55 | 75 |
| Fa (Medium Achiever) | 63 | 78 |
| Me (Medium Achiever) | 70 | 79 |

As stated in Table 3.3, while some pre-service teachers had lower achievement test scores, they had higher final grades because of conducting pre-preparation tasks and the assignments in or out of the class. On the other hand, some pre-service teachers had higher achievement test scores. Because of not conducting pre-preparation duties or the assignments in class or out of the class completely, their grades did not increase as expected. It can be said that pre-service teachers' achievement differed according to multiple choice exam results or completing alternative evaluation types. Pre-service teachers who have final grades between 70 and 75 were accepted as having low achievement score, the pre-service teachers who have final grades between 76 and 80 were accepted as having medium achievement score and pre-service teachers who have final grades over 81 were accepted as having high achievement score. The codes were comprised of the first and second characters of their names and assigned achievement level of pre-service teachers.

## 3.7. Data Collection Instruments

In the current study, Principles and Methods of Instruction Course Achievement Test, Classroom Environment Inventory, Student Questionnaire and Interview Schedule were implemented to answer the research questions and test the hypotheses. They were explained below.

### *3.7.1. Principles and Methods of Instruction Course Achievement Test*

Achievement test was implemented as pre and post-test both in experimental and control groups. It was developed by the researcher and consisted of multiple choice questions and a matching type-five items question related to the Principles and Methods of Instruction course. It was developed to determine the achievement of pre-service teachers in the Principles and Methods of Instruction Course by considering the objectives and the content of the course. The steps that were applied during the development process were explained below.

Before developing the achievement test, objectives of Principles and Methods of Instruction Course were determined so that each item would evaluate a particular learning outcome. 14 objectives were developed in accordance with the aims and goals

of Principles and Methods of Instruction Course as determined by the Council of Higher Education (YÖK, 2007).

After determining the objectives, the table of specifications was prepared in order to confirm that the objectives and the related items covered the content of Principles and Methods of Instruction Course. Moreover, the table of specifications was also prepared to ensure the content validity. The distribution of test items across the objectives of principles and methods of instruction course were presented in Appendix D.

The development stage of the test items was based on the cognitive domain of Bloom's Taxonomy. According to Anderson & Krathwohl (2010), in order for any behavior to occur, the prerequisite knowledge leading to it should also be learned. Hence, the questions were related to knowledge, comprehension and application stages of Blooms' Taxonomy. The first form of the achievement test included 44 multiple choice questions and one matching type question including five items. The matching type question was related to concepts like education, teaching, learning, curriculum development, public education and in-service teacher training program.

While developing the achievement test, different sources such as Principles and Methods of Instruction course books, related literature and instruments developed by other researchers were examined. Since more than one objective was written related to some topics, it can be said that more than three questions were written for each topic except planning of instruction (Ozcelik, 2010; Turgut & Baykul, 2011).

In order to confirm the face validity of the AT, the objectives and related questions were checked by seven experts (one professor, two associate professors, and four assistant professors) in Curriculum and Instruction Department of Ege University, Hacettepe University, Iowa State University and Middle East Technical University as also stated by Turgut & Baykul, (2011). They were asked to check for the clarity of questions, representativeness of content by the selected items and appropriateness of the design of the instrument.

One of the experts suggested that some items need to be written shorter. Moreover, another experts suggested that the length of distractors need to be the same for the item related to mastery learning. Suggestions of experts were taken into consideration while revising the instrument. Furthermore, one of the experts suggested

that in item 26, because the option B and E were close in meaning, they could result in the elimination of each other. Hence, the item E was restated.

After receiving the opinions of experts, the test was administered to five pre-service teachers who took the course in the spring semester of 2016-2017 academic year to examine if there were any statements that could be misunderstood and check the optimal administration time. Pre-service teachers indicated that the questions were clear and adequacy of test duration was enough. On the other hand, some of the pre-service teachers indicated that they did not learn some of the techniques that were asked in the test. Hence, they stated that the test was a little harder than they were used to. The reason for this may be that since there are dozens of different teaching techniques in the literature, pre-service teachers were taught different techniques by different instructors which resulted in the fact that some of the questions included the ones that they had not learned. The items that included the techniques pre-service teachers did not learn were examined by comparing course objectives and making some changes in terms of distractors. These items were re-examined after the results of item analysis.

The first form of the achievement test was applied to 486 sophomore pre-service teachers who took the Principles and Methods of Instruction Course at the spring semester of 2016-2017 academic year. The applications started in May and were completed in June. Pre-service teachers were given sufficient time to answer the questions.

Firstly, the item difficulty index was examined. An item which is neither too difficult nor too easy is evaluated to be a good question. In other words, test items having moderate difficulty as indices between '0.20 – 0.80' are recommended to be included in achievement tests (Baykul, 2010). The difficulty indices of test items can be categorized as follows (Ozcelik, 2011; Turgut & Baykul, 2011):

- Items having difficulty indices between "0.00–0.19" are referred as "very difficult"
- Items having difficulty indices between "0.20–0.39" are referred as "difficult"
- Items having difficulty indices between"0.40–0.59" are referred as "moderate"
- Items having difficulty indices between "0.60 – 0.79" are referred as "easy"

- Items having difficulty indices between “0.80 – 1.00” are referred as “very easy”.

In addition to these, item discrimination indices were examined. The items which have low discrimination indices are either very difficult or very easy. Negative discrimination indices indicate that participants who know the topic are answering the item wrong (Büyüköztürk, Kılıç-Çakmak, Akgün, Karadeniz, & Demirel, 2010). Items having negative discrimination should be removed from the test. Test items having discrimination indices above 0.20 are normally considered to be appropriate for the application of academic achievement tests (Ozcelik, 2010; Turgut & Baykul, 2011).

Another important factor in test item analysis is reliability coefficient. The Kuder and Richardson-20 (KR-20) formula for determining internal consistency of achievement test was used. The values of KR-20 can range between 0 and 1. The closer the value to 1, the better the internal consistency. According to Fraenkel and Wallen (2009), a reliability coefficient of 0.70 or above indicates that the test is reliable enough that can be used as a research tool.

The item discrimination indices, item difficulty indices and reliability coefficient of the achievement test was calculated by using Test Analysis Program (TAP, version 14. 7. 4). The item difficulty and item discrimination values were presented for the total of the test in Appendix E.

According to the item difficulty and item discrimination indices analysis, items S1, S3, S7, S8 and S9 which were indicated by the TAP were omitted from the test because of having a discrimination index less than .20 and the difficulty indices of items were over .80 or below 0.15. By running the program again, the items S11, S17, S20 and S21 were removed from the AT because of having a discrimination index less than .20. This means that these items have very low ability to discriminate pre-service teachers who know the content from those who do not. Moreover, items S2, S25 and S33 were revised in terms of distractors. According to the results of item analysis which was stated in Appendix G, item 2 was revised because one option of it was a strong distractor. Moreover, item 25 was revised in terms of the sample case included in the question and options which included two strong distractors. Finally, item 33 was revised because one option of it was a strong distractor. The item difficulty and

discrimination indices were shown in Table 3.4 after removing items and conducting necessary revisions.

Table 3.4.

*Item Difficulty, Item Discrimination Indices and Item Numbers*

| Item Number in Pilot Test | Item Number in the Final Form | Item Difficulty Index | Item Discrimination Index | Item Number in Pilot Test | Item Number in the Final Form | Item Difficulty Index | Item Discrimination Index |
|---|---|---|---|---|---|---|---|
| S2 | 29 | 0.31 | 0.29 | S30 | 15 | 0.59 | 0.56 |
| S4 | 1 | 0.87 | 0.21 | S31 | 27 | 0.38 | 0.51 |
| S5 | 25 | 0.44 | 0.31 | S32 | 18 | 0.54 | 0.32 |
| S6 | 13 | 0.64 | 0.46 | S33 | 28 | 0.34 | 0.23 |
| S10 | 22 | 0.45 | 0.48 | S34 | 2 | 0.75 | 0.44 |
| S12 | 6 | 0.70 | 0.42 | S35 | 16 | 0.58 | 0.41 |
| S13 | 34 | 0.24 | 0.33 | S36 | 32 | 0.31 | 0.21 |
| S14 | 9 | 0.67 | 0.23 | S37 | 3 | 0.74 | 0.49 |
| S15 | 11 | 0.65 | 0.29 | S38 | 4 | 0.72 | 0.37 |
| S16 | 10 | 0.67 | 0.53 | S39 | 5 | 0.72 | 0.26 |
| S18 | 12 | 0.65 | 0.46 | S40 | 21 | 0.47 | 0.40 |
| S19 | 8 | 0.68 | 0.51 | S41 | 20 | 0.50 | 0.43 |
| S22 | 30 | 0.31 | 0.27 | S42 | 14 | 0.62 | 0.47 |
| S23 | 26 | 0.42 | 0.52 | S43 | 33 | 0.29 | 0.25 |
| S24 | 31 | 0.31 | 0.28 | S44 | 35 | 0.24 | 0.26 |
| S25 | 23 | 0.45 | 0.44 | S45 | 36 | 0.45 | 0.35 |
| S26 | 7 | 0.69 | 0.40 | S46 | 37 | 0.21 | 0.22 |
| S27 | 17 | 0.54 | 0.35 | S47 | 38 | 0.60 | 0.32 |
| S28 | 24 | 0.45 | 0.34 | S48 | 39 | 0.47 | 0.42 |
| S29 | 19 | 0.52 | 0.57 | S49 | 40 | 0.15 | 0.26 |

As indicated in Table 3.4, after removing nine questions from the test, the discrimination indices were between ‘0.21-0.57’ with a mean difficulty index of 0.37. The KR-20 value was found to be 0.77 before removing nine items but it became 0.78 after their removal. In addition to these, the difficulty indices of the remaining items ranged between ‘0.15 – 0.74’ with a mean difficulty index of 0.51. Lastly, in the final form of the achievement test, items were ordered according to their difficulty indices

from easy to difficult except the matching type item which was stated as the last item. The distribution of items according to the difficulty indices were presented in Appendix F. In Table 3.5, the distribution of test items across the objectives of Principles and Methods of Instruction course were shown after the item analysis.

Table 3.5.

*Distribution of Test Items across the Objectives of Principles and Methods of Instruction Course after the Pilot Study*

| Objectives of Principles and Methods of Instruction Course | Item Numbers in the Final Form |
|---|---|
| 1. Students will be able to understand the basic concepts related to education. | 29, 36, 37, 38, 39, 40. |
| 2. Students will be able to use appropriate principles in different teaching-learning situations. | 1, 25, 13 |
| 3. Students will be able to understand the properties of objectives. | 22 |
| 4. Students will be able to use different types of objectives in accordance with the teaching-learning situations. | 6, 33, 34 |
| 5. Students will be able to understand the properties of teaching plans. | 9, 11 |
| 6. Students will be able to know the properties of teaching-learning theories, approaches, strategies, methods and techniques. | 10, 12, 8 |
| 7. Students will be able to understand the properties of teaching-learning theories, models and approaches. | 30, 26, 31 |
| 8. Students will be able to use appropriate theories, models and approaches for different teaching-learning conditions. | 23 |
| 9. Students will be able to understand the properties of teaching strategies. | 7, 17 |
| 10. Students will be able to use appropriate teaching strategies for different teaching-learning conditions. | 24 |
| 11. Students will be able to understand the properties of teaching methods. | 19, 15, 27, 18 |
| 12. Students will be able to use appropriate teaching methods for different teaching-learning conditions. | 28, 2, 16 |
| 13. Students will be able to understand the properties of teaching techniques. | 32, 3, 4, 5, 21 |
| 14. Students will be able to use appropriate teaching techniques for different teaching-learning conditions. | 20, 14, 35 |
| Total Number of Items | 40 |

As a result of the item analysis, Principles and Methods of Instruction Course Achievement Test was developed which is valid and reliable and some of the sample items were presented in Appendix H. The test contained 40 questions (the last question is a matching type and included five items) with the mean item difficulty 0.51, mean item discrimination value 0.37 and the Kr-20 reliability coefficient 0.78.

### *3.7.2. The Classroom Environment Perceptions Scale of Pre-Service Teachers (CEPSPT)*

The Classroom Environment Perceptions Scale of Pre-Service Teachers (CEPSPT) was implemented after the treatment as post-test both in experimental and control groups. It was developed by the researcher and consisted of Likert-type items related to pre-service teachers' perceptions of classroom environment. Therefore, one of the important aims of the present study was to develop and validate a classroom environment instrument for assessing pre-service teacher's perceptions related to psycho-social learning environment both in flipped learning and traditional classroom. The steps that were applied during the development process were explained below.

In this study, firstly a comprehensive literature review was conducted related to psycho-social learning environment instruments. Many classroom environment instruments across various grade levels, subjects, and also for specific classroom contexts in many countries were investigated in order to assess the classroom environment. There are nine basic classroom learning environment instruments which were used widely in environment studies as both dependent and independent variable stated in Chapter II. They were adapted or modified for use in other instruments developed after them. For example, Learning Environment Inventory LEI which was developed after MCI was a simplified version of it. The items of LEI and CES were used to develop the CUCEI. Moreover, by using the items and scales of the existing classroom environment instruments the What Is Happening In this Class? (WIHIC) questionnaire was developed by Fraser et al. (1996). Even though, there were numerous studies which were conducted to develop classroom environment instruments, some theoretical and methodological shortcomings were determined in the literature.

First of all, many of the pre-mentioned instruments were developed to evaluate the psychosocial environment of primary or secondary schools rather than higher education institutions. Hence, it can be said that there is a remarkable shortage of instruments for assessing classroom environment in higher education institutions. On the other hand, one of the instruments used in higher education institutions, the CUCEI was developed basically to evaluate the post-graduate or seminar classes not specifically for undergraduate classes.

In addition to these, most of the instruments developed to assess the psychosocial classroom environments in higher education institutions, generally provided information about pre-service teachers' general perceptions about the classroom environments in higher education institutions rather than the perceptions pre-service teachers' classroom environment for a specific course.

Furthermore, as also stated by Yin & Lu (2014), some of the instruments developed to assess the perception of students in higher education institutions (e.g., science laboratory environment inventory) can be less appropriate for students majoring in arts and humanities other than natural sciences.

Finally, there have been few studies about the development or adaptation of instruments for assessing classroom environments in Turkey. Although some researchers contributed classroom environment translating instruments that originated in English and adapting them (Atbas, 2004; Ozkok et al., 2011; Sagkal, Topcu-Kabasakal, & Türnüklü, 2015), there is still absence of a scale to be used in pre-service teacher training classrooms in Turkish literature. When these diverse scales were considered, it can be stated that none of these instruments were appropriate to be used in pre-service teacher education classes in Turkish context.

The current instrument that was developed in accordance with the constructivism, environment fit theory, flipped learning principles and also the works of Fraser and his colleagues (Fraser, 1980; Fraser, Anderson et al., 1982; Fraser & Fisher, 1983; Fraser et al., 1992; Fraser, et al., 1996; Fraser & Treagust, 1986; Rentoul & Fraser, 1980; Taylor et al., 1997; Trickett & Moos, 1973). It included involvement, innovation, student cohesiveness, cooperation, individualization, satisfaction, task orientation, democracy and difficulty dimensions. This instrument was developed by

including Moos' (1974) three general categories to investigate classroom environment in a wide perspective.

The pilot form of Classroom Environment Perceptions Scale of Pre-Service Teachers (CEPSPT) included 60 items, 5 point Likert type (ranging from 1=completely disagree to 5=completely agree) and consisted of positively and negatively constructed statements which were adapted from existing instruments or were newly developed (Aldridge et al., 2004; Atbas, 2004; Chien, 2007; Dorman et al., 2003; Fraser, 1979; Fraser, 1980; Fraser & Fisher, 1983; Fraser, et al., 1992; Fraser, et al., 1996; Fraser, Pearse et al., 1982; Fraser & Treagust, 1986; Goh et al., 1995; LaRocque, 2008; Majeed et al., 2002; Rentoul & Fraser, 1980; Taylor et al., 1997; Trickett & Moos, 1973; Trinidad et al., 2005; Wheldall, et al., 1999; Yin & Lu, 2014).

In this study, expert opinion was obtained from seven faculty members (one professor, two associate professors, and four assistant professors in the Curriculum and Instruction Department of Ege, Hacettepe, Iowa State and Middle East Technical University) in terms of the face validity items i.e. about the clarity, readability of items, properness of items to the sub-scales, physical layout of the instrument and the order of scales. Moreover, one research assistant from Turkish Language Teaching department examined the scale in terms of grammar mistakes and clarity of sentences. For instance, one of the experts suggested that the item 33 "Good friendships are established among the students in different groups" written in the 'cooperation' scale was suggested to be appropriate for 'student cohesiveness' scale. Based on the suggestions of experts, necessary revisions were conducted and the dimensions of the classroom environment scale for pre-service teachers consisted of nine sub-scales, namely, Satisfaction, Involvement, Cooperation, Task Orientation, Student Cohesiveness, Difficulty, Democracy, Individualization and Innovation. Then, the instrument was administered to seven pre-service teachers to check the instrument whether the items and instructions are clear and readable. After taking pre-service teachers' feedback, the Classroom Environment Perceptions Scale of Pre-Service Teachers (CEPSPT) was made ready for pilot testing. The items 1, 3, 7, 9, 12, 13, 16, 17, 19, 20, 25, 26, 33, 34, 40, 44, 50, 52, 54, 57, 59 were negatively constructed.

In the pilot study, the factor structure of the scale CEPSPT was determined through exploratory factor analysis, confirmatory factor analysis were conducted and

then reliability coefficients were calculated. The participants were selected from pre-service teachers studying at Uşak, Ege and Manisa Celal Bayar University which would not be included in the actual study. 528 pre-service teachers who were sophomores and took the Principles and Methods of Instruction course in 2016-2017 education year spring semester filled out the CEPSPT from May to June. Pre-service teachers needed 10-15 minutes to fill out the scale. After eliminating eight questionnaires because of unanswered items, a total of 520 questionnaires was included for the analysis. Among the 520 pre-service teachers, 314 (60.4%) of them were female and 206 (39.6%) of them were male and 251 (48.3%) of them from Uşak University; 239 (46%) of them from Ege University and 30 (5.8%) of them from Manisa Celal Bayar University.

#### *3.7.2.1. Exploratory Factor Analysis (EFA)*

Exploratory Factor Analysis (EFA) which is a multivariate analysis method was applied in order to determine the underlying factors of the CEPSPT. Oblique rotation was employed because the factors of the scale are likely to correlate with each other. Data analyses were conducted using Statistical Package for Social Sciences (SPSS 22.0) and Cronbach's alpha was used to determine the reliability of factors.

During the analysis, firstly, data were screened in terms of missing data and it was observed that there were no missing values. Then negatively constructed items were recoded into different variable. Then univariate outliers were checked whether their z-scores exceeded -4 or +4 and multivariate outliers were checked by Leverage statistics, Cook's Distance, DF Beta, and Standardized Residuals (Field, 2009). In the current study the Leverage value lied between 0 and 1, all cases have a Cook's distance less than 1, Standardized Residual values lied between -2 and 2 and DF Beta statistics lied between -1 and 1, which showed that cases have no unexpected influence on the regression parameter (Field, 2009).

In addition to these, linearity assumption was checked by q-q plots and linear relationships were observed among the variables which confirm that the assumption was met. Furthermore, univariate normality assumption was checked. The normality among single variables was assessed by skewness and kurtosis (Tabachnick & Fidell, 2007). In the present data set, the results of Kolmogorov-Smirnov and Shapiro-Wilk

tests were found significant (Appendix J). However, as stated by Field (2009) if the sample size (200 or more) is large, it is more important to look at the value of skewness and kurtosis statistics rather than calculating their significance. In the present study, the values of skewness and kurtosis statistics were between -1 and +1. Thus, it can be stated that the data were normally distributed. As for the multivariate normality, Mardia's test was used and it was determined that multivariate normality was violated. Moreover, it was determined that multicollinearity assumption was not violated. The correlation coefficients were below .90, VIFs were below 10, and the tolerance values was less than .10 (Field, 2009).

The Principle axis factoring (PAF) extraction method was employed because the multivariate normality was violated (Hair, Black, Babin, & Anderson, 2014). In this study, oblique rotation, namely promax was conducted to determine the validity of the instrument (Field, 2009). Bartlett's test of sphericity and Keiser Meyer Olkin (KMO) measure of sampling adequacy were checked as for the evidence for factorability. Correlations were not higher than .90 (Field, 2009; Tabachnick & Fidell, 2007).

As stated by Field (2009), the KMO statistics vary between 0 and 1. The values which are close to 1 shows that patterns of correlations are relatively compact and indicates that factor analysis is appropriate to yield distinct and reliable factors. The KMO value of this data set is 0.92 and according to criteria stated by Kaiser (1974), it can be evaluated as superb (cited in Field, 2009). In the data set, there are correlations below 0.3; however, even very small correlations may be very significant with large sample size (Tabachnick & Fidell, 2007). For this data set, Bartlett's test is significant $X^2$ ($df$=741) = 7778.47, $p$<.000. Thus, by examining the correlation matrix and the Bartlett's test results, it can be stated that the data is appropriate to conduct factor analysis.

The EFA was conducted by using Principal Axis Factoring (PAF) and promax rotation technique and initially 14 factors were extracted. However, items 37, 42, and 48 were cross-loaded, hence they were removed from the analysis. After repeating the analysis, items 14, 18 and 59 were removed because their factor loads were less than 0.30. Then, when the analysis was repeated, since the factor load of item 52 was less than 0.30 and items 9 and 43 comprised a 2-item factor they were removed from the

analysis. Later, item 50 was removed from the scale because its factor load was less than 0.30 and item 57 was removed from the analysis because it formed one-item factor. After conducting the analysis again, items 19 and 20 were removed from analysis because they comprised a 2-item factor. After repeating the analysis, since items 33 and 34 comprised a 2-item factor, they were removed from the scale. Then, items 1, 3 and 7 comprising an irrelevant 3-item factor were removed from the scale. Finally, after repeating the analysis, items 53, 35 and 36 were removed because of comprising an irrelevant 3-item factor. Factors with eigenvalues greater than one considered and scree plot was checked while determining the number of factors. According to the last analysis, seven eigenvalues were found as higher than one. However, it was observed that one factor was distributed to two factors. Hence, the analysis was conducted again and factor structure was pre-determined as six, which was appropriate to hypothesized structure at the beginning of the study. The scree plot of EFA was shown in Figure 3.1.

According to Field (2009), factors with large eigenvalues should be retained. In the scree-plot, the factors with large eigenvalues can be understood by the sharp descent in the curve followed by a tailing off (Field, 2009). Hence, by examining theoretical structure, besides scree plot, six factors were retained.

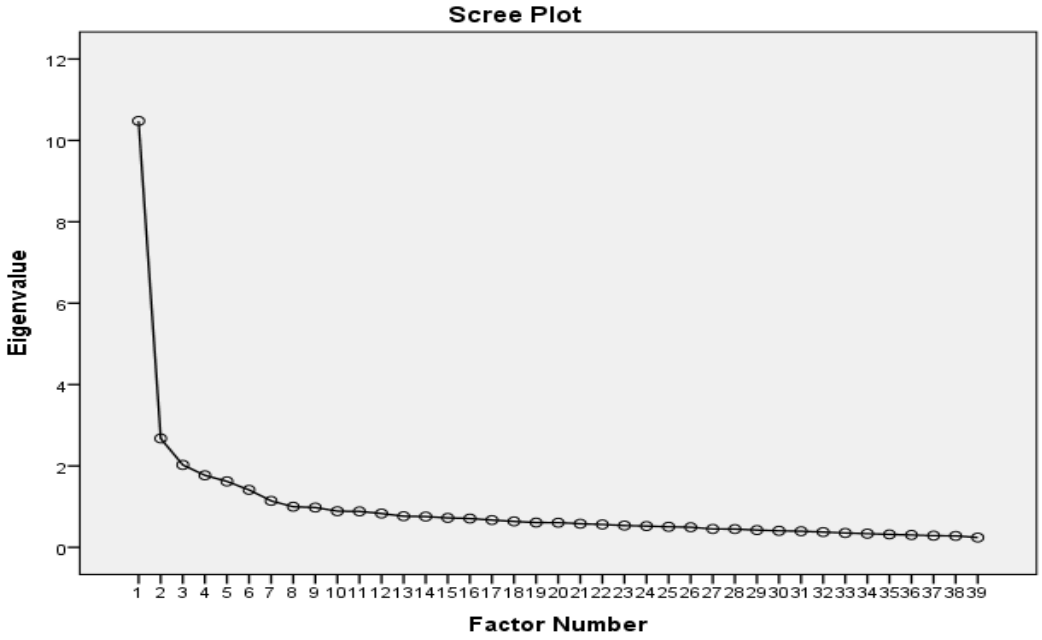


Figure 3.1. Scree Plot for CEPSPT

In Table 3.6, the eigenvalues and percentages of variance explained by these factors were displayed. The 1st, 2nd, 3rd, 4th, 5th and 6th factors explained 26.87%, 6.86%, 5.19%, 4.54%, 4.15% and 3.62% of the variances respectively. The explained total variance was calculated as 51.2%. Moreover, the eigenvalues varied from 10.48 to 1.41 for different scales.

Table 3.6.

*Eigenvalues, Percentages of Variance and Cumulative Percentages for Factors of the CEPSPT*

| Factor | Eigenvalue | % of Variance | Cumulative % |
|---|---|---|---|
| 1 | 10.48 | 26.87 | 26.87 |
| 2 | 2.67 | 6.86 | 33.73 |
| 3 | 2.03 | 5.19 | 38.92 |
| 4 | 1.77 | 4.54 | 43.46 |
| 5 | 1.62 | 4.15 | 47.61 |
| 6 | 1.41 | 3.62 | 51.23 |

After checking the pattern matrix, the items with factor loading greater than 0.3 on its own scale and less than 0.3 on all other scales were shown (Field, 2009; Stevens, 2009). Moreover, the significance of a factor loading depends on the sample size. According to Stevens (2009), for a sample size of 300, the factor loading should be greater than 0.29 and for 600 it should be greater than 0.21. The factor loadings of the data set with 520 participants were greater than 0.38. Moreover, the difference between factor loadings of two factor were greater than 0.15. Hence, it can be said that a good factor structure was obtained. The factor loadings for the CEPSPT were presented in Table 3.7.

Table 3.7.

*Factor Loadings for Promax Six-Factor Solution for the CEPSPT*

| | Factors | | | | | |
|---|---|---|---|---|---|---|
| Items | 1 | 2 | 3 | 4 | 5 | 6 |
| M2 | .13 | -.01 | **.48** | -.01 | .06 | -.15 |
| M4 | .13 | .18 | **.50** | -.10 | -.05 | -.12 |
| M5 | ,07 | .11 | **.57** | -.07 | -.10 | -.09 |
| M6 | -.05 | .03 | **.50** | .08 | .12 | .14 |
| M8 | **.52** | .04 | .32 | .00 | -.04 | -.08 |
| M10 | .03 | -.02 | **.55** | .07 | -.01 | -.06 |
| M11 | .12 | -.01 | **.48** | .13 | -.02 | -.01 |
| M15 | -.09 | .01 | **.41** | .21 | .09 | .05 |
| M21 | .08 | .04 | .05 | .07 | **.55** | -.14 |
| M22 | -.17 | -.02 | -.02 | .14 | **.67** | -.07 |
| M23 | -.02 | .25 | -.06 | .03 | **.63** | -.14 |
| M24 | .03 | **.51** | -.09 | .03 | .23 | .02 |
| M27 | ,09 | **.51** | -.12 | -.05 | .11 | -.09 |
| M28 | -05 | **.71** | .07 | -.04 | -.02 | .02 |
| M29 | -.11 | **.81** | .12 | -.06 | .01 | .12 |
| M30 | -.15 | **.62** | .23 | .06 | -.03 | .15 |
| M31 | .08 | **.68** | .02 | -.05 | -.02 | -.03 |
| M32 | -.07 | **.54** | .11 | .12 | -.06 | -.02 |
| M38 | **.63** | .28 | -.28 | .11 | -.12 | -.09 |
| M39 | **.50** | .27 | -.05 | .11 | -.08 | -.01 |
| M41 | **.43** | .11 | -.03 | .07 | -.05 | -.14 |
| M45 | .06 | .11 | .12 | **.54** | -.05 | .02 |
| M46 | -.18 | -.05 | .05 | **.72** | .10 | .05 |
| M47 | .07 | -.09 | .03 | **.80** | -.01 | .06 |
| M49 | .22 | -.00 | -.09 | **.69** | .01 | -.08 |
| M51 | .06 | .15 | .02 | **.48** | .04 | .00 |
| M55 | -.13 | .00 | .11 | .01 | .02 | **-.63** |
| M56 | .00 | -.08 | .18 | .04 | -.01 | **-.67** |
| M58 | .09 | .07 | -.12 | -.07 | .11 | **-.60** |
| M60 | -.13 | -.14 | .06 | .02 | .10 | **-.57** |
| M12S | **.54** | -.07 | .17 | -.10 | -.02 | .04 |
| M13S | **.60** | -.12 | .05 | .06 | -.04 | .15 |
| M16S | **.54** | .02 | .22 | -.11 | .14 | .04 |
| M17S | **.65** | -.09 | .09 | .01 | .05 | .11 |
| M25S | **.06** | -.09 | .02 | -.04 | .61 | .11 |
| M26S | **.20** | .11 | -.01 | -.18 | .53 | .18 |

Table 3.7 (Continued)

| | Factors | | | | | |
|---|---|---|---|---|---|---|
| Items | 1 | 2 | 3 | 4 | 5 | 6 |
| M40S | **.45** | -.01 | -.02 | .07 | .05 | .14 |
| M44S | **.59** | -.20 | .09 | -.04 | .08 | .01 |
| M54S | **-.01** | -.08 | -.06 | .14 | .18 | .38 |
| | Factor Correlations | | | | | |
| Factor1 | 1.00 | | | | | |
| Factor2 | .53 | 1.00 | | | | |
| Factor3 | .55 | .55 | 1.00 | | | |
| Factor4 | .46 | .52 | .54 | 1.00 | | |
| Factor5 | .43 | .49 | .52 | .42 | 1.00 | |
| Factor6 | .35 | .13 | .27 | .24 | .30 | 1.00 |

According to Table 3.7, items 8, 12, 13, 16, 17, 38, 39, 40, 41, 44 were loaded to the 1st factor. The factor loadings of 1st factor ranged from .43 to .65. These items are about whether the pre-service teachers enjoy class work or not. Therefore, the 1st factor was named as "Satisfaction". Items 24, 27, 28, 29, 30, 31 and 32 were loaded to the 2nd factor. The factor loadings of 2nd factor ranged from .51 to .81. These items are about whether the pre-service teachers cooperate rather than compete with one another on learning tasks. Hence, the 2nd factor was named as "Cooperation". Items 2, 4, 5, 6, 10, 11 and 15 were loaded to the 3rd factor. The factor loadings of 3rd factor ranged from .41 to .57. These items are about whether the pre-service teachers have attentive interest, participate in discussions, and do additional work. Therefore, the 3rd factor was named as "Involvement". In addition, items 45, 46, 47, 49 and 51 were loaded to the 4th factor. The factor loadings of 4th factor ranged from .48 to .80. These items are about whether it is important to complete activities planned and stay on the subject matter. Hence, the 4th factor was named as "Task Orientation". The items 21, 22, 23, 25 and 26 were loaded to the 5th factor. The factor loadings of 5th factor ranged from .53 to .67. These items are about whether the pre-service teachers know, help and support each other. Hence, the 5th factor was named as "Student Cohesiveness". Finally, the items 54, 55, 56, 58 and 60 were loaded to the 6th factor. The factor loadings of 6th factor ranged from .38 to -.67. These items are about whether pre-

service teachers find the class work hard or not. Hence, the 6th factor was named as "Difficulty".

### *3.7.2.2.* Confirmation of the Factor Structure of CEPSPT

The factor structure of the CEPSPT was confirmed through Confirmatory Factor Analysis (CFA). The participants were selected from pre-service teachers studying at Manisa Celal Bayar University. The applications conducted in the end of the December and the beginning of the January. Pre-service teachers needed 10-15 minutes to fill out the scale. 280 pre-service teachers who were sophomores and took the Principles and Methods of Instruction course in 2017-2018 education year fall semester filled out the CEPSPT. Among the 280 pre-service teachers, 201 (71.8 %) of them were female and 79 (28.2%) of them were male and 77 (27.5%) of them from Classroom Teaching Department; 85 (30.4%) of them from Turkish Language Teaching Department; 69 (24.6%) of them from Science Teaching Department and 49 (17.5%) of them from Elementary School Mathematics Teaching Department.

CFA was conducted using Lisrel 8.8 and the model fit was evaluated as stated by Hair et al. (2014) by model chi-square, RMSEA (Root Mean Square Error of Approximation), CFI (Comparative Fit Index), GFI (Goodness of Fit Index), IFI (Incremental Fit Index), NFI (Normed Fit Index), NNFI (Non-Normed Fit Index).

In the present data set, CFA proposed the following model fit indices: $X^2$ (df= 650) = 1281.19, p<.000, RMSEA= .059, CFI= .97, NFI= .94, NNFI= .97, IFI= .97, RFI= .93 and GFI= .81. For the model fit indices CFI, IFI, NNFI, NFI, RFI the acceptable values are .90 or above, and values greater than 0.95 are indicative of the good fitting model (Tabachnick & Fidell, 2007). However, as for the GFI 0.85 or above values are acceptable. Moreover, the acceptable values for RMSEA are between .05 and .08 and values between .00 and .05 are accepted as superb (Hair, 2014). Finally, a last fit statistic is the normed $X^2$ which is calculated by dividing the value of $X^2$ to the value of degrees of freedom. According to the Hair, (2014), the value smaller than 2 is considered very good and between 2.0 and 5.0 is acceptable. However, $X^2$:df ratios on the order of 3:1 or less are associated with better-fitting modes. In the current data set, the value of $X^2$/ df = 1.93 (p<.000) is less than 2 which indicates a good fitting statistics. Since it was significant, other goodness of fit indices were checked. Except

GFI, other goodness of fit indices were above the acceptable values. Error covariances of item pairs 30-11, and 1-6 which were the items of the same construct were observed as high when the modification indices were checked.

CFA was re-run and modifications were conducted to improve model fit among item pairs 30 and 31 with higher error covariances. Items 30 and 31 were both the items of the same construct, which was the fifth factor in the scale. Item 30 is "Students know each other well in this class" whereas item 31 is "Each student knows the names of other students in class". They are theoretically connected to each other. Afterwards, CFA was re-run, and a modification was conducted to improve model fit among item pairs 1 and 6 with higher error covariances. Items 1 and 6 were both the items of the same construct, which is the first factor in the scale. Item 1 is "Students are willing to attend the class" whereas item 6 is about "Students look forward to coming to this course". They were theoretically connected to each other.

After the modifications, CFA proposed the following model fit indices: $X^2$ (df= 648) = 1214.74, $p$<.000, RMSEA= .056, CFI= .97, NFI= .94, NNFI= .97, IFI= .97, RFI= .94, and GFI= .81. The value of $X^2$/df =1.87 ($p$<.000) is less than 2 which indicates a good fitting statistics. Since it was significant, other goodness of fit indices were checked. The model fit values indicated superb fit except GFI which is also close to expected value. It can be said that each item significantly contributed to the corresponding factors since the loadings on the associated factors were significant at p= .001 level according to standardized estimates of path coefficients. They ranged from 0.34 for item 28 to 0.88 for item 9 which can be seen in Figure 3.2.

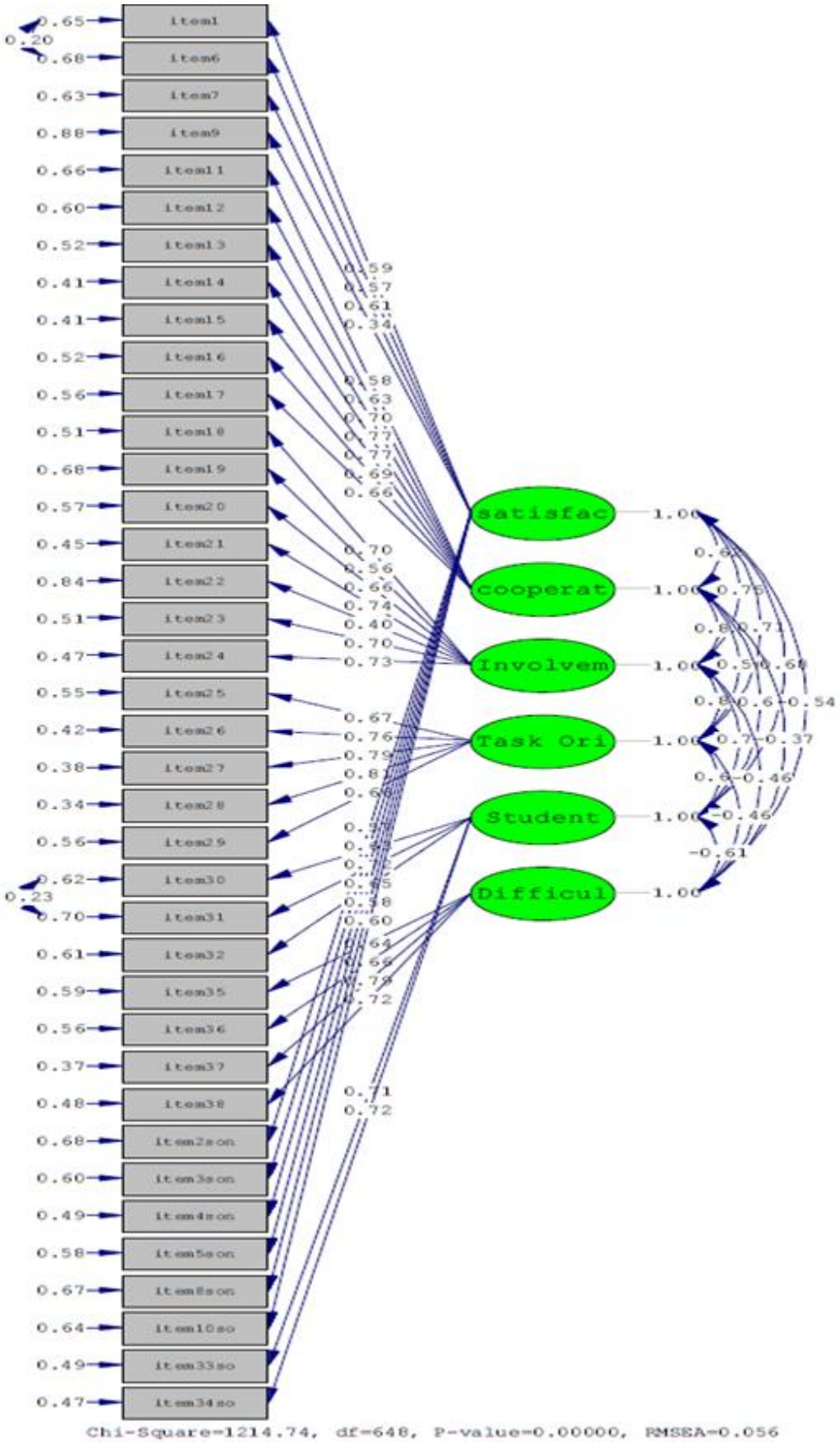


Figure 3.2. Standardized Path Coefficients for Six-Factor CEPSPT.

Note: factor1= Satisfaction, factor2= Involvement, factor3= Cooperation, factor4= Task Orientation, factor5= Student Cohesiveness and factor6= Difficulty.

#### *3.7.2.3.* Reliability of the CEPSPT

In the current study, reliability was examined by Cronbach's Alpha coefficients of internal consistency were calculated for each sub-scale of the CEPSPT. According to Hair et al. (2014), reliability should be 0.70 or higher to indicate adequate convergence or internal consistency. The reliability coefficient was found 0.85 for Satisfaction, 0.84 for Cooperation, 0.77 for Involvement, .83 for Task Orientation, 0.77 for Student Cohesiveness, and 0.44 for Difficulty scales. However, if item 54 deleted from the difficulty scale, the reliability of the Difficulty scale raised to 0.72. Moreover, the reliability coefficient of the scale as a whole was also calculated as 0.91.

Table 3.8.

*The Item Numbers across the Factors of the CEPSPT*

| Factors | Item Numbers |
|---|---|
| 1. Satisfaction | 8, 12, 13, 16, 17, 38, 39, 40, 41, 44 |
| 2. Cooperation | 24, 27, 28, 29, 30, 31, 32 |
| 3. Involvement | 2, 4, 5, 6, 10, 11, 15 |
| 4. Student Cohesiveness | 45, 46, 47, 49, 51 |
| 5. Task Orientation | 21, 22, 23, 25, 26 |
| 6. Difficulty | 55, 56, 58, 60 |

Finally, as it can be seen in Table 3.8 the CEPSPT was developed as a valid and reliable 38-item 5-point (ranging from 1-completely disagree to 5- completely agree) Likert scale (some of the sample items were presented in Appendix K) consisting of six scales: 1. Satisfaction, 2. Cooperation, 3. Involvement, 4. Student Cohesiveness, 5. Task Orientation, and 6. Difficulty. Satisfaction scale consisted of 10 items (e.g., Students look forward to coming to this course), Cooperation scale consisted of 7 items (e.g., Each student tries to fulfill his/her duties fully in individual or group works), Involvement scale included 7 items (e.g., Students strive to complete the activities that are being conducted in class), Task Orientation scale included 5 items

(e.g., The learning tasks are planned clearly and carefully), Student Cohesiveness scale consisted of 5 items (e.g., Students know each other well), and Difficulty scale included 4 items (e.g., Students are challenged in group work conducted in class.).

### *3.7.3. Student Questionnaire on Flipped Learning Process (SQ)*

The perceptions of experimental group regarding the video courses, including different habits of watching the videos and their perceptions about the effect of using videos on pre-service teachers' learning were asked through student questionnaire. Moreover, the perceptions of pre-service teachers about the flipped learning applications such as whether group studies affected pre-service teachers' learning positively, developed self-learning skills, supported and facilitated learning, flipped learning took longer time to learn or it was perceived as distracting because of being so much activities asked through student questionnaire shown in Appendix L.

The items of SQ were examined by seven experts (one professor, two associate professors, and four assistant professors) in Curriculum and Instruction Department of Ege University, Hacettepe University, Iowa State University and Middle East Technical University to evaluate whether they are proper to the aims of the study and establish the face validity of the SQ, as stated by Turgut & Baykul, (2011).

The first part of the questionnaire included personal questions and the second part of the questionnaire included 33 items. For the pilot study of the questionnaire, 259 pre-service teachers who learn all of the courses through flipped learning at a private university were asked to fill the questionnaire. The Cronbach Alpha reliability coefficient of internal consistency of the questionnaire was found .95 and descriptive statistics methods were used to analyze the data. The questionnaire included positively and negatively constructed statements which were adapted from existing instruments or were newly developed (Clark, 2013; Day & Foley, 2006; Enfield, 2013; Gaughan, 2014; Kecskemety & Morin, 2014; Turan, 2015; Ziegelmeier & Topaz, 2015; Zappe, et al., 2009).

### *3.7.4. Interview Schedule*

Interview schedule was implemented in the experimental group after the treatment. The interviews were conducted to reveal the perceptions and views of pre-

service teachers about flipped learning activities, materials, assignments, group works, communication with the instructor and perceptions of classroom environment. Hence, 14 interview questions were prepared (Appendix M). The interview schedule consisted of statements which were adapted from existing instruments or were newly developed (Alsancak-Sırakaya, 2015; Clark, 2013; Gaughan, 2014; Turan, 2015).

In order to establish validity of the interview schedule, the items were checked to by seven experts (two professor, two associate professors, and four assistant professors) in Curriculum and Instruction Department of Ege University, Hacettepe University, Iowa State University and Middle East Technical University as also stated by Turgut ve Baykul, (2011).

The interviews were recorded after taking the permission of pre-service teachers. They were transcribed and coded. Codes were generated after reading the transcriptions many times in accordance with the literature about flipped learning.

### *3.7.5. Student Performance Evaluation Rubrics*

The rubrics were developed by the researcher to score the performances of pre-service teachers for different activities. In this study, three rubrics were developed and they were explained sequentially.

The Student Performance Evaluation Rubric (Appendix N) was about evaluating the weekly video homework. The scoring range of the rubric changed from 0 to 5. While the lowest score of zero was reserved for no homework, the highest score of five was awarded for responses that complete homework by covering all the topics in the course content, mention about the examples in the videos, and also give original examples about different topics and finally, if all of the written explanations and statements were correct. Moreover, pre-service teachers who delivered their homework on time got one extra point, pre-service teachers who delivered their homework using Moodle system-Edmodo also got one extra point, and pre-service teachers who participated actively in the face to face part of the course got one extra point too. Lastly, all the given grades by adding weekly grades among 0-5 were converted to a grade over 100.

The second rubric (Appendix O) was about evaluating a teaching technique presentation plan. The scoring range of the rubric changed from 0 to 5. While the

lowest score of zero was reserved for pre-service teachers who did not submit their planning assignments, the highest score of five was awarded for responses if the presentation plan included objectives of the application which were written in the plan in accordance with the objective writing criteria, the content of the course was explained clearly and is consistent with the objectives, the teaching principles which were included during the application of teaching technique were clearly explained, the relationships between the presented technique and teaching theory/strategy and method were explained clearly, finally, the assessment part took place in the plan. Lastly, all the given grades were converted to a grade over 100.

Finally, the third rubric (Appendix P) was about evaluating the teaching technique presentations of pre-service teachers. The rubric consisted of two parts. The first part included criteria to evaluate the applications of pre-service teachers and named "Application Skills" (50 points). The second part of the rubric included criteria to evaluate the communication and presentation skills of pre-service teachers and named "Presentation Skills" (50 points). The highest score for the application part was awarded for pre-service teachers who used the principles of technique correctly and effectively, checked whether classmates understand the topic or not, answered their classmates' questions clearly, asked appropriate questions to reach the objectives of the presentation topic and finally, supported presentation by implying proper visual or audio materials. The highest score for the presentation skills part was awarded for pre-service teachers who use a clear, understandable and fluent language, established eye contact, use tone of voice, gestures and mimics as well as use body language quite effectively, use the time of presentation quite effectively, and finally, demonstrate desire and enthusiasm for instruction. On the other hand the lowest score of 0 was reserved for pre-service teachers who do not make presentation.

After pre-service teachers turn back the assignments they were firstly graded by the researcher taking the rubric into consideration. Then, every week, randomly selected six assignments, five teaching technique presentation plans and five teaching technique presentations both for flipped and traditional groups were also graded by two academicians by taking the rubric into consideration. One of the academicians is an assistant professor at the Curriculum and Instruction Department and the other is an instructor with a doctorate in the Curriculum and Instruction Department. The inter-

rater reliability coefficient was computed and was found 0.90 which showed high reliability and internal consistency of scoring besides the extent of consensus on the use of the scoring rubric.

### 3.8. The Pilot Study

In the current study, a pilot study was implemented in order to eliminate any problems that might be encountered during the real implementation. In the pilot study, the duration, clarity and audibility of videos, the extent of the video content and applications conducted in the face to face part of the course were checked in order to detect any problems before the implementation of the study.

The pilot study was conducted in the spring semester of 2016-2017 at a public university located in the Aegean Region and implemented in the Principles and Methods of Instruction Course at the Guidance and Psychological Counselling Department. Out of two sections of the department, one section was chosen as the pilot study group randomly which consisted of 30 pre-service teachers: 15 female and 15 male.

The content of the Principles and Methods of Instruction course for 6 weeks included: Teaching principles, teaching theories and models (Gagne's theory on learning and instruction, Mastery learning, Keller's individualized instruction, Carroll's model of school learning, Bloom's mastery learning, constructivism, multiple intelligence theory etc.), teaching strategies (teaching through presentation, discovery learning and teaching through research and investigation and cooperative learning), methods of teaching (lecturing, discussion, case study, demonstration, project based learning, problem based learning etc.), teaching techniques (question and answer, brainstorming, role playing, concept mapping, different discussion techniques etc.).

The pilot study applications began after the midterm exams and lasted six weeks but the researcher attended to courses from the beginning of the semester in order to observe the flow of the course and get to know pre-service teachers before the pilot study. Firstly, they were informed about the course applications and materials that would be used at the rest of the course and how they need to watch the videos.

Moreover, pre-service teachers were provided with membership from Facebook and WhatsApp groups in order to share videos and discuss about different issues.

The videos prepared by the researcher about the Principles and Methods of Instruction course. Also, a Facebook group was formed in order to share videos with pre-service teachers. Moreover, they were provided with videos before the course using Facebook or Whatsapp. Pre-service teachers were expected to watch video lessons (approximately 21 minutes). After watching the videos, they were expected to summarize what they have learned from the content of the videos and write an interesting questions. In the face-to face part of the class, after a brief summary of the video course, Kahoot or Socrative applications which are online question and answer game activity pre-service teachers were conducted and assignments were conducted in the course time mostly in groups.

In the pilot study, Principles and Methods of Instruction Course Achievement Test, Classroom Environment Inventory, Student Questionnaire on Flipped Learning were administered and pre-service teachers were asked to write a reflection paper about the activities and materials of flipped learning. 30 pre-service teachers filled the Inventory and 29 pre-service teachers filled the Questionnaire. The quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS 22.0) and the qualitative data was analyzed through content analysis.

According to Student Questionnaire, for the pre-service teachers' habits of watching videos, it was found that while watching the videos, 48.3% pre-service teachers never took notes and 86.2% of pre-service teachers never wrote questions to be asked in the class. Also, according to student questionnaire, 30% of pre-service teachers indicated that they did not come to the course prepared. Hence, it was thought that pre-service teachers should be graded on their weekly content summaries and they should be encouraged to ask questions in the face-to face part of the class.

48.2% of pre-service teachers indicated that flipped learning increased interaction with the instructor within the class and out of the class. However, this percentage is quite less than expected because in the literature it was stated that flipped learning increase interaction with the instructor. Thus, it is thought that the active use of Facebook and WhatsApp groups by the instructor and pre-service teachers are

encouraged to interact with the instructor and other pre-service teachers whenever they need help.

Moreover, it was inferred that in order to made it easier for pre-service teachers to follow the course content, increase pre-service teachers' interest in the course, it was decided that videos should be enriched with more audio visual elements and pop-up questions. On the other hand, 17.2% of the pre-service teachers agreed that learning with videos was inefficient due to technical problems. Hence, in order to eliminate any technical problems, duration of videos was decided to be short and videos should be sent to the pre-service teachers at least four days before the course so that they could find the opportunity to access the necessary equipment or internet.

In addition to these, 68.9% of pre-service teachers agreed that flipped learning was effective in practicing theoretical knowledge. It was thought that activities planned in a concise and effective way to let practicing theoretical knowledge instead of doing many activities which is distracting for some pre-service teachers.

Finally, after analyzing pre-service teachers' reflection papers from this pilot study, it was inferred for the actual implementation that pre-service teachers wanted music behind the voice of instructor in the lecture videos. Hence, lecture videos which were prepared for the actual study included music behind the voice of instructor. Moreover, it was observed that Kahoot or Socrative applications increased the motivation and engagement of pre-service teachers towards the course. Hence, it was decided that Kahoot or Socrative applications took place in the face-to-face part of the course.

### 3.9. Data Collection Procedures and Materials

This study was conducted in the fall semester of 2017-2018 education year in the Principles of Methods of Instruction Course at the Classroom Teaching Department-Elementary Education Division which is three hours a week.

The course lasted for 15 weeks but except four weeks (one week is orientation week, two weeks are midterm exams, and one week after midterm exams), the treatment process was carried out for 11 weeks. During the orientation period, which was the first week of the semester, pre-service teachers were informed about the course applications and materials that would be used during the semester and they were

provided with membership from the Facebook, WhatsApp groups and the course management system that is Edmodo. The experimental process was explained below in detail.

### *3.9.1. The Procedures Conducted in the Experimental Group*

The learning processes of the experimental group follows these steps respectively:

#### *3.9.1.1. The Activities Conducted by the Experimental Group before the Class*

The experimental group was taught by using flipped learning and pre-service teachers were provided with videos which were developed by the researcher before the course using Facebook and Edmodo. Pre-service teachers were expected to watch video lessons (approximately 21 minutes). After watching the videos, they were expected to summarize what they have learned from the content of the videos in written form and share them on the Moodle system-Edmodo. Every pre-service teachers was required to come to class with at least one interesting question about the videos as well as the notes taken about the online video lecture. Each video lesson included pop-up questions which were provided for experimental group pre-service teachers to test whether they learned the subject or not. Similar to constructivism, in flipped learning, foundational concepts and base knowledge were learned through videos or podcasts outside of the classroom. These concepts were then built upon and explored further in the classroom for deeper and meaningful learning. In the current study, pre-service teachers could learn by watching the videos as many times as they needed at their own pace by using technology out of the class time when and wherever they want. This can also be matched with the "flexible environment" pillar of flipped learning. Then, they had a better chance of mastering the learning objectives by freeing class time for activities. In this way, flipped learning with Bloom's mastery learning strategies created the flipped-mastery classroom in which pre-service teachers demonstrated their understanding or mastery of concepts before moving on. In addition to these, the implementation of flipped learning is also based on the experiential learning which is complementary with traditional learning which mostly involves lecturing. In the current study, since video lectures provided pre-service teachers with theoretical

knowledge outside of the classroom whereas experiential learning enabled active, practical, meaningful and individualized experiences and skills to be developed inside the flipped learning classroom.

In addition to the video lectures submitted to only experimental group, both control and experimental groups were encouraged to make reading about the subject before the class from the course books suggested at the course syllabus or on the internet, which is also supported by peer instruction. Similar to peer instruction, in the flipped learning firstly, pre-service teachers acquired preparatory knowledge through videos, podcasts, screencasts and assigned textbook readings. Then, they moved to the group learning activities in the classroom and practiced self-teaching to increase engagement and enhance mastery of concepts during class time.

#### *3.9.1.2. The Activities Conducted by the Experimental Group inside the Class*

For the pre-service teachers who were in the experimental group, face to face class activities were comprised of three parts which were question-answer & discussions part, learning outcomes check part and group exploration part respectively.

*Question-answer & discussions*

In face to face part of the course, firstly, pre-service teachers were informed about the aims and objectives of the course and the content was explained briefly. However, pre-service teachers were not given additional lecturing and "re-teaching" of the video content but some important points that pre-service teachers did not understand were explained. Pre-service teachers were asked whether they had any questions about the video lectures. When they could ask the things that they did not understand or they wondered about, their questions were answered. Then question-answer and discussion time followed in order to check whether pre-service teachers learned the critical points of each subtopic. In this way, similar to constructivist environment, in flipped learning, pre-service teachers discussed the topic, shared their opinions with the instructor and their peers, and discovered new concepts.

*Learning outcomes check*

Then the pre-service teachers in the experimental group were directed to Kahoot or Socrative applications which are online question and answer game activity. Moreover, in this part, similar to constructivism, the assessment of process rather than product was emphasized. In the current study, since class time is used to apply what pre-service teachers have learned from the videos, it allowed to use various formative evaluation techniques to assess whether pre-service teachers understand the content or not. Since Kahoot application gives the names of the pre-service teachers who took the top three, their names were shared on Facebook group to increase the motivation and engagement of pre-service teachers towards the course which was shown in Figure 3.3.

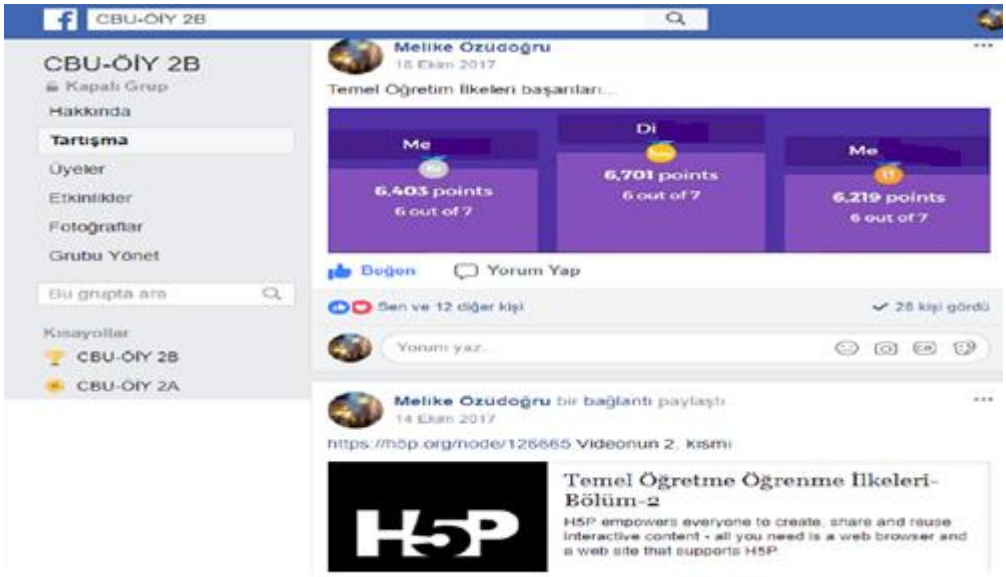


Figure 3.3. Kahoot Application Results

*Group exploration*

In the experimental group, there was a group work to be completed in the class requiring pre-service teachers to reflect on, discuss, and apply what they have learned. Similar to the experiential learning environments, pre-service teachers demonstrated their learning through activities and were assessed based upon their performance not

through their ability of memorizing information. They could reflect on the meaning from those experiences critically through written, verbal or hands-on exercises designed to learn course content and increase mental connections. In the flipped learning, by participating in cooperative and collaborative learning activities, pre-service teachers completed different tasks like preparing sample products, lesson plans and presentations. It can be seen that, flipped learning also provided differentiation and cooperation which is related to peer learning. All these activities can be matched with the "learning culture" pillar of flipped learning.

The cooperative and collaborative learning activities which required positive interdependence. Hence, all pre-service teachers tried to manage group goals together. In addition, these tasks required individual accountability by assigning group members their own responsibility. Although the group member facilitates learning, each group member was accountable for their own learning. Moreover, during cooperative learning tasks, group members developed different interpersonal skills like empathy, understanding, effective communication and conflict resolution.

Moreover, the classroom activities supported Bandura's Social Learning theory in that pre-service teachers were in constant interaction with each other and the instructor in the classroom while working on assignments. Pre-service teachers could observe and learn from their instructors and peers. They were helped by the instructor or more knowledgeable peers to develop into the zone of proximal development.

Finally, pre-service teachers uploaded the classroom assignments to Moodle to be evaluated. A scene from pre-service teachers' group work was shown in Figure 3.4.


Figure 3.4. A Scene from Group Work

### *3.9.2. The Procedures Conducted in the Control Group*

The learning processes of the control group follows these steps respectively:

#### *3.9.2.1. The Activities Conducted by Control Group before the Class*

The control group was taught according to the principles of traditional instruction. Pre-service teachers in the control group were assigned homework from their course books to read before the class time. Moreover, pre-service teachers conducted assignments outside of the class time individually which were conducted by the experimental group in the class.

#### *3.9.2.2. The Activities Conducted by Control Group inside the Class*

In the current study, the pre-service teachers who were in the control group gathered in the classroom to learn the content of lectures from the instructor. They took notes about the explanations of the same instructor. The course subject was explained during the class time by the researcher using PowerPoint slides. The pop-up questions included in the lecture videos and the questions which were asked during Kahoot or Socrative activities were asked to the control group in the classroom. However, they worked on assignments and tasks usually on their own, outside of the class.

The syllabus of the course and Weekly Lesson Plans were developed by the researcher. The syllabus covered the objectives of the course, topics of Principles and Methods of Instruction Course with the time of teaching, suggested readings and evaluation criteria (see Appendix Q). The weekly lesson plans included the topics of the week, video lesson links, pop-up, Kahoot and Socrative questions and weekly applications (see Appendix R). In order to develop each unit, the objectives of the course, principles and applications related to flipped learning were considered. While developing the syllabus of the course and weekly lesson plans, the literature about flipped learning was reviewed (Berrett, 2012; Davies et al, 2013; Fulton, 2012; Hamdan et al., 2013; Kecskemety & Morin, 2014; McLaughlin et al., 2013; Mason et al., 2013; Millard, 2012; Milman, 2012; Sams & Bergmann, 2013; Talbert, 2014; Tune et al., 2013; Zappe, 2009; Ziegelmeier & Topaz, 2015). The summary of procedures in the experimental and control groups were stated in Table 3.9.

Table 3.9

*The Procedures in the Experimental and Control Group*

| | Before Class | Inside the Class |
|---|---|---|
| Experimental Group | ✓ Pre-service teachers were given videos before the course.<br>✓ Pre-service teachers summarized the content of the videos.<br>✓ Pre-service teachers reflected about the content.<br>✓ Pre-service teachers came to class with at least one question about the subject.<br>✓ Pre-service teachers interacted to understand each other' ideas, questions and even offer help to each other to solve their problems using Facebook, WhatsApp or Edmodo. | ✓ Pre-service teachers' questions and the points they wondered about the content of videos were answered.<br>✓ Experimental group was directed to Kahoot/Socrative applications in relation to the course content.<br>✓ A group work was completed in the class requiring Pre-service teachers to reflect on, discuss, and practice what they have learned. |
| Control Group | ✓ Pre-service teachers were assigned a topic and expected to read about it before the class.<br>✓ Pre-service teachers uploaded the previous week's homework to Edmodo to be evaluated. | ✓ Lecturing took place.<br>✓ During lecturing, question and answer part took place.<br>✓ Instructor answered pre-service teachers' questions.<br>✓ The Kahoot questions were asked to pre-service teachers involved in the control group during the lesson orally. |

The face to face part of the course was two hours for experimental group and three hours for control group. In the current study, during the data collection process different materials and software were used and they were explained below.

### *3.9.3. The Materials and Software Involved in the Study*

#### *3.9.3.1. Videos*

The instructional videos were created by using Camtasia Studio 8 software. Besides recording onscreen activities, Camtasia also records audio and webcam

videos. It is used to explain PowerPoint presentations. The recordings which were prepared using Camtasia can be edited and shared by using different software. Hence, in the present study, the videos included both the sound and the image of researcher. At the beginning of each video, pre-service teachers were informed about the objectives and the course content before moving on to the new topic of the course. In Figure 3.5, a sample video recording using Camtasia was shown:

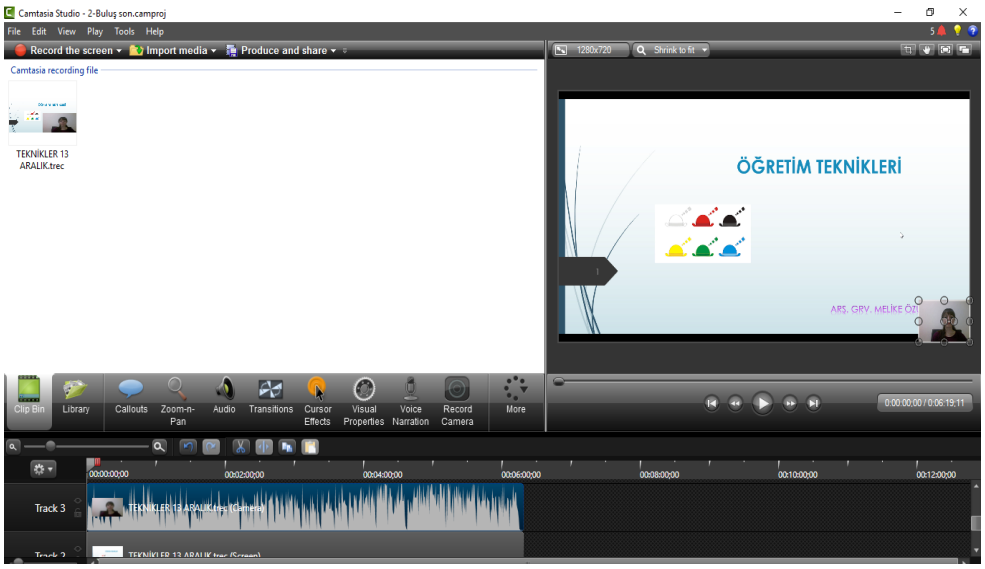


Figure 3.5. A Sample Video Recording Using Camtasia.

After recordings were completed, they were converted to interactive videos using H5p (H5p is an abbreviation for HTML5 Package) which is an open-source content collaboration framework based on JavaScript (https://h5p.org/). Videos lasted around 21 minutes in a week but they were divided into two, three or four parts according to the subject. H5p includes pop quizzes, interactive timelines which make pre-service teachers more active and engaged and increase the ratio of pre-service teachers' watching videos. In Figure 3.6a and Figure 3.6b, an example video which was turned to interactive video was shown. In the Figure 3.6a and Figure 3.6b, the parts that include multiple type, true/false or matching type questions were stated in purple, the extra explanations and example videos were stated in blue points.

By including video courses, flipped learning provided differentiation by customizing the curriculum for different learning styles to achieve mastery of learning objectives as also stresses by Fulton (2012b). In this way, learning was personalized

for each pre-service teachers since they were in control of their own learning. While quick learners could able to fast forward and move on, slower learners did not have to try to learn the next subject before grapping the previous one because they could access the information on their own schedule and as often or as little as needed.


Figure 3.6a. Sample Weekly Interactive Video Screencast

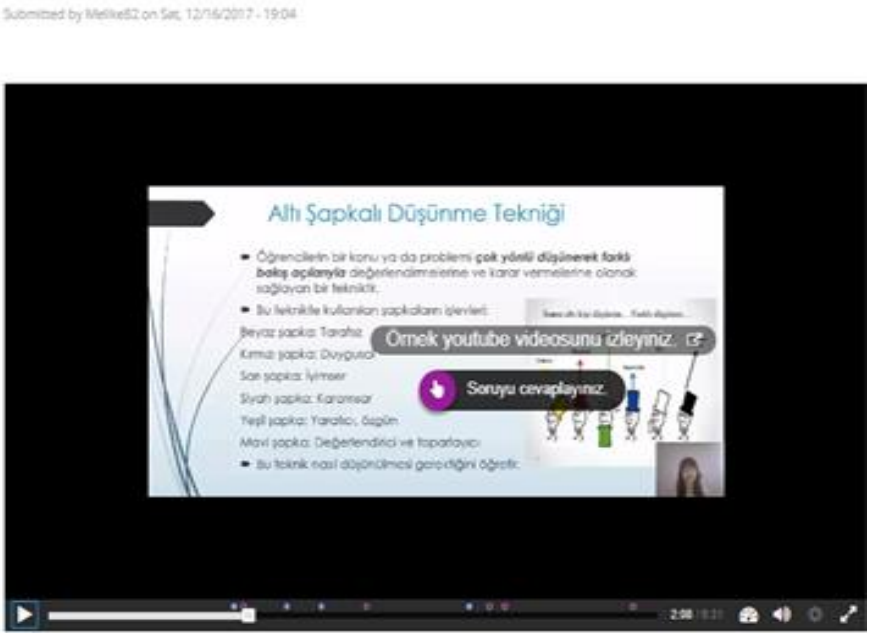


Figure 3.6b. Sample Weekly Interactive Video with Pop-Quiz.

### *3.9.3.2. Kahoot and Socrative*

Kahoot is one of the game-based learning platforms which can be accessed via web browser. It is used as educational technology in classrooms. In this way, pre-service teachers can both entertain and compete with each other in order to answer the questions by using their mobile phones. The questions are mostly multiple-choice type. In the current study, the aim of using Kahoot was to encourage pre-service teachers to complete the assigned video lessons and provide daily formative assessment for the researcher since the questions were prepared according to the content of video lessons. In Figure 3.7, an example Kahoot screen was shown:

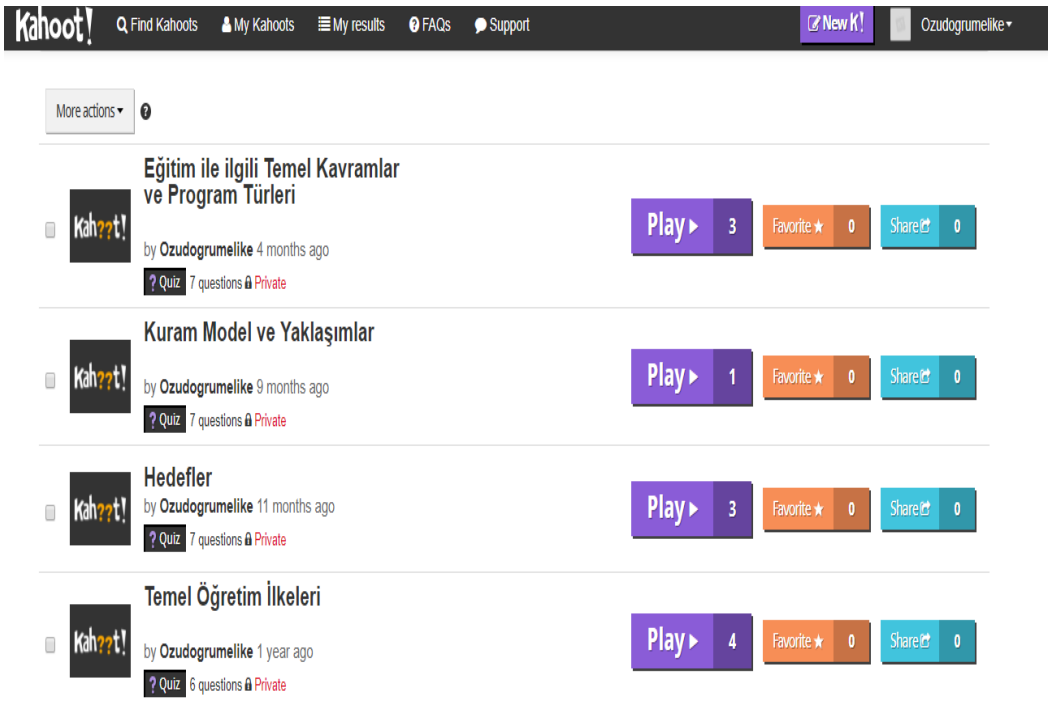


Figure 3.7. Kahoot Screen

Socrative is also one of the classroom applications that increase fun and result in effective student engagement. In the present study, Socrative allowed to assess pre-service teachers quickly with questions prepared by the researcher to get immediate insight into student understanding. In Figure 3.8, a sample Socrative screen was shown:

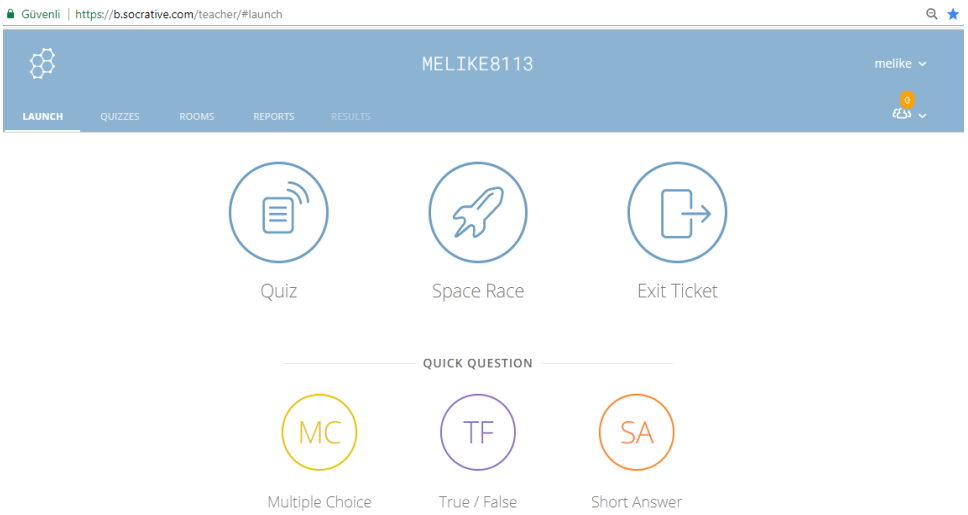


Figure 3.8. Socrative Screen

Also, Socrative delivers any gradable assessment as a fun interactive Space Race. It engaged pre-service teachers in some healthy competition and provided detailed results afterwards about pre-service teachers' understanding of the subject. The reports were placed in the reports section of Socrative. In Figure 3.9, a sample Socrative screen from Space Race was shown:

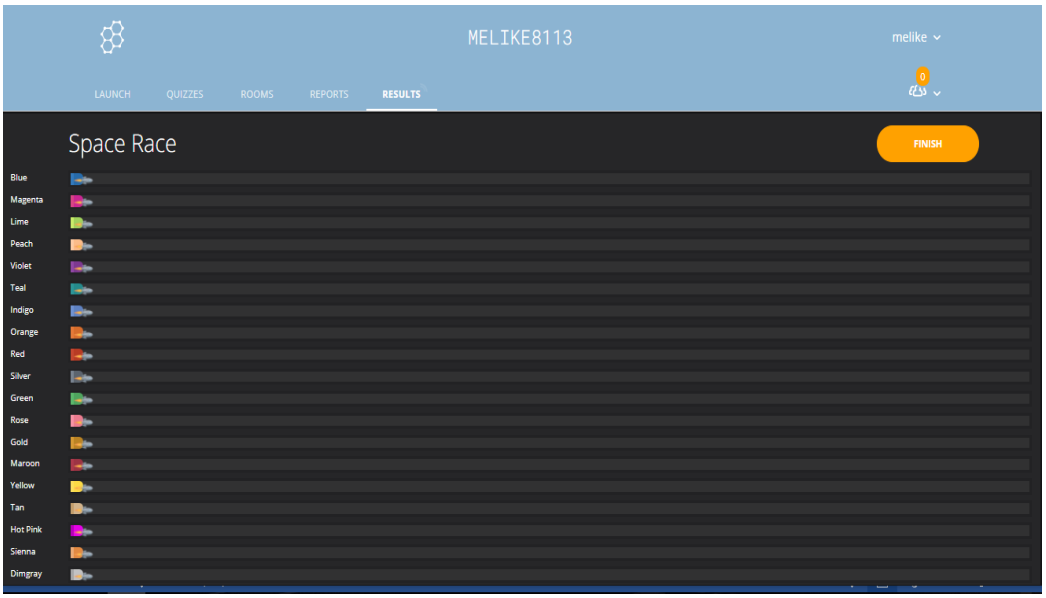


Figure 3.9. Socrative Screen from Space Race

### *3.9.3.3. Course Management System-Edmodo*

The Course Management System, Moodle- Edmodo is an online networking application for teachers and students. Since anonymous posting is not possible, it is a safer way to increase within-class communication and encourage peer-support and peer-learning both in the classroom and online. Hence, in the current study, an Edmodo class group was created both for experimental and control groups by the researcher which can be seen in Figure 3.10. Pre-service teachers were provided with separate access codes for both groups to join the class. The weekly videos of the course were placed on Edmodo and also information about homework was posted on Edmodo.

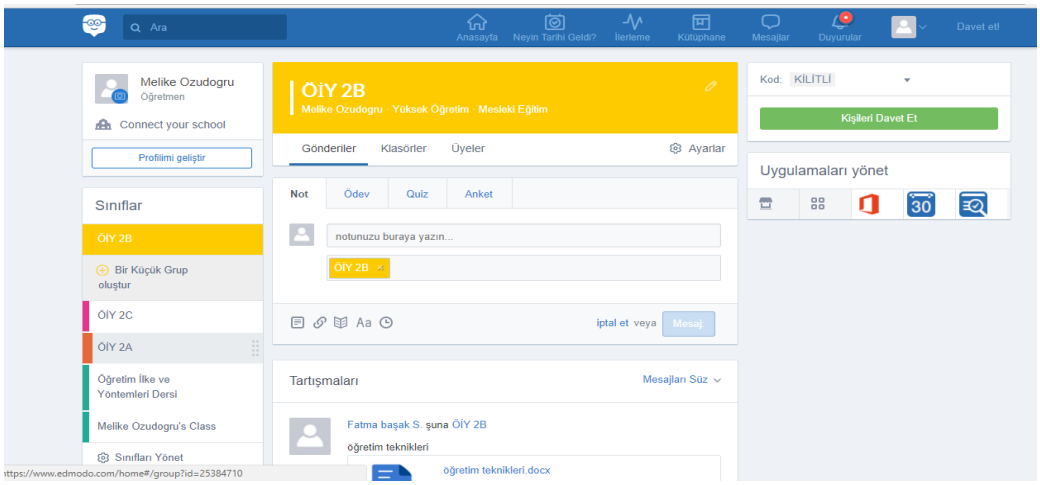


Figure 3.10. Edmodo Class Group

Finally, pre-service teachers of the experimental group uploaded the classroom assignments and control group uploaded their homework to Moodle to be evaluated. The submission time and number of pre-service teachers can be viewed on Edmodo day by day. As it can be seen in Figure 3.11, although pre-service teachers were expected to submit their assignments due to 25$^{th}$ of December, and by the 23$^{rd}$ December, 2017, 21 pre-service teachers submitted their assignment.

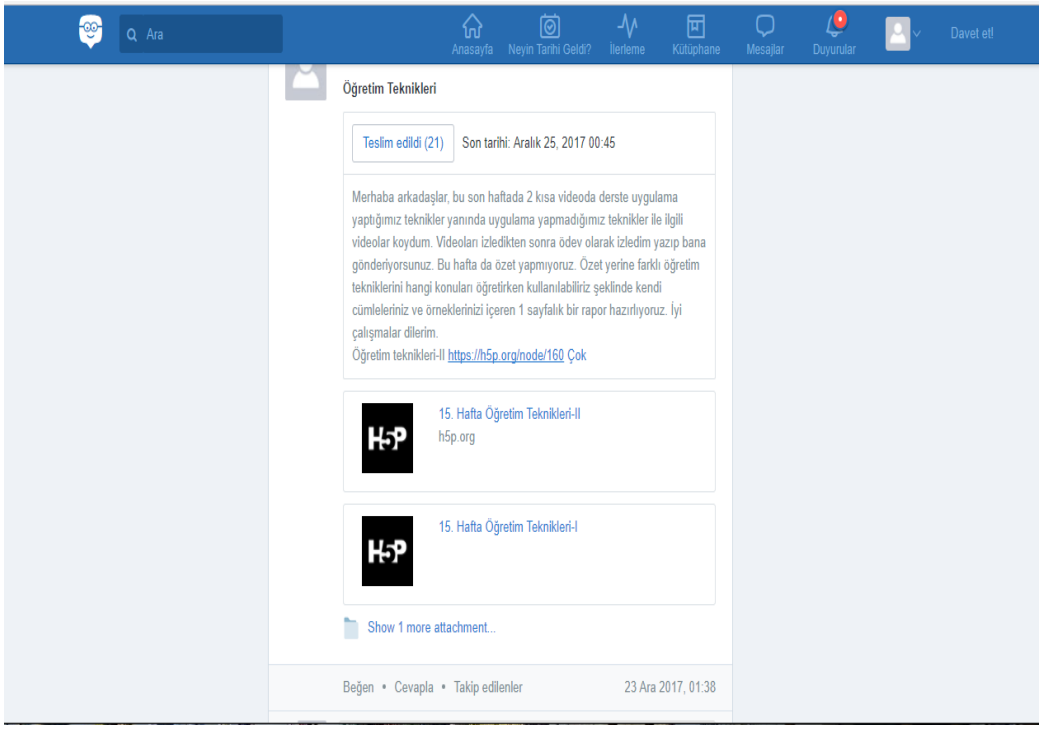


Figure 3.11. Assignment Submission on Edmodo

Before each lesson, videos were produced by the researcher and published through the course management system, Edmodo and Facebook, and pre-service teachers of the experimental group were announced about the publication of video at the social networking site on Facebook and WhatsApp. Pre-service teachers were asked to reflect on the content of the videos before the class.

Moreover, pre-service teachers were asked some questions about the subject in class using Kahoot or Socrative. These same questions were asked to pre-service teachers of the control group during the traditional instruction with the intent of including the same content and questions except for the type of instruction, hence, decreasing the differences between the two groups.

#### *3.9.3.4. Social Networking Sites*

In the present study, separate groups were created at the social networking sites on Facebook and WhatsApp for both the control group and the experimental groups. The screencast of Facebook and WhatsApp groups for the experimental group pre-service teachers can be seen in Figure 3.12a and Figure 12b. Pre-service teachers of

the experimental group interacted and communicated with others and also with instructor at home, understand others' ideas, questions and even offer help to others to solve their problems and difficulties using Facebook, WhatsApp or Moodle. The aim of this interaction was not only to increase the learning of pre-service teachers', but also enhance their communication skills, cooperation and ability to tolerate each other which resulted in a better learning environments and more student engagement in the classroom.


Figure 3.12a. A Screencast from Facebook Group


Figure 3.12b. A Screencast from WhatsApp Group

In the control group, Facebook was not used actively because there were no videos or Kahoot results to be shared. The pre-service teachers in the control group used WhatsApp to ask questions related to assignments, the time of submission or final exam. Pre-service teachers also enrolled to different WhatsApp groups for some other courses. Hence forming Facebook or WhatsApp groups is not a new application for the control group. The materials and software involved in the study and their functions were summarized in Table 3.10.

Table 3.10

*The Materials and Software Involved in the Study and Their Functions*

| Materials and software | The functions of materials and software |
|---|---|
| Videos | ✓ to present the course content.<br>✓ to test learning through interactive questions. |
| Social Networking Sites-Facebook, WhatsApp | ✓ to ensure communication in the course for the experimental group.<br>✓ to announce about the publication of videos for the experimental group.<br>✓ to share the names of top 3 pre-service teachers after the Kahoot application.<br>✓ to share the photos of pre-service teachers after group studies while preparing weekly assignments at the experimental group. |
| Kahoot-Socrative | ✓ to increase engagement to lesson in the experimental group.<br>✓ to make enrichment activities and increase the retention level of pre-service teachers in the experimental group. |
| Moodle-Edmodo | ✓ to publish videos for experimental group.<br>✓ to upload reflections and assignments for experimental group and homework for control group.<br>✓ to provide interaction among experimental group pre-service teachers to understand others' ideas, questions and examine individual weekly reflections. |

Finally, while collecting qualitative data, the interviews were conducted in an empty classroom during the two final weeks following the 15$^{th}$ week. The interviewees were informed about keeping their personal information confidential. The interviewer was friendly with pre-service teachers which was taught as a factor to increase the ratio of providing honest responses. Although pre-service teachers were provided with semi-structured interviews, they were let to be flexible in terms of their answers and explanations. Duration of the interviews varied around 20 to 30 minutes.

### 3.10. Data Analysis

In the current study, different data analysis techniques were used. The data collected from achievement test and classroom environment scale were analyzed by using descriptive and inferential statistical analysis techniques as presented in Table 3.11. As for the data obtained from achievement test, classroom environment scales and student questionnaires means (*M*) and standard deviations (*SD*) were indicated.

Table 3.11

*Overall Data Sources, Type of Data and Data Analysis Procedures*

| Research Questions | Data source | Data Type/ Data Collection Instrument | Data Analysis |
|---|---|---|---|
| 1. Is there a significant difference between the experiment and control groups according to AT scores and final grades? | Pre-service teachers included in Experimental and control group | Quantitative/ Achievement Test scores and Final Grades | MANOVA |
| 2. Is there a significant difference between the experiment and control groups according to classroom environment perception (satisfaction, involvement, cooperation, task orientation, student cohesiveness and difficulty) scores? | Pre-service teachers included in Experimental and control group | Quantitative/ Classroom Environment Inventory | MANOVA |
| 3. What are the perceptions of pre-service teachers about flipped learning and classroom environment? | Pre-service teachers included in Experimental group | Quantitative - Qualitative/ Questionnaire and Interview | Descriptive statistics/ Descriptive and Content analysis |

The data obtained from questionnaires were analyzed according to means, standard deviations and frequencies. Moreover, multivariate analysis of variance, MANOVA was conducted to examine the effect of flipped learning on pre-service teachers' AT scores and final grades and to examine the effect of flipped learning on classroom environment scales (Tabachnick & Fidell, 2007). For the analysis of quantitative data, SPSS 22.0 was used and alpha level was determined as .05.

In order to analyze the data obtained from the interview schedule both the content and descriptive analysis techniques were employed (Cohen et al., 2007; Fraenkel & Wallen, 2009). The emerging codes were collected under themes and categories according to the literature and research questions. The themes were searched through a repeated process of catching keywords and the qualitative data was

analyzed and revisited until the point of saturation was reached (Creswell, 2012). In order to strengthen the validity and the reliability of the qualitative analysis results the precautions which were taken explained under the title of "Trustworthiness of the Qualitative Part of the Research" at the end of this chapter. Also, an academic who was outside of the study was asked to review and evaluate the interview report.

### 3.11. The Role of the Researcher

Throughout the study, many tasks and activities were prepared and applied by the researcher. First of all, data collection materials were developed by the researcher with the guidance of the researchers' advisor and the pilot studies of these instruments were conducted by the researcher. Also, the researcher prepared pre-class tasks which mainly included lecture videos. For the videos, firstly, Power-point slides were prepared and they were converted to interactive videos using Camtasia 8.8 and H5P programs. Moreover, pop-up questions, video links from You Tube and internet was decided and inserted by the researcher in order to make pre-service teachers more active and engaged in the course and increase the ratio of pre-service teachers' watching videos. All flipped learning activities which were conducted in the face to face part of the class were prepared by the researcher with the guidance of the researchers' advisor. During discussion and group studies, pre-service teachers were guided by the researcher. While completing unfinished homework out of the class time, pre-service teachers were directed through the use of social media. After the completion of the treatment process, achievement test was i by other researchers who were assigned by the faculty administrators were with pre-service teachers in order to distribute the exam papers, collect them and observe the pre-service teachers during the exam. However, the classroom environment scale, student questionnaire on flipped learning and interviews were administrated by the researcher. The interviews were audio recorded and member checking processes were employed by the researcher. Finally, both quantitative and qualitative data were analyzed by the researcher.

### 3.12. Limitations of the Study

1) This study was limited to the data obtained from pre-service teachers during the fall semester of 2017-2018 for 11 weeks at a public university located in the Aegean

Region and was implemented in the Principles and Methods of Instruction Course at the Elementary Education-Classroom Teaching Department.

2) The study was restricted to 33-class hour implementation process in Principles and Methods of Instruction Course.

3) Since the random selection of pre-service teachers was not employed because of administrative problems randomly assigned two sections of Classroom Teaching Department were used as experimental and control groups.

4) All interviews were conducted by the researcher.

### 3.13. Internal Validity and External Validity Threats

The experimental study is the most appropriate way to establish cause and effect relationship among variables. Hence, internal validity threats were controlled in order to increase the quality of an experimental research design. In this way, observed difference on the dependent variable was directly related to independent variable, not due to some unintended variable as stated by Fraenkel & Wallen (2009). In this study, possible threats to internal validity of the results and ways to control them were explained in this section. These threats were selection bias/subject characteristics, mortality, location, instrumentation, data collector characteristics, data collector bias, testing, expectancy effects, and implementation (Fraenkel & Wallen, 2009).

In the current study, in order to eliminate selection bias or subject characteristics threat pre-test was implemented to both experimental and control groups. By conducting pre-test before the experimental study, the level of pre-service teachers in terms of the content of the course was checked at the beginning of the semester. The achievement scores of both the experimental and control group were compared by independent samples t-test and they were not found significantly different. Moreover, after weekly program of the faculty was announced, pre-service teachers chose their section just by chance; hence, it can be said that every student in the Classroom Teaching Department had an equal chance of being assigned to any of the experimental or control groups.

The loss of subjects is known as the mortality threat. Pre-service teachers may drop out of the study because of illness, family issues or requirements of the activity in long-running experiments (Cohen et al., 2007). According to Fraenkel & Wallen

(2009), in such studies, it is common to find that 20% or more of the subjects do not return their forms and they have stated that this loss of subjects probably will not be a problem if the loss is about the same in both experimental and control groups. In the current study, one pre-service teacher out of 28 pre-service teachers from the control group was a remedial student; hence she did not need to attend classes regularly and one pre-service teacher was a foreign student and went back to her home country. Hence, the number of pre-service teachers in the control group remained 26. Similarly, in the experimental group two pre-service teachers out of 32 pre-service teachers did not conduct more than half of the pre-class work so they were omitted from the experiment. As a result, since two pre-service teachers were diminished both from experimental and control groups, it can be said that this threat did not affect the experiment.

In this study, to control locations threat, location was held constant during interviews for experimental group pre-service teachers (Fraenkel & Wallen, 2009). Also, the classes of both groups were determined by the faculty at the beginning of the semester and they were held constant during the semester. In other words, both groups attended to the classes determined by the faculty. In addition to these, since the performance of pre-service teachers may lower in the final examination, variables such as if the classes were poorly lighted or there was noise in the class were controlled by the researcher. Furthermore, both groups were taught by the same instructor and finally, all interviews were conducted in the same empty classroom during final exam period.

The way in which the instruments were used may also constitute a threat to the internal validity if the nature of the instrument is changed. For example, the scoring procedure because of the fatigue of the scorer after successive scoring of the instrument results in instrument decay. After some time, the scorer becomes tired and scores differently-rigorous at the beginning but more generously later. However, in the present study, for the instrument decay threat to the internal validity some precautions were taken. For example, the final exam questions were multiple choice type, so they were objectively graded. Moreover, for the class assignments of the experimental group and homework of control group were evaluated according to a rubric prepared at the beginning of the study. Finally, to control for this threat, besides the researcher,

the teaching technique applications were video recorded and they were also scored by an academic who was the real instructor of the course and an academic who were not involved in the experiment.

As for the data collector characteristic threat, it can be said that gender, age, experience or other characteristics of the individual who collect the data may affect the nature of the data obtained in a study. In the present study, data both from the experimental and control groups were collected by the researcher. Hence, both groups were subject to the same researcher, gender and experience conditions.

Data collector bias is about the condition that data collector may unconsciously distort the data in such a way as to make certain outcomes more likely. Hence, in the present study, all procedures were standardized in order to eliminate data collector bias. For example, both groups were given equal time on final exam, extra time were not given to experimental group. The researcher were not in the exam place; instead of the researcher, other people assigned by the faculty administrators were with pre-service teachers in order to distribute the exam papers, collect them and observe the pre-service teachers during the exam.

In the present study, data were collected with a pre-test at the beginning of the study. However, there were 11 weeks between the pre-test and post-test. Hence, it may be not be possible for pre-service teachers to remember all the questions. Moreover, since the duration between the pre-test and post-test lasted long, pre-service teachers may not be alerted to what is being studied by the questions that take place in the pre-test. Also, it was observed that pre-service teachers just learned what they were presented weekly and completed their assignments weekly instead of making greater effort to memorize the content in the pre-test.

In addition to these, the way pre-service teachers view the experiment can also threaten the internal validity. For example, when pre-service teachers feel that they are cared and someone tries to help them, they work hard. This positive effect results from attention and recognition of subjects and is called as Hawthorne effect. In the current study, both the experimental and control group were given equal help and recognition. For example, pre-service teachers of both groups were called by name in the class and obtained membership from WhatsApp and Facebook groups and whenever they had a problem and they were permitted to share it with the group or privately with the

instructor. Moreover, in the present study, novelty threat was diminished as much as possible because they got used to the videos and applications and they did not perceive it as a novel method. Hence, pre-service teachers who were involved in this experimental study performed better because of the specific nature of the treatment rather than of the novelty of the treatment.

Finally, since pre-service teachers in the control group receive no treatment, they may become demoralized or resentful and hence may perform more poorly than the treatment group as stated by Fraenkel & Wallen (2009). In the current study, it was observed that all pre-service teachers kept working through the end of the semester and tried to complete and turn their homework.

### 3.14. Trustworthiness of the Qualitative Part of the Research

In the qualitative part of the study, some precautions were also taken in order to increase trustworthiness of the study. Trustworthiness of a research was described as "the collection of various strategies to be followed in order to promote the accuracy or credibility of the findings" (Creswell, 2012, p. 259). The credibility, transferability, dependability and confirmability are four major criteria which were identified by Guba & Lincoln (1981) to determine trustworthiness of a qualitative research (cited in Gay, Mills & Airasian, 2014). Hence, in the current study the following procedures were included in order to enhance the validity and understandability of the study.

In the current study, in order to increase the credibility and thus accurately represent what the participants think, feel, and do prolonged engagement at the research site, peers debriefing, triangulation, referential adequacy materials, and member checks were involved. The researcher conducted both the experimental study applications, applied different teaching techniques, video recorded pre-service teachers' presentations and audio recorded interviews, and closely observed pre-service teachers during class discussions, group works and plays. Hence, the researcher was engaged in the process by being in the classroom with pre-service teachers throughout the study.

In the present study, member checking was employed by asking pre-service teachers involved in the study to review the accuracy of the interview report. Moreover, in order to increase validity and reliability, external audit or peer debriefing

was employed (Gay et al., 2014). An academic and the course instructor were asked to reflect on the study by listening, prompting through the treatment process. They scored randomly selected assignments of the experimental and control groups after the researcher and the inter rater reliability was found high.

Furthermore, in the current study, data were triangulated through different data collection instruments such as achievement test, scale, questionnaire and interview form in order to enhance its validity (Fraenkel & Wallen, 2009; Gay et al., 2014).

Furthermore, the answers of pre-service teachers were written down together with the questions asked in order to reduce distortions owing to forgetting. Also, personal thoughts of the researcher were recorded while conducting the interviews, which is referred as researcher reflexivity by Fraenkel & Wallen (2009). In this way, the responses of pre-service teachers which seem unusual or incorrect were noted and checked later.

In the qualitative part of the study, the aim was to deepen the perceptions of pre-service teachers about flipped learning. Since this case is unique to the faculty and to the class explained before, the findings should be carefully transferred into other contexts and interpreted in line with the present context. Hence, in the current study, detailed explanations about the context of the study were presented in order to increase the transferability or generalizability of the study.

In addition to these, this research was explained clearly, a sample lesson plan was attached for the readers at the end of the study, steps which were followed during application indicated precisely and the questions asked both in the class and at the Kahoot/Socrative applications were stated in the weekly lesson plans in order to increase the dependability property of qualitative research as stated by Guba & Lincoln (1981). In this regard, the study can be applied in different contexts.

Finally, the findings of the study were objectively reported without any bias which is the confirmability property of qualitative research. The data was triangulated with different instruments and peer debriefing were implemented with an academic and the course instructor (Guba & Lincoln, 1981).

As for the objectivity or external reliability in a qualitative research, the methods and procedures were described explicitly and in detail. In this way, other researchers can follow the actual sequence of how data were collected, analyzed and

reported for specific conclusion by examining rival conclusions (Miles, Huberman & Saldana, 2014).

### 3.15. Ethical Considerations

During this research, the approval of the Human Subjects Ethics Committee at METU was obtained. At the beginning of the semester, before conducting the study, the aim of the study and procedures that will be conducted during the semester were explained to pre-service teachers and their permissions were asked. All pre-service teachers had the right not to participate in the study or withdraw from the study at any time they wanted. Their names were not revealed and the data collected from them remained confidential.

# CHAPTER 4

# RESULTS

In this chapter, firstly, quantitative results which were obtained from CEPSPT, AT and SQ were presented, then qualitative results which were obtained from interview schedule were explained in line with the research questions.

## 4.1. The Results about the Effect of Instruction on the Principles and Methods of Instruction Course Achievement Test (AT) and Final Grades

The aim of the first research question was to investigate whether there is a significant difference between the experimental and control groups according to achievement test scores and final grades. Hence, Multivariate Analysis of the Variance (MANOVA) was used in order to examine the effects of an instruction on pre-service teachers' Principles and Methods of Instruction Course Achievement Test (AT) and Final Grades. The AT was developed by the researcher which included 40 multiple choice questions. Pre-service teachers' final grades were computed as 20% of the total scores for weekly video homework, 30% of the scores obtained from a teaching technique presentation & plan and 50% of the scores obtained from the AT.

Multivariate analysis of variance (MANOVA) statistical technique was used to explore the relationship between several categorical independent variables and two or more dependent variables (Hair, et al., 2014).

First of all, before conducting MANOVA, according to Tabachnick & Fidell (2007), the assumptions of univariate and bivariate normality, multivariate normality, homogeneity of variance, homogeneity of covariance, and outliers were checked in order to explore the appropriateness of the data for MANOVA and their results were stated below.

*Univariate and Multivariate Normality*

Skewness-Kurtosis values, histograms, Q-Q plots and Kolmogorov-Smirnov and Shapiro-Wilk's tests were examined to check univariate normality assumption (Field, 2009). While, for the flipped learning group skewness-kurtosis values were between -1 and +1, for the control group they were between -2 and +2 for pre-test and final grades but -3 and +3 for post-test grades. Moreover, for both groups the points on Q-Q plots for the cases was along the diagonal with some minor distributions. The Q-Q plots of the variables indicated the normal distribution. Finally, the results of the Kolmogorov-Smirnov and Shapiro-Wilk's tests although significant for some variables, as stated by (Field, 2009) they might be affected by sample size. Hence, it can be said that data indicated a normal distribution (see Appendix I). Multivariate normality assumption was checked according to Mardia's test and it was seen that multivariate normality was not violated $p > .05$ (see Appendix I).

*Multivariate Outliers*

The data were examined in terms of multivariate outliers. Since an outlier is a case that differs substantially from the main trend of the data, can cause the model to be biased (Field, 2009). Firstly, Mahalonobis Distance was checked in order to inspect the absence of influential observations (outliers). According to the results of analysis, cases with $X^2 > 11.1$ can be detected as outliers. There was only one case, with a higher value, 14.42. Hence, outliers were checked by applying casewise diagnostics strategy. It was seen that none of the cases have a Cook's distance greater than 1, Standardized Residual values lied between -2 and 2, DF Beta statistics was also checked to see whether all cases lied between -1 and 1 and the Leverage values lied between 0 and 1 (Field, 2009). It can be said that cases have no undue influence over the model.

*Homogeneity of Variance*

The assumption of homogeneity of variance was checked by Levene's test. According to Levene's test, the test results were not significant so we can assume that error variances of the dependent variables were equal across groups, $F(1, 54) = .03$ $p > .05$ for the AT and $F(1, 54) = .12$ $p > .05$ for the final grades. In other words, the

variances of the groups were not significantly different, indicating that the variances were equal.

*Homogeneity of Covariance*

While checking the assumptions of MANOVA, it is also required that the covariances among dependent variables should be homogeneous across the cells. The value of *Box's M* = .75 and *F* (3, 1715505.36) = .24 *p* > .05. According to covariances among dependent variables, the observed covariance matrices of the dependent variables are equal across groups. Hence, it can be said that the covariance matrices were roughly equal and the assumption was tenable (Hair, et. al., 2014).

As stated by Field (2009), knowing the best test statistic in terms of test power and robustness is important. When the sample sizes are equal the Pillai's trace is the most robust test to the violation of the assumptions. However, since sample sizes are unequal, Wilks' Lambda test statistics was chosen in order to check the significance of the MANOVA model. Before interpreting the results of MANOVA, descriptive statistics were shown in Table 4.1.

Table 4.1

*Mean Scores and Standard Deviations for the Results of the Principles and Methods of Instruction Course Achievement Test (AT) and Final Grades.*

| Group | AT | | Final Grades | |
|---|---|---|---|---|
| | M | SD | M | SD |
| Flipped Learning | 73.27 | 9.22 | 82.80 | 5.90 |
| Traditional Instruction | 62.08 | 9.53 | 74.13 | 6.53 |

According to the results of descriptive statistics as shown in Table 4.1, pre-service teachers who were in the experimental group (*M* = 73.27, *SD* = 9.22) had higher achievement test scores than the pre-service teachers in the control group (*M* = 62.08, *SD* = 9.53). Also, pre-service teachers who were in flipped learning group had higher final grades (*M* = 82.80, *SD* = 5.90) than the pre-service teachers who were in the traditional instruction group (*M* = 74.13, *SD* = 6.53).

According to multivariate test results, Wilks' Lambda test was significant as shown in Table 4.2. The independent variable 'group' had a significant effect on dependent variables $F$ (2, 53) = 13.55 $p$ < 05. In other words, pre-service teachers who were in flipped learning group had significantly higher achievement test scores and final grades than the pre-service teachers who were in the traditional instruction group. The multivariate eta squared .39 indicated that 39 percent of multivariate variance of the achievement test scores and final grades were related to the group factor.

After checking the multivariate results of MANOVA, univariate analyses were also interpreted. Before checking the ANOVA results, Bonferoni correction was conducted through dividing alpha value of .05 by the number of dependent variables (.05/2 = .025). According to the test between subject results, it was seen that the group variable had significant effect on both dependent variables. In other words, pre-service teachers in the flipped learning group had significantly higher AT scores $F$ (1, 54) = 27.21, $p$ < .025 and final grades $F$ (1, 54) = 19.89 $p$ < .025 then the pre-service teachers who are in the traditional group.

Table 4.2

*Multivariate and Univariate Analyses of Variance for the Results of the Principles and Methods of Instruction Course Achievement Test (AT) and Final Grades.*

| Variable | MANOVA* $F$ (2,53) | ANOVA** $F$ (1,54) | |
|---|---|---|---|
| | | AT | Final Grades |
| Group | 13.55 | 27.21 | 19.89 |

*$p$ < .05 **$p$ < .025

## 4.2. The Results about the Effect of Instruction on Pre-Service Teachers' Perceptions of Classroom Environment

The aim of the second research question was to investigate whether there is a significant difference between the experimental and control groups according to the perceptions of classroom environment (satisfaction, cooperation, involvement, task orientation, student cohesiveness, difficulty) scores. In the current study, MANOVA

was used to examine the effects of instruction on pre-service teachers' perceptions of classroom environment (satisfaction, cooperation, involvement, task orientation, student cohesiveness, and difficulty) scores. In this part of the study, there were 6 dependent variables and one independent variable. Before conducting MANOVA, the assumptions univariate and bivariate normality, multivariate normality, homogeneity of variance, homogeneity of covariance, and outliers (Tabachnick & Fidell, 2007) were checked in order to explore the appropriateness of the data for MANOVA and their results were stated below.

*Univariate Normality*

In the present study, Skewness-Kurtosis values, histograms, Q-Q plots and Kolmogorov-Smirnov and Shapiro-Wilk's tests were examined to check univariate normality assumption (Field, 2009). The skewness and kurtosis values were between -1 and +1, for both groups. Moreover, for both groups the points were on Q-Q plots for the cases was along the diagonal with some minor distributions. The Q-Q plots of the variables indicated the normal distribution. Finally, although the results of the Kolmogorov-Smirnov and Shapiro-Wilk's tests were significant for some scales, as stated by Field (2009), they might be affected by sample size. Hence, it can be said that data indicated a normal distribution. (see Appendix J).

*Multivariate Outliers*

Moreover, in the present study, the data were examined in terms of multivariate outliers. Firstly, Mahalonobis Distance was checked in order to inspect the absence of influential observations (outliers). According to the table of critical values and Chi square since there are 6 variables for $p$=0.001 significance, $X^2$ = 22.46. The analysis revealed that the data has no cases with $X^2$ values greater than 18.34. Also, by applying case wise diagnostics strategy, any outliers were obtained. Hence, it can be said that there were no multivariate outliers.

*Multivariate Normality*

Multivariate normality assumption was checked according to Mardia's test and it was seen that multivariate normality was violated $p < .05$ (see Appendix J). However, as stated by Hair et. al. (2014), since the assumptions of univariate and bivariate

normality were not violated and reported (see Appendix J), departures from multivariate normality is usually inconsequential. Hence, continuing with further analyses was decided.

*Homogeneity of Variance*

The assumption of homogeneity of variance was checked by Levene's test and the test results were found not significant. Hence, it can be said that error variance of the dependent variables were equal across groups, $F$ (1, 54) = .29 $p$ > .05 for the satisfaction; $F$ (1, 54) = .36 $p$ > .05 for the cooperation; $F$ (1, 54) = 1.33 $p$ > .05 for the involvement; $F$ (1, 54) = .55 $p$ > .05 for the task orientation; $F$ (1, 54) = .70 $p$ > .05 for the student cohesiveness and finally $F$ (1, 54) = 2.24 $p$ > .05 for the difficulty.

*Homogeneity of Covariance*

It is also required that the covariances among dependent variables should be homogeneous across the cells. The value of Box's $M$ = 27.23 and $F$ (21, 10250.92) = 1.14 p> .05. According to covariances among dependent variables, the observed covariance matrices of the dependent variables were equal across groups. Hence, it can be said that the covariance matrices were roughly equal and the assumption was tenable (Hair, et. al., 2014). Wilks' Lambda test statistics was chosen in order to check the significance of the MANOVA model because the multivariate normality assumption was violated. Before interpreting the results of MANOVA, descriptive statistics were presented in Table 4.3.

According to the results of descriptive statistics as shown in Table 4.3, pre-service teachers who were in flipped learning and traditional instruction groups perceived the classroom environment almost similar. In other words, pre-service teachers had similar mean scores according to all dimensions of classroom environment. The pre-service teachers who were in flipped learning group had a mean $M$ = 41.03 ($SD$ = 4.99) for satisfaction; pre-service teachers who were in the traditional instruction group had a mean $M$ = 42.33 ($SD$ = 3.91). On the other hand, pre-service teachers who were in flipped learning group had a mean $M$ = 21.47 ($SD$ = 3.14) for student cohesiveness; pre-service teachers who were in the traditional instruction group had a mean $M$ = 20.96 ($SD$ = 2.57).

Table 4.3

*Mean Scores and Standard Deviations for the Perceptions of Classroom Environment as Functions of Satisfaction, Cooperation, Involvement, Task Orientation, Student Cohesiveness, and Difficulty.*

| *Group* | *Satisfaction* | | *Cooperation* | | *Involvement* | | *Task Orientation* | | *Student Cohesiveness* | | *Difficulty* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Flipped Learning | 41.03 | 4.99 | 29.30 | 3.71 | 30.17 | 3.13 | 22.27 | 2.30 | 21.47 | 3.14 | 8.93 | 2.50 |
| Traditional Instruction | 42.23 | 3.91 | 29.88 | 3.68 | 30.85 | 2.46 | 22.81 | 1.96 | 20.96 | 2.57 | 8.35 | 3.44 |

According to multivariate test results, as shown in Table 4.4, the independent variable 'group' had no significant effect on dependent variables $F$ (6, 49) = .63 $p$ > .05. After checking the multivariate results of MANOVA, univariate analyses were also interpreted. Before checking the ANOVA results, Bonferoni correction was conducted through dividing alpha value of .05 by the number of dependent variables (.05/6 = .008). According to the test between subject results, it was seen that the group variable did not have any significant effect on dependent variables. In other words, being in the flipped learning group or in the traditional group had no significant effect on pre-service teachers' perception of classroom environment namely satisfaction $F$ (1, 54) = .98 $p$ > .008; cooperation $F$ (1, 54) = .35 $p$ > .008; involvement $F$ (1, 54) = .80 $p$ > .008; task orientation $F$ (1, 54) = .88 $p$ > .008; Student Cohesiveness $F$ (1, 54) = .43 $p$ > .008 and difficulty $F$ (1, 54) = .54 $p$ > .008.

Table 4.4

*Multivariate and Univariate Analyses of Variance for the Perceptions of Classroom Environment in the Flipped Learning and Traditional Instruction Groups*

| Variable | MANOVA* F (6,49) | ANOVA** F (1,54) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Satisfaction | Cooperation | Involvement | Task Orientation | Student Cohesiveness | Difficulty |
| Group | .63 | .98 | .35 | .80 | .88 | .43 | .54 |

*$p$ > .05. **$p$ >.008

## 4.3. The Results related to the Perceptions of Pre-Service Teachers about Flipped Learning

The aim of the third research question was to investigate the perceptions of pre-service teachers about flipped learning and classroom environment. In order to answer this research question Student Questionnaire on Flipped Learning and Interview

Schedule were implemented to pre-service teachers who were in Flipped Learning group after the treatment process. In this part, first, the results obtained through student questionnaire were presented, then the results obtained from interviews were presented.

### *4.3.1. The Results Obtained from Student Questionnaire on Flipped Learning*

Student questionnaire was administered to the pre-service teachers who were involved in the experimental group in order to learn their habits of watching videos and perceptions about video lessons and flipped learning after the treatment process. The categories for the questions 1 to 6 represent (3) always, (2) sometimes, and (1) never, and questions from 7 to 33 represent (5) strongly agree, (4) agree, (3) partially agree, (2) disagree, and (1) strongly disagree.

As for the pre-service teachers' habits of watching videos, according to the results of SQ analysis as shown in Table 4.5, it was found that while watching the videos, pre-service teachers always took notes (86.7%), watched the videos carefully (80%) and watched some parts again (50%). On the other hand, it was found that 43% of the pre-service teachers never wrote questions to be asked in the class.

Table 4.5.

*Frequencies, Percentages, Mean Scores and Standard Deviations of Pre-Service Teachers' Habits of Watching Videos.*

| | Always | | Sometimes | | Never | | M | SD |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | | |
| 1. I watched the videos carefully. | 24 | 80 | 6 | 20 | - | - | 2.80 | .41 |
| 2. I was not interested in another thing while watching. | 12 | 40 | 16 | 53.3 | 2 | 6.7 | 2.33 | .61 |
| 3. I watched some parts again. | 15 | 50 | 14 | 46.7 | 1 | 3.3 | 2.47 | .57 |
| 4. I took notes while watching. | 26 | 86.7 | 4 | 13.3 | - | - | 2.87 | .35 |
| 5. I wrote questions while watching. | 4 | 13.3 | 13 | 43.3 | 13 | 43.3 | 1.70 | .70 |
| 6. I watched videos piece by piece. | 14 | 46.7 | 15 | 50 | 1 | 3.3 | 2.43 | .57 |

*The mean scores of items1-6 were evaluated over 3.

In addition to these, according to perceptions of pre-service teachers, as shown in Table 4.6, pre-service teachers agreed that learning with videos affected their learning positively by providing the opportunity of turning back and watching some parts again and by making up the courses by themselves (100%). Moreover, it increased their interest in the course because of being enriched with audio visuals (90%), increased interaction with the instructor within the class and out of the class (90%) and provided access to the course content independent of the space (86.6%). On the other hand, pre-service teachers disagreed that learning with videos was inefficient due to technical problems (76.7%) and was more difficult than the methods used in other courses (66.7%). The items that take place in Table 4.6 are the main properties of flipped learning and pre-service teachers indicated their ideas positively about this new method.

Table 4.6

*Frequencies, Percentages, Mean Scores and Standard Deviations of Pre-Service Teachers' Perceptions of Learning with Videos.*

| Learning with videos | Strongly agree | | Agree | | Partly agree | | Disagree | | Strongly disagree | | M | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % | f | % | | |
| 7. was easier. | 4 | 13.3 | 20 | 66.7 | 5 | 16.7 | 1 | 3.3 | - | - | 3.90 | .66 |
| 8. provided access to the course content independent of the space. | 13 | 43.3 | 13 | 43.3 | 3 | 10 | 1 | 3.3 | - | - | 4.27 | .78 |
| 9. provided self-learning opportunities. | 10 | 33.3 | 17 | 56.7 | 3 | 10 | - | - | - | - | 4.23 | .63 |
| 10. provided learning when and where I wanted. | 16 | 53.3 | 8 | 26.7 | 6 | 20 | - | - | - | - | 4.33 | .80 |
| 11. facilitated practice in face-to face courses. | 15 | 50 | 13 | 43.3 | 2 | 6.7 | - | - | - | - | 4.43 | .63 |

Table 4.6 (Continued)

| Learning with videos | Strongly agree | | Agree | | Partly agree | | Disagree | | Strongly disagree | | M | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % | f | % | | |
| 12. increased interaction with the instructor in and out of the course. | 14 | 46.7 | 13 | 43.3 | 3 | 10 | - | - | - | - | 4.37 | .67 |
| 13. affected my learning positively because of having the opportunity to go back and watch some parts again. | 20 | 66.7 | 10 | 33.3 | - | - | - | - | - | - | 4.67 | .48 |
| 14. made me interested in the course with audial and visually enriched course content. | 17 | 56.7 | 10 | 33.3 | 3 | 10 | - | - | - | - | 4.47 | .68 |
| 15. made it easier for me to follow the course content | 15 | 50 | 13 | 43.3 | 2 | 6.7 | - | - | - | - | 4.43 | .63 |
| 16. affected my learning positively because of giving the opportunity to make up for the lessons I missed by myself. | 16 | 53.3 | 14 | 46.7 | - | - | - | - | - | - | 4.53 | .51 |
| 17. was inefficient due to technical problems. | - | - | 4 | 13.3 | 6 | 20 | 15 | 50 | 8 | 26.7 | 2.00 | .79 |
| 18. was more difficult than the methods used in the other courses. | - | - | 4 | 13.3 | 6 | 20 | 15 | 50 | 5 | 16.7 | 2.30 | .91 |

* Items 7- 18 were evaluated over 5.

According to perceptions of pre-service teachers, as shown in Table 4.7, in terms of learning contribution, pre-service teachers agreed that flipped learning yielded more learning than the courses taught by other methods (86.7%), supported and facilitated learning and was effective to practice theoretical knowledge (90%). In addition, pre-service teachers agreed that it made learning fun (76.7%) and attracted the attention of pre-service teachers owing to the use of different technologies (63.3%).

In terms of personal learning and contribution pre-service teachers agreed that flipped learning developed self-learning skills (86.7%), supported independent learning skills (93.3 %), planned and systematic work (76.7%) and increased research and exploration abilities (63.3%). Moreover, in terms of classroom environment perceptions pre-service teachers agreed that it increased social interaction (73.4%). On the other hand, pre-service teachers agreed that flipped learning took longer time to learn (33.3%) and was not distracting because of being so many activities (70%).

Table 4.7

*Frequencies, Percentages, Mean Scores and Standard Deviations of Pre-Service Teachers' Perceptions about Flipped Learning*

| Flipped Learning | Strongly agree | | Agree | | Partly agree | | Disagree | | Strongly disagree | | M | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | F | % | f | % | | |
| 19. supported planned and systematic work. | 9 | 30 | 14 | 46.7 | 6 | 20 | 1 | 3.3 | - | - | 4.03 | .81 |
| 20. supported my independent learning skills. | 7 | 23.3 | 21 | 70 | 2 | 6.7 | - | - | - | - | 4.17 | .53 |
| 21. increased my social interaction. | 5 | 16.7 | 17 | 56.7 | 5 | 16.7 | - | - | - | - | 4.10 | .66 |
| 22. increased my research and exploration ability. | 7 | 23.3 | 12 | 40 | 9 | 30 | 2 | 6.7 | - | - | 3.80 | .89 |
| 23. developed my self-learning skills. | 12 | 40 | 14 | 46.7 | 3 | 10 | 1 | 3.3 | - | - | 4.23 | .77 |
| 24. took it longer to learn. | - | - | 10 | 33.3 | 6 | 20 | 12 | 40 | 2 | 6.7 | 2.80 | .99 |
| 25. made learning fun. | 12 | 40 | 11 | 36.7 | 6 | 20 | 1 | 3.3 | - | - | 4.13 | .86 |
| 26. was adopted by me more than the other methods. | 11 | 36.7 | 15 | 50 | 3 | 10 | 1 | 3.3 | - | - | 4.20 | .76 |

Table 4.7 (Continued)

| Flipped Learning | Strongly agree | | Agree | | Partly agree | | Disagree | | Strongly disagree | | M | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | F | % | f | % | | |
| 27. yielded more than the courses taught by other methods. | 12 | 40 | 14 | 46.7 | 4 | 13.3 | - | - | - | - | 4.27 | .69 |
| 28. supported and facilitated my learning. | 10 | 33.3 | 17 | 56.7 | 3 | 10 | - | - | - | - | 4.23 | .63 |
| 29. was distracting because there were many activities. | 1 | 3.3 | 2 | 6.7 | 6 | 20 | 14 | 46.7 | 7 | 23.3 | 2.20 | .99 |
| 30. attracted my attention much because of the use of different technologies. | 9 | 30 | 10 | 33.3 | 8 | 26.7 | 3 | 10 | - | - | 3.83 | .99 |
| 31. provided faster learning. | 7 | 23.3 | 17 | 56.7 | 5 | 16.7 | 1 | 3.3 | - | - | 4.00 | .74 |
| 32. was effective in practicing theoretical knowledge. | 10 | 33.3 | 17 | 56.7 | 2 | 6.7 | 1 | 3.3 | - | - | 4.20 | .71 |
| 33. affected my learning positively because of involving group work. | 12 | 40 | 14 | 46.7 | 4 | 13.3 | - | - | - | - | 4.27 | .69 |

* Items 19-33 were evaluated over 5.

### *4.3.2. The Results of Interviews*

The aim of the third research question was to investigate the perceptions of pre-service teachers about flipped learning and classroom environment. In this part of the study, after presenting the results obtained through student questionnaire, the results obtained from interviews were presented. Interview schedule was implemented in the experimental group after the treatment. The interviews were conducted to reveal the perceptions and views of pre-service teachers about flipped learning activities, materials, assignments, group works, communication with the instructor and perceptions of classroom environment. Hence, 14 interview questions were prepared.

According to content analysis, the themes emerged as the codes were collected under the themes and they were presented in Table 4.8.

Table 4.8

*Themes Related to Flipped Learning*

| |
|---|
| A. Perceptions of Pre-Service Teachers about the Flipped Learning |
| 1. First impressions |
| 2. Changes in perceptions |
| B. Perceptions of Pre-Service Teachers about Pre-Class Part |
| 1. Videos |
| 2. Course Materials |
| 3. Preparation process |
| C. Perceptions of Pre-Service Teachers about the Course Process |
| 1. Teaching Materials |
| 2. Activities |
| 3. Participation |
| 4. Interaction |

The perceptions of pre-service teachers about the flipped learning were categorized under three themes. They were "Perceptions of Pre-Service Teachers about the Flipped Learning", "Perceptions of Pre-Service Teachers about Pre-Class Part" and "Perceptions of Pre-Service Teachers about the Course Process". They were explained below in dept.

#### *4.3.2.1. Perceptions of Pre-Service Teachers about the Flipped Learning*

According to content analysis, it was found that the perceptions of pre-service teachers about the flipped learning theme had two sub-themes. They were 1) first impressions and 2) changes in perceptions.

##### *4.3.2.1.1. First impressions*

In the interview process, one of the questions was about pre-service teachers' first impressions when mentioned about the flipped learning at the beginning of the

semester. It was observed that they were not positive about this approach. High achiever pre-service teachers scared because of the burden that stems from the activities of flipped learning besides their other responsibilities. The medium and low achievers scared and surprised because this method was not familiar to them. Moreover, they felt a heavy work load due to the explanations of the instructor about activities, and tasks at the first lesson. Hence, all pre-service teachers were too prejudiced. Some of the responses about their first impressions include:

> Ga (High Achiever): *I was very scared. We will deal with the videos…I said will we watch the videos besides our other burdens… at first, Edmodo was very hard for us, but you ... you have never stopped and we have followed you and now I am glad that we have done so.*
>
> En (Medium Achiever): *I was surprised actually, you came and said that I would implement such a teaching method. Actually, I thought that I would be forced ...Normally, I go to the class and sleep and then I go to home ... but you said that we will do this, we will do that…I thought I was going to have difficulty ... I thought I would be screwed… I thought I would have difficulty ... I had difficulty in the first few weeks…we paced in a process that we were not accustomed to but then we got used to it.*
>
> Me (Medium Achiever): *First, I thought it was like the distance education courses I took last semester. I was not listening to the videos of the distance education courses. So, I thought I would not listen to those, too. ... I thought that I would slur over those videos ... but I had to listen to your videos because you assigned homework.*
>
> Me (Low Achiever): *I was too prejudiced because it was a way that we did not know about and it seemed to me that I needed to put a lot of effort. However, in this way learning was much easier, topics to study did not accumulate, I will study for the exam, but I will not work as we normally do...because I have already learned lots of things in class.*

#### *4.3.2.1.2. Changes in perceptions*

In the interview process, the eleventh question was about the difference between the pre-service teachers' thoughts at the beginning of the semester related to Flipped Learning and those at the end of the semester. They explained their thoughts in terms of the tasks they conducted during the course, the teaching materials (videos), learning and the communication with their peers. Some of the responses about the change of thoughts about flipped learning included:

Bu (High Achiever): *I came to class without feeling the obligation to follow the lesson ... in other courses, for example in some of the courses, I went there because my attendance right was limited, but in this course although I thought that you used us like subjects at first ... later this course became a course that I needed to learn ... because this course was related to my profession... I thought that I should attend to the courses because I need to learn the ways of teaching my students.*

Fa (High Achiever): *Actually, I did not really think that watching videos would contribute to my learning, I mean, I thought how we would benefit from watching videos, but it contributed much more than I thought and I believe that learning would be permanent.*

Me (Medium Achiever): *At the beginning of the semester, I thought that I would suffer, since I did not like feeling trouble, I thought that I would not take into consideration the course but when I realized that I had fun, my interest to the course increased.*

Me (Low Achiever): *At first, we thought that it would be very difficult and we would suffer... but the videos were short and clear and they did not take too much time while watching and we learned lots of things in a short time...when we came to the class, we strengthened our knowledge and practiced with our friends. I could say that it is a method that should be implemented in other courses…*

Ha (Low Achiever): *I could not get connected to Edmodo at first, I did not know how to make my homework or send it back to you…my homework on the first week was late…Then I accustomed to the flipped learning and did not have any problems.*

Moreover, in the interview process, one of the questions was about how they could define the flipped learning with a word or phrase according to their own perceptions. The definitions of pre-service teachers indicated that all of the pre-service teachers interviewed had positive opinions about the flipped learning which also reflected the changes of pre-service teachers' opinions in the positive direction. Some of the responses about the definition of flipped learning according to their perceptions include:

Ga (High Achiever): *It is a method which provides learning in an environment we want to learn.*

Nu (High Achiever): *It's a method that is both fun and easy to learn.*

Ra (High Achiever): *It's a method that results in permanent learning.*

Fa (Medium Achiever): *It was a method that is difficult but instructive.*

> Me (Medium Achiever): *It was a method that we were not accustomed to but when it was applied, it was very beneficial for us in terms of learning without noticing that we had learned.*
>
> Me (Low Achiever): *It was a method that enabled us to learn actively and fast.*

According to content analysis, interviewees who had high course achievement beside its effect on learning, they stressed that flipped learning as a method which provided learning in an environment they wanted to learn which might match with pre-service teachers' being more task oriented. This method is also accepted positively by both medium and low achiever pre-service teachers in terms of contribution to learning. For example, a medium achiever pre-service teacher indicated flipped learning as difficult but instructive method (Fa-Medium Achiever). This perception might be explained with the perceived difficulty of classroom environment which stemmed from assigning pre-service teachers some obligatory tasks, requiring the active participation of pre-service teachers in class and conducting group work.

In the interview process, the last question was about the perceptions of pre-service teachers whether they are willing to take another course which is designed according to the principles of flipped learning. It was found that high, medium and low achiever pre-service teachers were positive about taking another course with flipped learning principles. Some of the pre-service teachers' responses include:

> Ra (High Achiever*): It was difficult, but I would accept the challenge from the beginning. It was challenging, but if we did not accept the difficulties at the beginning, then the content accumulated and we got clogged.*
>
> Fa (High Achiever*): I would not be afraid anymore ... I knew the kind of things I needed to deal with...I knew that I would have responsibilities...I knew that I would study every week.*
>
> Me (Medium Achiever): *I think that this method would be beneficial for me...but I do not know if I can manage it for all lessons...It depends on the course…but I think I would suffer if I had to learn ten lessons based on this method.*
>
> Ha (Low Achiever): *I think that I will at least learn since we are getting far away from traditional instruction.*

According to content analysis, it was found that high, medium and low achiever pre-service teachers were positive about the new instruction and they were willing to take another course which is designed according to the principles of flipped learning.

In addition to these, pre-service teachers indicated their perceptions about the time taken to learn in flipped learning when compared to the other courses. During the interviews, instead of learning duration, pre-service teachers mostly focused on whether they memorized the content or they actually learned it. Similarly, in the SQ (see Table 4.8) 80 % of pre-service teachers indicated that flipped learning provided faster learning. Some of the responses of pre-service teachers includes:

> Me (Medium Achiever): *I did not learn in other lessons but memorized before exam ... I learned in this course but I did not learn in other courses, I memorized.*
>
> Me (Low Achiever): *The videos were short…we were learning by ourselves they took up at most 40-45 minutes for students even if they didn't want to study.*

#### *4.3.2.2. Perceptions of Pre-Service Teachers about Pre-Class Part*

According to the content analysis, it was found that the perceptions of pre-service teachers about pre-class part had three sub-themes. They were 1) videos, 2) materials and 3) preparation process.

##### *4.3.2.2.1. Videos*

In the interview process, the third question was about the videos used in flipped learning. The responses of pre-service teachers were categorized under seven sub-themes. They were 1) the perceptions of pre-service teachers about the voice and images of the videos, 2) the quantity of information in the videos, 3) factors effecting the desire to watch videos, 4) recurring watching of videos on learning, 5) appropriateness of time of sending the videos, 6) the obligation to watch the videos before class on pre-service teachers' learning and 7) the internet videos.

#### *4.3.2.2.1.1. Voice and Images of the Videos*

According to the analysis of the interview process, all of the pre-service teachers interviewed generally had positive opinions about the videos. Majority of the pre-service teachers expressed their positive opinions about video lessons in SQ (see Table 4.7). They indicated that the voices and images of the videos were clear and understandable. Also, in the SQ (see Table 4.7), 90% percent of pre-service teachers indicated that videos made them interested in the course because of audial and visually enriched course content. There were background music in the videos. At the class, pre-service teachers indicated that it was higher in one video and later its level was decreased. Some of the responses about the videos used in flipped learning include:

> Mu (High Achiever): *I think the videos were good. The videos were good in terms of listening and summarizing ... the quality of sound was good.*
>
> Me (Medium Achiever): *I could see everything thoroughly…sometimes there were schemas…the videos were good for me…and it's even nicer their being pictured and colored.*
>
> Fa (Medium Achiever): *The music in the videos made me drowsy…it was a little suppressing your voice...*
>
> Me (Low Achiever): Of course the sounds and images of the videos were understandable…

In the interview process, the twelfth question was about the suggestions of pre-service teachers to implement flipped learning effectively. According to the perceptions of pre-service teachers, there should not be background music in the videos, there might be animations in the videos, the instructor should appear in the foreground with gestures and facial expressions, and finally videos should end up with a quiz. Some of the suggestions of pre-service teachers include:

> Mu (High Achiever): *Maybe if you had ended up the videos with test… if there were a 10 or 15 questions-test at the end of the videos, it would be great in terms of learning.*
>
> Me (Low Achiever): *There should not be music in the videos and you appear at the margin of the page but I wish you were in the foreground with your gestures and your facial expressions...I said this because maybe I am accustomed to learning this way.*

#### *4.3.2.2.1.2. The Quantity of Information in the Videos*

Moreover, pre-service teachers indicated that the videos included sufficient information which helped them to learn the subject. Some of the responses about the quantity of information in the videos included:

> *Fa (High Achiever): In my opinion, the content was pretty sufficient, also the questions related to the content were good.*
>
> *En (High Achiever): You split the videos ...If you set an eight-minute video, when we watched this eight-minute video, it was enough. I mean, it was very brief and plain in terms of content than any other workbook.*
>
> *Me (Medium Achiever): There was enough information about the content… I think the information was enough for me since I like summary information...I could see everything thoroughly...*
>
> *Me (Low Achiever): There was enough information and even there was information that did not exist in some other books.*

#### *4.3.2.2.1.3. Factors Effecting Pre-Service Teachers' Desire to Watch Videos*

In addition, pre-service teachers indicated the incentives as the visual components, the expressions of the instructor together with slides, desire to participate in class activities and discussions and the pop-up questions in the videos as the encouraging elements to watch videos. Some of the responses about the factors effecting pre-service teachers' desire to watch videos included:

> Bu (High Achiever): *There were no elements to reduce my desire to watch videos, but I knew that when I did not watch the video, I would not be able to participate in the class activities when I came to class the next day which encouraged me to watch videos... I listened to the videos since I wanted to talk in the class.*
>
> Me (Medium Achiever): *There were both questions and in the meantime, you were inserting different videos which were pointed in blue… I think they were quite enough and they were beneficial.*
>
> Ha (Low Achiever): *Since we raced in the lesson, I had so much fun… I watched the videos because I wanted to be always first in them.*
>
> Me (Low Achiever): *There were visual items. There were slides ... the expressions of the instructor together with slides encouraged me to watch videos.*

Furthermore, all pre-service teachers indicated the internet and the music behind the voice of the instructor as factors that reduced their desire to watch videos. Some of the responses about the factors that reduced pre-service teachers' desire to watch videos included:

> Ra (High Achiever): *We did not have powerful internet since we lived in KYK Dorm (Credit and Dormitories Institution - state dorm), and also, the internet lab in the university was not open the time we wanted or we had different lessons at the time they were open. Hence, we spent much time to listen or summarize.*
>
> Fa (High Achiever): *There was a problem only in terms of watching videos ... internet ... I waited 3 hours on the internet ... Edmodo did not open but the other sites opened ... The installation period of Edmodo took more times…I watched most of the homework videos there (KYK) but since I could not send them, because Edmodo was not installed, I came to the university and sent them here.*
>
> Me (Low Achiever): *I would rather the videos were without music… there would not be any music at all... I wish only the voice of the instructor, and there would not be any sound out of it.*

#### *4.3.2.2.1.4. Recurring Watching of Videos on Learning*

Pre-service teachers indicated their perceptions about recurring watching of videos on learning. Pre-service teachers' explanations indicated that they would watch the videos whenever they felt the need which would contribute to learning. Also, in the SQ, all of the pre-service teachers indicated their having the opportunity to go back and watch some parts again affected their learning positively (see Table 4.7). Some of the responses for the recurring watching of videos include:

> Ga (High Achiever): *The video courses was very good for me. I could stop it, I was taking my note, and then I was going back to beginning of the video when I needed. I was learning by watching the videos again. So, until the video was over, I had been watching it two or three times. Before the course, we were prepared. Also, you were explaining and conducting activities in class. By this way, learning was very permanent. In terms of learning, I benefitted more.*
>
> Me (Medium Achiever): *Naturally, when I did not understand something, I went back and studied again. I will watch all of the videos again before the final exam.*

Me (Low Achiever): *I watched videos once because the videos were short and clear ...but I feel the need to watch them once more before the final exam.*

#### *4.3.2.2.1.5. The Appropriateness of Time to Send the Videos*

According to the perceptions of pre-service teachers, the time to send the videos were appropriate. Some of the responses about the time to send the videos included:

Ga (High Achiever): *You were sending the videos in time, we were watching them before the course and taking our notes.*

Fa (High Achiever): *It was appropriate, generally, you sent videos on Friday, and we had at least the weekend to study.*

Me (Medium Achiever): You sent them in two or three day after the course... there was time to summarize ...

On the other hand, one of the high achiever pre-service teacher suggested that videos should be sent a little earlier. The suggestions of this pre-service teacher include:

Ga (High Achiever): *You sent the videos generally on Friday... if you sent the videos a little earlier, we would watch them earlier and submit you earlier.*

#### *4.3.2.2.1.6. The Obligation to Watch the Videos before Class on Pre-Service Teachers' Learning*

In addition to these, pre-service teachers indicated their perceptions about the obligation of watching videos before class on their learning. They indicated that if the watching of videos were not obligatory, they would not feel the responsibility of watching it. Some of the student responses include:

Ra (High Achiever): *If watching the videos were not compulsory, we might not watch them regularly. We might say ourselves that I didn't want to watch them today, and ask ourselves that whether we had to watch them every day. When students felt tired...they could say that "I am tired and I will not study today.*

Me (Middle Achiever): *This obligation is a good thing in terms of learning, but at first this obligation was not good for me because* pre-service teachers *at first could not think that some obligations would be beneficial for them later hence they should learn it or do the tasks.*

Me (Low Achiever): *I would not have felt any responsibility if you had not forced me… I would watch videos every two or three weeks…It was better in this way, I learned without the content accumulated.*

Me (Low Achiever): *We watched the videos you sent to us, we summarized and took notes, then we sent them back to you... At first, I thought that this process as a bit pointless, but after a while I understood that we would not study to the course if we did not send the summaries or assignments to you every week ... the videos would stay as you sent.*

#### *4.3.2.2.1.7. Perceptions about the Use of Internet Videos*

According to the content analysis, pre-service teachers indicated that they did not watch internet videos related to the subject to learn the lesson. They indicated that the videos sent by the instructor were more understandable and concise to learn the content than the internet videos. Some of the responses of pre-service teachers about the videos used in flipped learning included:

Bu (High Achiever): *I watched the video on the internet, they were around two hours... they explained the topic in very long times…but with the videos you sent, we could learn the topic in a very short time with clear outline…*

Me (Medium Achiever): *I did not need it because they were too long and I was tired of watching them. Hence, after a while, I got distracted and I never watched the internet videos for this course.*

#### *4.3.2.2.2. Course Materials*

In the interview process, the forth question was about the materials used in flipped learning. Pre-service teachers indicated that they used textbooks and articles they searched on the internet. However, it was observed that both high achiever, medium and low achiever pre-service teachers preferred learning the video content instead of studying from different books and internet articles. Some of the responses about the materials used in flipped learning include:

Ga (High Achiever): *I studied from my Kpss book at the beginning…but I found the content of video courses more beneficial. Hence, I totally left it, but now I will solve questions from a book while preparing for the exam.*

Fa (High Achiever): *If there were anything I did not understand about the subject I was searching on the internet.*

En (High Achiever): *I have benefitted from the textbook ... and even we brought the textbook to the class to be used in some applications.*

Ra (High Achiever): *I studied from my KPSS book at the beginning…but I found the content of video courses as short, clear and general... The content about a topic was so long in the book hence it was so boring. Your explanations was to the point.*

En (Medium Achiever): *I studied from some books...I was studying the topics that I did not understand…Also, after we learned the topic in the class I practiced to figure out whether I understood the topic or not.*

Me (Low Achiever): *I had a book for the course but I often searched on the internet because some of the topics that you mentioned in the course, did not exist in the book. For example, some of the techniques we learned in class were not explained in the book. For that reason, I did not benefit from the book much.*

When pre-service teachers were asked about the Moodle-Edmodo which was also a mandatory material to be used by them to send homework or watch videos, they had both positive and negative opinions. Some of the responses about the Edmodo used in flipped learning include:

Nu (High Achiever): *I think it was good to send homework via Edmodo... I think it was easier rather than writing by hand.*

Fa (High Achiever): *The installation period of Edmodo took more times…I watched most of the homework videos there (KYK) but since I could not send them, because Edmodo was not installed, I came to the university and sent them here.*

*En (Medium Achiever): Edmodo did not contribute to me much because after I got my username and password, I forgot it...I submitted most of the individual homework by hand, but I watched the videos from Facebook...*

#### *4.3.2.2.3. Preparation process*

In the interview process, the fifth question was about the tasks completed before the face-to- face part of flipped learning. Firstly, pre-service teachers indicated the similarities and differences for the preparation process of the course in terms of summary of the video lesson, answering the video questions, preparation of a curious question to discuss in class, etc. taught according to flipped learning and the preparation process that took place in other courses. In terms of preparation process, high, medium and low achiever pre-service teachers attended to other courses without getting prepared for the lessons. Some of the responses for the preparation process of courses include:

> Mu (High Achiever): *We attended other courses without getting prepared for the lessons … I mean, we didn't have any preparatory work...we did not print-out any article related to the course...we were watching and summarizing the videos while preparing for this course and we were ready for the lesson which contributed to better learning...we needed to know the content to participate in activities conducted in class.*
>
> Nu (High Achiever): *In fact, I did not study for other courses ...Since you sent videos every week, I studied for this course, I took notes to my notebook ... in terms of learning it was more permanent when compared to the other courses...*
>
> En (Medium Achiever): *I have never gone to other courses with such preparation… There was a laboratory lesson that we had to make a few preparations because it was already an experiment… because there is no incentive ... when we went to the first course ... instructors said that have this book ... we had the book, we read it and passed to the next parts ... the instructors did not ask us to get prepared from this page to that page... we come to class and instructors lectured from the page 200 to 250 and we were done ... then they continued from the page 250 in the next lesson... I mean they never said that we should study like this…*
>
> Me (Low Achiever): *I did not prepare for other courses before and after the course… I start to study on the topics just a week before the exam day...*

On the other hand, in the Principles and Methods of Instruction Course, pre-service teachers indicated that they prepared for the course by summarizing the video lesson, answering the video questions, preparing at least a curious question to discuss in class. On the other hand, one of the pre-service teachers suggested that instead of

summarizing the content of videos they should prepare homework comprising of examples about the subject. The suggestions of the pre-service teacher include:

> En (High Achiever): *We summarized the videos and submitted them to you weekly ... then you wanted us to write examples about the use of different techniques… If it had always been this way…if you had asked us to write examples about the content of the videos from the beginning of the semester, it would be more beneficial…over the last two weeks, I watch the videos, I summarize all the techniques, then I need to create examples about the use of different techniques… I have to do something original ...I write so... In this way, I study every technique two or three times. It would have been clearer if this was the case at the beginning of the semester.*

Also, flipped learning contributed pre-service teachers' conduct different activities in class, get prepared before the class and complete assignments after the class. As also stated in the SQ (see Table, 4.8), it enhanced pre-service teachers' self-learning skills, supported independent learning skills, planned and systematic work and increased research and exploration abilities. These can be attached to the perceived task orientation of classroom environment.

#### *4.3.2.3. Perceptions of Pre-Service Teachers about the Course Process*

According to the content analysis, it was found that the perceptions of pre-service teachers about course process had four sub-themes. They were 1) teaching materials, 2) activities 3) participation, and 4) interaction.

##### *4.3.2.3.1. Teaching Materials*

In terms of pre-service teachers' perceptions about the effect of materials involved in the face-to-face part of the class on learning the subject, they indicated that Kahoot was an effective material to learn the subject. Some of the responses of pre-service teachers includes:

> En (High Achiever): *I liked Kahoot very much ... the rocket race… they were so funny and such activities were encouraging to learn the topic. Normally, if we were asked to solve questions about the subject, we might not have so much fun, but it was the feeling of race, ambition…encouraged us to solve the questions in Kahoot or*

*Socrative…the game is something that we can also implement to our students.*

En (Medium Achiever): *The Kahoot and Socrative we used every week were good ... I liked them ... it was fun to learn by playing with them...we were racing...*

Me (Low Achiever): *We were active while learning, our interest to the course increased…we felt as if we were in a competition…and it is a method that we can also implement to our students.*

During the flipped learning, pre-service teachers involved in computer based applications like Kahoot and Socrative. Moreover, they enjoyed Kahoot and Socrative applications a lot because they were having fun and found learning encouraging by playing with these software. These may also be matched with the perceived satisfaction of pre-service teachers in the classroom environment. These different kinds of materials used during flipped learning helped pre-service teachers be satisfied with the course by providing a controlled race in the activities and feeling of fun and learning. Also, in the SQ (see Table 4.8), pre-service teachers indicated that since they were satisfied with the flipped learning, it was adopted by them more than the other methods, supported and facilitated their learning. In other words, pre-service teachers enjoyed the class work. Hence, the extent which pre-service teachers found work hard decreased which was associated with the difficulty property of classroom environment. It can be said that when pre-service teachers enjoyed during the classroom activities and got satisfied from the classroom environment, their involvement in the course increased, hence, the perceived level of difficulty of tasks decreased which also decreased the perceived difficulty level of classroom environment.

#### *4.3.2.3.2. Activities*

Pre-service teachers' perceptions about the activities conducted in class when compared to the activities conducted in other courses were also investigated. Pre-service teachers indicated the similarities and differences about the activities of the course in terms of active/ passive participation, computer assisted applications, group work, presentations. In terms of activities conducted in class, high, medium and low achiever pre-service teachers indicated that except laboratory lesson, they did not

conduct any kind of activities in other courses. The other courses were indicated as heavily traditional. Some of the responses of pre-service teachers include:

> Ga (High Achiever): *We did not perform any kinds of activities ... Most of the instructors were reading the slides there was nothing else ... if you did not go to class and took the slides instead, it was the same... there was not extra contribution of going to class.*
>
> En (High Achiever): *There were no similarities because in other courses, we might not speak even a word during a one and a half hour course. We were in class for one and a half hours where the teacher lectures fully without having any student participation, but with the technique you implemented, for example, you were talking about half an hour of the 1.5-hours course and then you were always asking us questions, we were discussing or we were practicing in the rest of the one hour ... Hence, I did not see any similarity between this course and other courses in terms of the activities conducted in class.*
>
> Me (Medium Achiever): *There was not any discussion in class because if there was someone who thought vice-versa, s/he could not express his/her thoughts... some instructors prefer speaking only themselves instead of asking questions we were more passive in the other courses.*
>
> Me (Low Achiever): *We did not conduct activities in other courses, we were doing experiments in science field, we prepared reports about the experiments.*

On the other hand, in the Principles and Methods of Instruction Course pre-service teachers conducted various tasks/activities in the class. First of all, pre-service teachers indicated practicing the theoretical knowledge as one of the strengths of flipped learning. Also, most of the pre-service teachers (90%) in the SQ (see Table 4.8) indicated that by conducting activities in class they practiced the theoretical knowledge and they learned without memorizing in a permanent way. Some of the responses of pre-service teachers include:

> Nu (High Achiever): *At least I did not memorize, I learned something.*
>
> *Bu (High Achiever): For example, we summarized, we came to class, when we did all of the activities separately, the learning was more permanent ... while solving the questions I imagined the activities conducted in class.*
>
> Ga (High Achiever): For example, *the lesson plan, you explained the topic in the video lesson, but when we came to class, we prepared a sample lesson plan ... hence the learning was permanent.*

En (Medium Achiever): *Other courses was loaded with topics that needed to be memorized…Instead of memorizing throughout 200 pages, I prefer learning the topics by practicing with small videos because it is fun and the learning is more permanent.*

Pre-service teachers' perceptions about the positive and negative aspects of conducting various tasks in the class were explained below respectively. Pre-service teachers' explanations about the positive aspects of conducting various tasks in the class were related to the peer interaction and cooperation. Some of the responses for the positive and negative aspects of conducting various tasks in class during flipped learning include:

Bu (High Achiever): *We were able to get close to the people we did not know ... I did not see any negative sides.*

En (High Achiever): *We comprised a group with people we had never talked to or greeted to, we shared things, we even took pictures after group work in class. In terms of interaction, communication with each other and group assignments the class works were beneficial.*

En (Medium Achiever): *If there was something I did not understand... for example ... I was asking it to one of my friends in my group...I was asking how it would be done and was explaining to me ... sometimes I was explaining to them...It was better to study in groups…*

Ha (Low Achiever): *A sincere atmosphere was established in the class... I think, the prejudices against each other were broken…The university does not resemble a high school... you talk to five people at the university and you do not talk much to other people but we had more friends in this course…Also, our communication with people improved.*

Moreover, pre-service teachers' perceptions about individual and group homework when compared to other courses were also asked. Pre-service teachers explained the similarities and differences in terms of originality of homework, being instructive or not, difficulty, instructor support, peer support, cooperation, etc.). In terms of the individual and group homework, both high and low achiever pre-service teachers indicated that there was not much homework in other courses. Even if they were assigned homework, they stated that the homework was not instructive and original. Some of the responses of pre-service teachers include:

Fa (High Achiever): *There was not much homework in other courses but if there was, it was a research assignment and we did not add much from ourselves...you wanted original assignments, for example, you wanted examples about the use of different methods to be original… in other courses, even coping and pasting were accepted... even in those lessons we could not ask our questions, if we had asked, there would not be sufficient answer...but in this course, we asked you whatever we needed to ask.*

Me (Low Achiever): *We did not have homework, I mean ... there were research assignments, one or two assignments which were not very instructive...They were prepared as an obligation by copying and pasting from the internet and after submitting to the instructor, they were forgotten.*

It can be said that, as one of the important properties of flipped learning, pre-service teachers learned the topic before the class by watching the videos and summarizing the content. Then they conducted various tasks in the class, mostly in groups. During the tasks, pre-service teachers cooperated and they knew, helped and supported each other which were related to the cooperation and students cohesiveness properties of classroom environment. Moreover, by doing different activities and group work, pre-service teachers involved in the course which also affected learning positively. Hence, it can be said that positively perceived classroom environment characteristics contributed to learning and satisfaction from the course and decreased the perceived difficulty of the course.

#### *4.3.2.3.3. Participation*

Since pre-service teachers were coming to class prepared their perceptions about its effect on participation in class activities were positive. Since they came to class prepared, they were eager to be active and shared their ideas and thoughts in the class. In other words, they were involved in all kinds of classroom tasks actively. They listened to the instructor carefully while making explanations about the course and tried to perform activities individually or as a group. It can be said that pre-service teachers had attentive interest to participate in discussions and do additional work. These properties are related to the involvement property of classroom environment. Some of the responses of pre-service teachers include:

Mu (High Achiever): *We were watching and summarizing the videos while preparing for this course and we were ready for the lesson which contributed to better learning because we needed to know the content to participate in activities conducted in class.*

Ga (High Achiever): *Before the course, we were prepared and after you explained the topic and conducted activities in class, learning was very permanent.*

Me (Medium Achiever): *Coming to class prepared affected our learning positively because we were eager to be active and shared our ideas in the class*.

#### *4.3.2.3.4. Interaction*

In the interview process, there were question was about pre-service teachers' perception about the interaction with instructor and their peers. The responses of pre-service teachers were categorized under two sub-themes. They were 1) the perceptions of pre-service teachers about the interaction with their instructor and 2) interaction with their peers.

##### *4.3.2.3.4.1. Interaction with Instructor*

In the interview process, the eight question was about the perceptions of pre-service teachers about the communication with the instructor. According to the perception of pre-service teachers, the instructor took pre-service teachers' feelings, thoughts, suggestions and ideas into consideration. Similarly, in the SQ (see Table 4.7) pre-service teachers indicated that this method increased their interaction with the instructor in and out of the course. Some of the responses of pre-service teachers include:

En (High Achiever): *You constantly informed us...in other lessons, I meet with the instructor once a week but you were taking care of us and interacting with us. You said that if we had any problems, we should inform you about it...actually you were always interested in us.*

Bu (High Achiever): *The instructor did not replied a message late and never there were a negative answer as not helping to solve our problems… The instructor always tried to help us...This is what we have been treated at last in the primary school.*

Fa (Medium Achiever): *When I could not complete my homework and sent you a message from WhatsApp about it, I was happy because you*

*were flexible...if you wanted to bring it tomorrow... either I would not do it or I would prepare it at the last minute without learning.*

Me (Low Achiever): *The instructor took heed of our feelings and ideas…*

In addition to these, in the interview process, the ninth question was about the perceptions of pre-service teachers about the support of the instructor. According to the perception of pre-service teachers, it was observed that instructor took the role of a guide mostly. One pre-service teachers' response includes:

Fa (High Achiever): *The instructor acted like a guide but when I said a guide, it seemed as if the instructor was not close to us…you were not far away from us, the instructor was nested with us and we were able to consult you whatever we wanted ...we could ask questions and we were not afraid of making mistakes.*

#### *4.3.2.3.4.2. Interaction with Peers*

In the interview process, the tenth question was about the perceptions of pre-service teachers about their communication with their peers. Some of the pre-service teachers' responses include:

Mu (High Achiever): *Everyone did whatever we needed for the task progressively in our group ... lastly, we brought the parts together and sent the assignment through Edmodo.*

En (High Achiever): *The communication with our peers affected learning positively. You may not be talking with some people in daily life, but in the group assignments since everyone would get the same grade, everyone had to put something… even if you do not talk with some people, because it was a joint work, we had to communicate with those people. This case made me happy…to greet a person, to join for a homework, work for the same goal made me happy*.

Me (Medium Achiever): *Since individual homework was more on our own personal responsibility, you perform whatever you needed to do. However, for assignments completed in a group, when some of your groupmates were passive, you might sometimes got nervous because you cared more...sometimes those could happen.*

Ha (Low Achiever): *We helped each other during group works because one of us suggested an idea …I also suggested another idea…the third*

*one said that they were true but we could add these things…then we came to a common point… I think peer help was useful*.

According to the perception of pre-service teachers, it was observed that because of the activities conducted according to flipped learning, their interaction and communication with their peers increased, pre-service teachers helped each other during group work and pre-service teachers fulfilled the requirements of tasks responsibly. These were related to the cooperation and student cohesiveness properties of classroom environment. In this environment pre-service teachers know, help and were supportive of one another. Also, as it was experienced in this study, they cooperated rather than compete with one another while learning topics or completing tasks. On the other hand, one pre-service teachers indicated that some of her friends were passive during group work.

### 4.4. Summary of the Results

In this section, the findings obtained for each research question were presented. According to the results obtained from the first research question, it was found that the achievement test scores and final grades of pre-service teachers in the experimental group were significantly higher than the traditional group. Also, the results obtained from the second research question showed that the classroom environment perception scores of pre-service teachers in the experimental group were not significantly different than those in the traditional group. In other words, being in the flipped learning group or in the traditional group did not have a significant effect on pre-service teachers' perceptions of classroom environment namely satisfaction, cooperation, involvement, task orientation, student cohesiveness and difficulty.

According to the results of the third research question which was asked to examine the pre-service teachers' perceptions in the flipped learning group deeply, it was found that while watching the videos, pre-service teachers mostly took notes and watched some parts again. However, it was found that many pre-service teachers never wrote questions to be asked in the class.

In addition to these, according to perceptions of pre-service teachers, it was stated that learning with videos affected their learning positively by providing the opportunity of turning back and watching some parts again and by making up the

courses by themselves. Moreover, it increased their interest in the course because of being enriched with audio visuals, increased interaction with the instructor within the class and out of the class and provided access to the course content independent of the space. Also, pre-service teachers disagreed that learning with videos was inefficient due to technical problems and was more difficult than the methods used in other courses.

According to perceptions of pre-service teachers, in terms of group learning contribution, pre-service teachers agreed that flipped learning yielded more learning than the courses taught by other methods, supported and facilitated learning and was effective to practice theoretical knowledge. In addition, pre-service teachers agreed that it made learning fun and attracted the attention of pre-service teachers owing to the use of different technologies.

According to content analysis, it was found that at first, pre-service teachers were not positive about flipped learning. High achievers scared because of the burden that stems from the activities of flipped learning besides their other responsibilities. The medium and low achievers scared and surprised because this method was not familiar to them. However, their thoughts changed at the end of the semester. Although, initially pre-service teachers did not believe that watching videos would contribute to their learning, at the end of the semester they realized that videos contributed much more than they thought and they stated that their belief about learning from videos would be permanent.

Moreover, all of the pre-service teachers interviewed generally had positive opinions about the videos. Majority of the pre-service teachers indicated that the voices and images of the videos were clear and understandable. Moreover, pre-service teachers indicated that the videos included sufficient information which helped them learn the subject. In addition, pre-service teachers indicated the incentives as the visual components, the expressions of the instructor together with slides, desire to participate in class activities and discussions and the pop-up questions in the videos as the encouraging elements to watch videos. On the other hand, pre-service teachers indicated the internet and the music behind the voice of the instructor as an element that reduced their desire to watch videos.

In addition to these, in terms of activities conducted in class, high, medium and low achiever pre-service teachers indicated that except laboratory lesson, they did not conduct any kind of activities in other courses. The other courses were indicated as heavily traditional. They stated that most of their instructors were reading the slides. Also, they stated that there was not extra contribution of going to class. On the other hand, in the Principles and Methods of Instruction Course pre-service teachers conducted various tasks/activities in the class. First of all, pre-service teachers indicated practicing the theoretical knowledge as one of the strengths of flipped learning. For example, they prepared sample lesson plans, concept maps and completed different group tasks. Hence, according to them, learning was permanent.

Furthermore, pre-service teachers stated that there was not much homework in other courses but if there was, even coping and pasting were accepted. On the other hand, in the Principles and Methods of Instruction Course, pre-service teachers, students were asked to prepare original assignments, for example, they were asked to write their original examples about the use of different methods.

In addition, according to the perception of pre-service teachers, their feelings, thoughts, suggestions and ideas into consideration. Also, because of the activities conducted according to flipped learning, their interaction and communication with peers increased, a sincere atmosphere in the class was established. Moreover, they stated that pre-service teachers helped each other during group work and each of them fulfilled the requirements of tasks responsibly. These were related to the cooperation and student cohesiveness properties of classroom environment.

# CHAPTER 5

# DISCUSSION

This chapter included discussion of findings obtained from quantitative and qualitative data and recommendations for practice and future research. In the first part of the discussion, the results of the study were discussed in detail and in the second part of the study recommendations were made for practice and future research.

## 5.1. Discussion of the Results

In this part, the findings of the current research were discussed in detail. Firstly, the findings related to pre-service teachers' achievement obtained from Achievement test were discussed, then the findings obtained from Classroom Environment Scale were discussed. Finally, the findings obtained through Student Questionnaire and interviews were discussed separately.

### *5.1.1. The Effect of Flipped Learning on Pre-Service Teachers' Principles and Methods of Instruction Course Achievement*

According to the results of the study, pre-service teachers who were in the experimental group (flipped group) had significantly higher achievement test scores than the pre-service teachers who were in the control group (traditional instruction group). Also, pre-service teachers who were in flipped learning group had significantly higher final grades than the pre-service teachers who were in the control group. Similar to the achievement test results, in the student questionnaire, pre-service teachers agreed that flipped learning yielded more learning than the courses taught by other methods, supported and facilitated learning and was effective in order to practice theoretical knowledge.

The reason for this result might be that pre-service teachers in the flipped learning group spent relatively more time for the course in terms of receiving instruction by watching videos and summarizing them out of classroom and applying

knowledge in the face to face part of the course compared to pre-service teachers who were in the traditional classroom. The questions of pre-service teachers were answered more immediately in the flipped learning than the pre-service teachers in the control group. Hence, pre-service teachers' performance improved more, which was in line with previous literature (Alsancak-Sırakaya, 2015; Boyraz, 2014; Davies et al, 2013; Day & Foley, 2006; Fulton, 2012a; Guc, 2017; Love et al., 2014; Mason et al. 2013; Saglam, 2016; Talley & Scherer, 2013; Tune et al., 2013; Turan, 2015; Wilson, 2013).

In the current study, pre-service teachers watched lecture videos and while watching them, pre-service teachers had the opportunity of turning back and watching some parts again whenever they needed, taking notes, writing questions to be asked in the class which might have increased the achievement of pre-service teachers in the flipped learning group when compared to pre-service teachers in control group. Similar to the current study, in the study conducted by Enfield (2013), it was reported that majority of students took notes and found it helpful in learning the course content which might have affected their learning positively. Moreover, in the study conducted by B. Aydin (2016), pre-service teachers indicated that they could learn the content according to their own learning speed and they could watch some videos again when they could not understand. Similarly, in the study conducted by Ceylaner (2016), ninth grade students in English course also stated that when they forgot some rules, they had the chance to turn back to the related video and watch the subject again. In this way, according to them, learning was deep and more permanent. Moreover, Day & Foley (2006) stated that according to Dale's Cone of Learning (1969), videos, fall in the middle of the cone in terms of retention and they indicated active learning experiences and participating in hands-on learning activities increase the retention of learning as it is in the flipped learning.

In the current study, pre-service teachers were presented with course materials in several different formats like slides, the expressions of the instructor together with slides, sample videos from You Tube and course books, which might have increased the involvement of pre-service teachers with different learning styles and preferences. Similarly, Lage et al. (2000) indicated that flipped learning clearly allows for students of all learning styles to use methods that best match for them. Umutlu (2016) prepared different video modalities by taking the participants' learning styles which was stated

as one of the important variable while examining the effects of the flipped learning on achievement in English. In the current study, pre-service teachers indicated that they preferred learning the video content instead of studying from different materials like books and internet articles because they found the content of video courses more beneficial, short, clear and general. They stated that the content about a topic was so long in books, hence it was so boring for them. Pre-service teachers' preference in terms of videos might have increased pre-service teachers' interest in the course because of being enriched with audio visuals. Similarly, in the study conducted by Boyraz (2014), it was found that according to English preparatory class students, learning through videos were fun and they preferred studying English via videos to studying English by underlining important points from course books. For the current study, this might be explained as pre-service teachers who took part in the control group did not perceive the traditional materials as attractive as the technological materials.

In addition to these, learning with videos provided pre-service teachers with access to the course content independent of the space, which may be another reason for the significantly higher achievement test scores of the flipped group than the pre-service teachers in the control group. In this way, they had the opportunity of making up the courses by themselves. Similarly, in the study conducted by Alsancak-Sırakaya (2015) senior pre-service teachers taking the Scientific Research Methods course and studying in the Guidance and Psychological Counseling department indicated that when they were absent in the course, they had the chance of watching the videos over and over, which might have increased the level of learning similar to current study. Moreover, in the study conducted by Guc (2017), secondary school students stated that they could not learn the subjects taught in the first lesson of the day because of coming to school quite early and being sleepless in other courses taught according to traditional principles. However, they indicated that they studied productively and learned when they felt physically and emotionally ready when they took a course according to flipped learning principles. Hence, it might be said that flipped learning contributed to personal learning abilities and developed self-learning skills, supported independent learning skills, planned and systematic work, enhanced research and exploration abilities and pre-service teachers had more control over their learning, as also stated

by pre-service teachers in the student questionnaire. Thus, it can be said that these are some of the important properties of flipped learning and pre-service teachers are positive about flipped learning due to these properties.

In the current study, students indicated that they learned better when the videos were divided into brief parts they found the content as shorter and plain than any other course book, which may be another reason for the significantly higher achievement test scores of the flipped group than the pre-service teachers in the control group. In the literature, there are many studies supporting this finding (Bergmann & Sams, 2012; Caudill, 2014; Enfield, 2013; Turan, 2015). Similarly, in the study of Caudill (2014) pre-service teachers in a flipped Applied Child Development course also stated teachers' keeping the lecture videos down to a minimum of ten minutes and teaching the most important things was better than long lecturing. Ceylaner (2016) indicated that some ninth grade students checked the duration of videos before watching them and watched the videos which were more than five minutes by skipping some parts. Similarly, Gaughan (2014) stated that college students watched videos between seventeen and twenty-nine minutes but did not watch a forty-minute video in the World History course. In the study conducted by Zappe et al. (2009), undergraduate architectural engineering students indicated the optimum video length to be around 20 minutes. In the current study, around 21 minutes videos were divided into two or three parts to be managed by pre-service teachers easily. Moreover, according to content analysis, pre-service teachers indicated that they preferred to watch video courses prepared by instructor than watching the internet videos about the same topic. Similarly, in the study conducted by Turan (2015), pre-service teachers in the Early Childhood Education department indicated their preference to watch the videos prepared by the instructor instead of ready-made internet videos. Dove & Dove (2017) found that flipped learning with teacher-created videos decreased elementary education pre-service teachers' mathematics anxieties and increased confidence in mathematics more than did instruction that incorporated in-class lectures or third-party videos. One of the reasons for this might be that most of the videos prepared for Principles and Method of Instruction course are prepared by special institutions to prepare pre-service teachers for KPSS examination (Public Personnel Selection Examination), and they are over one hour and include full of terms and extra topics

that pre-service teachers are not familiar with. Day & Foley (2006) indicated that while preparing web/video lectures, professional production quality is not necessary, and evidence from focus groups suggested that informal recordings were found more enjoyable. Hence, it can be said that brief, clear and concise videos prepared by the instructor might have been perceived by pre-service teachers as more understandable and concise to learn the content than the internet video, which might be the reason for significantly higher achievement test scores of the flipped group than the control group.

The reason for the result that pre-service teachers who were in the experimental group had significantly higher achievement test scores and final grades than the pre-service teachers who were in the control group may stem from the preparation process for the courses. In the current study, in terms of preparation process, pre-service teachers who were involved in flipped group attended to other courses without getting prepared for the lessons but attended to this flipped course by getting prepared, which is similar to the senior pre-service teachers taking Scientific Research Methods course in the study of Alsancak-Sırakaya (2015). They summarized the video lessons, answered the video questions and prepared a curious question to be discussed in class during pre-preparation. They stated that since they were sent videos every week in the flipped course, they needed to know the content to participate in the activities conducted in class. In the study conducted by Boyraz (2014), English preparation class students stated that without getting prepared they could not learn the subject. However, by doing pre-class work, they got ready to participate in class activities and discussions conducted in the face-to-face part of the class. Guc (2017) stated that since secondary school students attended courses prepared, they were aware of the parts that they learned or could not learn. Hence, students listened to the solutions of questions about the parts they did not understand more carefully, which in turn increased students' control over their learning. Similarly, in the present study, pre-service teachers who were in the control group might have attended to the Principles and Method of Instruction course without getting prepared for the lessons although they were assigned homework from their textbooks to read before the class time, which might be the reason for the result that pre-service teachers who were in the experimental group had

significantly higher achievement test scores and final grades than the pre-service teachers who were in the control group.

This result may also have stemmed from the fact that experimental group conducted different activities in the face-to-face part of the class. The pre-service teachers who were in the flipped group indicated that they did not conduct any kind of activities in other courses except laboratory lessons. The other courses were indicated as being heavily traditional. Similarly, the pre-service teachers who were in the control group did not conduct different tasks in the Principles and Method of Instruction course except question-answer activities and student presentations. In the current study, pre-service teachers were active learners instead of passively listening to teachers' explanations which is in line with the previous literature (Alsancak-Sırakaya, 2015; Baker, 2000; Bergmann & Sams, 2012; Ceylaner, 2016; McLaughlin et al., 2013). In the current study, it is thought that since pre-service teachers were prepared before the course, they were ready to participate actively in the face-to-face part of the class. Because of having prerequisite knowledge about the subject, they were more confident in asking questions and taking part in discussions, which might be another reason for the result that pre-service teachers who were in the experimental group had significantly higher achievement test scores and final grades than the pre-service teachers who were in the control group. Similarly, in the study conducted by McLaughlin et al. (2013), although performance in the flipped learning course was not significantly higher than the traditional course, pharmaceutics students had positive perceptions about flipped learning which involved active learning opportunities. These students indicated that because of learning key concepts before coming to class, their learning in class improved greatly.

Another reason for the result that pre-service teachers who were in the experimental group had significantly higher achievement test scores and final grades than the pre-service teachers who were in the control group may be the perceptions of pre-service teachers about the individual and group homework/assignments. In the current study, pre-service teachers who were in the experimental group were asked to prepare original assignments. They were asked to write examples about the use of different methods, prepare posters or sample lesson plans and presentations. In the flipped group, during interviews, pre-service teachers indicated that there was not

much homework in other courses. They stated that if they were assigned homework, they would complete it by coping and pasting from the internet sources, which were not very instructive and original. They were prepared as an obligation, and after being submitted to the instructor, they were forgotten. Similarly, the pre-service teachers who were in the control group might have perceived the homework as not beneficial and instructive for themselves, instead they perceived homework as an obligation which might be the reason for the result that pre-service teachers who were in the experimental group had significantly higher achievement test scores and final grades than the pre-service teachers who were in the control group.

Moreover, in the current study, since pre-service teachers prepared their homework mostly in groups in the face-to-face part of the class, they shared the workload equally. Also, while preparing them, pre-service teachers could ask their questions to the instructor. In other words, they could receive immediate help from both the instructor and their peers. Hence, the homework stress level scores of flipped group might not be high. In this way, they could learn deeply in a positive classroom environment. However, in the study conducted by B. Aydin (2016), some pre-service teachers indicated that in the Material Design and Use in Education course they did not have much time and necessary materials with them. Hence, they were anxious about the fact that they would not produce the material as they wanted. On the other hand, control group had a week to produce the necessary material which was relieving for them.

Abeysekera & Dawson (2015) indicated that flipped learning approach as a method to utilize face to face class time productively and involve students to be active participants. In the current study, the inclusion of student response systems like Kahoot and Socrative might have motivated students and increased their performance. Moreover, they might have increased students' involvement, achievement and cooperation in the class. Ziegelmeier & Topaz (2015) stated checking students' knowledge as a useful way to keep up-to-date with course material and encourage them to watch the videos before the face to face part of the course. Cohn & Fraser (2015) stated that the inclusion computer applications during the instruction, increase students' understanding and retention. The regular use of student response systems might have improved the quality of discussions and final exam scores of pre-service

teachers more than those who did not use student response systems as also stated by Guess (2008). Martyn (2007) stated that although there were no significant differences between the groups, the mean scores of introductory computer information system students who used student response systems were higher. Moreover, the involvement of students who used student response systems increased and they could self-evaluate their level of understanding of the material (Martyn, 2007). These findings were also supported by Brewer (2004) that instructional technologies supported the mastery of knowledge by providing new opportunities for interaction, involvement and collaboration between students and faculty.

Another reason for the result that pre-service teachers who were in the experimental group had significantly higher achievement test scores and final grades than the pre-service teachers who were in the control group may be the faculty-student interaction as also indicated by Lage et al. (2000). In the current study, during in-class activities the instructor was able to monitor the flipped group's performance and comprehension, and when a misunderstanding or any confusion was noticed, they were cleared up immediately which is in line with previous research (Alsancak-Sırakaya, 2015; Bergmann & Sams, 2012; Berrett, 2012; Ceylaner, 2016; Findlay-Thompson & Mombourquette, 2014; McLaughlin et al., 2013; Milman, 2012; Ziegelmeier & Topaz, 2015). In the flipped learning, instructors have many opportunities to give feedback, which eases the learning process and creates a sense of involvement and acceptance by creating a positive classroom environment. Also, in the current study, pre-service teachers interacted with the instructor out of the class by using social media and the instructor could help them anytime they needed. In the study of Findlay-Thompson & Mombourquette (2014), Introduction to Business Administration students reported that talking to the professor in and out of the class was easier in the flipped learning, which was also the case in the current study. In addition to these, similar to the current study, den Brok et al. (2004) indicated that interpersonal teacher behavior is significantly related to performance of students in courses. Teacher proximity was important for pleasure in courses and was significantly associated with confidence. Ghaith (2002) showed that the more the learners received academic and personal teacher support rather than peer support, the more they perceived that they could better adjust socially and psychologically at school. Hence, it can be said that the increased

faculty-student interaction might be one of the reasons for the achievement of flipped learning group.

This result may also have stemmed from increased student interactivity and collaboration in flipped learning when compared to traditional courses. The pre-service teachers who took part in flipped group indicated an increase in collaboration with their friends and instructors both in the classroom and out of the classroom by using technology, which is similar to the findings of study conducted by Baker (2000). In this way, pre-service teachers cooperated with others when completing assignments and could learn from each other. Similarly, in the study conducted by Ceylaner (2016), ninth grade students indicated that they shared a lot with their classmates because of being involved in group tasks. They stated that they solved their problems together and even shared videos via Bluetooth with their classmates to be watched by the peers who did not have internet connection. In the study conducted by Guc (2017), among 13 secondary school students, 11 of them indicated positive opinions about flipped learning on peer learning. Moreover, in the current study, pre-service teachers indicated that since everyone would get the same grade from the group work, they communicated with those people even if they were not close friends. Also, they stated that because it was a joint work, all of them put effort. They worked together to achieve their group goals. In other words, their communication with peers during class affected learning positively.

Different from the current study, many studies indicated insignificant differences in student learning (G. Aydin, 2016; Butzler, 2014; Clark, 2013; Davies et al, 2013; Findlay-Thompson & Mombourquette, 2014; McLaughlin et.al, 2013; Ramaglia, 2015; Yavuz, 2016; Ziegelmeier & Topaz, 2015). The reason for this result may be that there are different design processes which were implemented by different flipped learning researchers. If researchers do not give importance to pre-class preparation or in-class active learning tasks, the results may not be as expected and students are likely to experience negative classroom environment and perceive less involvement, satisfaction, cooperation, cohesiveness, teacher and peer support and feel more difficulty, which in turn effects student achievement. Flipped learning is typically implemented as watching the videos at home and doing homework or assignments in the class instead of doing at home. However, flipped learning is more

than that simple vision. As stated by Lee et al. (2016), this approach involves two different modes of learning and it does not mean simply combining the two or laying one on top of the other, but it means integrating two different modes of learning by maximizing the advantages of each environment. Moreover, the reason for the insignificant differences in student learning may be that there are different participant and instructor characteristics, materials, implementation procedures which result in different outcomes.

### *5.1.2. The Effect of Flipped Learning on Pre-Service Teachers' Perceptions of Classroom Environment*

In the current study, by administering the Classroom Environment Perceptions Scale of Pre-Service Teachers, the effects of instruction on pre-service teachers' perceptions of classroom environment (satisfaction, cooperation, involvement, task orientation, student cohesiveness, and difficulty) were examined. According to the results obtained from the classroom environment scale, pre-service teachers who were in flipped learning group did not have significantly different mean scores than those who were in the control group according to all dimensions of classroom environment. In other words, flipped learning and control group pre-service teachers perceived the classroom environment almost similar. In the study conducted by Roth (1998), it was found that negative classroom environment perceptions were related to lower achievement and positive classroom environment perceptions were related to higher achievement. In the current study, although pre-service teachers who were in flipped learning group had higher final grades than the pre-service teachers who were in the control group, both groups had similar classroom environment perceptions.

According to literature, the perceptions of students about the classroom environment have a significant influence on various learning outcomes (Afari, 2013; Arısoy, 2007; Chionh & Fraser, 2009; Dorman et al., 2003; Dotterer & Lowe, 2011; Fraser, 1998; Fraser & Treagust, 1986; Goh & Fraser, 2000; Haertal et al., 1981; Roth, 1998; Velayutham & Aldridge, 2013; Zandvliet, 1999). The findings of the study conducted by Atbas (2004) indicated that teacher supportiveness, involvement, satisfaction with course were found as the significant predictors of class participation. Moreover, in the study conducted by LaRocque (2008), elementary school students in a large urban school perceived the satisfaction, competitiveness and friction properties

of classroom environment more but they perceived relatively low scores in terms of the difficulty and cohesiveness properties of the classroom environment. The study conducted by Chien (2007) found that teacher support and equity dimensions of classroom environment were significantly and positively related to the business management students' attitudes to the subject. On the other hand, there are many classrooms which provide fewer opportunities for student self-management, choice, collaboration, cooperation and are characterized by less favorable interpersonal relationships among peers and teachers, reflect the decline in the students' involvement and achievement scores (Wang, 2012). Also, in the study of Strayer (2012), students in the college level introductory statistics indicated their being less satisfied about the task orientation property of flipped learning classroom environment but being more open to cooperative learning and innovative teaching methods.

In the current study, pre-service teachers who were in the flipped learning and the control groups had similar classroom environment perceptions. The reason for this might have stemmed from the instructor support. On the other hand, there are several studies which investigated the psychosocial climate in the classroom point to the importance of the teacher in maintaining a warm, friendly, supportive, and communicative environment in accounting for higher affective and cognitive gains (den Brok et al., 2005; Fraser & Walberg, 2005; Goh & Fraser, 1997; Kim et al., 2000; Koul & Fisher, 2005). In the flipped learning group, instructor mostly took the role of a guide. The pre-service teachers perceived the instructor not far away from them but very close to them to be able to consult whatever they wanted without being afraid of making mistakes. In addition to these, according to the content analysis, pre-service teachers who were in the flipped group stated that the instructor took students' feelings, thoughts, suggestions and ideas into consideration and their interaction with the instructor in and out of the course was increased. Similarly, pre-service teachers who were in the control group were taught by the same instructor and this group was also behaved similar to the experimental group. Both of the groups were cared and they knew that whenever they had problems, they would be welcomed and solved by the instructor. The instructor was perceived by both group as available by e-mail or WhatsApp and pre-service teachers of both group felt free to go to the office whenever they had questions. Furthermore, according to the content analysis, pre-service

teachers stated that in other courses they could not ask their questions to the instructors and if they asked, there would not be a sufficient answer. However, in the current study, pre-service teachers from both groups could ask whatever they needed to ask. It can be said that a positive classroom environment which includes some of the important features of the classroom environment such as trust and openness as also stated by McRobbie et al. (1997) were provided both for flipped and control group pre-service teachers.

This result might stem from survey fatigue which might have limited pre-service teachers' responses to the CEPSPT. This scale was implemented at the end of the semester when pre-service teachers had to complete university-wide course evaluation survey and had many course examinations, which might have affected students' responses. These pre-service teachers might not have spent quality time and effort on completing the CEPSPT. Therefore, the perceptions of pre-service teachers with the classroom environment might not have been accurate. In addition to these, the items of CEPSPT included 5-point Likert type (5-strongly agree, 1-strongly disagree) responses which might not have provided a wide range of response options to reflect the difference between the perceptions of pre-service teachers in flipped and traditional group. Most pre-service teachers responded among a small range which might have narrowed the perceptions of pre-service teachers about the classroom environment.

In the current study, pre-service teachers who were in the flipped and control groups perceived satisfaction property of classroom environment similar. The reason for this might have stemmed from the fact that most of the pre-service teachers in both groups enjoyed the class tasks, took part in class work, were satisfied with the activities conducted in class and looked forward to coming to class at similar levels. Hence, they had equal satisfaction perceptions of the classroom environment.

Satisfaction was defined by Fraser & Treagust (1986) as the extent to which students enjoy class work and according to the literature, many studies reported that flipped learning increased students' satisfaction in the classroom environment (Cibik, 2017; Lage et al., 2000; Lee et al., 2016; Touchton, 2015). On the other hand, some researchers have not been positive about whether the flipped learning environment increases the satisfaction of students (Butzler, 2014; Findlay-Thompson & Mombourquette, 2014; Kecskemety & Morin, 2014; Missildine et. al., 2013; Strayer,

2012; Zappe et al., 2009). The results of the study conducted by Kecskemety & Morin (2014) suggested dissatisfaction with the flipped learning approach for the engineering students and Missildine et al. (2013) reported that nursing students were significantly less satisfied with the flipped learning than traditional instruction. Finally, in the study conducted by Findlay-Thompson & Mombourquette (2014), Business Administration students were undecided about their responses that they stated both positive and negative ideas about the flipped learning in a business course.

The reason for flipped group's satisfaction might have stemmed from the tasks and materials used in the face to face part of the class. The pre-service teachers who were in the flipped group indicated that Kahoot and Socrative were effective to learn the subject because of having too much fun and the feeling of race and ambition. It can be said that learning by using such activities might have been more encouraging rather than solving questions about the subject from a book. In the literature, there are many studies that found that the use of different materials like Kahoot, Socrative Edpuzzle, Edmodo, Camtasia, WhatsApp, Facebook during flipped learning were fun and increased satisfaction in the course (B. Aydin, 2016; Boyraz, 2014; Touchton, 2015; Turan, 2015; Zandvliet, 1999). B. Aydin (2016) indicated that the use of materials like Edpuzzle, Kahoot, Camtasia, Facebook in the Material Design and Use in Education course in the Computer Education and Instructional Technologies department increased involvement and satisfaction in the course. Moreover, in the current study, the use of computer applications during flipped learning might have decreased the perceived difficulty of course by providing a controlled race in activities and the feeling of fun while learning, which might have helped pre-service teachers to get satisfied with the course. Yin & Lu (2014) found that competition among freshmen students was positively correlated with learning. As in the current study, controlled competition might have facilitated pre-service teachers' learning by providing challenging tasks and satisfaction in the course by providing exciting learning experiences for the pre-service teachers during tasks and competitions organized in the face to face part of the class. On the other hand, Majeed et al. (2002) assessed the lower secondary students' perceptions in mathematics classroom environment in Brunei Darussalam. The findings indicated that less difficulty and less competition were associated with more satisfaction. Similarly, in the current study, pre-service teachers'

close relationship with their peers might be another reason for the satisfaction of flipped group. Moreover, the satisfaction of pre-service teachers might have stemmed from getting help from the instructor immediately when they prepare assignments in the face-to-face part of the class, taking immediate feedback, asking their questions or stating their problems immediately via social media.

In the current study, different kinds of technological issues like lack of fast internet connection and the music behind the voice of the instructor might have affected the satisfaction of pre-service teachers. Also, videos might not be much interesting for some pre-service teachers and the total duration of videos might be long for some pre-service teachers, which might have affected the total satisfaction scores of pre-service teachers. Hence, pre-service teachers both in the flipped and control group had satisfaction scores related to Principles and Method of Instruction course classroom environment at similar levels.

In the current study, pre-service teachers who were both in the flipped learning and the control group had similar classroom environment perceptions in terms of perceived cooperation. The reason for this may be that pre-service teachers in flipped group cooperated with each other while preparing presentations instead of competing when doing assignments, enjoyed working together whenever it was necessary, helped each other and learned from other pre-service teachers in this class, encouraged each other about achieving their goals, conducted their responsibilities individually, both groups had equal perception of the classroom environment related to cooperation dimension.

In the literature, it was stated that classrooms characterized by high degrees of cooperation, tend to produce the most favorable student outcomes (Boyraz, 2014; Butt, 2014; Caudill, 2014; Durik & Eccles, 2006; Findlay-Thompson & Mombourquette, 2014; Mason et al., 2013; Millard, 2012; Patrick et al., 2007; Walker, 2003; Wang, 2012). Chien (2007) stated that business management students did the work together in groups and discussed, and learned much from each other. Similarly, Oksuz-Zerey (2017) found that working collaboratively in language classrooms contributed to students' willingness to communicate in English. In the current study, since most of them wanted to get good grades, they worked towards a common goal. Strayer (2007) found that students in the college level introductory statistics course were open to

cooperation in the flipped learning group which was unearthed in the qualitative data analysis. In the current study, many students from the flipped learning group mentioned the importance of learning with their peers while conducting in-class activities.

In the current study, according to the findings of content analysis, during the flipped learning process pre-service teachers stated that during the tasks conducted in the face to face part of the flipped learning, they mostly worked in groups in which they cooperated, knew and supported each other, which were related to the cooperation and student cohesiveness properties of classroom environment. Furthermore, by doing different activities and group work, pre-service teachers might have involved in the course which also affected learning positively. Hence, it might be said that as pre-service teachers perceive that classroom environment contribute to learning and satisfied from the course, they are involved in cooperative activities to achieve a task, share materials and divide workload among themselves. Similarly, Ghaith (2002) stated that in the environments where introductory English course students perceived the cooperativeness dimension of classroom environment more, they work together to maximize each other's learning in a positive way.

In the current study, pre-service teachers who were both in the flipped learning and the control group had similar classroom environment perceptions in terms of cooperation. The reason for this may be that some of group members might be passive during group work. When assignments were completed in groups, if some of the group mates were passive, others might have needed to work more, which may have decreased the motivation, student cohesiveness, cooperation and satisfaction properties of classroom environment for some pre-service teachers. Similarly, in the study conducted by Chien (2007), it was unearthed that business management students were able to work well with their classmates, and distributed the work among group members which might have increased learning and cooperation, as was the case in the current study. However, in the same study, some of the business management students also found themselves doing the majority of the work or found others in their groups that were not committed to work. This is one of the problems which could happen in all kinds of group studies. Group works are different from individual homework which requires students' own personal responsibility. In order to overcome this problem, the

tasks should be distributed equally among group members and instructors should monitor whether all students realize their own responsibilities or not.

In the current study, pre-service teachers who were both in the flipped learning and the control group perceived involvement property of classroom environment similar. The reason for this might have stemmed from the fact that pre-service teachers in both groups discussed the topics in class, they were asked questions, they indicated their opinions during class discussions, their ideas and suggestions were welcomed without any judgment and used during classroom discussions. Hence, in the current study, both flipped and control group had similar level of involvement perceptions of the classroom environment.

In the current study, pre-service teachers who were in the flipped group benefitted from different resources like course books, internet, Edmodo-Moodle, Facebook and WhatsApp which might have affected their involvement positively. The use of different materials and resources might be facilitate self-directed study, instructor-student interaction, collaboration and student cooperativeness which in turn might have affected the involvement positively. Pre-service teachers downloaded the videos from Edmodo or class Facebook group. After they watched the videos, they summarized them and tried to learn the subject by themselves, which might have increased the perceived involvement property of classroom environment. In the study conducted by Atbas (2004), English preparatory class students expressed higher levels of satisfaction with course materials, which was found to be a significant determinant of higher levels of class participation and higher English achievement. Similar to the current study, Lage et al. (2000) created some additional resources that students benefited during the learning process. They prepared a course homepage which is similar to Edmodo-Moodle, Facebook and WhatsApp used in the current study to provide the course materials as the PowerPoint lectures, assignments, old exams, an Internet chat room and a bulletin board for each section of the course. Hence, microeconomics freshmen students were able to discuss about the applications conducted in class in more detail and ask their questions by using the course materials more than the class time allowed, which is similar to the current study.

In the current study, when pre-service teachers were asked about the Moodle-Edmodo which was also a mandatory material to be used by them to send homework

or watch videos, they had both positive and negative opinions. Some of the pre-service teachers indicated that sending homework via Edmodo was good since it was easier rather than writing by hand. On the other hand, some the pre-service teachers stated that when there was not a faster internet connection, the installation period of Edmodo took more time. Hence, sometimes they returned their assignments late or they had to come to the faculty to access a powerful internet connection. The technical problems might have annoyed pre-service teachers and not affected classroom environment perceptions positively in terms of satisfaction and involvement.

In addition to these, Clark (2013) stated teacher support as one of the important factors affecting ninth grade students' involvement in mathematics. In the study of Ozdemir & Rahimi (2013), it was unearthed that negative teacher attitudes blocked learning and satisfaction from the course. For example, if instructors reprimanded or used bad language in the classroom, this behavior would make students feel estranged and inhibited from learning. They also indicated that when the instructor was kind and friendly, the students were influenced positively. Thus, they wanted to study and got more involved, which might be the case in the current study. This might be explained as pre-service teachers from both groups knew that instructor would help them when they needed help, they did not feel stressed and became more engaged in the lessons as in the current study. Hence, it can be said that pre-service teachers of both groups perceived the classroom environment created by the instructor at similar levels in terms of involvement.

The results of research about classroom environment suggest that greater class involvement is one of the significant predictors of a positive classroom environment which in turn predicts various affective and cognitive outcomes (Clark, 2013; Fraser, Pearse et al., 1982; Haertel, Walberg & Haertel, 1981; Rentoul & Fraser, 1980). The results of study conducted by Atbas (2004) indicated that student involvement was a significant predictor of higher levels of class participation, better outside class study habits, and higher English achievement scores. Similarly, in the study conducted by McLaughlin et al. (2013), according to qualitative results, it was found that pharmaceutics students indicated their desire for high-quality engagement with content, peers and instructors in the flipped learning environment. In the study of Chien (2007), students stated that their instructor encouraged their active involvement

in the class, respected their views and they worked out problems together. The instructor, by asking questions, gave students the opportunity to be involved and explain their ideas. They solved a case as a team and presented it every week which were similar to the activities conducted in the current flipped learning group.

In the current study, pre-service teachers who were both in the flipped and the control groups perceived task orientation property of classroom environment at similar levels. The reason for this may be that during instruction both groups had clearly set rules and procedures, were provided with structure during activities, had properly set standards for achievement, were directed firmly to achieve goals of the course and every the pre-service teachers was expected to get the best performance. In the flipped learning, goals were explained to the pre-service teachers before each course. Videos were assigned and the pre-service teachers know exactly what were their responsibilities related to videos like summarizing the videos or writing an important question. However, the self-directed learning properties of flipped learning which require planned and systematic work might not be proper for some pre-service teachers. Hence, they might get sidetracked in the pre-class preparation part of the course rather than stick to the point as also stated by den Brok et al. (2005). Moreover, another reason for this result might be that flipped group need more reassurance than they were provided. Frederickson, Reed & Clifford (2005) stated that students required more reassurance that they are on the right track because of being in a technology rich environment where the instructors share their responsibility with students during the learning process than the students in a traditional lecture course (cited in Strayer, 2005). In the current study, the pre-service teachers were guided by the instructor both during the learning process and while preparing their assignments. However, some the pre-service teachers might need more support and guidance in using Moodle-Edmodo or taking part in computer based activities.

Similarly, in the study conducted by Mason et al. (2013), engineering students who even performed well expressed their frustration with the course structure in the flipped learning environment. Many students indicated that they were overwhelmed with the number of resources available for them and needed help to identify specific videos to watch. The participants of the study conducted by Caudill (2014) stated that they were not aware that the course was a flipped model. Maybe the pre-service

teachers in the current study might need more clear vision about how this flipped course will be conducted, what kinds of activities will take place and what the goals of each topic are at the beginning of the semester. Hence, this might be the reason that both flipped and the control group perceived task orientation property of classroom environment at similar levels.

On the other hand, in the literature, it was stated that classrooms characterized by high degrees of teacher expectation, direction, structure, and organization tended to produce most favorable cognitive and affective student outcomes (Chien, 2007; Chionh & Fraser, 2009; Dorman et al., 2003; Telli et al., 2006; Velayutham & Aldridge, 2013; Zandvliet, 1999). Velayutham and Aldridge (2013) found that the learning environment scale with the greatest influence on students' learning was task orientation. Graham, McLean, Read, Suchet-Pearson & Viner (2017) stated that online activities involved in flipped learning increased interest in self-directed learning which is related to task orientation property of classroom environment. Oksuz-Zerey (2017) found a significant relationship between willingness to communicate in English and task orientation property of classroom environment in medium effect size.

In the current study, pre-service teachers who were in the flipped learning and the control groups had similar classroom environment perceptions in terms of student cohesiveness. The reason for this may be that pre-service teachers in both group knew each other by their first names, were close enough to be personal friends, were willing to get to know each other and favored for one another in this class at similar levels. Hence, they had similar student cohesiveness perception of the classroom environment according to CEPSPT. On the other hand, various research indicated that the student cohesiveness aspect of classroom environment is an important factor in explaining outcomes, particularly affective ones, in various subject matter areas (Chionh & Fraser, 2009; Dorman et al., 2003; Fraser, 1986; Fraser, 1998; Haertal et al., 1981; Majeed et al., 2002; Velayutham & Aldridge, 2013). Oksuz-Zerey stated that the better students knew each other, the more they were supportive and the better they worked together which affected their willingness to communicate in English in large effect size. Cohn & Fraser (2015) stated that peer instruction raised interest and enjoyment in courses. Similarly, Walker (2003) indicated the strong outcome-environment

association between the student interaction and collaboration properties of classroom environment.

In the current study, according to content analysis, pre-service teachers stated positive classroom environment perceptions in terms of student cohesiveness. They made friendships with the people who were not friends before this course and knew others in this class. Also, they indicated that there was a sincere atmosphere in the class and their prejudices against each other were broken. They were friendlier to the members of this class and worked well with other class members. Moreover, pre-service teachers indicated that they helped and supported their group members who were having trouble about the assignments. Hence, it may be said that student cohesiveness property of classroom environment might have affected their participation and achievement in the Principles and Methods of Instruction course positively. The group work might have helped pre-service teachers to become socially more comfortable. Also, by explaining a problem or idea to their friends in the group might have helped them to develop a deeper understanding of the subject.

The use of social media, WhatsApp or Facebook might have increased the interaction among students by giving voice to many students who were silent during in-class discussions during the flipped learning. Similar to the present study, as stated by Baker (2000), students who were silent during in-class discussions by using social media had time to prepare, edit and rewrite their comments without any time limit before submitting them to their peer which was also stated in the study conducted by Ceylaner (2016). Hence, it can be said that, many students who are mostly silent, can begin to interact with other peers which in turn may increase social interaction even in the face-to-face part of the class. Velayutham & Aldridge (2013) found that the student cohesiveness aspect of the learning environment which is from Moos' relationship dimension has a significant influence on learning as stated by pre-service teachers in the current study. Majeed et al. (2002) found strongest positive association between the lower secondary students' perceptions in mathematics classroom environment's student cohesiveness property and satisfaction. These findings indicated the importance of supportive relationships among students in the classroom.

In the current study, pre-service teachers who were in the flipped learning and the control groups had similar classroom environment perceptions in terms of

difficulty. In the current study, pre-service teachers in both groups might have perceived the pre-class preparation at similar hardship, found the tasks conducted in the class at similar difficulty, perceived that they were constantly challenged for more and found the class work at similar hardship to manage. Hence, both the flipped and control group perceived the classroom environment at similar levels in terms of difficulty dimension according to the scores obtained from CEPSPT.

According to literature many studies reported the relationship between the difficulty dimension of classroom environment and various affective and cognitive outcomes (Fraser, 1986; Haertal et al., 1981; LaRocque, 2008; Majeed et al., 2002; Taylor & Fraser, 1991). Fraser (1986) implemented 15 scales of Learning Environment Inventory and found that higher achievement was found in classes which were characterized by high scores on the cohesiveness, satisfaction, difficulty, organization dimensions. On the other hand, LaRocque (2008) found that the difficulty dimension of the classroom environment was significantly related to elementary school students' ($4^{th}$, $5^{th}$ and $6^{th}$ grade) mathematics and reading achievement in a negative direction. In other words, when students perceived their classroom environment as relatively more difficult, they tended to have lower reading achievement.

In the current study, pre-service teachers who were in the flipped group perceived the classroom as difficult as the pre-service teachers in the control group. Although flipped learning required both pre-class preparation and in-class active involvement, pre-service teachers in the flipped group did not perceive these tasks difficult and get satisfied with the course as the pre-service teachers in the control group.

In the current study, flipped learning was also accepted positively by pre-service teachers in terms of contribution to learning. For example, a medium achiever pre-service teacher indicated flipped learning as difficult but an instructive method which may be explained with the perceived difficulty of classroom environment which might have stemmed from assigning students some obligatory tasks, requiring the active participation of students in class and conducting group work. Similarly, in the study conducted by Lage et al. (2000), microeconomics freshmen students did not view flipped learning as an easy class. On the contrary, they indicated that they studied for

the flipped course more than the other courses they took the same semester. However, they might have perceived the difficulty of classroom environment at moderate level because if students had perceived the environment as relatively more difficult, they might have tended to have lower achievement as also stated by LaRocque (2008). Hence, by confirming the previous statements, in the current study, students who were both in flipped learning and control group had similar difficulty scores.

### *5.1.3. The Perceptions of Pre-Service Teachers about Flipped Learning*

In the current study, semi-structured interviews were conducted at the end of the treatment process in order to explore the pre-service teachers' perceptions about the flipped learning deeply. According to the analysis of interviews, at first pre-service teachers were not positive about the method which is in line with many studies (Alsancak-Sırakaya, 2015; Caliskan, 2016; Lage et al., 2000; Turan, 2015). They indicated that they were scared and surprised because they were not accustomed to this method. The reason for this might be that the pre-service teachers needed time to get used to a new method until they notice the benefits of it in terms of learning and affective outcomes. Similar to flipped learning, in other pedagogical approaches such as peer learning, students reported that they were initially skeptical of peer instruction; however, they got used to it as they found that the method helped them learn the course content (Fagen et al., 2002). Moreover, they felt a heavy workload due to the explanations of the instructor about activities and tasks in the first lesson. On the other hand, pre-service teachers' first impressions changed at the end of the semester. They accepted that they were too prejudiced about flipped learning. The reason for this change might have stemmed from the fact that there were many tasks that encouraged learning before and during the class. Hence, they learned more than the other methods as also found in the study conducted by Alsancak-Sırakaya (2015). Also, pre-service teachers might have perceived the learning much easier because topics to study before exams did not accumulate by this method. Similarly, in the study conducted by Mason et al. (2013), it was stated by mechanical engineering students who took the Control Systems course that although they struggled with the new format initially, they adapted quickly and found the flipped learning satisfactory and effective. In the study conducted by Guc (2017), secondary school mathematics students indicated that at first they were anxious about flipped learning but in time they were used to learning

by this method. Moreover, in the study conducted by Butt (2014), at the beginning of the semester, while around a 50% of respondents thought that flipped learning would be beneficial, at the end of the semester over 75% of total respondents viewed the flipped learning beneficial for their learning experience compared to lecturing. These students also developed positive attitudes about the flipped learning.

According to the content analysis, pre-service teachers had positive opinions about the flipped learning at the end of the semester which is in line with previous literature (Alsancak-Sırakaya, 2015; Bishop & Verleger, 2013; Butt, 2014; Ceylaner, 2016; Cibik, 2017; Clark, 2013; Davies et al, 2013; Findlay-Thompson & Mambourquette, 2013; Gaughan, 2014; Guc, 2017; Love et al., 2014; Murphree, 2014; Turan, 2015). The reason for this result might have stemmed from the fact that pre-service teachers noticed the positive sides of flipped learning. They might be pleased with flipped learning because of its many advantages such as providing active learning, flexible and interactive learning environment, learning perceived as fun because of using technology and increasing interaction with instructors and peers which were also stressed in the study conducted by Caliskan (2016). In the current study, pre-service teachers defined flipped learning as a both fun and easy method to learn, a method that results in permanent learning, a difficult but instructive method or a method that provides learning in an environment they want to learn. Similarly, in the study conducted by Mason et al. (2013), engineering students initially struggled with the new format, but when they adapted to it, they found flipped learning satisfactory and effective. In the study of Caudill (2014), some pre-service teachers indicated learning before going to class and conducting some activities in the class as very interesting and they stated that this method helped them understand the topic. Also, in the study conducted by Alsancak-Sırakaya (2015), similar to current study, pre-service teachers were able to learn outside of the class with the videos and then came to class and talked about it.

Moreover, in the current study, pre-service teachers also indicated their preference to attend to the other flipped courses in order to learn the ways of teaching to their own students in the future. On the other hand, in the study conducted by B. Aydin (2016), pre-service teachers indicated their preference to attend other flipped courses if they were related to social sciences or humanities courses which required

oral explanations or courses that required practices like Material Design and Use in Education course. However, they did not want to learn mathematics with flipped learning approach because of the fact that they would not take immediate teacher support when they were studying video courses at home. Different from the current study, in the study of Zappe et al. (2009), it was found that although 74% of students thought that the flipped learning was helpful in understanding the concepts in an architectural engineering course, 95% of the students indicated that the flipped learning approach should be used 50% of the time or less and the use of traditional lectures should be maintained.

In the present study, students' preference about the teaching method was not asked in the student questionnaire. However, during interviews all of the students stated that they preferred to take another course conducted via flipped learning approach which is in line with previous literature (Findlay-Thompson & Mombourquette, 2014; Guc, 2017; Touchton, 2015). Some of the reasons for pre-service teachers' preference to take another flipped course might have stemmed from the fact that most of the pre-service teachers might have had or improved self-learning skills. Instead of instructor, they might perceive themselves as the person to explain the content and address the right questions. Hence, they might not have felt lost while they are trying to learn the material by themselves according to the flipped learning approach. Also, they might have perceived the design of flipped learning well enough to increase the communication between instructor and students as well as among students. In the current study, students were always in connection with the instructor in both face to face part and out of the class through the use of social media in order to relieve the burden of learning. Furthermore, in the current study, pre-service teachers were mentioned about the difficulties of preparing videos and classroom activities as an instructor. In this way, they did not have the perception that by implementing this method the instructor took a lot of pressure and responsibility of herself and put it on students instead. Hence, by taking all these precautions they did not feel that they were striving by themselves without the help of the instructor. Contrary to the current study, in the study of Kecskemety & Morin (2014), students were asked about their preferred classroom approach. Students preferred traditional lecture-based classroom to flipped learning. This negative perception might have

stemmed from the fact that they did not notice the benefits of watching videos and doing activities in class contributed to their learning.

Moreover, another reason for positive perceptions of pre-service teachers about flipped learning might have stemmed from the fact that they did not memorize the content but they actually learned the content and learning did not take longer time. Similar to the current study, in the study conducted by Mason et al. (2013), students indicated that they spent significantly fewer hours per week studying outside of the classroom than the students who took the course in the traditional classroom. Hence, it can be said that when flipped learning is integrated with group tasks, discussions and active student presentations, it does not require longer time to study, as it was also found in the current study. However, different from the current study, there are negative opinions about the flipped learning's taking longer time. In the study conducted by Turan (2015), pre-service teachers in the Early Childhood Education department stated that the obligation of watching videos before class and the time taken to learn in flipped learning as some of the weaknesses of flipped learning.

Another reason which for the pre-service teachers' positive perceptions of flipped learning might have stemmed from practicing the theoretical knowledge. They prepared lesson plans, concepts maps in order to practice theoretical knowledge. Hence, they might have perceived that they learned more and their learning was permanent. Similarly, in the study conducted by Turan (2015), pre-service teachers also stated that flipped learning was based on practice and increased the permanence of the learning.

Teacher support might be another reason for the pre-service teachers' positive perceptions about flipped learning. Since pre-service teachers were provided with immediate support by their instructors, they might be motivated more in terms of learning and might have better adjusted to the new method. Moreover, the instructor's proximity might have affected the performance and satisfaction in course as also stated by den Brok et al. (2004). Similarly, Atbas (2004) found teacher-student interaction and teacher support as one of the key factors in explaining students' participation in class activities and achievement in English.

Providing students with different modalities of learning and different visual components like slides, the expressions of the instructor together with slides, inserted

videos from You Tube and the pop-up questions might be another reason for the pre-service teachers' positive perceptions of flipped learning. It can be said that visual and audial materials might have increased participation in class activities which might have affected perceiving flipped learning positively. Moreover, video links from YouTube or pop-up questions might have helped learning in an easy way and relieved the burden of the pre-service teachers as also stated by Alsancak-Sırakaya (2015) and Milman (2012). Furthermore, Kahoot and Socrative softwares, might have increased the fun in the face to face part of the course which in turn affected their perceptions of flipped learning as also stated by Turan (2015).

On the other hand, in the literature, there are some studies which have mentioned about the weaknesses of flipped learning (B. Aydın 2016; G. Aydın 2016; Caudill, 2014; Enfield, 2013; Guc, 2017; Milman, 2012; Yavuz, 2016). In the current study, the lack of fast internet connection and the music behind the voice of the instructor, might be the reason for negative perceptions of pre-service teachers about flipped learning. These kinds of technological issues might have affected the satisfaction of pre-service teachers from flipped learning. Hence, they might have some negative perceptions about. Similarly, Caudill (2014) stated that the downsides of using technology in a classroom setting were the program crashing, not working applications, and uninteresting or too long videos. Different from the current study, in the studies conducted by Enfield (2013) and Milman (2012), it was displayed that some technical issues like accessing, streaming and downloading the videos annoyed many students and affected their learning negatively. In the study conducted by Guc (2017), for some secondary school mathematics students it was an important issue to open videos because of viruses or other reasons. In the present study, since the videos were divided into parts, the file size was not large. Hence, watching them from their phones or jumping forward or backward in the video did not create a problem. However, because of slow internet speed in the student dormitories, they had problems to open Edmodo.

### 5.2. Recommendations

In this section, recommendations for practice and further research were made based on the results of the study.

### 5.2.1. Recommendations for Practice

This study indicated that there was a significant effect of the instruction designed according to the principles of flipped learning on pre-service teachers' achievement in the Principles and Methods of Instruction course. Also, this study is one of the studies conducted to assess learning environments of pre-service teachers in Turkey. Hence, the principles of flipped learning that were used in this study and the properties of classroom environment can be recommended to the practitioners to effectively design instructional environments. Recommendations for practice are as follows:

1. Pre-service teachers stated that visual components, the expressions of the instructor together with slides, inserted videos from You Tube and the pop-up questions in the videos as incentives that encouraged them to watch videos. Hence, it is suggested that videos should be produced so that they are interactive with links and pop-up questions.
2. Since, pre-service teachers indicated that they learned better when the videos were divided into brief parts, they found the content as shorter and plain than any other workbook. Hence, the length of videos should be kept proper to the grade level of students and the lecture videos should include the most important things than long lecturing.
3. In the current study, pre-service teachers were always in connection with the instructor in both face to face part and out of the class through the use of social media in order to relieve the burden of learning, increase the involvement of pre-service teachers and support pre-class studies. Hence, it is suggested that the interaction between students and instructors should be provided through the use of social media.
4. Pre-service teachers might be mentioned about the difficulties of preparing videos and classroom activities as an instructor. In this way, they might not have the perception that by implementing this method the instructor took a lot of pressure and responsibility of herself and put it on students instead. Also, they do not feel that they were striving by themselves without the help of the instructor.

5. Some pre-service teachers indicated that when there was not a faster internet connection, the installation period of Edmodo took more time. Because of this problem, sometimes they handed in their assignments late or they had to come to the faculty to access a powerful internet connection. Hence, it is suggested that before implementing flipped learning, technological equipment and powerful internet connection should be provided. Also, it is better to provide students with longer period of time to watch the videos, prepare the summaries and questions and send back to the instructor.
6. Some of the pre-service teachers stated that they were not easily adapted to Edmodo-Moodle or other technologies because they had not used before. Also, they indicated that they were scared and surprised because they were not accustomed to this method. The introduction of flipped learning to the pre-service teachers is one of the critical points in the adaptation period. Hence, it is suggested that while designing a different study about flipped learning, pre-service should be clearly explained about the principles of flipped learning, pre-class preparation, Moodle, social media, activities and tasks that will be conducted during the face-to-face part of the course in the first lesson in order for pre-service teachers' have positive perceptions about flipped learning.
7. In the literature, one of the limitations of the flipped learning was stated that students may watch the videos when the time may not be the best for learning any concepts. For example, a student might view a video while also watching a football match or a film. Hence, it is suggested that their learning should be monitored through note checks, in class discussions, video challenge questions or quizzes in order to check that students learned and prepared enough to take part in the classroom activities.
8. One of the important factor concerning the classroom environment is the students' satisfaction with the classroom activities, which contributes to learning and positive classroom environment perceptions. Since pre-service teachers raced by using Kahoot and Socrative applications, they had so much fun in the face to face part of the course. Also, many pre-service teachers indicated that they watched the videos before the course to be successful at these games. Hence, it is suggested that various in-service programs should be

organized for instructors in order to sensitize them about different computer applications, software and games.

9. According to the study, it appears that maintenance of a suitable classroom environment is conductive to higher levels of student participation. Instructors have important role and responsibilities in achieving positive classroom environment by encouraging higher levels of involvement, cooperation and interaction among students and providing students with support, help and friendship, as well as being task-oriented and submitting the content in moderate difficulty. Hence, it is suggested that instructors should be provided with quality in-service programs about the importance of classroom environment dimensions.
10. In the current study, it was found that pre-service teachers' relationships with their peers affected their learning positively. Hence, it is suggested that pre-service teachers should be provided with opportunities to interact and work together so that they can help each other to learn the topic, get to know each other well and build positive classroom environment.
11. In the current study, pre-service teachers indicated that they took part in classroom activities in groups, asked questions, explained their opinions, shared their ideas with group members, prepared posters and sample lesson plans and presented together. Hence, it is suggested that especially in teacher training classrooms students should be provided with different opportunities to apply what they have learned theoretically.
12. In the current study, pre-service teachers indicated that some of them were passive during group work. Since flipped learning gives importance to autonomy and peer learning, it is suggested that instructors should monitor continuously and be careful in terms of students' relying too much on others during group studies.
13. While conducting activities in the face-to-face part of the class, instructors should be careful and observe the group studies continuously, otherwise, students may be off-task and engage in social conversations rather than focusing only on the activity at hand.

14. It is suggested that different teaching methods and materials like videos, textbooks, examples, group studies, preparation of lesson plans, student response systems and concept maps for upper level learning opportunities in the flipped learning classrooms should be included in the face to face part of the course in order to adapt teaching to all students.

In summary, the findings of this study might provide useful findings for instructors to design instruction by sensitizing themselves to the positive and negative influences of the dimensions of classroom environment. For more clear and deep conclusions and educational implications, however, future research is needed. The following section is related to this issue.

### 5.2.2. Recommendations for Further Research

Based on the findings of this study, recommendations for future research are as the following:

1. The current study was conducted in the Principles and Methods of Instruction course in which most of the pre-service teachers were interested in the content because the course was obligatory for all the departments in the faculty of education. Hence, students in these environments might be motivated to learn by themselves to complete both the outside work and in class activities. Hence, it is suggested that in order to examine the effectiveness of flipped learning, a different study might be set in an elective type course.
2. For further research, it is suggested that students write reflection papers regularly about their learning process in a flipped learning environment including, video lessons and in class activities in order to help them cope with and adapt to various learning activities. In this way, instructors may know students' mind-set about in the flipped learning and help them how they should approach their problems.
3. A longitudinal study can be designed in order to see the effect of flipped learning. Pre-service teachers who take part in the flipped learning group and control group can be observed in school experience course in terms of how these different groups implement instruction. They can be compared in terms

of which group uses different active teaching methods while they are teaching as pre-service teachers.

4. Further research may use video analytics which might help instructors to better understand how pre-service teachers and other students use the instructional videos, when and how many times a student accesses a video, may increase the effectiveness of flipped learning. Also, via this way, instructors may observe when students are pausing, what parts of the video they repeat and how long it takes for each student to get through the video. Through this way, instructors may work on the videos to increase students' learning and achievement.
5. It was stated by pre-service teachers that various aspects of classroom environment influenced their achievement. Hence, it is suggested that further studies might investigate which dimensions of classroom environment have significant effect on pre-service teachers' course achievement.
6. In addition to the classroom environment variables included in the current study, other variables such as individualization, personal relevancy, investigation, innovation, personalization, equity and differentiation may be included as a further study.
7. Complex constructs like satisfaction, involvement, task orientation and student cohesiveness might not be easily reduced to measurable items on questionnaires. The findings of the current study need to be investigated through further research by involving observations both in the flipped learning and traditional instruction environments.
8. In the current study, pre-service teachers' perceptions of the actual classroom environment was investigated. Further research studies may investigate classroom environments according to pre-service teachers' both actual and preferred perceptions of classroom environments to identify discrepancies between the two learning environments and necessary precautions can be implemented to reduce existing discrepancies.
9. The scale, which was developed as a valid and reliable instrument for assessing the pre-service teachers' learning environment at the tertiary level, can be used by researchers to examine different classrooms' learning environments and take appropriate measures to improve classroom instruction.

10. In order to investigate the effect of flipped learning, further studies can include additional cognitive and affective variables such as attitude, motivation, cognitive load, self-directed learning readiness, retention.
11. Lastly, it is suggested that the findings of this study might be confirmed in other Faculties of Education and foundation universities for generalization purposes.

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# APPENDICES

## A. APPROVAL FROM HUMAN SUBJECTS ETHICS COMMITTEE

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
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05 Mayıs 2017

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Prof.Dr. Meral AKSU ;

Danışmanlığını yaptığınız doktora öğrencisi Melike ÖZÜDOĞRU' nun ***"Ters Yüz Öğrenmenin Öğretmen Adaylarının Başarı ve Sınıf Ortamı Algılarına Etkisi"*** başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek gerekli onay **2017-EGT-085** protokol numarası ile **01.06.2017 – 30.04.2018** tarihleri arasında geçerli olmak üzere verilmiştir.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Ş. Halil TURAN
Başkan V

Prof. Dr. Ayhan SOL
Üye

Prof. Dr. Ayhan Gürbüz DEMİR
Üye

Doç. Dr. Yaşar KONDAKÇI
Üye

Doç. Dr. Zana ÇITAK
Üye

Yrd. Doç. Dr. Pınar KAYGAN
Üye

Yrd. Doç. Dr. Emre SELÇUK
Üye

## B. INFORMED CONSENT FORM

### ARAŞTIRMAYA GÖNÜLLÜ KATILIM FORMU

Bu araştırma, ODTÜ Eğitim Programları ve Öğretim Anabilim Dalı doktora öğrencisi Melike Özüdoğru tarafından Prof. Dr. Meral Aksu danışmanlığındaki doktora tezi kapsamında yürütülmektedir. Bu form sizi araştırma koşulları hakkında bilgilendirmek için hazırlanmıştır.

**Çalışmanın Amacı Nedir?**

Araştırmanın amacı, Öğretim İlke ve Yöntemleri dersinde Ters Yüz Öğrenme (Flipped Learning) yöntemine ilişkin materyal geliştirip uygulamak ve bu yöntemin öğretmen adaylarının başarılarına ve sınıf ortamı ile ilgili algılarına etkisini araştırmaktır.

**Bize Nasıl Yardımcı Olmanızı İsteyeceğiz?**

Deneysel çalışma 2017- 2018 Eğitim- Öğretim yılı güz döneminde yürütülecektir. Bu kapsamda öncelikle Eğitim Fakültesinde öğrenim gören ve Öğretim İlke ve Yöntemleri (ÖİY) dersini 2016-2017 Eğitim- Öğretim yılı güz ve bahar dönemlerinde almış olan ve çalışmaya katılmak isteyenler lisans öğrencilerinden ÖİY dersi "Başarı Testini" ve "Sınıf Ortamı Algıları Ölçeğini" madde analizlerinin yapılması amacıyla doldurmaları istenecektir. Başarı Testinin cevaplanması yaklaşık olarak 55 dakika sürecektir. Sınıf Ortamı Algıları Ölçeğinin doldurulması ise yaklaşık 20 dakika sürecektir. Pilot uygulama sonrası yapılan analizler sonucunda Başarı Testine ve Sınıf Ortamı Algıları Ölçeğine son şekli verilecektir. Ayrıca, "Ters Yüz Öğrenme Öğrenci Görüş Anketinin" okunurluğu, anlaşılırlığı ve madde dağılımlarının incelenmesi için öğrenim biçimleri Ters Yüz Öğrenme olan üniversitelerin Eğitim Fakültesi öğrencilerinden Ters Yüz Öğrenme Öğrenci Görüş Anketini doldurmaları beklenmektedir. Son olarak, yine öğrenim biçimleri Ters Yüz Öğrenme olan üniversitelerin Eğitim Fakültesi öğrencilerinden katılmayı kabul edilen öğrencilerce

“Görüşme Formunda” yer alan açık uçlu soruların formun okunurluğu ve anlaşılırlığını kontrol etmek için yanıtlanması beklenmektedir.

2017- 2018 Eğitim- Öğretim yılı güz döneminde Eğitim Fakültelerinde öğrenim gören, ÖİY dersini alan ve çalışmaya katılmayı kabul eden lisans öğrencileri ile deneysel çalışma yapılacaktır. Deneysel çalışma yaklaşık 10 hafta sürecektir. Çalışma sonunda ise katılmayı kabul ederseniz, sizden beklenen, Başarı Testini Ters Yüz Öğrenme Öğrenci Görüş Anketini, Sınıf Ortamı Algıları Ölçeğini derecelendirme ölçeği üzerinde yanıtlamanızdır. Ayrıca seçilen ve katılmayı kabul edilen öğrencilerce Görüşme Formunda yer alan açık uçlu soruların yanıtlanması beklenmektedir. Deneysel çalışmanın son haftasında yüz yüze derslerde bir ders saatinde Başarı Testinin doldurulması için zaman ayrılacaktır. Diğer ders saatinde ise Sınıf Ortamı Algıları Ölçeği ile Ters Yüz Öğrenme Öğrenci Görüş Anketinin doldurulması beklenmektedir. Görüşmeler ise gönüllü öğrencilerle ders dışı saatlerde öğrenciler için en uygun zamanlarda yapılacaktır.

**Sizden Topladığımız Bilgileri Nasıl Kullanacağız?**

Araştırmaya katılımınız tamamen gönüllülük temelinde olmalıdır. Anketlerde, ölçeklerde, başarı testinde ve görüşme formunda sizden kimlik veya kurum belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak, sadece araştırmacılar tarafından değerlendirilecektir. Katılımcılardan elde edilecek bilgiler toplu halde değerlendirilecek ve bilimsel yayınlar için kullanılacaktır. Sağladığınız veriler gönüllü katılım formlarında toplanan kimlik bilgileri ile eşleştirilmeyecektir.

**Katılımınızla ilgili bilmeniz gerekenler:**

Deneysel çalışma genel olarak kişisel rahatsızlık verecek sorular veya uygulamalar içermemektedir fakat deneysel çalışma sırasında herhangi bir nedenden ötürü kendinizi rahatsız hissederseniz çalışmadan çıkmakta serbestsiniz. Benzer şekilde, anketlerde, ölçeklerde, başarı testinde ve görüşme formunda genel olarak kişisel rahatsızlık verecek sorular bulunmamaktadır. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda uygulayıcıya ilgili formu tamamlamadığınızı söylemek yeterli olacaktır. Çalışma sonunda, bu araştırmayla ilgili sorularınız cevaplanacaktır.

Çalışmanın sağlıklı ilerleyebilmesi ve bulguların güvenilir olması için çalışmaya katılmayan kontrol grubu öğrencileri ile çalışma ile ilgili detaylı bilgi paylaşımında bulunmamanızı dileriz.

**Araştırmayla ilgili daha fazla bilgi almak isterseniz:**

Anket sonunda, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için ODTÜ, Eğitim Fakültesi, Eğitim Programları ve Öğretim Anabilim Dalı doktora öğrencisi Melike Özüdoğru (E-posta: ozudogru123@gmail.com) ya da Eğitim Programları ve Öğretim Anabilim Dalı öğretim üyesi Prof. Dr. Meral Aksu (E-posta: aksume@gmail.com) ile iletişim kurabilirsiniz.

***Yukarıdaki bilgileri okudum ve bu çalışmaya tamamen gönüllü olarak katılıyorum.***

(Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

İsim Soyad Tarih İmza

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## C. STUDIES RELATED TO THE FLIPPED LEARNING

| Author | Course | Grade level / Number of Students | Research Method/ Data Collection Instruments | In-Class Activities . | Out of Class Activities | Findings |
|---|---|---|---|---|---|---|
| Lage, Platt, & Treglia (2000) | Microeconomics course | Undergraduate/ 40 | Quantitative Method/ Survey as a post test. | Small-Group Activities | Reading assigned sections of the textbook, viewing video lectures or PowerPoint lectures with sound. | The findings indicated that students in the flipped learning group expressed their satisfaction. Also, freshmen students did not view flipped learning as an easy class. On the contrary, they indicated that they studied for the flipped course more than the other courses they took the same semester. |
| Foertsch, Moses, & Strikwerda (2002) | Computer Sciences course for engineering majors. | Undergraduate/ 539 | Mixed Method/ Survey and open ended questions | Group problem-solving sessions. | Video lectures and Internet materials viewed by students. Use of eTEACH application to transform course lectures into homework. | The findings showed that students were positive about the flipped course and the interaction among students and instructor. More than half of the students felt that taking notes was easier and they understood the lectures presented via eTEACH more than attending the in class lecture. Finally, most of the students satisfied that they could view and review video lectures on their own schedule. |
| Day & Foley (2006) | Human–computer interaction course. | Undergraduate/ 46 | Quasi-experimental research design/Survey Midterm and final exams project work. | Instructor guided in-class critiquing session and group activity. | Video Lecture, Homework | The results of the study indicated that students in the flipped group performed better on course assignments and final course grades than the traditional group but the differences in average grades for the midterm and final exams were insignificant. Students showed positive attitudes about flipped learning. |

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|---|---|---|---|---|---|---|
| Zappe, Leicht, Messner, Litzinger, & Lee (2009) | Architectural Engineering course- Introduction to the Building Industry. | Undergraduate/ Enrolled students: 95 1st survey: 77 2nd survey: 80 | Quantitaive Method/ Course Survey which consisted of open-ended, check-lists, and rating scale items. | Problem solving activities. | iTunesU to post video lectures. Example problems and solutions, which were not covered in class, were provided as additional video recordings. The online quizzes. | It was found that although 74% of students thought that the flipped learning was helpful in understanding the concepts in an architectural engineering course. However, 95% of the students indicated that the flipped learning approach should be used 50% of the time or less and the use of traditional lectures should be maintained. Also, taking the lecture out of class allowed greater time for in-class problem solving and increased the teacher-student interaction. |
| Strayer (2012) | Statistics | Undergraduate/ 49 | Mixed Method/ College and University Classroom Environment Inventory (CUCEI), field notes, interviews, researcher journal entries, and student reflections. | Students completed projects and activities required the use of Microsoft Excel spreadsheet program as a tool. | Video lectures using an intelligent tutoring system (ITS)- ALEKS. | The findings of this research revealed that flipped group experienced the innovation and cooperation properties of classroom environment than the traditional group. On the other hand, it was found that flipped group was less satisfied with the task orientation property of classroom environemnt in statistics course. |
| Tune, Sturek, & Basile (2013) | Medical Education | Graduate students /27 | Quantitaive/Multiple-choice exams, survey. | Quiz, question and answer, problem-solving activities and homework. | Viewing video lectures. | The findings of this research revealed that in-class quizzes and homework were important factors and increased medical students' exam performance. Also, flipped learning was found as an effective approach to learn main physiological concepts. |
| Mason, Shuman, & Cook (2013) | A Control Systems course in the Department of Mechanical Engineering. | Undergraduate/ 40 | Quantitative methods/ Survey and exams. | Cooperative learning and problem-based learning activities. | Viewing video lectures, quizzes and homework. | The study was conducted in two consecutive semesters. The first semester a traditional instruction and the second semester flipped learning was implemented. It was found that flipped learning permitted to the instructor to include much content than the traditional instruction. Also, flipped learning |

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| | | | | | | resulted in better performance of students on quizzes and exams than traditional group in a Control Systems course. Also, students stated that they spent significantly fewer hours per week to study outside of the classroom than the students in traditional instruction group. |
| Missildine, et al., (2013) | Nursing Education- Adult Health Course. | Undergraduate/ 589 | A quasi-experimental research Design/ Questionnaire | Case studies and Games. | Viewing video lectures. | The study was conducted in three consecutive semesters. The first semester (fall 2009) included classroom lectures by faculty and via interactive television, the second semester (spring 2010) included lecture plus lecture capture and the third semester (fall 2010) included flipped learning. The findings of the study indicated that there were significant differences in student learning between flipped group and other groups. However, it was reported that nursing students in the flipped group were significantly less satisfied with the instruction method. |
| Davies, Dean, & Ball (2013) | Introductory Excel in the Information Systems Department. | Undergraduate/ 53 | A pretest posttest quasi-experimental Research design./ Surveys | Students were free to participate. | Textbook readings, viewing video lectures. | The course was divided into two 5-week terms in the fall semester of 2012. Students in the traditional group were taught during the first term and participants in the flipped group and simulation groups were taught during the second term. The findings of the study indicated that flipped learning facilitated learning and effective than the simulation based instruction. Also, students found this flipped learning to be more motivating because of allowing differentiation of instruction. Additionally, flipped learning was also better than the traditional learning in terms of delivering the content but not significantly. It was also found that students in the flipped group were significantly more willing to take another Information Systems class. |
| McLaughlin, Griffin, Esserman, Davidson, Glatt, Roth, Gharkholonarehe, & | Pharmaceutics | Undergraduate/ 22 | Mixed Method/ Survey, multiple-choice examinations with limited short-answer and essay questions. | Clicker questions, think-pair-share activities, student presentation | Viewing video lectures through Integrated Learning Accelerator Modules | The result of the study indicated that the performance of students in 2012 when they taught according to flipped approach was not significantly higher than the performance of students in 2011 when the course was taught according to traditional instruction. However, the qualitative findings revealed that flipped learning fostered student involvement and competence. |

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|---|---|---|---|---|---|---|
| Mumper (2013) | | | | s and quizzes. | (iLAMs). | |
| Clark (2013) | Secondary mathematics classroom. | Ninth grade students/42 | Action research design/ Survey, test, interviews. | Hands-on | Viewing video lectures, ɔlating ıs. | The result of the study revealed that there was not a significant difference between the performance of ninth grade students who were in the flipped learning group and those who were in the traditional group. However, the involvement and communication of students in the flipped group increased when compared to the traditional group. Also, students in the flipped group stated improvements in the quality of instruction and the use of class time. |
| Findlay-Thompson & Mombourquette (2014) | Business course. | Undergraduate/ 107 | Mixed Method/ Post-term interviews, assignments, quizzes and exams. | Quiz and assignment, projects. | Viewing video lectures. | The findings of the study indicated insignificant differences in student learning. Students were undecided about their responses that they stated both positive and negative perceptions about the flipped learning in a business course. Although students stated some positive comments about flipped learning such as the increased interaction with their peers and instructors, they preferred traditional instruction and stated that lectures should be in the classroom and they didn't like watching the videos at home. |
| Love, Hodge, Grandgenett & Swift (2014) | Applied Linear Algebra course | Undergraduate/ 55 | Quantitative Method/ Course exams, the end-of-semester survey. | Hands-on activities, group work. | Watching screencasts, reading the textbook, instructor's notes, completing pre-class assessment. | The findings of the study revealed students in flipped learning group had significantly increased sequential exam scores compared to the students in the traditional group. However, students in both groups performed similarly in the final exam. Students in the flipped group were positive about flipped learning process, they were satisfied in terms of video lectures and appreciated the collaboration among themselves. |
| Murphree (2014) | History | Undergraduate/ 106 | Quantitative/ Survey and Quizzes, out-of class discussion postings. | In-class discussions, in-class essays. | No formal, pre-packaged lectures. | The result of the study revealed positive opinions about the flipped learning at the end of the semester. Students stated that essay assignments enhanced their understanding of course content and writing skills. |
| Touchton (2015) | Statistics course in undergraduate | Undergraduate/ 83 | Quantitative / Assignments and research projects. | Read textbook material, | The homework | The result of the study found that students in the flipped group performed slightly better on their final projects than students in the traditional group. Students |

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|---|---|---|---|---|---|---|
| | political science majors. statistics classes to evaluate | | | watch mini-lectures and slideshows. | problem sets, lab exercises and research projects completed in class. | in the flipped group stated that they enjoyed the course more than those in a traditional group. Also, it was found that students in the flipped group were more interested in taking additional political science courses than those in the traditional group. |
| Ziegelmeier & Topaz (2015) | Multivariable calculus. | Undergraduate/45 | Mixed method/ Survey, mid-course interview, quizzes and participation in Piazza-online discussion forum. | activities such as solving sets of example problems, working in labs in groups, solving homework problems with partners. | Watching screencasts, online quizzes. | The result of the study indicated insignificant differences in student learning. However, students in flipped learning group stated that class time devoted to work on the subject was beneficial. On the other hand, students in the traditional group indicated that there was not enough time to do in-class activities. Additionally, more students in the traditional group attended office hours and help sessions than the students in flipped group because most of the questions of students in flipped group were answered during class. |
| Turan (2015) | Computer-II course in Early Childhood Education department. | Preservice teachers/116 | Mixed method/ Achievement test, cognitive load scale, motivation scale, questionnaire and semi-structured interview form. | Video lectures | Mini lecture, question-answer, Kahoot, weekly applications | In this study it was found that flipped learning increased students' achievement and motivation and decreased their cognitive load levels. Also, students demonstrated positive views about the method. |
| Alsancak-Sırakaya (2015) | Scientific Research Methods course | preservice teachers/66 | Mixed method Research/ Achievement test, self-directed learning readiness scale, motivation scale, semi-structured interview form. | Question-answer, structured individual and group tasks. | Lecture videos, weekly quizzes | The results of the study showed that achievement and motivation scores of surpassed the ones in control group. However, there was not a significant difference between students' weekly quiz scores. There was not a significant difference between self-directed learning readiness total score between both groups. |
| B. Aydın (2016) | Material Design and Use course in Education in the department of | Pre-service teachers/44 | Pre-test/post-test control group quasi-experimental research design./ Achievement | Kahoot, group tasks. | Video lectures | The results of the study showed that achievement scores of pre-service teachers in the flipped learning group were significantly higher than control group. Also, homework/task stress level scores of pre-service |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Computer Education and Instructional Technologies. | | test, homework/ task stress level scale, Homework/tasks, semi-structured interviews. | | | teachers in the flipped learning group were lower than the control group. According to interview results, most of the pre-service teachers had positive views about the flipped learning. |
| Ceylaner (2016) | English course | Ninth grade students/46 | Quasi-experimental study/ Self - Directed Learning Readiness Scale, the Attitude Towards English Lessons Scale, and the focus group interview. | Video lectures | Individual or group work | The results of the study showed significant difference between the Flipped learning group and control group in terms of self - directed learning readiness and attitudes toward English course. Also, students were mostly positive about the method. |

## D. DISTRIBUTION OF TEST ITEMS ACROSS THE OBJECTIVES OF PRINCIPLES AND METHODS OF INSTRUCTION COURSE BEFORE THE PILOT STUDY

| *The topics of Principles and Methods of Instruction Course* | Objectives of Principles and Methods of Instruction Course | Item Numbers in the Pilot Test |
|---|---|---|
| Basic concepts of education | 1. Students will be able to understand the basic concepts related to education. | 1, 2, 45, 46, 47, 48, 49 |
| Teaching principles | 2. Students will be able to use appropriate teaching principles in different teaching-learning situations. | 3, 4, 5, 6 |
| The goals and objectives of education | 3. Students will be able to understand the properties of objectives. | 7, 8, 9, 10 |
| | 4. Students will be able to use different types of objectives in accordance with the teaching-learning situations. | 11, 12, 13 |
| Planning of Instruction | 5. Students will be able to understand the properties of teaching plans. | 14, 15 |
| Teaching theories, models, strategies, methods and techniques. | 6. Students will be able to know the properties of teaching-learning theories, approaches, strategies, methods and techniques. | 16, 18, 19, 20, 21 |
| Teaching theories and models | 7. Students will be able to understand the properties of teaching-learning theories, models and approaches. | 22, 23, 24 |
| Teaching theories and models | 8. Students will be able to use appropriate theories, models and | 25 |

| | | |
|---|---|---|
| | approaches for different teaching-learning conditions. | |
| Teaching strategies | 9. Students will be able to understand the properties of teaching strategies. | 26, 27 |
| | 10. Students will be able to use appropriate teaching strategies for different teaching-learning conditions. | 28 |
| Teaching methods | 11. Students will be able to understand teaching methods. | 17, 29, 30, 31, 32 |
| | 12. Students will be able to use appropriate teaching methods for different teaching-learning conditions. | 33, 34, 35 |
| Teaching techniques | 13. Students will be able to understand the properties of teaching techniques. | 36, 37, 38, 39, 40 |
| Teaching strategies and techniques | 14. Students will be able to use appropriate teaching techniques for different teaching-learning conditions. | 41, 42, 44 |
| | Total Number of Items | 49 |

## E. ITEM DIFFICULTY AND ITEM DISCRIMINATION INDICES DETERMINED IN THE PILOT IMPLEMENTATION

| Items | Item Difficulty Index | Item Discrimination Index | Items | Item Difficulty Index | Item Discrimination Index |
|---|---|---|---|---|---|
| S1 | **0.56** | **0.09** | S26 | 0.69 | 0.36 |
| S2 | 0.31 | 0.31 | S27 | 0.54 | 0.34 |
| S3 | **0.65** | **0.18** | S28 | 0.45 | 0.30 |
| S4 | 0.87 | 0.16 | S29 | 0.52 | 0.55 |
| S5 | 0.44 | 0.28 | S30 | 0.59 | 0.48 |
| S6 | 0.64 | 0.43 | S31 | 0.38 | 0.47 |
| S7 | **0.13** | **0.04** | S32 | 0.54 | 0.31 |
| S8 | **0.23** | **0.01** | **S33** | 0.34 | 0.20 |
| S9 | **0.10** | **0.13** | S34 | 0.75 | 0.38 |
| S10 | 0.45 | 0.41 | S35 | 0.58 | 0.36 |
| S11 | **0.77** | **0.18** | **S36** | 0.31 | 0.24 |
| S12 | 0.70 | 0.39 | S37 | 0.74 | 0.46 |
| S13 | 0.24 | 0.28 | S38 | 0.72 | 0.37 |
| S14 | 0.67 | 0.22 | S39 | 0.72 | 0.24 |
| S15 | 0.65 | 0.30 | **S40** | 0.47 | 0.43 |
| S16 | 0.67 | 0.50 | S41 | 0.50 | 0.42 |
| S17 | **0.91** | **0.15** | **S42** | 0.62 | 0.45 |
| S18 | 0.65 | 0.42 | **S43** | 0.29 | 0.23 |
| S19 | 0.68 | 0.54 | **S44** | 0.24 | 0.23 |
| S20 | **0.37** | **0.19** | S45 | 0.45 | 0.31 |
| S21 | **0.91** | **0.16** | S46 | 0.21 | 0.19 |
| S22 | 0.31 | 0.25 | S47 | 0.60 | 0.29 |
| S23 | 0.42 | 0.47 | S48 | 0.47 | 0.37 |
| S24 | 0.31 | 0.28 | S49 | 0.15 | 0.22 |
| S25 | 0.45 | 0.37 | | | |

## F. DISTRIBUTION OF ITEMS ACCORDING TO THE DIFFICULTY INDICES IN THE PILOT IMPLEMENTATION

| Item Difficulty Indices | Number of Items | Item Number | Category |
|---|---|---|---|
| P > .80 | 1 | 4 | Very easy |
| .60 <p <.79 | 14 | 6, 12, 14, 15, 16, 18, 19, 26, 34, 37, 38, 39, 42, 47 | Easy |
| .40 <p <.59 | 14 | 5, 10, 23, 25, 27, 28, 29, 30, 32, 35, 40, 41, 45, 48 | Moderate |
| .20 <p <.39 | 10 | 2, 13, 22, 24, 31, 33, 36, 43, 44, 46 | Difficult |
| P <.19 | 1 | 49 | Very Difficult |
| Total | 40 | | |

## G. THE ANSWERS OF PRE-SERVICE TEACHERS RELATED TO ACHIEVEMENT TEST ITEMS IN THE PILOT APPLICATION

| Items | *A* | *B* | *C* | *D* | *E* |
|---|---|---|---|---|---|
| **S1** | 126 | 5 | 54 | 13 | 254* |
| S2 | 30 | 243 | 140* | 21 | 17 |
| **S3** | 38 | 294* | 54 | 33 | 33 |
| S4 | 394* | 9 | 3 | 44 | 2 |
| S5 | 23 | 64 | 201* | 129 | 33 |
| S6 | 290* | 61 | 9 | 84 | 9 |
| **S7** | 15 | 57* | 29 | 27 | 322 |
| **S8** | 102* | 124 | 102 | 52 | 72 |
| **S9** | 52 | 75 | 235 | 46* | 44 |
| S10 | 49 | 17 | 203* | 101 | 76 |
| **S11** | 26 | 19 | 37 | 348* | 22 |
| S12 | 13 | 15 | 73 | 33 | 319* |
| S13 | 62 | 199 | 52 | 107* | 30 |
| S14 | 73 | 10 | 302* | 47 | 18 |
| S15 | 110 | 294* | 29 | 10 | 10 |
| S16 | 36 | 14 | 56 | 304* | 39 |
| **S17** | 3 | 413* | 12 | 10 | 14 |
| S18 | 51 | 50 | 22 | 32 | 294* |
| S19 | 35 | 306* | 27 | 37 | 46 |
| **S20** | 206 | 168* | 41 | 20 | 17 |
| **S21** | 410* | 10 | 3 | 6 | 24 |
| S22 | 128 | 51 | 60 | 72 | 141* |
| S23 | 92 | 39 | 57 | 191* | 60 |
| S24 | 91 | 59 | 83 | 72 | 140* |
| **S25** | 206* | 146 | 57 | 21 | 18 |
| S26 | 31 | 313* | 24 | 60 | 22 |

| | | | | | |
|---|---|---|---|---|---|
| S27 | 34 | 64 | 246* | 81 | 25 |
| S28 | 204* | 41 | 157 | 15 | 32 |
| S29 | 44 | 120 | 25 | 237* | 23 |
| S30 | 21 | 74 | 27 | 62 | 269* |
| S31 | 49 | 64 | 172* | 140 | 28 |
| S32 | 33 | 64 | 246* | 25 | 85 |
| **S33** | 153 | 156* | 6 | 63 | 73 |
| S34 | 30 | 35 | 31 | 15 | 340* |
| S35 | 21 | 28 | 261* | 89 | 54 |
| **S36** | 39 | 38 | 142* | 43 | 188 |
| S37 | 337* | 28 | 31 | 28 | 29 |
| S38 | 37 | 35 | 32 | 324* | 19 |
| S39 | 40 | 326* | 20 | 24 | 42 |
| **S40** | 215* | 31 | 116 | 34 | 49 |
| S41 | 95 | 48 | 226* | 42 | 35 |
| **S42** | 17 | 282* | 9 | 38 | 106 |
| **S43** | 132* | 23 | 52 | 120 | 116 |
| **S44** | 110* | 35 | 42 | 102 | 150 |

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| S45(63empty) | 45 | 43 | 21 | 11 | 202* | 10 | 37 | 21 |
| S46(53empty) | 72 | 91 | 18 | 33 | 25 | 53 | 95* | 13 |
| S47(47empty) | 6 | 11 | 73 | 273* | 22 | 2 | 7 | 12 |
| S48(46empty) | 25 | 19 | 212* | 17 | 19 | 55 | 22 | 38 |
| S49(45empty) | 94 | 69* | 8 | 13 | 22 | 100 | 10 | 92 |

* The correct answers.

## H. SAMPLE ITEMS OF PRINCIPLES AND METHODS OF INSTRUCTION COURSE ACHIEVEMENT TEST / ÖĞRETİM İLKE VE YÖNTEMLERİ DERSİ TESTİ ÖRNEK MADDELER

**Ad Soyad:**

**Bölüm:**

Değerli Öğretmen Adayları,

Bu testte, Öğretim İlke ve Yöntemleri dersi konularını kapsayan 36 soru vardır. Test, iki bölümden oluşmaktadır. Birinci bölümde 35 çoktan seçmeli; ikinci bölümde ise bir eşleştirme sorusu bulunmaktadır. Lütfen tüm soruları cevaplamaya çalışınız. Sınav süresi 45 dakikadır.

**Birinci Bölüm:** Aşağıdaki soruları okuduktan sonra doğru seçeneği daire içine alarak işaretleyiniz.

1. Aşağıdaki örneklerden hangisi gösterip-yaptırma öğretim yönteminin kullanılabileceği durumlar için uygun bir örnek değildir?

A) Bir müzik öğretmeninin, 23 Nisan'da Zeybek oynamayı öğretmek için hareketin tümünü öğrencilere göstererek ve küçük parçalara bölerek her öğrencinin tekrar etmesini sağladığı durumlarda

B) Aşçılık okulundaki bir öğrencinin uzmanın talimatlarını adım adım izleyip gerekli düzeltmelere göre yemeği yaptığı durumlarda

C) Tıp fakültesinde yaraya dikiş atmayı öğretmek için öğretim üyesinin bir kadavra üzerinde öncelikle kendisinin nasıl dikiş attığını anlatarak açıklaması sonrasında ise öğrencilerden diğer yaraları dikmelerini istediği durumlarda

D) Bir modacının kumaşı kesmeyi gösterdiği ve ardından öğrencilere verdiği kumaş parçalarını uygun ölçülerde kesmelerini izlediği durumlarda

E) Öğretmenin kaldırma kuvveti ile ilgili bir deneyi yaptığı, öğrencilerin deneyin yapılış aşamalarını dikkatle izleyip not aldığı durumlarda

2. Bir matematik öğretmeni öğrencilerini üç gruba ayırıp farklı küme çeşitlerine girebilecek şarkılar dinleyebilecekleri "cd"ler; farklı küme çeşitleri oluşturmaları için kartonlar ve kümelerin özelliklerini kullanarak bir şiir yazabilecekleri renkli kağıtlar bırakmıştır. Her bir

grup tüm masalardaki çalışmaları tamamlamıştır. Bu öğretmen derste aşağıdaki tekniklerden hangisini kullanmaktadır?

A) Köşeleme B) İstasyon C) Gösteri D) Çember E) Akvaryum

30. Öğretmen, matematik dersinde mutlak değer konusu ile ilgili olarak yaptığı açıklamalardan sonra, öğrencilerle soru-cevap etkinliği yapmıştır ve Uzungöl, Ağrı Dağı, Van Gölü, Ayder Yaylası gibi yerlerin denizden yükseklik ve derinliklerinin işaretlerle gösterildiği resimli çalışma yaprakları dağıtmıştır. Öğrencilerinden mutlak değer işareti kullanarak gerçek değerlerini göstermelerini istemiştir. Bu etkinlik Gagne'nin öğretim durumları modeline göre aşağıdakilerden hangi aşamaya örnektir?

A) Dikkati çekme

B) Hedeften haberdar etme

C) Ön koşul öğrenmeleri hatırlatma

D) Öğrenmede rehber olma

E) Performansı ortaya çıkarma

**İkinci Bölüm:** Aşağıdaki soruları okuduktan sonra, A sütununda verilen ifadelerin karşılığını B sütununda bularak parantez içine yazınız.

**CEVAP ANAHTARI**

| | | | | | |
|---|---|---|---|---|---|
| **1** | **E** | **2** | **B** | **3** | **E** |

## I. UNIVARIATE AND MULTIVARIATE NORMALITY RESULTS FOR THE ACHIEVEMENT TEST

### *Kolmogorov-Smirnov and Shapiro-Wilks Test Results for Achievement Test*

**Tests of Normality**

| Grup | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Experimental Group | Ontestpuan | ,205 | 30 | ,002 | ,916 | 30 | ,021 |
| | FinalGrades | ,112 | 30 | ,200* | ,960 | 30 | ,315 |
| | Sontest | ,122 | 30 | ,200* | ,976 | 30 | ,711 |
| Control Group | Ontestpuan | ,156 | 26 | ,105 | ,949 | 26 | ,225 |
| | FinalGrades | ,200 | 26 | ,009 | ,906 | 26 | ,021 |
| | Sontest | ,192 | 26 | ,014 | ,876 | 26 | ,005 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

### *Univariate Normality Results for Achievement Test*

**Descriptives**

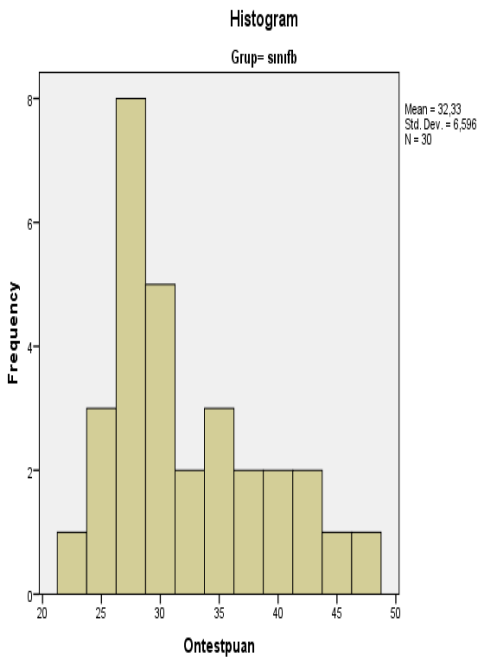
| Grup | | | | Statistic | Std. Error |
|---|---|---|---|---|---|
| Experimental | Ontestpuan | Mean | | 32,33 | 1,204 |
| | | 95% Confidence Interval for Mean | Lower Bound | 29,87 | |
| | | | Upper Bound | 34,80 | |
| | | 5% Trimmed Mean | | 32,04 | |
| | | Median | | 30,00 | |
| | | Variance | | 43,506 | |
| | | Std. Deviation | | 6,596 | |
| | | Minimum | | 23 | |
| | | Maximum | | 48 | |
| | | Range | | 25 | |
| | | Interquartile Range | | 10 | |
| | | **Skewness** | | ,741 | ,427 |
| | | **Kurtosis** | | -,400 | ,833 |

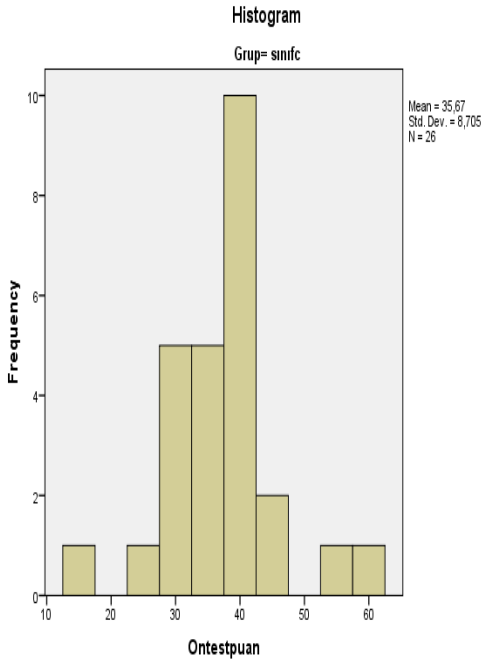
| | | | | | |
|---|---|---|---|---|---|
| | FinalGrades | Mean | | 82,80 | 1,077 |
| | | 95% Confidence Interval for Mean | Lower Bound | 80,60 | |
| | | | Upper Bound | 85,00 | |
| | | 5% Trimmed Mean | | 82,74 | |
| | | Median | | 83,50 | |
| | | Variance | | 34,786 | |
| | | Std. Deviation | | 5,898 | |
| | | Minimum | | 73 | |
| | | Maximum | | 94 | |
| | | Range | | 21 | |
| | | Interquartile Range | | 9 | |
| | | **Skewness** | | -,043 | ,427 |
| | | **Kurtosis** | | -1,041 | ,833 |
| | Sontest | Mean | | 73,27 | 1,683 |
| | | 95% Confidence Interval for Mean | Lower Bound | 69,82 | |
| | | | Upper Bound | 76,71 | |
| | | 5% Trimmed Mean | | 73,19 | |
| | | Median | | 74,00 | |
| | | Variance | | 84,961 | |
| | | Std. Deviation | | 9,217 | |
| | | Minimum | | 55 | |
| | | Maximum | | 93 | |
| | | Range | | 38 | |
| | | Interquartile Range | | 16 | |
| | | **Skewness** | | -,067 | ,427 |
| | | **Kurtosis** | | -,475 | ,833 |
| Control Group | Ontestpuan | Mean | | 35,67 | 1,707 |
| | | 95% Confidence Interval for Mean | Lower Bound | 32,16 | |
| | | | Upper Bound | 39,19 | |
| | | 5% Trimmed Mean | | 35,58 | |
| | | Median | | 37,50 | |
| | | Variance | | 75,779 | |
| | | Std. Deviation | | 8,705 | |
| | | Minimum | | 15 | |
| | | Maximum | | 58 | |
| | | Range | | 43 | |
| | | Interquartile Range | | 11 | |

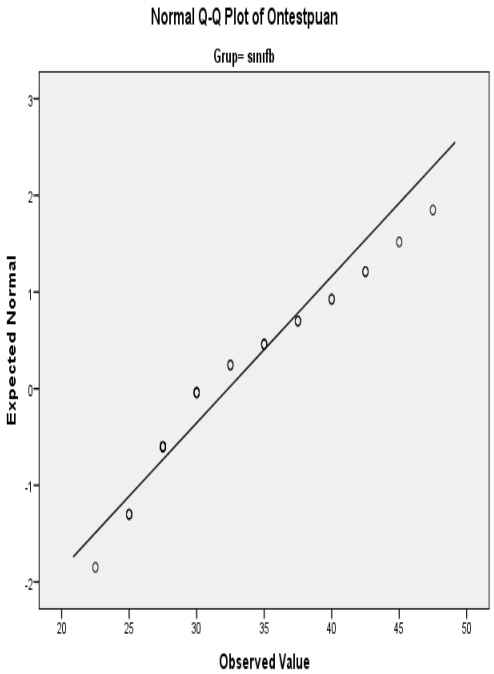
| | | | | |
|---|---|---|---|---|
| | **Skewness** | | ,199 | ,456 |
| | **Kurtosis** | | 1,474 | ,887 |
| FinalGrades | Mean | | 74,13 | 1,281 |
| | 95% Confidence Interval for Mean | Lower Bound | 71,50 | |
| | | Upper Bound | 76,77 | |
| | 5% Trimmed Mean | | 74,54 | |
| | Median | | 74,50 | |
| | Variance | | 42,671 | |
| | Std. Deviation | | 6,532 | |
| | Minimum | | 56 | |
| | Maximum | | 84 | |
| | Range | | 28 | |
| | Interquartile Range | | 6 | |
| | **Skewness** | | -1,140 | ,456 |
| | **Kurtosis** | | 1,369 | ,887 |
| Sontest | Mean | | 62,08 | 1,869 |
| | 95% Confidence Interval for Mean | Lower Bound | 58,23 | |
| | | Upper Bound | 65,93 | |
| | 5% Trimmed Mean | | 62,93 | |
| | Median | | 65,00 | |
| | Variance | | 90,794 | |
| | Std. Deviation | | 9,529 | |
| | Minimum | | 33 | |
| | Maximum | | 73 | |
| | Range | | 40 | |
| | Interquartile Range | | 11 | |
| | **Skewness** | | -1,426 | ,456 |
| | **Kurtosis** | | 2,293 | ,887 |

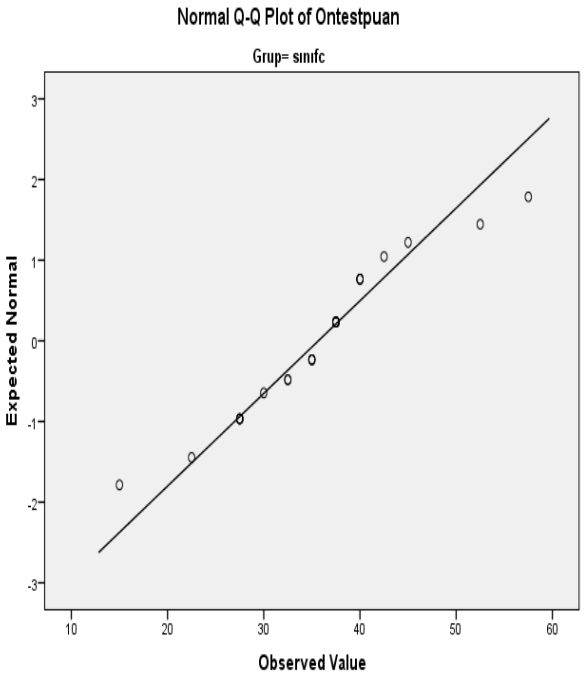
*Univariate Normality Histograms and Q-Q Test Results for Achievement Test*

**Pre-Test Distribution**

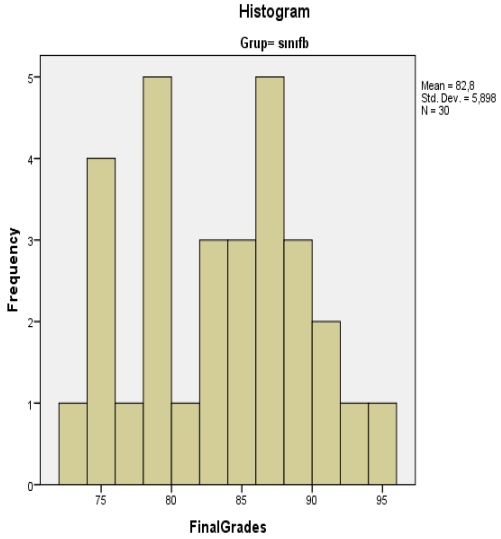


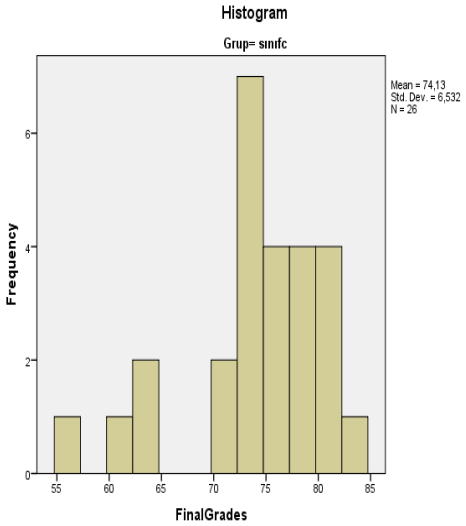



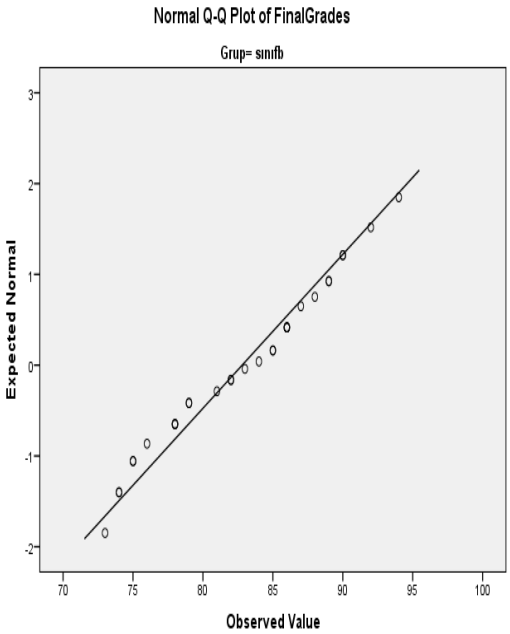



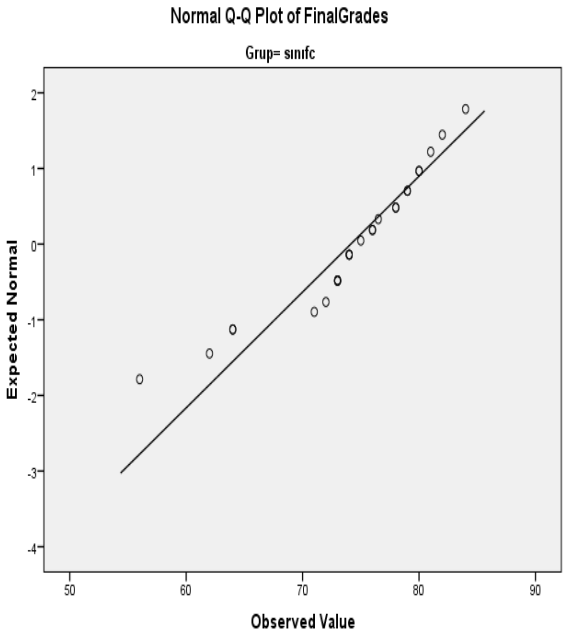



# Final Grade Distribution

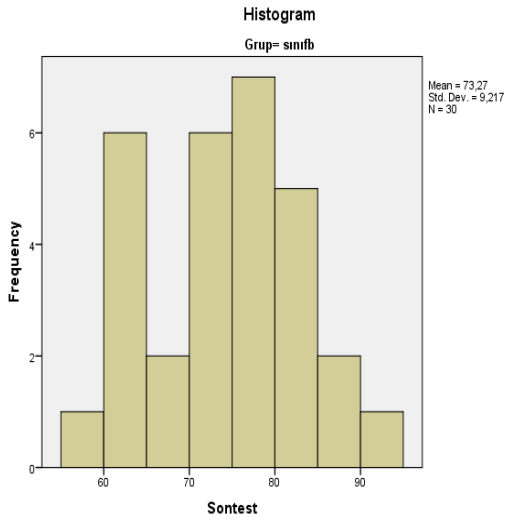


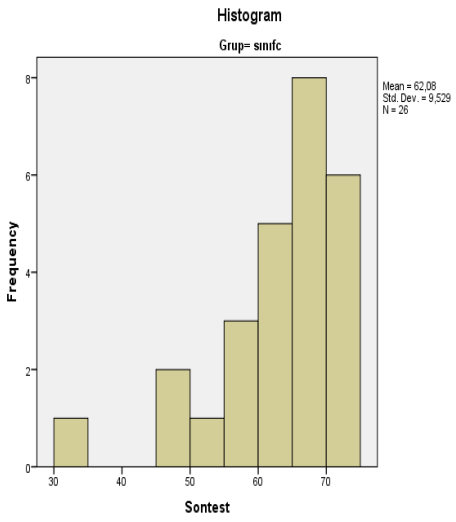



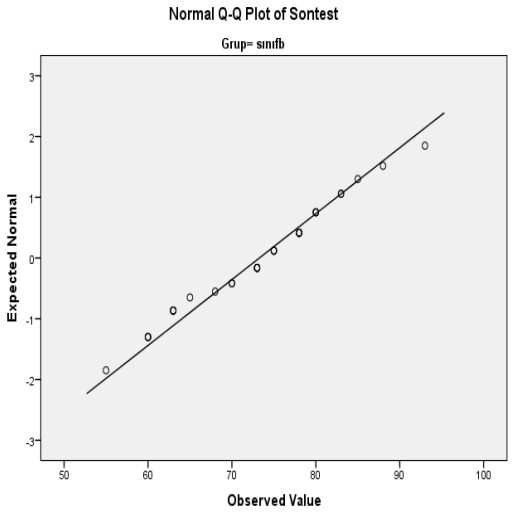



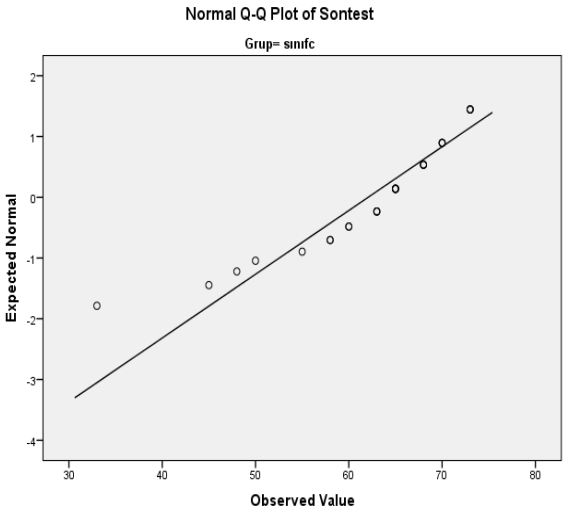



# Post-Test Distribution



## *Multivariate Normality Results for Achievement Test*

====== Multivariate Statistics ========

Tests of multivariate skew:

Small's test (chisq)

| Q1 | df | p-value |
|---|---|---|
| 2,6561 | 2,0000 | ,2650 |

Srivastava's test

| chi(b1p) | df | p-value |
|---|---|---|
| 2,5302 | 2,0000 | ,2822 |

Srivastava's test

| b2p | N(b2p) | p-value |
|---|---|---|
| 3,1667 | ,3601 | ,7188 |

Mardia's test

| b2p | N(b2p)"p |
|---|---|
| 7,5345 | -,4354 ,6633 |

Omnibus test of multivariate normality:

(based on Small's test, chisq)

| VQ3 | df | p-value |
|---|---|---|
| 5,5169 | 4,0000 | ,2383 |

------ END MATRIX -----

## J. UNIVARIATE AND MULTIVARIATE NORMALITY RESULTS FOR THE CLASSROOM ENVIRONMENT SCALE

### *Kolmogorov-Smirnov and Shapiro-Wilks Test Results for Classroom Environment Instrument*

**Tests of Normality**

| Grup | | Grup | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|---|
| | | | Statistic | df | Sig. | Statistic | df | Sig. |
| sınıfb | Satisfaction | 1 | ,172 | 30 | ,024 | ,930 | 30 | ,048 |
| | Cooperation | 1 | ,107 | 30 | ,200* | ,944 | 30 | ,119 |
| | Involvement | 1 | ,128 | 30 | ,200* | ,926 | 30 | ,039 |
| | TaskOrientation | 1 | ,158 | 30 | ,053 | ,918 | 30 | ,024 |
| | StdCohesiveness | 1 | ,167 | 30 | ,031 | ,898 | 30 | ,008 |
| | Difficulty | 1 | ,195 | 30 | ,005 | ,907 | 30 | ,012 |
| sınıfc | Satisfaction | 2 | ,136 | 26 | ,200* | ,954 | 26 | ,281 |
| | Cooperation | 2 | ,136 | 26 | ,200* | ,920 | 26 | ,046 |
| | Involvement | 2 | ,180 | 26 | ,029 | ,911 | 26 | ,028 |
| | TaskOrientation | 2 | ,152 | 26 | ,128 | ,906 | 26 | ,022 |
| | StdCohesiveness | 2 | ,160 | 26 | ,086 | ,935 | 26 | ,100 |
| | Difficulty | 2 | ,175 | 26 | ,038 | ,923 | 26 | ,053 |

### *Kolmogorov-Smirnov and Shapiro-Wilks Test Results for each Items of Classroom Environment Instrument*

**Tests of Normality for CEPSFE**

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| M1S | ,209 | 520 | ,000 | ,905 | 520 | ,000 |
| M2 | ,270 | 520 | ,000 | ,860 | 520 | ,000 |
| M4 | ,243 | 520 | ,000 | ,877 | 520 | ,000 |
| M5 | ,278 | 520 | ,000 | ,859 | 520 | ,000 |
| M6 | ,281 | 520 | ,000 | ,830 | 520 | ,000 |
| M8 | ,218 | 520 | ,000 | ,900 | 520 | ,000 |
| M10 | ,260 | 520 | ,000 | ,859 | 520 | ,000 |
| M11 | ,282 | 520 | ,000 | ,862 | 520 | ,000 |
| M14 | ,266 | 520 | ,000 | ,868 | 520 | ,000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| M15 | ,296 | 520 | ,000 | ,834 | 520 | ,000 |
| M18 | ,205 | 520 | ,000 | ,909 | 520 | ,000 |
| M21 | ,238 | 520 | ,000 | ,887 | 520 | ,000 |
| M22 | ,243 | 520 | ,000 | ,881 | 520 | ,000 |
| M23 | ,250 | 520 | ,000 | ,884 | 520 | ,000 |
| M24 | ,194 | 520 | ,000 | ,904 | 520 | ,000 |
| M27 | ,205 | 520 | ,000 | ,897 | 520 | ,000 |
| M28 | ,205 | 520 | ,000 | ,897 | 520 | ,000 |
| M29 | ,267 | 520 | ,000 | ,862 | 520 | ,000 |
| M30 | ,286 | 520 | ,000 | ,854 | 520 | ,000 |
| M31 | ,204 | 520 | ,000 | ,902 | 520 | ,000 |
| M32 | ,238 | 520 | ,000 | ,880 | 520 | ,000 |
| M35 | ,223 | 520 | ,000 | ,889 | 520 | ,000 |
| M36 | ,225 | 520 | ,000 | ,895 | 520 | ,000 |
| M37 | ,225 | 520 | ,000 | ,897 | 520 | ,000 |
| M38 | ,209 | 520 | ,000 | ,895 | 520 | ,000 |
| M39 | ,228 | 520 | ,000 | ,897 | 520 | ,000 |
| M41 | ,213 | 520 | ,000 | ,909 | 520 | ,000 |
| M42 | ,212 | 520 | ,000 | ,887 | 520 | ,000 |
| M43 | ,285 | 520 | ,000 | ,851 | 520 | ,000 |
| M45 | ,205 | 520 | ,000 | ,896 | 520 | ,000 |
| M46 | ,249 | 520 | ,000 | ,858 | 520 | ,000 |
| M47 | ,232 | 520 | ,000 | ,887 | 520 | ,000 |
| M48 | ,190 | 520 | ,000 | ,909 | 520 | ,000 |
| M49 | ,210 | 520 | ,000 | ,901 | 520 | ,000 |
| M51 | ,248 | 520 | ,000 | ,884 | 520 | ,000 |
| M53 | ,206 | 520 | ,000 | ,894 | 520 | ,000 |
| M55 | ,204 | 520 | ,000 | ,905 | 520 | ,000 |
| M56 | ,198 | 520 | ,000 | ,909 | 520 | ,000 |
| M58 | ,216 | 520 | ,000 | ,893 | 520 | ,000 |
| M60 | ,190 | 520 | ,000 | ,907 | 520 | ,000 |
| M3S | ,192 | 520 | ,000 | ,912 | 520 | ,000 |
| M7S | ,175 | 520 | ,000 | ,915 | 520 | ,000 |
| M9S | ,350 | 520 | ,000 | ,764 | 520 | ,000 |
| M12S | ,204 | 520 | ,000 | ,908 | 520 | ,000 |
| M13S | ,180 | 520 | ,000 | ,915 | 520 | ,000 |
| M16S | ,223 | 520 | ,000 | ,891 | 520 | ,000 |
| M17S | ,210 | 520 | ,000 | ,906 | 520 | ,000 |
| M19S | ,206 | 520 | ,000 | ,883 | 520 | ,000 |
| M20S | ,219 | 520 | ,000 | ,897 | 520 | ,000 |
| M25S | ,225 | 520 | ,000 | ,897 | 520 | ,000 |
| M26S | ,203 | 520 | ,000 | ,906 | 520 | ,000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| M33S | ,195 | 520 | ,000 | ,907 | 520 | ,000 |
| M34S | ,249 | 520 | ,000 | ,881 | 520 | ,000 |
| M40S | ,217 | 520 | ,000 | ,898 | 520 | ,000 |
| M44S | ,212 | 520 | ,000 | ,897 | 520 | ,000 |
| M50S | ,183 | 520 | ,000 | ,914 | 520 | ,000 |
| M52S | ,181 | 520 | ,000 | ,910 | 520 | ,000 |
| M54S | ,254 | 520 | ,000 | ,886 | 520 | ,000 |
| M57S | ,216 | 520 | ,000 | ,900 | 520 | ,000 |
| M59S | ,233 | 520 | ,000 | ,891 | 520 | ,000 |

a. Lilliefors Significance Correction

***Univariate Normality Results for Classroom Environment Scales***

**Descriptives**

| Grup | | Grup5 | | | Statistic | Std. Error |
|---|---|---|---|---|---|---|
| Experimental Group | Satisfaction | 1 | Mean | | 41,03 | ,912 |
| | | | 95% Confidence Interval for Mean | Lower Bound | 39,17 | |
| | | | | Upper Bound | 42,90 | |
| | | | 5% Trimmed Mean | | 41,28 | |
| | | | Median | | 40,50 | |
| | | | Variance | | 24,930 | |
| | | | Std. Deviation | | 4,993 | |
| | | | Minimum | | 26 | |
| | | | Maximum | | 50 | |
| | | | Range | | 24 | |
| | | | Interquartile Range | | 6 | |
| | | | Skewness | | -,721 | ,427 |
| | | | Kurtosis | | 2,088 | ,833 |
| | Cooperation | 1 | Mean | | 29,30 | ,678 |
| | | | 95% Confidence Interval for Mean | Lower Bound | 27,91 | |
| | | | | Upper Bound | 30,69 | |
| | | | 5% Trimmed Mean | | 29,31 | |
| | | | Median | | 29,50 | |
| | | | Variance | | 13,803 | |
| | | | Std. Deviation | | 3,715 | |
| | | | Minimum | | 23 | |

| | | | | | |
|---|---|---|---|---|---|
| | | Maximum | | 35 | |
| | | Range | | 12 | |
| | | Interquartile Range | | 7 | |
| | | Skewness | | -,059 | ,427 |
| | | Kurtosis | | -1,177 | ,833 |
| Involvement | 1 | Mean | | 30,17 | ,572 |
| | | 95% Confidence Interval for Mean | Lower Bound | 29,00 | |
| | | | Upper Bound | 31,34 | |
| | | 5% Trimmed Mean | | 30,19 | |
| | | Median | | 30,00 | |
| | | Variance | | 9,799 | |
| | | Std. Deviation | | 3,130 | |
| | | Minimum | | 25 | |
| | | Maximum | | 35 | |
| | | Range | | 10 | |
| | | Interquartile Range | | 5 | |
| | | Skewness | | ,232 | ,427 |
| | | Kurtosis | | -,919 | ,833 |
| TaskOrientation | 1 | Mean | | 22,27 | ,421 |
| | | 95% Confidence Interval for Mean | Lower Bound | 21,41 | |
| | | | Upper Bound | 23,13 | |
| | | 5% Trimmed Mean | | 22,43 | |
| | | Median | | 23,00 | |
| | | Variance | | 5,306 | |
| | | Std. Deviation | | 2,303 | |
| | | Minimum | | 16 | |
| | | Maximum | | 25 | |
| | | Range | | 9 | |
| | | Interquartile Range | | 3 | |
| | | Skewness | | -,749 | ,427 |
| | | Kurtosis | | ,415 | ,833 |
| StdCohesiveness | 1 | Mean | | 21,47 | ,573 |
| | | 95% Confidence Interval for Mean | Lower Bound | 20,30 | |
| | | | Upper Bound | 22,64 | |
| | | 5% Trimmed Mean | | 21,74 | |
| | | Median | | 22,00 | |
| | | Variance | | 9,844 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Std. Deviation | | 3,137 | |
| | | | Minimum | | 12 | |
| | | | Maximum | | 25 | |
| | | | Range | | 13 | |
| | | | Interquartile Range | | 4 | |
| | | | Skewness | | -1,118 | ,427 |
| | | | Kurtosis | | 1,598 | ,833 |
| | Difficulty | 1 | Mean | | 8,93 | ,457 |
| | | | 95% Confidence Interval for Mean | Lower Bound | 8,00 | |
| | | | | Upper Bound | 9,87 | |
| | | | 5% Trimmed Mean | | 9,04 | |
| | | | Median | | 9,00 | |
| | | | Variance | | 6,271 | |
| | | | Std. Deviation | | 2,504 | |
| | | | Minimum | | 4 | |
| | | | Maximum | | 12 | |
| | | | Range | | 8 | |
| | | | Interquartile Range | | 4 | |
| | | | Skewness | | -,314 | ,427 |
| | | | Kurtosis | | -1,036 | ,833 |
| Control Group | Satisfaction | 2 | Mean | | 42,23 | ,767 |
| | | | 95% Confidence Interval for Mean | Lower Bound | 40,65 | |
| | | | | Upper Bound | 43,81 | |
| | | | 5% Trimmed Mean | | 42,40 | |
| | | | Median | | 42,50 | |
| | | | Variance | | 15,305 | |
| | | | Std. Deviation | | 3,912 | |
| | | | Minimum | | 33 | |
| | | | Maximum | | 48 | |
| | | | Range | | 15 | |
| | | | Interquartile Range | | 5 | |
| | | | Skewness | | -,609 | ,456 |
| | | | Kurtosis | | -,073 | ,887 |
| | Cooperation | 2 | Mean | | 29,88 | ,722 |
| | | | 95% Confidence Interval for Mean | Lower Bound | 28,40 | |
| | | | | Upper Bound | 31,37 | |
| | | | 5% Trimmed Mean | | 30,05 | |

| | | | | | |
|---|---|---|---|---|---|
| | | Median | | 30,50 | |
| | | Variance | | 13,546 | |
| | | Std. Deviation | | 3,681 | |
| | | Minimum | | 22 | |
| | | Maximum | | 35 | |
| | | Range | | 13 | |
| | | Interquartile Range | | 5 | |
| | | Skewness | | -,735 | ,456 |
| | | Kurtosis | | -,072 | ,887 |
| Involvement | 2 | Mean | | 30,85 | ,483 |
| | | 95% Confidence Interval for Mean | Lower Bound | 29,85 | |
| | | | Upper Bound | 31,84 | |
| | | 5% Trimmed Mean | | 30,84 | |
| | | Median | | 31,50 | |
| | | Variance | | 6,055 | |
| | | Std. Deviation | | 2,461 | |
| | | Minimum | | 27 | |
| | | Maximum | | 35 | |
| | | Range | | 8 | |
| | | Interquartile Range | | 5 | |
| | | Skewness | | -,349 | ,456 |
| | | Kurtosis | | -1,071 | ,887 |
| TaskOrientation | 2 | Mean | | 22,81 | ,384 |
| | | 95% Confidence Interval for Mean | Lower Bound | 22,02 | |
| | | | Upper Bound | 23,60 | |
| | | 5% Trimmed Mean | | 22,93 | |
| | | Median | | 23,00 | |
| | | Variance | | 3,842 | |
| | | Std. Deviation | | 1,960 | |
| | | Minimum | | 18 | |
| | | Maximum | | 25 | |
| | | Range | | 7 | |
| | | Interquartile Range | | 3 | |
| | | Skewness | | -,641 | ,456 |
| | | Kurtosis | | -,246 | ,887 |
| StdCohesiveness | 2 | Mean | | 20,96 | ,504 |
| | | | Lower Bound | 19,92 | |

| | | | | | |
|---|---|---|---|---|---|
| | | 95% Confidence Interval for Mean | Upper Bound | 22,00 | |
| | | 5% Trimmed Mean | | 21,03 | |
| | | Median | | 21,50 | |
| | | Variance | | 6,598 | |
| | | Std. Deviation | | 2,569 | |
| | | Minimum | | 16 | |
| | | Maximum | | 25 | |
| | | Range | | 9 | |
| | | Interquartile Range | | 4 | |
| | | Skewness | | -,567 | ,456 |
| | | Kurtosis | | -,582 | ,887 |
| Difficulty | 2 | Mean | | 8,35 | ,675 |
| | | 95% Confidence Interval for Mean | Lower Bound | 6,96 | |
| | | | Upper Bound | 9,74 | |
| | | 5% Trimmed Mean | | 8,15 | |
| | | Median | | 8,00 | |
| | | Variance | | 11,835 | |
| | | Std. Deviation | | 3,440 | |
| | | Minimum | | 4 | |
| | | Maximum | | 17 | |
| | | Range | | 13 | |
| | | Interquartile Range | | 6 | |
| | | Skewness | | ,767 | ,456 |
| | | Kurtosis | | ,037 | ,887 |

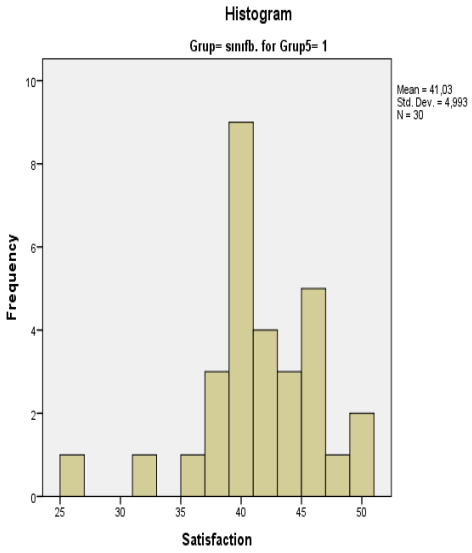
## *Univariate Normality Results for Exploratory Factor Analysis*

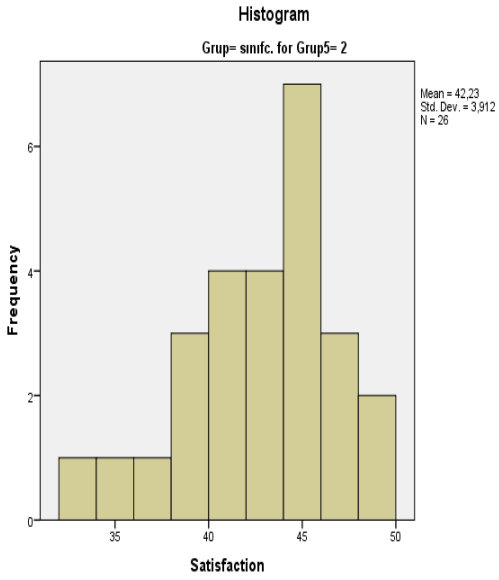
| | *N* | *M* | *SD* | *Skewness* | *Std. Error* | *Kurtosis* | *Std. Error* |
|---|---|---|---|---|---|---|---|
| M1S | 520 | 3,22 | 1,169 | -,321 | ,107 | -,748 | ,214 |
| M2 | 520 | 3,48 | ,923 | -,703 | ,107 | ,468 | ,214 |
| M4 | 520 | 3,47 | ,935 | -,553 | ,107 | ,270 | ,214 |
| M5 | 520 | 3,77 | ,975 | -,781 | ,107 | ,387 | ,214 |
| M6 | 520 | 3,91 | ,999 | -1,021 | ,107 | ,857 | ,214 |
| M8 | 520 | 3,21 | 1,018 | -,275 | ,107 | -,160 | ,214 |
| M10 | 520 | 3,54 | ,924 | -,715 | ,107 | ,694 | ,214 |
| M11 | 520 | 3,60 | ,919 | -,689 | ,107 | ,436 | ,214 |
| M14 | 520 | 3,52 | ,923 | -,636 | ,107 | ,370 | ,214 |
| M15 | 520 | 3,86 | ,837 | -,816 | ,107 | 1,214 | ,214 |
| M18 | 520 | 3,22 | 1,111 | -,250 | ,107 | -,706 | ,214 |
| M21 | 520 | 3,38 | ,967 | -,482 | ,107 | -,069 | ,214 |
| M22 | 520 | 3,66 | 1,006 | -,602 | ,107 | ,036 | ,214 |
| M23 | 520 | 3,49 | 1,012 | -,572 | ,107 | -,046 | ,214 |
| M24 | 520 | 3,16 | 1,057 | -,322 | ,107 | -,459 | ,214 |
| M27 | 520 | 3,18 | ,970 | -,326 | ,107 | -,236 | ,214 |
| M28 | 520 | 3,27 | 1,016 | -,405 | ,107 | -,195 | ,214 |
| M29 | 520 | 3,49 | ,908 | -,671 | ,107 | ,484 | ,214 |
| M30 | 520 | 3,57 | ,916 | -,755 | ,107 | ,602 | ,214 |
| M31 | 520 | 3,18 | 1,048 | -,342 | ,107 | -,463 | ,214 |
| M32 | 520 | 3,37 | 1,009 | -,593 | ,107 | ,026 | ,214 |
| M35 | 520 | 3,23 | 1,093 | -,499 | ,107 | -,405 | ,214 |
| M36 | 520 | 3,23 | 1,090 | -,445 | ,107 | -,483 | ,214 |
| M37 | 520 | 3,22 | 1,166 | -,401 | ,107 | -,704 | ,214 |
| M38 | 520 | 2,50 | 1,005 | ,188 | ,107 | -,426 | ,214 |
| M39 | 520 | 3,11 | ,995 | -,311 | ,107 | -,180 | ,214 |
| M41 | 520 | 2,98 | 1,031 | -,131 | ,107 | -,422 | ,214 |
| M42 | 520 | 3,25 | ,940 | -,411 | ,107 | -,013 | ,214 |
| M43 | 520 | 3,71 | ,929 | -,818 | ,107 | ,801 | ,214 |
| M45 | 520 | 3,27 | ,986 | -,359 | ,107 | -,111 | ,214 |
| M46 | 520 | 3,80 | 1,028 | -,819 | ,107 | ,396 | ,214 |
| M47 | 520 | 3,54 | ,990 | -,512 | ,107 | ,023 | ,214 |
| M48 | 520 | 2,75 | 1,035 | ,195 | ,107 | -,375 | ,214 |
| M49 | 520 | 3,33 | 1,050 | -,401 | ,107 | -,307 | ,214 |
| M51 | 520 | 3,45 | 1,041 | -,586 | ,107 | -,102 | ,214 |
| M53 | 520 | 3,41 | 1,008 | -,431 | ,107 | -,048 | ,214 |
| M55 | 520 | 2,81 | ,968 | ,086 | ,107 | -,366 | ,214 |

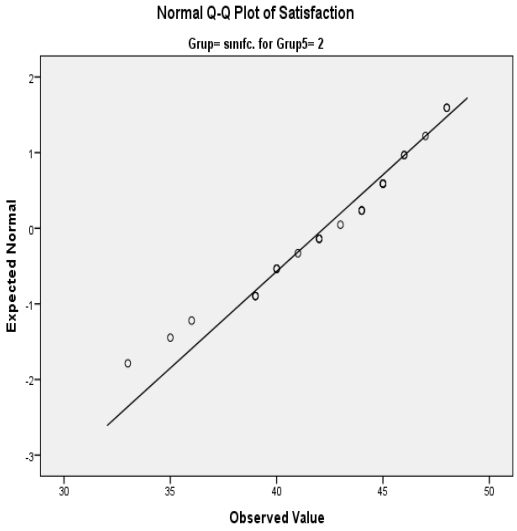
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| M56 | 520 | 2,89 | 1,003 | ,091 | ,107 | -,389 | ,214 |
| M58 | 520 | 2,67 | ,924 | ,285 | ,107 | -,193 | ,214 |
| M60 | 520 | 2,74 | 1,010 | ,218 | ,107 | -,338 | ,214 |
| M3S | 520 | 3,14 | 1,118 | -,213 | ,107 | -,717 | ,214 |
| M7S | 520 | 2,96 | 1,114 | -,079 | ,107 | -,731 | ,214 |
| M9S | 520 | 3,38 | ,930 | -1,066 | ,107 | ,249 | ,214 |
| M12S | 520 | 3,20 | 1,145 | -,293 | ,107 | -,719 | ,214 |
| M13S | 520 | 3,17 | 1,134 | -,169 | ,107 | -,732 | ,214 |
| M16S | 520 | 3,34 | ,996 | -,464 | ,107 | -,106 | ,214 |
| M17S | 520 | 3,09 | 1,082 | -,264 | ,107 | -,460 | ,214 |
| M19S | 520 | 3,40 | 1,324 | -,372 | ,107 | -1,054 | ,214 |
| M20S | 520 | 3,32 | 1,017 | -,418 | ,107 | -,253 | ,214 |
| M25S | 520 | 3,48 | 1,100 | -,462 | ,107 | -,448 | ,214 |
| M26S | 520 | 3,33 | 1,059 | -,317 | ,107 | -,453 | ,214 |
| M33S | 520 | 2,83 | 1,010 | ,220 | ,107 | -,377 | ,214 |
| M34S | 520 | 2,50 | 1,011 | ,613 | ,107 | ,083 | ,214 |
| M40S | 520 | 3,40 | 1,047 | -,437 | ,107 | -,261 | ,214 |
| M44S | 520 | 3,25 | ,974 | -,309 | ,107 | -,090 | ,214 |
| M50S | 520 | 2,86 | 1,121 | ,155 | ,107 | -,738 | ,214 |
| M52S | 520 | 3,24 | 1,105 | -,275 | ,107 | -,520 | ,214 |
| M54S | 520 | 3,53 | ,995 | -,515 | ,107 | -,166 | ,214 |
| M57S | 520 | 3,18 | ,938 | -,110 | ,107 | -,208 | ,214 |
| M59S | 520 | 2,52 | 1,027 | ,515 | ,107 | -,120 | ,214 |

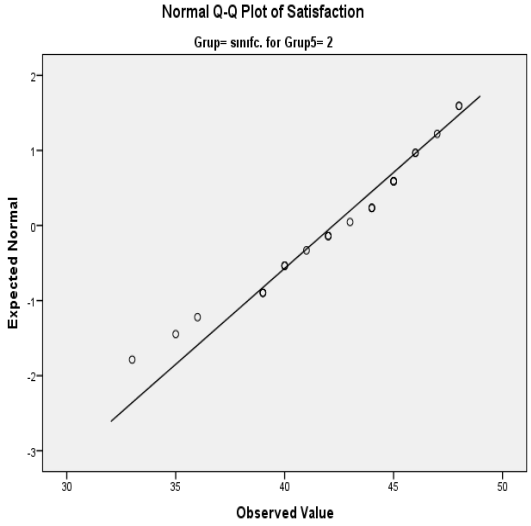
*Univariate Normality Histograms and Q-Q Test Results for Classroom Environment Scale*

## The Distribution of Satisfaction Scores

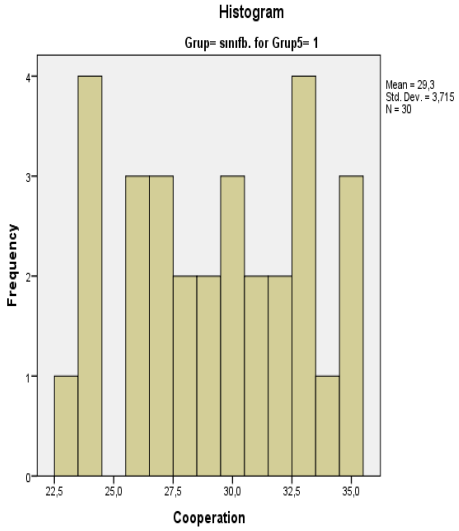


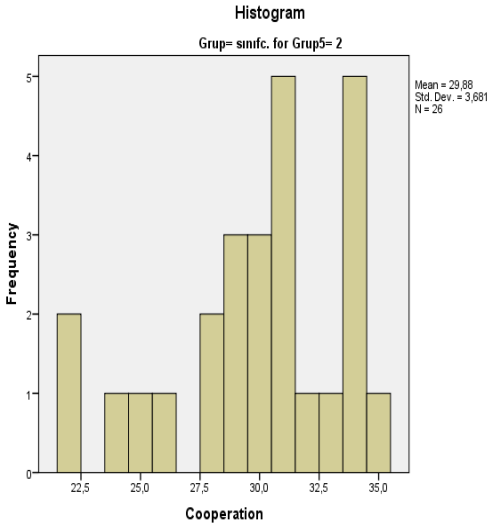



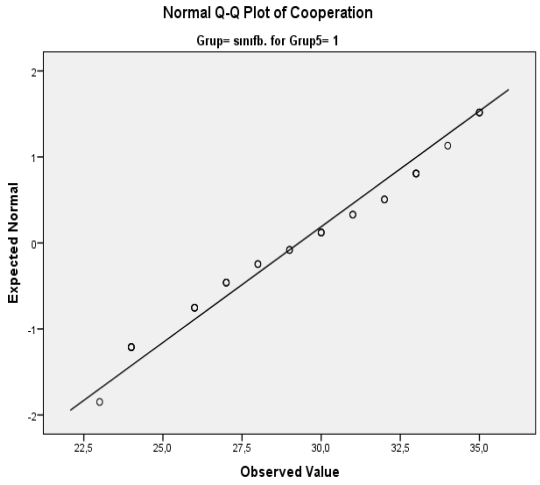



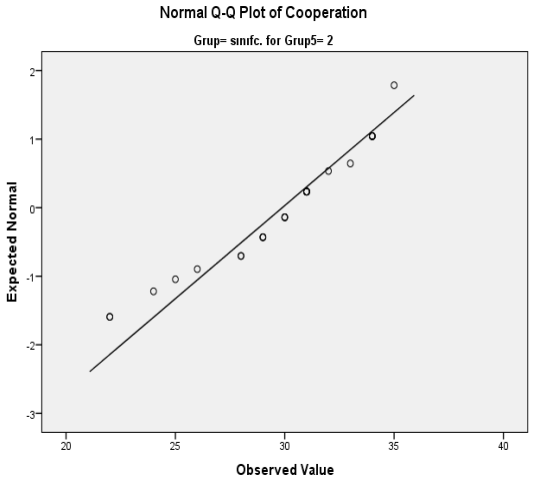



# The Distribution of Cooperation Scores

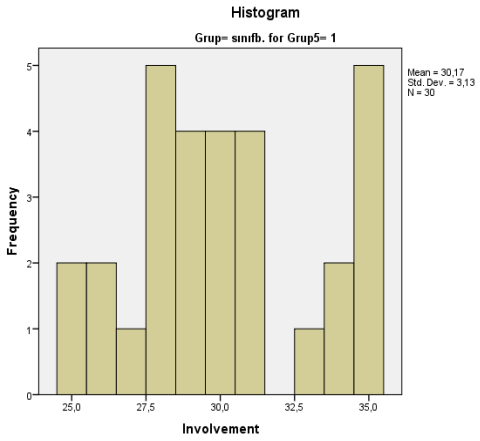


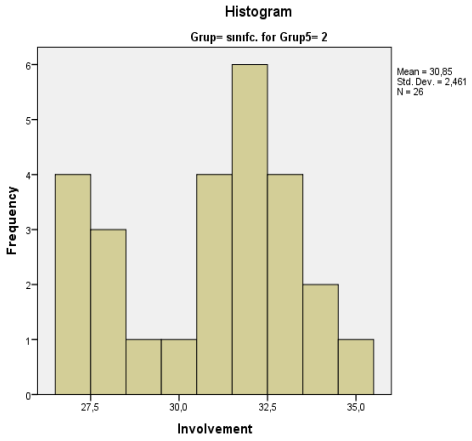



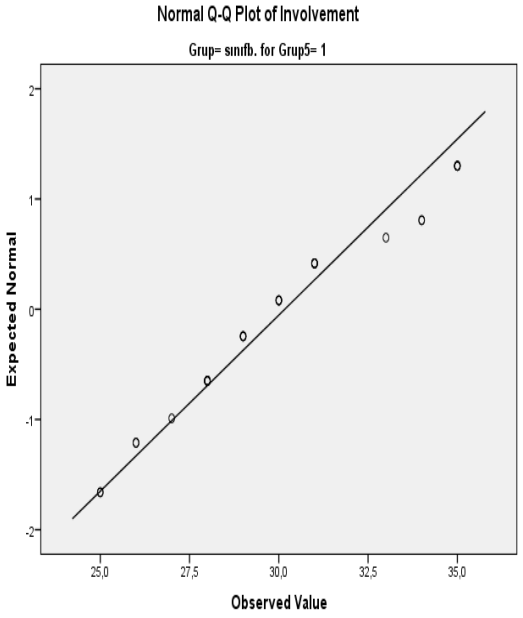



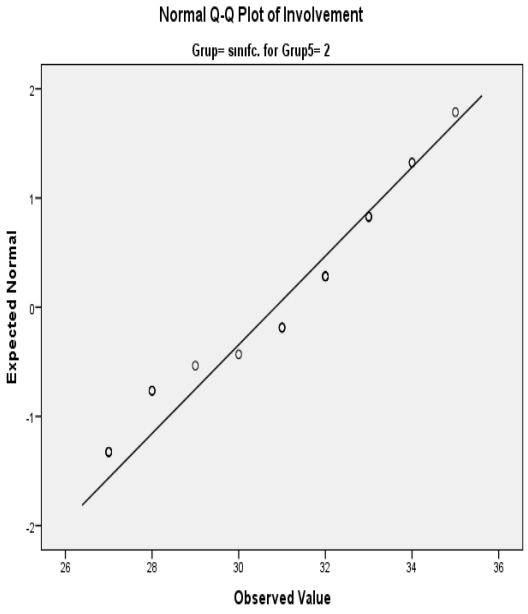



# The Distribution of Involvement Scores

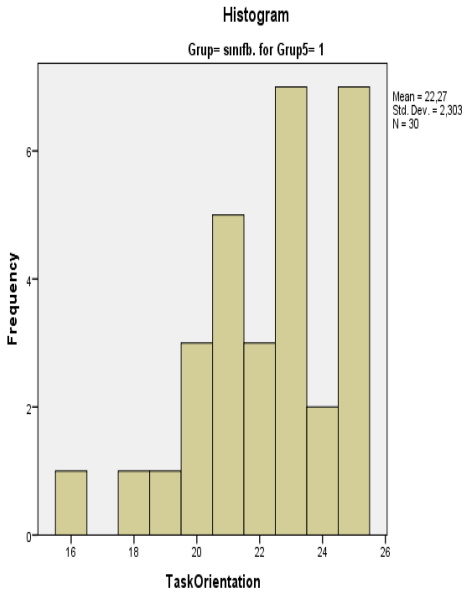


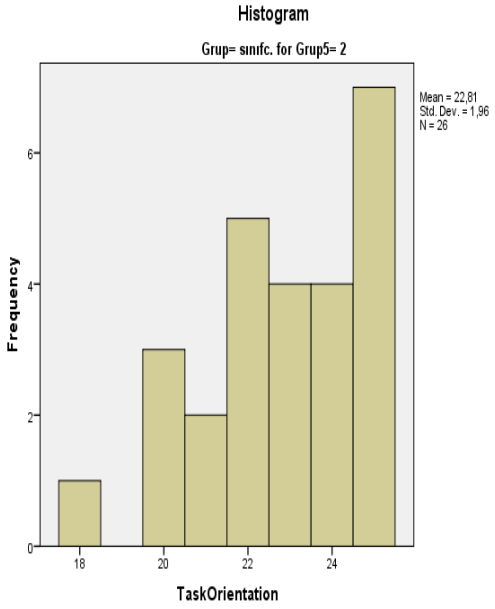



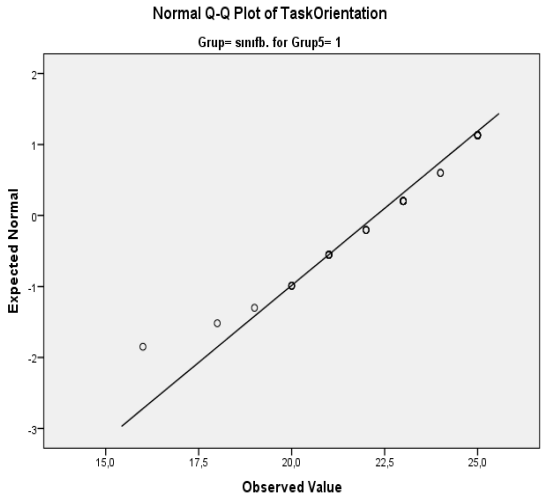



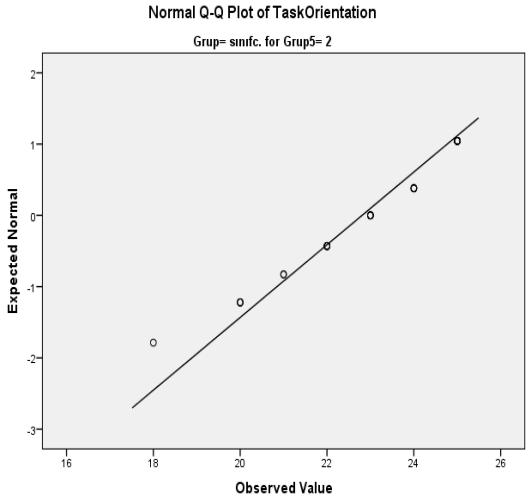



# The Distribution of Task Orientation Scores

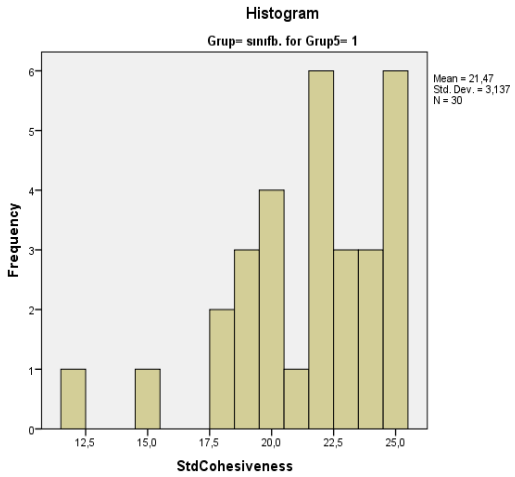


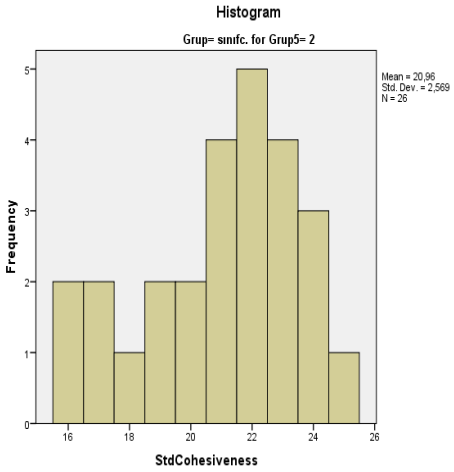



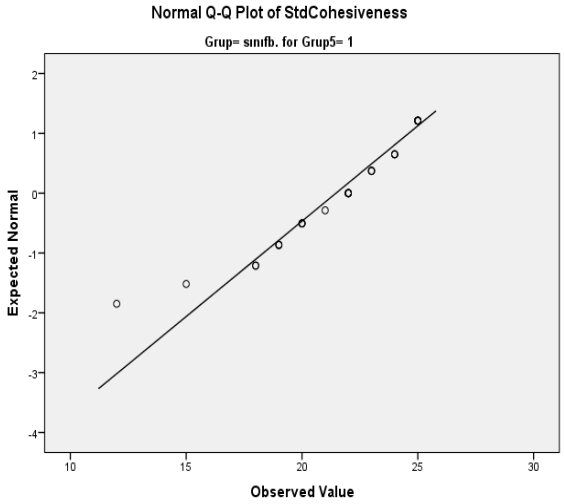



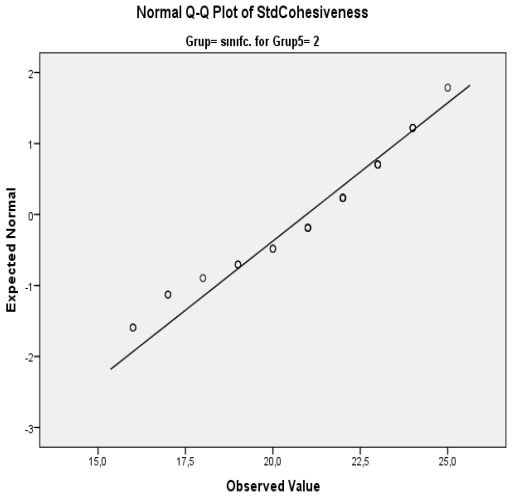



# The Distribution of Student Cohesiveness Scores

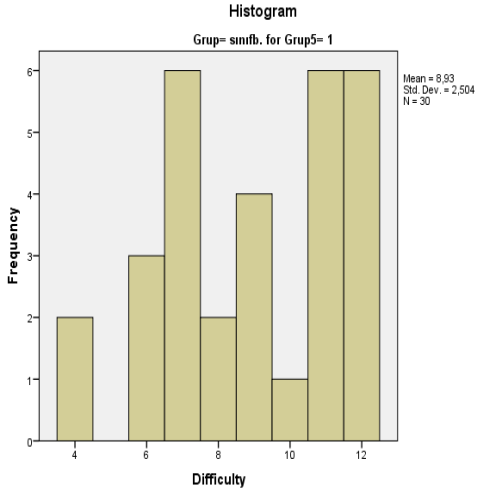


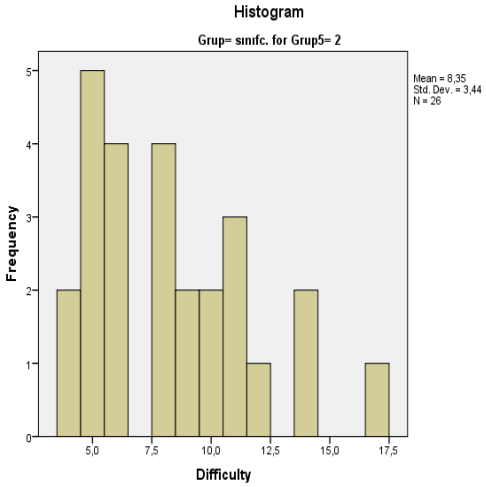



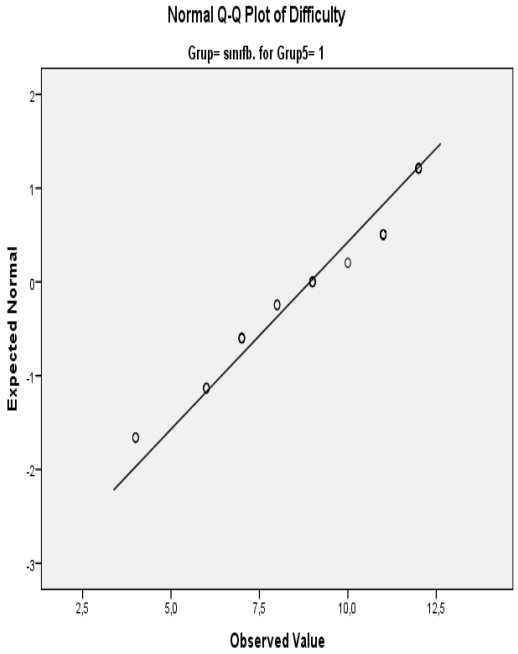



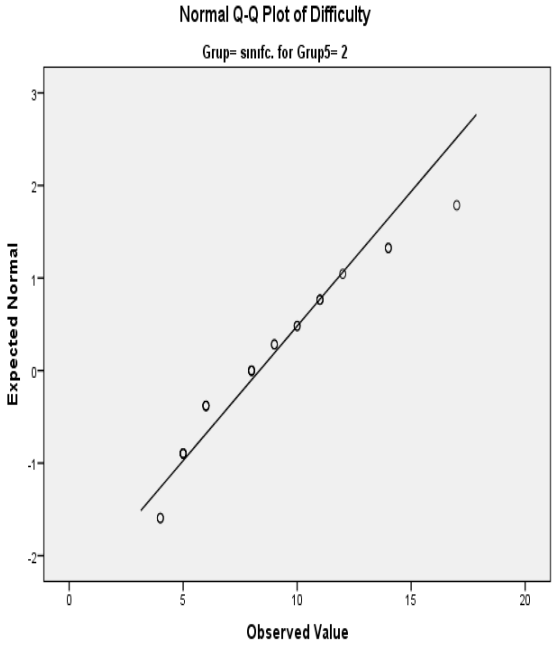



# The Distribution of Difficulty Scores



## Multivariate Normality Results for Exploratory Factor Analysis for Classroom Environment Scale

====== Multivariate Statistics ========

Tests of multivariate skew:

Small's test (chisq)

| Q1 | df | p-value |
|---|---|---|
| 700,2401 | 60,0000 | ,0000 |

Srivastava's test

| chi(b1p) | df | p-value |
|---|---|---|
| 116,0574 | 60,0000 | ,0000 |

Srivastava's test

| b2p | N(b2p) | p-value |
|---|---|---|
| 3,6781 | 24,4486 | ,0000 |

Mardia's test

| b2p | N(b2p)"p |
|---|---|
| 4487,2049 | 101,4137 | ,0000 |

Omnibus test of multivariate normality:

(based on Small's test, chisq)

| VQ3 | df | p-value |
|---|---|---|
| 1217,5483 | 120,0000 | ,0000 |

------ END MATRIX -----

## Multivariate Normality Results for the Confirmatory Factor Analysis of Classroom Environment Scale

====== Multivariate Statistics ========

Tests of multivariate skew:

Small's test (chisq)

| Q1 | df | p-value |
|---|---|---|
| 27,5422 | 6,0000 | ,0001 |

Srivastava's test

| chi(b1p) | df | p-value |
|---|---|---|
| 21,4815 | 6,0000 | ,0015 |

Srivastava's test

| b2p | N(b2p) | p-value |
|---|---|---|
| 3,7081 | 5,8927 | ,0000 |

Mardia's test

| b2p | N(b2p)"p |
|---|---|
| 59,5796 | 9,8348 | ,0000 |

Omnibus test of multivariate normality:

(based on Small's test, chisq)

| VQ3 | df | p-value |
|---|---|---|
| 32,1742 | 12,0000 | ,0013 |

------ END MATRIX -----

## K. SAMPLE ITEMS OF THE CLASSROOM ENVIRONMENT PERCEPTIONS SCALE OF PRE-SERVICE TEACHERS (CEPSPT) / ÖĞRETMEN ADAYLARININ SINIF ORTAMI ALGILARI ÖLÇEĞİ

Değerli Öğrenciler,
Bu ölçek Öğretim İlke ve Yöntemleri dersinin işlenişi sürecinde öğretmen adaylarının sınıf ortamı ile ilgili algılarının belirlenmesi amacıyla hazırlanmıştır. Ölçek iki bölümden oluşmaktadır. Birinci bölümünde kişisel bilgilere ilişkin sorular, ikinci bölümde ise sınıf ortamı değişkenleri ile ilgili görüş ve düşünceler yer almaktadır.
Görüşleriniz sadece bilimsel araştırma amaçlı kullanılacaktır. Bu çalışma sonunda oluşturulacak olan raporlarda kişisel bilgileriniz doğrudan veya dolaylı olarak kullanılmayacaktır.
Lütfen hiçbir soruyu cevapsız bırakmayınız.
Zaman ayırdığınız ve emek verdiğiniz için teşekkür ederiz.
Saygılarımızla,

Arş. Gör. Melike ÖZÜDOĞRU
Manisa Celal Bayar Üniversitesi

Prof. Dr. Meral AKSU
Orta Doğu Teknik Üniversitesi

### 1. KİŞİSEL BİLGİLER

Size uygun seçeneğin yanındaki kutuya X işareti koyunuz veya uygun cevabı yazınız.

1. Cinsiyetiniz: Kadın ( ) Erkek ( )
2. Kayıtlı olduğunuz Üniversite: ….……
3.Bölümünüz:……...

### 2. SINIF ORTAMI ALGILARI İLE İLGİLİ GÖRÜŞLER

Ölçekte yer alan her bir maddeye ilişkin görüşlerinize uyan “Tamamen Katılıyorum, Kısmen Katılıyorum, Karasızım, Katılmıyorum, Kesinlikle Katılmıyorum” seçeneklerinin altında bulunan boşluğa (X) işareti koymanız beklenmektedir.

| | Kesinlikle katılmıyorum | Katılmıyorum | Kısmen katılıyorum | Katılıyorum | Kesinlikle katılıyorum |
|---|---|---|---|---|---|
| 1. Derste öğrenciler konuya odaklanmak yerine başka konularda konuşur. | | | | | |
| 2. Öğrenciler birbirleri ile yarışmak yerine işbirliği yaparlar. | | | | | |
| 3. Öğrenciler bireysel ya da grup çalışmalarında birbirlerine saygı duyarlar. | | | | | |
| 4. Öğrenciler yaptıkları çalışmaları sınıfta sunarlar. | | | | | |
| 5. Dersteki öğrenme görevleri açık ve dikkatli bir şekilde planlanmıştır. | | | | | |
| 6. Sınıf içinde verilen görevler zordur. | | | | | |

# L. STUDENT QUESTIONNAIRE ON FLIPPED LEARNING PROCESS / ÖĞRETMEN ADAYLARININ TERS YÜZ ÖĞRENME GÖRÜŞLERİ ANKETİ

Değerli Öğrenciler,
Bu anket, Ters Yüz Öğrenme (Flipped Learning) ile ilgili görüşlerinizi almak amacıyla hazırlanmıştır. Anket iki bölümden oluşmaktadır. Birinci bölümünde kişisel bilgilere ilişkin sorular, ikinci bölümde ise Ters Yüz Öğrenme ile ilgili görüş ve düşünceler yer almaktadır. Bu bölümde üç alt başlık bulunmaktadır ve her alt başlığın altındaki maddeler eksik cümle formunda düzenlenmiştir. Her soruyu başlığı tamamlayacak şekilde okuyup cevaplayınız. Görüşleriniz sadece bilimsel araştırma amaçlı kullanılacaktır. Bu çalışma sonunda oluşturulacak olan raporlarda kişisel bilgileriniz doğrudan veya dolaylı olarak kullanılmayacaktır.
Anketin birinci bölümünde yer alan soruların yanındaki veya altındaki ilgili kutucuğa (X) işareti koymanız beklenmektedir. Anketin ikinci bölümünde ise, her bir maddeye ilişkin görüşlerinize uyan "Her zaman", "Bazen", "Hiçbir zaman" veya "Tamamen Katılıyorum, Kısmen Katılıyorum, Karasızım, Katılmıyorum, Kesinlikle Katılmıyorum" seçeneklerinin altında bulunan boşluğa (X) işareti koymanız beklenmektedir.
Lütfen hiçbir soruyu cevapsız bırakmayınız.
Zaman ayırdığınız ve emek verdiğiniz için teşekkür ederiz.
Saygılarımızla,

Arş. Gör. Melike ÖZÜDOĞRU
Manisa Celal Bayar Üniversitesi

Prof. Dr. Meral AKSU
Orta Doğu Teknik Üniversitesi

## 1. KİŞİSEL BİLGİLER

Size uygun seçeneğin yanındaki kutuya X işareti koyunuz.

1. Cinsiyetiniz: Kadın ( ) Erkek ( )

2. Bölümünüz: ……

3. Sürekli kullandığınız size ait bir bilgisayarınız var mı? Evet ( ) Hayır ( )

4. İnternete hangisi/hangileri ile bağlanıyorsunuz? Ev ( ) Yurt ( ) Üniversite ( )
Arkadaşımın bilgisayarı ( ) İnternet kafe ( )

5. Internet erişimi olan bir cep telefonunuz var mı? Evet ( ) Hayır ( )

6. Bilgisayar başında günde ne kadar zaman harcıyorsunuz? ( Ders amaçlı, e-posta, sosyal iletişim ağları, gazete, dergi okuma, oyun oynama, film izleme, vs.)
1 saatten az ( ) 1-3 saat arası ( ) 3-5 saat arası ( ) 5-7saat arası ( )
7-10 saat arası ( ) 10 saatten fazla ( )

7. Bilgisayar başında harcadığınız zamanın ne kadarını bu derste gördüğünüz konularla ilgili öğrenmelere ayırıyorsunuz?
1 saatten az ( ) 1-3 saat arası ( ) 3-5 saat arası ( ) 5-7 saat arası ( )

8. Bu derste ders hocası ile ders dışında bir haftada ortalama kaç defa yüz yüze iletişime geçtiniz?
Hiç ( ) 1 kez ( ) 2 kez ( ) 3 kez ( ) 4 kez ( ) 5'ten fazla ( )

9. Bu derste ders hocası ile ders esnasında bir haftada ortalama kaç defa karşılıklı iletişime geçtiniz?
Hiç ( ) 1 kez ( ) 2 kez ( ) 3 kez ( ) 4 kez ( ) 5'ten fazla ( )

10. Ders için açılan facebook sayfasını haftada kaç kez kontrol ettiniz?
Hiç ( ) 1-2 kez ( ) 3-10 kez ( ) 10'dan fazla ( )

## 2. TERS YÜZ ÖĞRENME İLE İLGİLİ GÖRÜŞLER

Size uygun seçeneğin yanındaki kutuya (X) işareti koyunuz.

| | Her zaman | | Ba zen | Hiçbir zaman | |
|---|---|---|---|---|---|
| **Video Dersleri,** | | | | | |
| 1. dikkatlice dinledim. | | | | | |
| 2. izlerken sadece ekrana baktım. | | | | | |
| 3. izlerken bazı bölümleri geri dönüp tekrar dinledim. | | | | | |
| 4. izlerken notlar aldım. | | | | | |
| 5. izlerken sorular yazdım. | | | | | |
| 6. bölerek izledim. | | | | | |
| | Tamamen Katılıyorum | Kısmen Katılıyorum | Kısmen katılıyorum | Katılmıyorum | Kesinlikle Katılmıyorum |
| **Video Dersler ile Öğrenmek,** | | | | | |
| 7. daha kolaydı. | | | | | |
| 8. ders içeriklerine mekândan bağımsız olarak erişmemi sağladı. | | | | | |
| 9. kendi kendime öğrenme fırsatı sağladı. | | | | | |
| 10. istediğim ortamda ve zamanda öğrenmemi sağladı. | | | | | |
| 11. yüz yüze derslerde uygulama yapmamı kolaylaştırdı. | | | | | |
| 12. öğretim elemanı ile ders içinde ve ders dışındaki etkileşimimi artırdı. | | | | | |
| 13. bazı bölümleri geri dönüp tekrar izleme imkânı vermesi öğrenmemi olumlu etkiledi. | | | | | |
| 14. görsel ve işitsel olarak zenginleştirilmiş ders içerikleri ile derse ilgi duymamı sağladı. | | | | | |
| 15. konuları takip etmemi kolaylaştırdı. | | | | | |
| 16. kaçırdığım dersleri kendi kendime telafi edebilme fırsatı verdiği için öğrenmemi olumlu etkiledi. | | | | | |
| 17. teknik sorunlar nedeniyle verimsizdi. | | | | | |

| | Tamamen Katılıyorum | Kısmen Katılıyorum | Kısmen katılıyorum | Katılmıyorum | Kesinlikle Katılmıyorum |
|---|---|---|---|---|---|
| 18. diğer derslerde kullanılan yöntemlere göre daha zordu. | | | | | |
| **Ters Yüz Öğrenme,** | | | | | |
| 19. planlı ve sistematik çalışmamı destekledi. | | | | | |
| 20. bağımsız öğrenme becerilerimi destekledi. | | | | | |
| 21. sosyal etkileşimimi artırdı. | | | | | |
| 22. araştırma ve keşfetme isteğimi artırdı. | | | | | |
| 23. kendi kendime öğrenme becerilerimi geliştirdi. | | | | | |
| 24. öğrenmek için daha uzun zaman gerektirdi. | | | | | |
| 25. öğrenmeyi eğlenceli hale getirdi. | | | | | |
| 26. yöntemi ile işlenen dersleri daha çok benimsedim. | | | | | |
| 27. yöntemi ile işlenen derslerden daha çok verim aldım. | | | | | |
| 28. yöntemi ile işlenen dersler öğrenmemi destekleyip kolaylaştırdı. | | | | | |
| 29. çok fazla etkinlik olduğu için dikkat dağıtıcıydı. | | | | | |
| 30. farklı teknolojilerin kullanılması nedeniyle çok ilgimi çekti. | | | | | |
| 31. daha hızlı öğrenmemi sağladı. | | | | | |
| 32. teorik bilgileri uygulamada etkiliydi. | | | | | |
| 33. sürecinde yapılan grup çalışmaları öğrenmemi olumlu etkiledi. | | | | | |

## M. INTERVIEW SCHEDULE / GÖRÜŞME SORULARI

Merhaba. Orta Doğu Teknik Üniversitesi Eğitim Programları ve Öğretim Anabilim dalında doktora yapmaktayım. "Öğretim İlke ve Yöntemleri" dersinde kullanılan Ters Yüz Öğrenme (Flipped Learning) ile ilgili doktora tez çalışması yapıyorum ve sizinle bu konuda görüşmek istiyorum. Bu görüşmede amacım, Ters Yüz Öğrenme (Flipped Learning) ile ilgili görüşlerinizi öğrenmektir. Bu ders ile sahip olduğunuz deneyimleri, yaşadığınız zorlukları ve önerilerinizi paylaşırsanız çok sevinirim.

Görüşmeye geçmeden önce, görüşmemizin gizli olduğunu ve görüşmede konuşulanların yalnızca doktora tezimde kullanılacağını belirtmek isterim. Bunun yanında, doktora tezimde isimler kesinlikle yer almayacak, bunun yerine takma isimler kullanılacak ya da isimleriniz şifrelenecektir.

Görüşmemize başlamadan önce sormak istediğiniz soru ya da belirtmek istediğiniz herhangi bir düşünceniz var mı?

Görüşmeyi kaydetmek istiyorum, bir sakıncası var mı?

Görüşmeye devam etmek istiyor musunuz?

Görüşmemizin yaklaşık bir saat süreceğini tahmin ediyorum. İzin verirseniz sorulara başlamak istiyorum.

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Prof. Dr. Meral AKSU
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1. Öğretim İlke ve Yöntemleri dersinizde kullanılan Ters Yüz Öğrenme yöntemini bir kelime ya da cümleyle nasıl ifade edersiniz?

SONDA

Öğrenmeyi kolaylaştıran bir yöntem mi?

Eğlenceli bir yöntem mi?

Uygulanması zor bir yöntem mi?

Materyallerle etkili öğrenmeyi sağlayan bir yöntem mi?

Ders hocası ile iletişimi artıran bir yöntem mi?

Tekrar etme olanağını artıran bir yöntem mi?

2. Dönem başında dersin Ters Yüz Öğrenme Yöntemi ile öğrenileceği söylendiği anda düşünceleriniz nelerdi?

SONDA

Dersin nasıl işleneceği ile ilgili olumlu ve olumsuz düşünceleriniz nasıldı? Açıklar mısınız?

Şaşırdınız mı? Merak mı ettiniz? Kötü hissettiniz mi?

Korktunuz mu? Endişelendiniz mi? Zor olacağını düşündünüz mü? Eğlenceli olacağını düşündünüz mü? Aktif olacağınızı düşündünüz mü?

3. Dersin öğretiminde kullanılan videolar ile ilgili düşünceleriniz nelerdir?

SONDA

Videolardaki ses ve görüntüler net ve anlaşılır mı? Açıklayınız.

Videolarda öğrenmeniz için yeterli bilgi verildi mi? Açıklayınız.

Videoları izlemeye teşvik eden ya da izleme isteğinizi azaltan unsurlar nelerdir?

Videoların dersten önce verilme zamanı uygun muydu? Sizce dersten ne kadar zaman önce verilmesi uygun olur? Neden?

Konuyla ilgili internette bulunan videoları dersi öğrenmek amaçlı kullandınız mı? Kullandıysanız, öğretim elemanı tarafından gönderilen videoları mı yoksa konuyla ilgili internette yer alan videolar mı ders içeriğini öğrenmenizde daha etkili oldu? Nedenleriyle açıklar mısınız?

Belirtilenler dışında videolarla ilgili herhangi bir sıkıntıyla karşılaştınız mı? Karşılaştıysanız ne tür sıkıntılar yaşadınız?

Videoların daha iyi bir hale getirilmesi için önerileriniz nelerdir?

4. Ters Yüz Öğrenme yöntemiyle işlediğiniz Öğretim İlke ve Yöntemleri dersinde video dışında ne tür materyaller kullandınız?

Ters Yüz Öğrenme yöntemiyle işlediğiniz dersi öğrendiğiniz diğer derslerle karşılaştırdığınız zaman kullanılan öğretim materyalleri konusunda görüşleriniz nelerdir?

SONDA

Ters Yüz Öğrenme yöntemiyle işlediğiniz derste kullanılan öğretim materyalleri öğrenmenizi nasıl etkiledi? Açıklayınız.

5. Daha önce aldığınız dersler ile Ters Yüz Öğrenme yöntemi ile aldığınız Öğretim İlke ve Yöntemleri dersindeki görevleriniz konusunda görüşleriniz nelerdir?

SONDA

Diğer derslere hazırlık süreciniz ile bu derse hazırlık süreciniz (ders özeti, video sorularının cevaplanması, sınıfta tartışmak için soru hazırlanması vb.) arasında ne gibi benzerlikler ve farklılıklar olduğunu söyleyebilirsiniz? Nedenleriyle açıklar mısınız?

Daha aktif miydiniz? Daha pasif miydiniz? Bu durumun yarattığı avantaj ve dezavantajları açıklar mısınız?

Derste öncesi, sırası ve sonrasında yapılacak görevler açık ve net bir şekilde belirtildi mi? Öğrenciler ne yapması gerektiğini biliyor muydu? Açıklayınız.

Diğer derslerde verilen ödevler ile bu derste yapılan bireysel ya da grup çalışmalarında hazırladığınız ödevleri karşılaştırdığınız zaman ne gibi benzerlikler ya da farklılıklar (zorluk, açıklık, destek alma, öğretim elemanı desteği, akran desteği, işbirliği vb.) olduğunu söyleyebilirsiniz? Nedenleriyle açıklar mısınız?

Çeşitli görevleri sınıf içinde bireysel veya grup olarak yapmanın sağladığı olumlu ve olumsuz yönler nelerdir?

Aldığınız diğer dersler ile bu dersi ders sonrası yapılan görevler açısından karşılaştırdığınızda ne gibi benzerlikler ve farklılıklar olduğunu söyleyebilirsiniz? Nedenleriyle açıklar mısınız?

6. Ters Yüz Öğrenme yönteminde kullanılan videoları ve diğer materyalleri düşündüğünüzde nasıl alıştınız. Bu süreçten bahseder misiniz?

SONDA

Yönteme nasıl adapte oldunuz?

7. Ters Yüz Öğrenme yöntemi ile aldığınız Öğretim İlke ve Yöntemleri dersini aldığınız diğer derslerle karşılaştırdığınızda bu yöntemin güçlü ve zayıf yönleri hakkında neler düşünüyorsunuz?

SONDA:

Yöntem size teorik bilgileri uygulama yapma fırsatı verdi mi? Açıklayınız.

Uygulama yaptığınız ve derste aktif olduğunuz için öğrendiklerinizin kalıcılığını nasıl etkiledi? Açıklayınız.

Tekrar tekrar videoları izleme imkânı vermesi öğrenmenizi nasıl etkiledi? Açıklayınız.

Derse hazırlıklı gelmeniz öğrenmeyi ve sınıf etkinliklerine katılımınızı nasıl etkiledi? Açıklayınız.
Ters yüz öğrenme yöntemi ile öğrenmek diğer derslere göre zamanınızı aldı mı? Açıklayınız.
Videoları önceden izleme zorunluluğunun olması öğrenmenizi olumlu ya da olumsuz etkiledi mi? Açıklayınız.
Alışma süreci öğrenmenizi olumlu ya da olumsuz etkiledi mi? Açıklayınız.

8. Ters Yüz Öğrenme yöntemiyle işlediğiniz dersi öğrendiğiniz diğer derslerle karşılaştırdığınızda öğretim elemanı ile iletişim konusundaki görüşleriniz nasıldır?
SONDA:
Öğretim elemanı duygu, düşünce, öneri ve fikirlerinizi önemsiyor muydu yoksa öğrencilere karşı kayıtsız mıydı? Açıklayınız.
Öğretim elemanı her dersin başında öğretim hedeflerini net bir şekilde açıkladı mı? Öğrenme faaliyetlerine nasıl katılınacağına dair açık talimatlar verdi mi? Öğretim elemanı, öğrenme görevleri için önemli zamanları açıkça bildirdi mi?
Öğretim elemanı, etkinliklerin daha iyi yürütülebilmesi için gerekli açıklamalar veya geri bildirimler sağladı mı?

9. Ters Yüz Öğrenme yöntemiyle işlediğiniz dersi öğrendiğiniz diğer derslerle karşılaştırdığınız zaman öğretim elemanının desteği konusunda görüşleriniz nelerdir?
SONDA:
Derslerle ya da başka konularla ilgili problemleriniz olduğunda öğretim elemanına rahatlıkla danışabiliyor muydunuz? Açıklayınız.
Öğretim elemanı rehber rolünü mü benimsedi, yoksa otorite konumunda mıydı? Açıklayınız.

10. Ters Yüz Öğrenme yöntemiyle işlediğiniz Öğretim İlke ve Yöntemleri dersinde akranlarınız ile iletişiminiz konusunda neler söyleyebilirsiniz?
Ters Yüz Öğrenme yöntemiyle işlediğiniz dersi öğrendiğiniz diğer derslerle karşılaştırdığınız zaman akranlarınız ile iletişim konusunda görüşleriniz nelerdir?

SONDA

Akranlarınızla sınıf ortamı etkileşiminizde farklılık var mıydı?

Bireysel ya da grup çalışmalarında bir birlerinizle yardımlaştınız mı? Bir birinizi cesaretlendirdiniz mi?

Grup çalışmalarında her öğrenci üzerine düşen görevi tam olarak yerine getirmek için elinden geleni yaptı mı?

Akranlarınız ile iletişiminizde farklılık varsa bu durum öğrenmenizi olumlu ya da olumsuz olarak etkiledi mi? Açıklar mısınız?

11. Ters Yüz Öğrenmeye ilişkin dönem başındaki düşünceleriniz ile dönem sonundaki düşünceleriniz arasında bir farklılık var mı? Varsa nasıl bir değişiklik var? Nedenleriyle birlikte açıklar mısınız?

SONDA:

Ders sürecindeki görevleriniz açısından farklılık var mıydı? Açıklayınız.

Kullanılan öğretim materyalleri açısından farklılık var mıydı? Açıklayınız.

Öğretim elemanı ile iletişim açısından farklılık var mıydı? Açıklayınız.

Öğretim elemanının desteği açısından farklılık var mıydı? Açıklayınız.

Akranlarınız ile iletişiminiz açısından farklılık var mıydı? Açıklayınız.

12. Ters Yüz Öğrenme yönteminin derslerde daha etkili uygulanabilmesi konusunda önerileriniz var mı, varsa nelerdir?

Ders sürecinde kullanılan videolar hakkında önerileriniz var mıydı? Açıklayınız.

Ders sürecindeki görevleriniz açısından önerileriniz var mıydı? Açıklayınız.

Yapılan bireysel ya da grup etkinlikleri hakkında önerileriniz var mıydı? Açıklayınız.

Yararlanılan sosyal medya hakkında önerileriniz var mıydı? Açıklayınız.

Öğretim elemanı ile iletişim açısından önerileriniz var mıydı? Açıklayınız.

Öğretim elemanının desteği açısından önerileriniz var mıydı? Açıklayınız.

13. Farklı bir derste, dersi veren öğretim elemanı dersin Ters Yüz Öğrenme yöntemine göre işleneceğini söylese tepkiniz nasıl olur? Neler düşünürsünüz? Açıklayınız.

SONDA:

Düşünceleriniz olumlu mu olumsuz mu olur? Açıklar mısınız?

Şaşırır mısınız? Kötü mü hissedersiniz? Korkar mısınız? Endişelenir misiniz? Zor olacağını mı düşünürsünüz? Eğlenceli olacağını mı düşünürsünüz? Yorulacağınızı mı düşünürsünüz?

## N. WEEKLY STUDENT PERFORMANCE EVALUATION RUBRIC / VİDEO ÖDEVLERİ DEĞERLENDİRME RUBRİĞİ

| DÜZEYLER | | | | | |
|---|---|---|---|---|---|
| **5** | **4** | **3** | **2** | **1** | **0** |
| • Video ders içeriğindeki tüm konulara değinilmiştir. Videodaki örneklere özetlerde değinilmiştir ve ek olarak özgün örnekler de vardır. Yazılan ifadeler doğrudur. | • Video dersteki içerikteki tüm konulara değinilmiştir. İçerikle ilgili videodaki örneklere yer verilmiştir fakat özgün örnekler yoktur. Yazılan ifadelerde birkaç hata vardır. | • Video dersteki içerikteki tüm konulara değinilmiştir. İçerikle ilgili videodaki bazı başlıklarla ilgili örnekler vardır fakat özgün örnekler yoktur. Yazılan ifadelerin yarıdan fazlası doğrudur. | • Video dersteki içerikteki tüm konulara özette değinilmiştir fakat özet anlamayı destekleyecek kadar detaylı değildir. Yazılan ifadelerin yarıdan fazlası hatalıdır. | • Sadece konu başlıkları yazılmıştır. İçerikle ilgili örnekler yoktur. Yazılan ifadelerin çoğu hatalıdır. | • Özet ödevi verilmedi. |

*Ödev zamanında teslim edilmiştir. (+1 puan)

* Moodle sistemini kullanarak teslim edilmiştir. (+1 puan)

*Derse aktif katılmıştır. (+1 puan)

## O. TEACHING TECHNIQUE PRESENTATION PLAN EVALUATION RUBRIC / ÖĞRETİM TEKNİĞİ SUNUM PLANI DEĞERLENDİRME RUBRİĞİ

| DÜZEYLER | | | | | |
|---|---|---|---|---|---|
| **5** | **4** | **3** | **2** | **1** | **0** |
| • Hedefler hedef yazma kriterlerine uygun yazılmıştır.<br>• İçerik anlaşılır bir şekilde açıklanmıştır ve hedeflerle uyumludur.<br>• Uygulaması yapılan öğretim tekniğinde hangi öğretim ilkelerine yer verildiği net olarak açıklanmıştır.<br>• Sunulan tekniğin hangi öğretim kuram/strateji ve yöntem ile ilgili olduğu nedenleri ile açıklanmıştır.<br>• Öğrencilerin nasıl değerlendirileceği belirtilmiştir. | • Hedefler hedef yazma kriterlerine uygun yazılmıştır, küçük hatalar vardır.<br>• İçerik hedeflerle uyumludur fakat kısmen açıklanmıştır.<br>• Uygulaması yapılan öğretim tekniğinde hangi öğretim ilkelerine yer verildiği kısaca açıklanmıştır.<br>• Sunulan tekniğin hangi öğretim kuram/strateji ve yöntem ile ilgili olduğu kısaca belirtilmiştir.<br>• Öğrencilerin nasıl değerlendirileceği değerlendirme bölümünde açıklanmadan sadece başlık olarak yazılmıştır. | • Hedef ifadeleri yazılırken bazı hatalar yapılmıştır.<br>• İçerik kısaca açıklanmıştır ve hedeflerle uyumludur.<br>• Sunulan tekniğin hangi öğretim ilkeleri ile ilgili olduğu açıklanmadan sadece belirtilmiştir.<br>• Sunulan tekniğin hangi öğretim kuram/strateji ve yöntem ile ilgili olduğu konusundaki açıklamalar yetersizdir.<br>• Öğrencilerin nasıl değerlendirileceği belirtilmemiştir. | • Sunum planında hedefler yazılmıştır fakat yarıdan fazlası hedef yazma kriterlerine uygun değildir.<br>• İçerik yazılmıştır fakat açıklamalar yeterli değildir.<br>• Sunulan tekniğin hangi öğretim ilkeleri ile ilgili olduğunun açıklanması eksiktir.<br>• Sunulan tekniğin hangi öğretim kuram/strateji ve yöntem ile ilgili olduğu konusundaki açıklamalar yetersizdir.<br>• Değerlendirmenin nasıl yapılacağı açıklanmamıştır. | • Sunum planı verilmiştir fakat bir cümle ile sadece başlıklar yer almaktadır. | Sunum planı verilmemiştir. |

## P. TEACHING TECHNIQUE PRESENTATION PERFORMANCE EVALUATION RUBRIC / ÖĞRETİM TEKNİĞİ SUNUMU DEĞERLENDİRME RUBRİĞİ

| BOYUTLAR | DÜZEYLER | | | | | |
|---|---|---|---|---|---|---|
| | 5 | 4 | 3 | 2 | 1 | 0 |
| **UYGULAMA BECERİLER (50 Puan)** | • Tekniğin ilkeleri doğru ve etkili kullanılmıştır.<br>• Öğrencilerin anlayıp anlamadıkları kontrol edilmiştir.<br>• Öğrencilerin sorularına oldukça uygun ve açık cevaplar verilmiştir.<br>• Hedeflere ulaştıracak uygun sorular soruldu.<br>• Sunum görsel veya işitsel materyallerle desteklenmiştir. | • Tekniğin ilkeleri bazı istisnalar dışında doğru ve etkili kullanılmıştır.<br>• Öğrencilerin anlayıp anlamadıkları genellikle kontrol edilmiştir.<br>• Öğrencilerin sorularına oldukça açık cevaplar verilmiştir.<br>• Hedeflere ulaştıracak genellikle uygun sorular soruldu.<br>• Sunum görsel veya işitsel materyallerle desteklenmiştir. | • Tekniğin ilkeleri kısmen doğru kullanılmıştır.<br>• Öğrencilerin anlayıp anlamadıkları sıklıkla kontrol edildi.<br>• Öğrencilerin sorularına verilen cevaplar kısmen eksiktir.<br>• Hedeflere ulaştıracak kısmen uygun sorular soruldu.<br>• Sunumda yeterli görsel veya işitsel materyal kullanılmamıştır. | • Tekniğin ilkeleri kısmen doğru kullanılmıştır.<br>• Öğrencilerin anlayıp anlamadıkları bazen kontrol edilmiştir.<br>• Öğrencilerin sorularına verilen cevaplar kısmen eksiktir.<br>• Hedeflere ulaştıracak kısmen uygun sorular soruldu.<br>• Anlatım yeterli görsel veya işitsel materyal kullanılmamıştır. | • Tekniğin ilkeleri kısmen doğru kullanılmıştır.<br>• Öğrencilerin anlayıp anlamadıkları kontrol edilmemiştir.<br>• Öğrencilerin sorularına verilen cevaplar genellikle eksiktir.<br>• Hedeflere ulaştıracak uygun sorular sorulmamıştır.<br>• Anlatımda yeterli görsel veya işitsel materyal kullanılmamıştır. | • Sunum yapılmamıştır. |

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|---|---|---|---|---|---|---|
| **İLETİŞİM BECERİLERİ (50 Puan)** | • Sunumu yapan öğretmen adayı, açık, anlaşılır ve akıcı bir dil kullanmıştır. Öğrencilerle göz teması kurmuştur.<br>• Ses tonu, jest ve mimikler yanında beden dili oldukça etkili kullanılmıştır.<br>• Sunum süresi oldukça etkili kullanılmıştır.<br>• Öğretme isteği ve hevesi gözlenmiştir. | • Sunumu yapan öğretmen adayı, kısmen açık, anlaşılır ve akıcı bir dil kullanmıştır.<br>• Öğrencilerle genellikle göz teması kurmuştur.<br>• Jest, mimikler ve beden dili genellikle kullanılmıştır.<br>• Sunum süresi iyi kullanılmıştır.<br>• Öğretme isteği ve hevesi gözlenmiştir. | • Sunumu yapan öğretmen adayı, bezen hızlı/yavaş konuşmuştur.<br>• Öğrencilerle bazen göz teması kurmaktan kaçınmıştır.<br>• Jest, mimikler ve beden dili bazen kullanılmıştır.<br>• Sunum süresi iyi kullanılmıştır.<br>• Öğretme isteği yerine görevi tamamlamaya çalışıldığı gözlenmiştir. | • Sunum yapan öğretmen adayı sıklıkla çok hızlı veya yavaş konuşmuştur.<br>• Sınıftakilerle göz teması kurmaktan sıklıkla kaçınmıştır.<br>• Jest, mimikler ve beden dilini sıklıkla yer verilmemiştir, sadece içerik sunulmuştur.<br>• Sunum için verilen süreye uyulsa da çok etkili kullanılamamıştır.<br>• Öğretme hevesi yerine görevi tamamlamaya çalışıldığı gözlenmiştir. | • Sunum yapan öğretmen adayı çok hızlı veya yavaş konuşmuştur.<br>• Sınıftakilerle göz teması kurmaktan tamamen kaçınmıştır.<br>• Jest, mimikler ve beden dilini genellikle yer verilmemiştir, sadece içerik sunulmuştur.<br>• Sunum süresinin dışına çıkılmıştır.<br>• Öğretme isteği ve hevesi yeterli gözlenmemiştir. | Sunum yapılmamıştır. |

## Q. THE SYLLABUS OF THE COURSE

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| **Dersin Adı:** Öğretim İlke ve Yöntemleri | **Ders Yılı/ Yarıyıl:** 2017-2018 Güz Yarıyılı |
| **Öğretim Üyesi:** | **Ders Zamanı:** Çarşamba 1-2-3<br>**Sınıf:** D6 |
| **Ders Asistanı:** Araş. Gör. Melike ÖZÜDOĞRU | **İletişim:** ozudogru123@gmail.com |

### Öğretim İlke ve Yöntemleri Ders İçeriği:

Öğretimle ilgili temel kavramlar, öğrenme ve öğretim ilkeleri, öğretimde planlı çalışmanın önemi ve yararları, öğretimin planlanması (ünitelendirilmiş yıllık plan, günlük plan ve etkinlik örnekleri), öğrenme ve öğretim stratejileri, öğretim yöntem ve teknikleri, bunların uygulama ile ilişkisi, öğretim araç ve gereçleri, öğretim hizmetinin niteliğini artırmada öğretmenin görev ve sorumlulukları, öğretmen yeterlikleri.

### Öğretim İlke ve Yöntemleri Dersi Kazanımları:

Eğitim ile ilgili temel kavramları anlar.

Öğrenme ve öğretme durumlarında uygun ilkeleri kullanır.

Hedef ifadelerinin taşıması gereken özellikleri anlar.

Farklı hedef alanlarında yer alan hedef ifadelerini uygun durumlarda kullanır.

Farklı öğretim planlarının özelliklerini anlar.

Öğretme-öğrenme kuram, model, yaklaşım, strateji, yöntem ve tekniklerinin özelliklerini bilir.

Öğretme-öğrenme kuram, model, yaklaşım, strateji, yöntem ve tekniklerinin özelliklerini anlar.

Öğretme-öğrenme koşulları için uygun kuram, model, yaklaşım, strateji, yöntem ve teknikleri kullanır.

**Çalışma Programı**

| Hafta | Konular | Zaman |
|---|---|---|
| **1.** | Dersin Tanıtımı | 20. 09. 2017 |
| **2.** | Eğitim ile İlgili Temel Kavramlar ve Etkili Öğretmen Özellikleri<br>• Eğitim<br>• Öğretim<br>• Öğrenme<br>• Öğretmen nitelikleri | 27. 09. 2017 |
| **3.** | Program Türleri ve Öğretimin Planlanması<br>• Eğitim programı<br>• Öğretim programı<br>• Ünitelendirilmiş yıllık plan<br>• Ders planı<br>• Öğretim Etkinliklerini Planlama | 04. 10. 2017 |
| **4.** | Öğretim Hedefleri<br>Eğitimde Hedefler:<br>• Hedeflerin kaynakları<br>• Hedef çeşitleri<br>• Hedef yazma ilkeleri | 11. 10. 2017 |
| **5.** | Eğitim Öğretim ile ilgili Temel İlkeler<br>• Hedefe görelik<br>• Öğrenciye görelik<br>• Öğrenci düzeyine uygunluk<br>• Bilinenden bilinmeyene<br>• Basitten karmaşığa<br>• Yakından uzağa<br>• Anlamlılık<br>• İş /Aktivite/ Uygulanabilirlik<br>• Açıklık/Ayanilik<br>• Yaşama yakınlık/Hayatilik<br>• Transfer edilebilme<br>• Somuttan soyuta<br>• Güncellik<br>• Ekonomiklik | 18. 10. 2017 |
| **6.** | Öğretim Kuram ve Modelleri<br>• Okulda Öğrenme Modeli<br>• Bireyselleştirilmiş Öğretim<br>• Tam Öğrenme<br>• Öğretim Durumları Modeli | 25. 10. 2017 |

| | | |
|---|---|---|
| **7.** | Öğretim Kuram, Model ve Yaklaşımları<br>Yapılandırmacılık<br>Çoklu Zekâ Kuramı | 01.11. 2017 |
| **8.** | Öğretim Stratejileri<br>• Sunuş Yoluyla Öğretim<br>• Buluş Yoluyla Öğretim<br>• Araştırma-İnceleme Yoluyla Öğretim | 08. 11. 2017 |
| **9.** | Ara sınav | 15. 11. 2017 |
| **10.** | Ara Sınav | 22. 11. 2017 |
| **11.** | Ara sınav sonrası | 29. 11. 2017 |
| **12.** | İşbirlikli Öğrenme<br>Öğretim Yöntemleri<br>• (Anlatım, tartışma, örnek olay, problem çözme, proje, gösterip yaptırma, bireysel çalışma yöntemi ) | 06. 12. 2017 |
| **13.** | Öğretim Yöntemleri<br>• (Anlatım, tartışma, örnek olay, problem çözme, proje, gösterip yaptırma, bireysel çalışma yöntemi ) | 13. 11. 2017 |
| **14.** | Öğretim Teknikleri<br>• Soru-Cevap<br>• Beyin Fırtınası<br>• Balık kılçığı<br>• Görüş geliştirme<br>• Altı Şapkalı Düşünme<br>• Altı Uygulama Ayakkabısı<br>• İstasyon<br>• Akvaryum,<br>• Konuşma halkası,<br>• Kartopu tekniği,<br>• Kavram Karikatürü,<br>• Mikro Öğretim,<br>• Eğitsel Oyunlar,<br>• Gösteri,<br>• Benzetim,<br>• Drama,<br>• Rol Oynama tekniği… | 20. 12. 2017 |
| **15.** | Öğretim Teknikleri (… devam) | 27. 12. 2017 |

**Önerilen Kaynaklar:**

Açıkgöz, K. (2007). Etkili öğrenme ve öğretme. İzmir: Biliş Yayınları.

Açıkgöz, K. (2003). Aktif Öğrenme (2. Baskı) . İzmir: Eğitim Dünyası yayınları.

Demirel, Ö. (2009). Kuramdan uygulamaya eğitimde program geliştirme (12. Baskı). Ankara: Pegem A Yayıncılık.

Demirel, Ö. (2008). Öğretim İlke ve Yöntemleri: Öğretme sanatı (14. Baskı). Ankara: Pegem A Yayıncılık.

Ertürk, S. (1997). Eğitimde program geliştirme. Ankara: Meteksan A.Ş.

Senemoğlu, N. (2009). Gelişim, öğrenme ve öğretim: Kuramdan uygulamaya. Ankara: Pegem A Yayıncılık.

Tan, Ş., Erciyeş, G., Güven, B., ve Kılıç, A. (2007). Öğretim ilke ve yöntemleri. Ankara: PegemA Yayıncılık.

**Değerlendirme:**

| | **Adet** | **Değer (%)** |
|---|---|---|
| **Yarıyıl (Yıl) İçi Etkinlikleri** | 6 | %50 |
| **Yarıyıl (Yıl) Sonu Etkinlikleri** | 1 | %50 |
| **Toplam** | | 100 |
| **Yarıyıl (Yıl) İçi Etkinlikleri** | **6** | **%50** |
| Ara Sınav | - | - |
| Ödevler | 4 | 20 |
| Sunum | 1 | 15 |
| Sunum Planı | 1 | 15 |
| **Yarıyıl Sonu Etkinliği-Final Sınavı** | **1** | **%50** |

# R. SAMPLE WEEKLY LESSON PLAN

## VII. HAFTA DERS PLANI

| | | |
|---|---|---|
| Kurumun Adı | Celal Bayar Üniversitesi | |
| Dersin Adı | Öğretim İlke ve Yöntemleri | |
| Bölüm | Sınıf Öğretmenliği | |
| Ünitenin Adı | Öğretim Kuram, Model ve Yaklaşımları | |
| Konu | Yapılandırmacı Öğrenme Kuramı, Çoklu Zekâ Kuramı | |
| Dersin Süresi | 50+50+50 | Tarih: 01.11.2017 |
| Öğrenci Kazanımları/ Hedef Davranışları | **Hedef**<br>Farklı öğretme-öğrenme kuram ve yaklaşımlarının (Yapılandırmacılık, Çoklu Zekâ Kuramı) özelliklerini bilir.<br>Farklı öğretme-öğrenme kuram ve yaklaşımlarının özelliklerini kavrar.<br>Farklı öğretme-öğrenme kuram ve yaklaşımlarına uygun durumlarda yer verir.<br>**Davranışlar**<br>Öğretim kuram ve yaklaşımlarının özelliklerini söyler.<br>Öğretim kuram ve yaklaşımlarının özelliklerini açıklar.<br>Farklı öğretim kuramları arasında ilişki kurar.<br>Farklı kuram ve yaklaşımları uygun durumlarda kullanır.<br>Farklı öğretme-öğrenme kuram ve yaklaşımlarına uygun plan yapar. | |
| Ünite Kavramları | Yapılandırmacı Öğrenme Kuramı, Çoklu Zekâ Kuramı | |
| Öğretme Strateji Yöntem ve Teknikleri | Bilgisayar destekli öğretim, grup çalışması, Kahoot uygulaması ile soru-cevap, Tartışma. | |
| Ders Materyalleri ve Öğretim Teknolojileri | Ders kitabı, projeksiyon, bilgisayar, internet. | |

| | |
|---|---|
| Öğretme Öğrenme Etkinlikleri | **VİDEO DERSLER (50 dk)**<br>• Video sunum boyunca Yapılandırmacı Öğrenme Kuramı ve Çoklu Zekâ Kuramın özellikleri örnekler verilerek öğretim elemanı tarafından açıklanır.<br>• Video 1: Yapılandırmacı Öğrenme Kuramı: https://h5p.org/node/131427<br>• Video 2: Çoklu Zekâ Kuramı: https://h5p.org/node/133694<br>• Video derste açıklanan her bir öğretim kuramı öğrenciler tarafından kendi cümleleriyle açıklanacak şekilde özetlenir ve kısa bir rapor hazırlanır. Hazırlanan rapor Moodle sistemine yüklenir.<br>• Öğrencilerden açıklanan öğretim kuramlarının özellikleri ile ilgili soruları cevaplamaları istenir (Video Soruları).<br><br>**YÜZ YÜZE DERSLER (50+50 dk)**<br><br>• Dersin başında öğretim elemanı dersin hedefleri konusunda öğrencilere hatırlatma yapar. (5 dk)<br>• Video derste öğrenilenlerin kısa özeti yapılır. Video da yer alan soru cevaplanır. (10 dk)<br>• Öğrencilerin farklı kuramlarla ilgili soruları sınıfta tartışılır ve gerekiyorsa düzeltmeler yapılır. (20 dk)<br>• Tartışmaların ardından bilgisayar destekli soru-cevap etkinlikleri yapılır. Öğrenciler Kahoot sisteminde hazırlanan soruları yanıtlarlar. En çok doğru cevap veren 3 öğrenci Facebook grubundan duyurulur. (15 dk)<br>• Grup çalışması olarak öğrencileri 3-5 kişilik gruplara ayrılırlar. Öğrenciler, belirledikleri bir derste ve konuda Yapılandırmacı Öğrenme Kuramı ve Çoklu Zekâ Kuramına dayanarak ders planı hazırlar. Etkinlik süresince öğrenciler farklı kaynaklardan internet ve ders kitabından faydalanabilirler. (25 dk) Hazırladıkları planı grupça sınıfa sunarlar. (25 dk) Sınıftan aldıkları dönüte göre gerekli düzeltmeleri yaptıkları raporu bir sonraki derse kadar Moodle sistemine yüklerler. |

İçerik

**YAPILANDIRMACI ÖĞRENME KURAMI**
**(Yapılandırmacı Ekol/Oluşturmacılık)**

1948'den 2000'li yıllara kadar Esasici Eğitim Felsefesi paralelinde öğretmenin merkezde olduğu, var olan kesin gerçeklerin yani nesnel bilgilerin öğrenciye aktarıldığı bir eğitim sistemi ile yetiştirildik ve ezbere eğitim yani öğretmek gibi bir kavram önemliydi.

2000'li yıllardan sonra bilginin ezberlenmesi ile **etkili ve kalıcı öğrenmenin az** olduğunun söylenmesi ile **bilgi nesnel olmasın, birey bilgiyi zihninde kendi yaşantı ve deneyimleriyle oluştursun anlayışı hakim oldu ve 2005 yılından itibaren esasici eğitim anlayışından uzaklaşıp, ilerlemeci eğitim felsefesi ve yapılandırmacı öğrenme kuramına göre eğitim ve öğretim programımızı düzenledik.** Yani **öğretmek** kavramından uzaklaşıp **öğrenmeyi öğrenme** kavramına önem verildi. **Nesnel bilgiden uzaklaşıp öznel bilgi kökenli bir eğitimi temel alıyoruz.**

Yapılandırmacılık, öğrenmenin nasıl oluştuğuna ilişkin bir kuramdır. Pozitivist geleneği reddetmektedir çünkü pozitivizme dayanan **davranışçı ve bilgi işleme kuramlarını savunanlar bilginin bireyden bağımsız olduğunu belirtmektedi**r. Oysaki insanlar doğduğu andan itibaren çevreleri ile sürekli etkileşim halindedir; çevrelerinde gerçekleşen olaylara yabancı kalamaz ve bu olayları algılamaya çalışırlar. Birey zaman içinde nesnelerle ilişkilerde bulunur ve deneyimleriyle çevresine anlam yüklemeye başlar. Bu durum bir takım öğrenmelerle sonuçlanır. Bu öğrenmelerde bireyin edilgen yapısı, yerini etkin öğrenmeye bırakır. İşte bu noktada bilginin yapılandırılmasında öğrenenin aktifliğinden söz edilir. Bu açıklamalar yapılandırmacılıkla ilişkilendirildiğinde şu tanıma ulaşılabilir **"Bilgi bireyler ya da gruplar tarafından etkin bir biçimde oluşturulur. Öğrenme bilginin pasif bir biçimde alınması değil, öğrenenin kavramlarını sürekli olarak yapılandırdığı bir süreçtir."** Bu süreçte bireyler zihinlerinde bilgiyle ilgili anlam oluşturmaya ve oluşturdukları anlamı kendilerine mal etmeye çalışırlar.

**Yapılandırmacılığa göre bilgi duyularımızla ya da çeşitli iletişim kanallarıyla edilgen olarak alınan ya da dış dünyada bulunan bir şey değildir. Tersine, öğrencinin deneyimleriyle oluşturulan öznel bir bilgidir. Yapılandırmacılık geleneksel bilgi kuramlarından farklıdır. Davranışçılık ve bilişselcilik bilen ve bilinen arasındaki ilişkiye dayanır. Başka bir ifadeyle, bilgi, bilenden bağımsız olarak bulunur. Bu nedenle bilgi kişiden kişiye değişmez. Yapılandırmacı yaklaşımda ise bilginin öğrenenin değer yargıları ve yaşantıları tarafından üretildiği düşünülür. Gerçek bilgi bireyin yaşantılarından bağımsız olarak gerçekleşemez.**

**Yapılandırmacılıkta öznel bilginin oluşturulma süreci:**
Bir öğrencinin bilgiyi oluşturması, yapılandırması ve bütünleştirici mantıkla bilgiyi kendince oluşturması için 4 temel öğe gereklidir.
*ÖZNEL OLUŞTURMA*

1. YAŞANTI +
2. DENEYİM +
3. SOSYALLEŞME +
4. ÖNBİLGİ (önbilgiler kullanılırsa öznelleştirilir.)

Yapılandırmacılık, 20. Yüzyılın ikinci yarısında öne çıkan Vico, Piaget, Vygotsky, Ausubel, Bruner, Dewey ve Glasersfeld gibi araştırmacıların çalışmalarıyla gündeme gelmiştir.

**Yapılandırmacı Yaklaşımın Öncüleri**

| **Piaget** **Bruner** | **Dewey** | **Gestalt** |
|---|---|---|
| Bilginin öznelleştirilmesinin zihnin şema oluşturmasıyla gerçekleştirileceğini savunur. | Problem çözme becerisi olmadan bilginin öznelleştirilemeyeceğine inanır. | Bütün-parça-bütün ilişkisi ile bireyin bilgiyi öznelleştireceğini savunur. |

**Bu dört öncü, zihinsel işlemlere vurgu yapmaktadır. Yani zihnin şema oluşturması, zihnin** bütün-parça-bütünü yakalaması ya da zihnin problem çözme becerisine sahip olması gerektiğine inanır. O nedenle bu yapılandırmacılık türüne **Bilişsel Yapılandırmacılık** denir. Bunun dışında Vygotsky ise sosyal çevrenin önemli olduğuna inanır ve vurgu yakınsak gelişim alanındadır. Yani birey yaşadığı sosyal çevreden soyutlanırsa (dil ve kültürden)

bilginin öğrenilemeyeceği ve öznelleşemeyeceğine inanır. Bu nedenle bu yapılandırmacılık türüne **Sosyal Yapılandırmacılık** denir.
Öznel bilgi demek =bilginin değişebilir olması,
işe yarar olması,
kullanışlı olması,
transfer edilebilen bilgi olmalıdır.
Öznel bilgi demek ≠ ezber, değişmeyen, durağan bilgiler değildir.

*****Yapılandırmacılıkta önbilgiler ile yeni bilgiler arasında bağlantılar kurup bilginin öznelleştirilmesi gerekir. Eğitim sürecinde kullanılan 2 tür bilgi vardır.**

| Birincil Bilgi Kaynakları | İkincil Bilgi Kaynakları |
|---|---|
| Henüz kitaba dergiye girmemiş öğrencinin kendi yaşantıları ile edindiği işlenmemiş ham veriler; anketlerle edinilen bilgiler, uzmanlardan edinilen bilgiler, yaparak yaşayarak öğrenilen bilgiler, simülasyon ve modeller ile öğrenilen bilgiler. | Kitap<br>Dergi<br>Ansiklopedi gibi bilginin öğrenciye hazır bir şekilde sunulduğu kaynaklardır. Daha az düzeyde etkili ve kalıcı öğrenme sağlanır. |

Örneğin, haber kaynaklarını öğretirken, kitaptan okutmak yerine öğrencilerin postaneye götürülmesi, mektup yazmanın ve göndermenin öğretilmesi, etrafta araştırma ve inceleme yapması ile daha kalıcı ve etkili öğrenme sağlanır.
Esasicilik= positivism
Yapılandırmacılık = post- positivism-ilerlemecilik-yeniden kurmacılığa dayanır.
Öğreten merkezli ezber öğrenme ve yüzeysel araştırmadan → derinlemesine araştırmaya doğru bir yönelim vardır.

*****Yapılandırmacılıkta konular temel kavramlar etrafında derinlemesine öğrenilir.** Yapılandırmacılıkta içerik tasarım modeli **sarmaldır**. Bir temel kavram öğrenciye en alt sınıf düzeyinde verilir ve sınıf düzeyi arttıkça o kavramı tekrar tekrar öğrenciye aktarılıp öğrencinin bilgiyi derinlemesine genişleterek öğrenmesinin sağlanması amaçlanmaktadır.

**Öznel bilgiyi zihninde oluşturacak olan öğrencidir. O nedenle,**

| Öğrenci | Öğretmen |
|---|---|
| Öğrenci süreçte aktiftir.<br>Sorumluluk alan bireydir.<br>Öğrenmeyi öğrenir. | Rehber-yol gösterici ve klavuzdur.<br>Bu nedenle öğretmene düşen en önemli görev bilginin öznelleşebileceği en uygun ortamı düzenlemektir. |

**Yapılandırmacılıkta Değerlendirme Süreci**
Yapılandırmacı yaklaşımla bağlantılı değerlendirmede öğrenci performansı ile ilgili karar verilir. Yapılandırmacı yaklaşımda değerlendirmenin amaçları dört noktada toplanabilir:
1) Pekiştirme sağlamak,
2) Kazandırılmış davranışın düzeltilmesi ve yeniden yapılandırılması,
3) Öğrencinin kendi kendini analiz etmesi,
Öğrencileri test etmek amacıyla; a) açık uçlu sınavlardan, b) otantik sınavlardan, c) performansa dayalı sınavlardan, d) kişisel gelişim dosyalarından ve e) kişisel görüşmelerden yararlanan yapılandırmacı yaklaşımın değerlendirmede ön plana çıkardığı özellikler aşağıda belirtilmiştir.
1) Sonuçlardan çok, öğrencinin yaşadığı öğrenme süreci değerlendirilir.
2) Grup çalışması değerlendirilir.
3) Öğrenciler ve öğretmen ölçme-değerlendirme ölçütlerini birlikte belirlerler.
4) Öğrenci başarısının değerlendirilmesi onların ortaya koydukları her türlü ürün (ödev, proje, rapor) ve sınıf içi durumları göz önünde bulundurularak yapılır.
5) Bilimsel beceriler, performansa dayalı ölçme değerlendirme ile değerlendirilebilir.
6) Öğretmen birebir kişisel görüşmeler yaparak öğrencileri değerlendirebilir.
7) Kişisel gelişim dosyaları (portfolyo) yardımı ile öğrenciler bir dönem boyunca değerlendirilerek gelişimleri incelenebilir. Amaç öğrenciyi sadece bir yönüyle değil, bilişsel, duyuşsal, devinişsel, sosyal ve ahlak yönlerinden nasıl bir gelişim gösterdiğine dair bütün yönleriyle değerlendirmektir.

**Çoklu Zekâ Kuramı**

Çoklu Zekâ Kuramı Gardner tarafından ortaya atılmıştır ve geleneksel zekâ anlayışına eleştiri olarak öne sürülmüştür.

Geleneksel zekâ anlayışına göre zekâ tektir. İnsan zihninde ya sadece sözel ya da sadece sayısal zekâ vardır. Zekâ değişmez ve gelişmez. Zekâ kalıtımla gelir. Madem zekâ değişmiyor, o zaman zekâyı ölçelim, bir zekâ ile ifade edelim diyorlar ve zekâ ya niceliksel anlam katılıyor. Örneğin, zekâ testinden 135 alan üstün zekâlı, 45 alan düşük zekâlı gibi.
Zekânın tek olmasını, değişmez ve ölçülebilir bir mekanizma olmasını ve nicel bir yapı olmasını eleştiren Gardner:

Zekâ tekil değil çok boyutludur ve kendi içinde bütünlük arz eden bir mekanizmadır demiştir. Çoklu zekâ kuramı bireylerin farklı yetenekleri olduğunu savunmaktadır. Çoklu zekâya göre her birey bu farklı zekâ boyutları ile dünyaya gelir, her bireyde bu yetenekler az ya da çok vardır. **Bu yetenekler uygun çevresel koşullar, ortamlar ve uyarıcılar sayesinde belirli bir düzeye kadar gelişir. Gardner'a göre zekâyı ölçmeye gerek yoktur ona göre zekâ ölçülmez, betimlenir.**
Gardner zekânın niteliksel boyutuna odaklanarak farklı zekâ türlerinin birlikte çalıştığını ancak bunun karmaşık yollarla gerçekleştiğini ifade eder. Ona göre bütün zekâlar eşit değerdedir ve birbirinden destek alarak bireyin problem çözmesini sağlar.
Zekânın farklı boyutları olmakla birlikte bu boyutlar birbirinden çok ayrı yapılar ya da özellikler değildir. Örneğin, bir futbol oyuncusu bedensel zekâyı koşarken, yakalarken ve vururken; uzamsal zekâyı sahayı ve diğer oyuncuların pozisyonlarını düşünürken; dil ve sosyal zekâyı oyun kurallarını öğrenirken ve takım arkadaşlarıyla paylaşımda bulunurken; öze dönük-içsel zekâyı kendini değerlendirirken kullanabilir.
Farklı zekâların baskın olması ya da olmaması durumlarını doğuran faktörler **genetik özelliklerin** yanı sıra bireyin **bilgiye ulaşım yollarının çeşitliliği, yaşadığı yerin nitelikleri, kültürel etmenler, ekonomik özellikler gibi çevresel özelliklerin** de etkisi vardır.
Gardner'ın bu çalışmaları bağlamında çoklu zekâ kuramının bireylerin farklı yeteneklerinin olduğu düşüncesiyle temellendirildiği söylenebilir. Bu nedenle öğretmenlerin temel amacı öğrencilerin bütün zekâ alanlarını geliştirmek olmalıdır. Bunun için de **farklı problem yöntem ve tekniklerine dayalı planlamalar yapmaları** gerektiği söylenebilir. Farklı zekâ alanları aşağıda açıklanmıştır.

**Sözel/Dilsel Zekâ**

Sözel zekâlı olan kişiler kelimeleri, cümleleri yani dili etkili kullanırlar.
Zengin kelime hazinesi vardır.
Hitabet yeteneği gelişmiştir.
Sözel zekâlı kişiler iyi yazar ve konuyu iyi anlatırlar.
Geliştirmek için sözlü ve yazılı anlatıma dayalı her türlü etkinlik bu zekâ alanını geliştirir.
Örneğin, sunum yapmak, tartışma ortamında öğrencilerin konuşmasını sağlamak sözel dilsel zekâyı geliştirir. Şair, yazar, gazeteciler, öğretmenler, avukatlar ve haber spikerlerinin sözel zekâları baskındır.

**Matematiksel/ Mantıksal Zekâ**

Matematiksel/ mantıksal zekâlı insanlar sebep sonuç ilişkisi kurarlar.
Bir konu hakkında neden kelimesini sürekli kullanırlar ve çok soru sorarlar.
Olaylar arasında bağlantı kurarlar. Problem çözme becerileri gelişmiştir.
Sayıları sıralama, sınıflama, istatistiksel verilerle yorumlamada iyidirler. Akıl yürütme, ayırt etme, çıkarım yapma, sonuca ulaşma vb. becerileri kolaylıkla gerçekleştirirler. Hesap yapmayı severler.
Geliştirmek için sayı oyunları, satranç oyunları, tangramlar, proje, problem çözme, örnek olay gibi etkinlikler bu zekâ alanını geliştirir.
Bilim insanları, matematikçiler, bankacılar, doktorlar, mühendisler ve muhasebecilerin matematiksel/ mantıksal zekâları baskındır.

**Görsel /Uzamsal Zekâ**

Renge, şekle ve ayrıntıya önem verirler. Üç boyut algılarlar ve düşünebilirler.
Kolaylıkla yön bulabilirler.
Görsel/ Uzamsal zekâya sahip insanlar duyduklarını değil gördüklerini akıllarında tutarlar.
Kavram haritalarını içeren öğretim, modeller, filmler, slaytlar kullanılması görsel/ uzamsal zekâyı geliştirir.
Ressamların, heykeltraşların, kaptanların, pilotların, yönetmenlerin, grafik tasarımcılarının mimarların ve modacıların görsel/ uzamsal zekâları baskındır.

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| | **Müziksel Zekâ**<br>Nota, ritm, ses tonu, melodi gibi müziksel olaylara çok yatkındırlar. Müziksel olayları hemen fark ederler. Melodileri hemen akılda tutulabilirler. Müzikle beraber çalıştıklarında daha verimli olurlar. Müziklere mırıldanarak tempo tutarlar.<br>Geliştirmek için solfej çalışmaları yapılır.<br>Müzisyenlerin, tiyatro/sinema sanatçılarının ve dansçıların müziksel zekâları baskındır.<br><br>**Bedensel/Kinestetik Zekâ**<br>Bedenlerini, ellerini ve parmaklarını etkili kullanabilirler.<br>Bedensel zekâsı gelişmiş kişiler konuşurken, bir şey anlatırken beden dillerini çok kullanırlar.<br>Beden dili olarak, koşma, zıplama, jest ve mimikler örnek verilebilir.<br>Tamir işlerini kolaylıkla yaparlar ve başkalarının mimiklerini taklit edebilirler.<br>Geliştirmek için sanat-spor etkinlikleri, drama etkinlikleri, pandomim, gösterip-yaptırma etkinlikleri ve oyun etkinlikleri kullanılır.<br>Sporcuların, sinema ve tiyatro oyuncularının, pandomim ustalarının, zanaatkârların ve cerrahların bedensel zekâları baskındır.<br><br>**Doğa Zekâsı**<br>Doğa Zekâsı gelişmiş kişiler çevreye, doğaya, hayvanlara ve bitkilere duyarlı olan bireylerdir.<br>Hayvan beslemeyi, doğayı ve toprağı çok severler.<br>Belgesel izlemek, doğa ile ilgili kitap okumak, hayvanat bahçesi ziyaretleri, doğa yürüyüşleri, gezi gözlem etkinlikleri doğa zekâsını geliştirir. Bunun için örnek olay, problem çözme ve proje yöntemleri etkili bir şekilde kullanılmalıdır.<br><br>**Sosyal Zekâ**<br>Sosyal zekâ, etrafındaki insanların duygu, düşünce istek ve ihtiyaçlarını anlama gücüdür. Empati becerileri gelişmiştir.<br>Sosyal zekâya sahip insanların bir insanı kolayca tanıma gücü vardır.<br>Liderlik özelliğine sahiptir.<br>Sosyal zekâlı insanların analiz edebilme, yorumlayabilme ve değerlendirme özellikleri yüksektir.<br>Bir etkinlik organize etmeyi, bir konuda liderlik yapmayı ve bir insana yardım etmeyi çok severler.<br>İletişime, etkileşime ve grupla çalışmaya dayalı etkinliklerde oldukça başarılıdırlar.<br>Sosyal zekâyı geliştirmek için tartışma yöntemi, beyin fırtınası tekniği, grupla çalışmaya dayalı etkinlikler ve kulüp faaliyetlerine sıkça yer verilmelidir.<br>Öğretmenlerin, politikacıların ve pazarlamacıların sosyal zekâları gelişmiştir.<br><br>**İçsel/Öze Dönük Zekâ**<br>İçsel zekâ, insanın kendini tanıması, kendisiyle ilgilenmesi, güçlü ve zayıf yanlarını fark etmesidir.<br>İçsel zekâ, kişinin kim olduğunu, ne yapmak istediğini bilme kapasitesidir.<br>Bireysel amaç belirleyip bireysel çalışmayı severler.<br>Bu nedenle tüm bireysel öğretim yöntem ve teknikleri kullanılabilir. Programlı öğretim, bireysel projeler, okumalar sıklıkla kullanılabilir.<br>Din adamlarının, felsefecilerin, mucitlerin içsel zekâları gelişmiştir. |

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| Ölçme ve Değerlendirme Etkinlikleri | **Video Dersteki Sorular:**<br><br>**Video 1**:<br><br>**Soru 1:**<br>Deneyler, modeller, gözlem, araştırma, arşivler ve görüşmelerden elde edilen veriler yapılandırmacılığa göre ikincil bilgi kaynaklarıdır.<br>Doğru/ Yanlış<br>(Cevap-Yanlış)<br><br>**Soru 2:**<br>Ders kitaplarından, test kitaplarından öğrendiğimiz bilgiler ve öğretmenin sunduğu bilgiler ikinci bilgi kaynaklarına örnektir.<br>Doğru/ Yanlış<br>(Cevap-Doğru)<br><br>**Soru 3:** Yapılandırmacı öğrenme kuramının özellikleri ile ilgili doğru seçeneği bulunuz.<br>A) Öğrenme ders kitaplarındaki bilgilerin derinlemesine öğrenilmesi önemlidir.<br>B) Eleştirel düşünme, yaratıcılık gibi üst düzey bilişsel süreçler önemlidir.<br>C) Bilginin ezberlenmesi esastır.<br>D) Yoğun bir şekilde konu aktarımı yapılır.<br>Cevap B<br><br>**Soru 4:**<br>Hangisi yapılandırmacı öğrenme kuramın özelliklerinden değildir?<br>A) Öğrencinin hayatında kullanacağı işine yarayacak bilgiler öğretilir.<br>B) Bilgi yanında özsaygı, özgüven, sabırlı olma, yardımseverlik, yaratıcılık gibi özelliklerin vurgulanması da önemlidir.<br>C) Öğrenci hataları öğrenme aracı olarak kullanılır.<br>D) Konular ve üniteler birbirinden bağımsız olarak öğrenilir.<br>Cevap D<br><br>**Soru 5:**<br>Hangisi yapılandırmacı kuramın özelliklerinden değildir?<br>A) Bilgi özneldir.<br>B) Birincil bilgi kaynaklarını kullanmak esastır.<br>C) Bilginin oluşturulmasında öğrencinin değerleri önemlidir.<br>D) Değerlendirmede ürüne önem verilir.<br>Cevap D |

**Video 2:**

**Soru 1:** Aşağıda belirtilen düşünce ya da fikirlerden hangisi Çoklu Zekâ Kuramının temel görüşlerinden birisi değildir?

A) Her insan, çeşitli zekâ alanlarının tümüne sahiptir.
B) Her insan, çeşitli zekâ alanlarından her birini yeterli bir düzeyde geliştirebilir.
C) Çeşitli zekâ alanları, genellikle bir arada karmaşık bir yapıda çalışırlar.
D) İnsanın üstün olan zekâ alanı geliştirilebilir.
Cevap D

Soru 2:
Problem çözme, neden-sonuç analiz çözümlemeleri ve tabloları, sorun çözme diyagramları, örüntü kurma, grafiksel örgütleme gibi teknikler *matematiksel/mantıksal* zekâ alanının geliştirilmesinde etkilidir.
Doğru/ Yanlış
(Cevap-Doğru)

Soru 3:
Öğretmenin grafik çizdirme, model yaptırma, kavram haritası oluşturtma ve bulmaca çözdürme gibi etkinlere yer vermesi en çok uzamsal/ görsel zekâ alanı baskın olan öğrencilerin etkili öğrenmesinde önemlidir.
Doğru/ Yanlış
(Cevap-Doğru)

Soru 4:
Yansıtma, hikaye tamamlama, proje, ev ödevi, günlük tutma ve beyin fırtınası gibi teknikler en çok içsel/ kişisel zakası baskın olan öğrencilerin öğretiminde daha verimli ve kalıcı öğrenmeler sağlar.
Doğru/ Yanlış
(Cevap-Doğru)

Soru5:
Münazara, şiir yazma, günlük tutma, gazete hazırlama, doğaçlama konuşma, rapor hazırlama gibi etkinlikler en çok sözel zekâ alanının gelişmesine katkı sağlar.
Doğru/ Yanlış
(Cevap-Doğru)

**Kahoot Soruları**

Öğrenciler Kahoot sisteminde hazırlanan soruları yanıtlarlar. (Performans değerlendirme)

**Soru 1:** Bir öğretmen İç Anadolu Bölgesini konusunda öğrencilere bölgenin haritasını gösterebilir, bölgeye özgü oyunlar oynatabilir, bölgeye özgü türküleri dinletebilir, öğrencilere bölgenin özelliklerini yansıtan bulmacalar hazırlatabilir.

Öğretme-öğrenme sürecinde yukarıda belirtilen etkinlikleri yapan öğretmenin davranışları en çok aşağıdakilerden hangisi ile ilgilidir?
A) İşbirlikli öğrenme
B) Proje temelli öğrenme
C) Çoklu zekâ kuramı
D) Yapılandırmacılık
Cevap: C

**Soru 2:** Aşağıdakilerden hangisi yapılandırmacı yaklaşıma göre öğretim yapılan sınıflarda olması gereken özelliklerden biri değildir?
A) Öğrencilerin birincil bilgi kaynaklarına ulaşmasına önem verilir.
B) Öğrenciler çoğunlukla yazılı ve çoktan seçmeli testlerle değerlendirilirler.
C) Çoklu değerlendirme teknikleri kullanılır.
D) Öğrenciler grup çalışmalarına teşvik edilirler.
Cevap B

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| | **Soru 3:** Öğrencilerinin matematiksel-mantıksal zekâsını geliştirmek isteyen bir öğretmen aşağıdaki yöntemlerden hangilerini kullanırsa bu amacına daha kolay ulaşır?<br>A) Rol oynama - Drama<br>B) Anlatım - İşbirliğine dayalı öğrenme<br>C) Neden sonuç diyagramı - Örnek olay<br>D) Soru cevap – Tartışma<br>Cevap C<br><br>**Soru 4:** Aşağıdakilerden hangisi Çoklu Zekâ Kuramının öğretim sürecinde kullanmasının en önemli özelliğidir?<br>A) Öğrenciler arasında rekabeti ortadan kaldırma.<br>B) Öğrencilerin çok yönlü gelişimlerini sağlama.<br>C) Öğrencilerin güçlü olan zekâ alanlarını geliştirme.<br>D) Öğretmenin öğrenme stratejilerini güçlendirme<br>Cevap B<br><br>**Soru 5:** Derslerinde öğrencilerin konuştukları dili etkili kullanabilmeleri amacıyla; tartışma, sunum yapma çalışmaları yanında şiir, öykü kompozisyon yazma çalışmalarına ağırlık veren bir öğretmenin, çoklu zekâ kuramına göre hangi zekâ alanını geliştirmeye çalıştığı söylenebilir?<br>A) Sözel / Dilsel zekâ<br>B) Görsel zekâ<br>C) Sosyal zekâ<br>D) İçsel zekâ<br>Cevap A<br><br>**Soru 6:** Aşağıdakilerden hangisi yapılandırmacı öğrenme kuramına göre gerçekleştirilebilecek etkinliklerden biri değildir?<br>A) Öğrencinin özgüveninin geliştirilmesine önem verilir.<br>B) Öğretmenin öğretmesinden çok rehber olmasına önem verilir.<br>C) Bilgi aşamalı bir sırada kavram haritalarından yararlanılarak aktarılır.<br>D) Gözlem, koleksiyon, sergi, tartışma gibi tekniklere yer verilir.<br>Cevap C<br><br>**Soru 7:** Öğretmen, sosyal bilgiler dersinde yaptığı sınavda öğrencilere problem durumları vermiş ve öğrencileri sınavdaki çözüm yöntemlerine göre değerlendirmiştir. Öğretmen bu sınavda hangi zekâ alanına sahip öğrencilerin daha başarılı olmalarını bekleyebilir?<br>A) Sözel / Dilsel<br>B) Görsel / Uzamsal<br>C) Mantıksal / Matematiksel<br>D) Sosyal / Bireylerarası<br>Cevap C<br><br>• Video dersteki içeriğe ilişkin hazırladıkları örnek sorular sınıfta arkadaşları tarafından tartışılarak değerlendirilir (Akran değerlendirme)<br>• Öğrencilerden sınıf etkinlikleri, videoları izleme süreçleri, sınıf çalışmalarındaki etkinliklerdeki olumlu ve olumsuz buldukları özellikleri ile ilgili olarak kendilerini değerlendirmeleri, görüş ve düşüncelerini yazmaları beklenecektir. (Öz-değerlendirme) |
| Dersin diğer Derslerle İlişkisi | • Eğitim Bilimine Giriş, Eğitim Psikolojisi, Öğretmenlik Uygulaması |
| Planın Uygulamasına İlişkin Açıklamalar | • Öğrencilerden Ters Yüz Öğrenme (TYÖ) ortamındaki sınıf etkinlikleri, sınıf çalışmaları hakkındaki deneyimleri, etkinliklerle ilgili olumlu ve olumsuz buldukları özellikleri yazmaları beklenmektedir. Ayrıca, farklı öğretim ilke ve yöntemlerini uygulayabilme ile ilgili kendi gelişimleri yansıtmaları, videoları izleme süreçleri, moodle sistemini kullanma ile ilgili deneyimleri ve dersin daha etkili yürütülebilmesi için görüş ve düşüncelerini yazmaları beklenmektedir (Her ay 1 kez yapılacaktır.)<br>• Gelecek ders için öğrencilerin yapmaları gereken çalışmalar belirtilir. |

# S. CURRICULUM VITAE

**PERSONAL INFORMATION**

Surname, Name: Özüdoğru, Melike
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Phone: 505 457 23 20
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**EDUCATION**

| Degree | Institution | Year of Graduation |
|---|---|---|
| MS | Ege University Curriculum and Instruction | 2013 |
| BS | Boğaziçi University Mathematics Teaching | 2005 |
| High School | Şehit Abdulkadir Klavuz Anatolian Teacher High School, Uşak | 2000 |

**WORK EXPERIENCE**

| Year | Place | Enrollment |
|---|---|---|
| 2011- Present | Celal Bayar University | Research Assistant |
| 2009-2011 | Ministry of National Education | Mathematics Teacher |
| 2006-2009 | TED College | Mathematics Teacher |

**FOREIGN LANGUAGES**

English

**PUBLICATIONS**

1. Özüdogru M. and Özüdogru F. “The effect of situated learning on students’ vocational English learning”. Universal Journal of Educational Research, 5(11), 2037-2044 (2017)

2. Özüdogru M. and Özüdogru F. “The effect of situated learning on students’ vocational English learning”. 5th International Congress on Curriculum and Instruction, 152. (Abstract Book /Oral Presentation) (2017)

3. Özüdogru M. “Mathematics Course Needs Assessment for Trigonometry Sub-Learning Area”. The Journal of International Social Research, 10(54), 758-770. (2017)

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5. Özüdogru M. and Özüdogru F. "Technological, pedagogical and content knowledge (TPACK) of mathematics teachers". 5th International Congress on Curriculum and Instruction, 536-536. (Abstract Book/Oral Presentation) (2017)

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12. Altıparmak K. and Özüdogru M. "Error and misconception: Relation of fraction and part-whole". International Journal of Human Sciences, 12(2), 1465-1483 (2015)

13. Ilğan A. and Özüdogru M. "Emotional Intelligence Competencies of Department Chairs Working in Higher Education Institutions According to Faculty' Perceptions". Kastamonu Education Journal, 23(2), 498-522 (2014)

**HOBBIES**

Swimming, Movies, Theater.

# T. TURKISH SUMMARY/TÜRKÇE ÖZET

## TERS-YÜZ ÖĞRENMENİN ÖĞRETMEN ADAYLARININ BAŞARI VE SINIF ORTAMI ALGILARINA ETKİSİ

### Giriş

Öğretmen eğitimi ortaya çıktığı zamandan itibaren incelenmiş, eleştirilmiş ve yeniden biçimlendirilmiştir (Cochran-Smith, 2004). Caillier ve Riordan (2009) öğretmen adaylarını eğiten kurumların ve programların, öğretmen adaylarını öğretmenlik mesleğine hazırlamada etkili olmadığı ve yirmi birinci yüzyılda beklenen takım çalışması, eleştirel düşünme, yaratıcılık, problem çözme yeteneği ve bilgi teknolojilerinin kullanımı gibi değişkenlere cevap vermediği için eleştirildiğini belirtmiştir.

Öğretmen yetiştirme programları, gerçek sınıf ortamında öğretmenlik mesleği ile ilgili içerik bilgisi, beceri ve yetenekleri uygulamaya hazırlanan öğretmen adaylarını eğitmektedir (Chiatula, 2015). Öğretmen adayları alan bilgisini edinmelerine, yüksek notlar almalarına ve hatta onur belgesi kazanmalarına rağmen, eğitim sırasında öğrendikleri teorik bilgiler ile gerçek sınıf uygulamaları arasında bağlantı kurmayı oldukça zor bulmaktadır (Chiatula, 2015; Eret, 2013).

Benzer şekilde, Eret (2013), Türkiye'deki mevcut hizmet öncesi öğretmen eğitimi programlarının en önemli sorunlarından birinin teori ile uygulama arasındaki bağlantı eksikliği olduğunu belirtmiştir. Bu nedenle, Türkiye'de hizmet öncesi öğretmen eğitimi programlarında Öğretim İlke ve Yöntemleri dersi teorik olarak öğrenilen bilgiler ile gerçek bir sınıf ortamında ihtiyaç duyulabilecek bilgi ve beceriler arasındaki bağlantıyı kurmak yer almıştır.

Horizon (2014) raporuna göre, eğitim paradigmaları davranışçılıktan yapılandırmacılığa doğru değişmektedir ve çevrimiçi öğrenme ve karma öğrenme gibi teknoloji kullanımına dayalı ve işbirlikli öğrenme etkinliklerinden faydalanılan öğretim yollarına daha fazla yer verilmesi önemli görülmektedir. Başka bir ifadeyle,

yüz yüze ve çevrimiçi ortamların avantajlarından yararlanarak, öğrencilerin bilişsel ve duyuşsal becerilerinin geliştirilmesi hedeflenmektedir (Johnson, Adams Becker, Estrada & Freeman, 2014).

Yeni nesil öğrencileri eğitmek ve öğretmenlik mesleğinde başarılı profesyoneller olarak yetiştirmek için geleneksel öğretim yaklaşımları öğrencilerin derste aktif olarak yer aldığı yöntemlerle değiştirilmelidir. Aktif öğrenme etkinlikleri için, eğitimciler ve öğrenciler daha fazla zamana ihtiyaç duyarlar ki bu durum geleneksel sınıf ortamlarının tersine çevrilmesini gerektirmektedir. 'Tersine çevrilmiş sınıf' olarak da bilinen 'Ters-yüz öğrenme', normalde sınıf içinde yapılan bilgi aktarımı gibi düşük düzeydeki öğretim etkinliklerinin sınıf dışına çıkarıldığı bir öğretim yaklaşımıdır. Ters-yüz öğrenme geleneksel sınıf tasarımını tersine çeviren, analiz, sentez ve değerlendirme gibi üst düzey görevlerin ve grup çalışmalarının sınıf içinde ev ödevi yerine yapıldığı, öğretmenin öğrencilere yardımcı olmak ve yönlendirmek için yer aldığı bir öğretim yaklaşımdır (Lage, Platt, & Treglia, 2000; Talbert, 2014).

Ters-yüz öğrenme, sınırlı ve değerli olan yüz-yüze ders saati içinde konunun anlatım yoluyla sunulmasından ziyade, bu zamanın ilgi çekici etkinlikler ve grup çalışması için kullanılması temeline dayanmaktadır. Eğitimciler kendi videolarını kaydederek veya internet videolarını kullanarak öğrencilere Bloom'un Taksonomisine göre bilme ve kavrama basamaklarında yer alan konu içeriğini ders zamanı dışında öğretebilir. Böylece, yüz-yüze ders zamanını Bloom'un Taksonomisine göre uygulama, analiz, sentez ve değerlendirme gibi üst düzey öğrenme etkinlikleri olan ödevler, projeler, grup çalışmaları ve diğer görevler için daha verimli olarak kullanabilirler.

Birçok araştırma sonucu, sınıf ortamının niteliği öğrenci gelişimi ve öğrenmesi üzerinde önemli bir etkiye sahip olduğunu göstermiştir (Afari, Aldridge, Fraser, & Khine, 2013; Dorman, Adams, & Ferguson, 2003; Fraser & Treagust, 1986; Fraser, 1998; Velayutham & Aldridge, 2013). Öğrenciler sınıf ortamlarını olumlu algıladıklarında daha iyi öğrenirler (Chionh & Fraser, 2009). Öğrenciler tarafından öğretmen-öğrenci etkileşimi açısından destekleyici olarak algılanan sınıf ortamları tehdit içeren ortamlara göre öğrencilerin ders başarılarını ve derslerden aldıkları zevki arttırmaktadır (LaRocque, 2008). Diğer taraftan, öğrenci tercihleri, grup çalışmaları ve

arkadaşlarla işbirliği açısından daha az fırsat sunduğu düşünülen sınıflar, öğrencilerin derse katılım düzeyleri ve başarı puanlarında olumsuz bir etkiye sahiptir (Wang, 2012).

Bunlara ek olarak, pek çok araştırma sonucu, sınıf ortamının öğrenci bağlılığı, memnuniyet, katılım, görev zorluğu, işbirliği, görev yönelimi ve demokrasi boyutlarının öğrenme çıktıları ile pozitif ilişkili olduğunu göstermiştir. Diğer taraftan, sınıf ortamının sürtüşme, klikleşme, ilgisizlik ve düzensizlik boyutlarının öğrenme ile negatif ilişkili olduğu belirtilmiştir (Haertel, Walberg, & Haertel, 1981; O'Reilly, 1975).

## Çalışmanın Amacı ve Araştırma Soruları

Çalışmanın amacı, ters-yüz öğrenme materyallerini geliştirmek ve Öğretim İlke ve Yöntemleri dersinde uygulayarak ters-yüz öğrenmenin öğretmen adaylarının başarıları ve sınıf ortamı algılarına etkisini araştırmaktır.

Çalışmanın amacına dayanarak, aşağıdaki araştırma soruları önerilmiştir:

1) Deney ve kontrol grupları arasında başarı testi puanlarına ve final notlarına göre anlamlı bir fark var mıdır?

2) Deney ve kontrol grupları arasında sınıf ortamı algıları (memnuniyet, işbirliği, katılım, görev yönelimi, öğrenci bağlılığı, zorluk) açısından anlamlı bir fark var mıdır?

3) Öğretmen adaylarının ters-yüz öğrenme ve sınıf ortamı hakkındaki algıları nasıldır?

## Çalışmanın Önemi

Çalışma, Öğretim İlke ve Yöntemleri dersinde ters-yüz öğrenme yaklaşımı kullanılarak gerçekleştirilmiştir. Bu ders, öğretmen adaylarının öğrenme ve uygulamada zorlandıkları çeşitli konuları içerir. Geleneksel öğretim genellikle düz anlatım yöntemini içerir. Bu nedenle, öğretmen adayları eğitim sırasında uygulama yapma fırsatı bulamadan, öğrenilen teorik bilgileri mesleğe başladıktan sonra uygulayabilmektedir. Öğretim İlke ve Yöntemleri dersinin ters-yüz öğrenme ilkeleri ile öğretimi, teorik bilgilerin yüz-yüze ders zamanının dışında sunulmasına imkân sağlayarak öğretmen adaylarının ders konuları ile ilgili bilgilerini sınıf ortamında uygulamasına ve derinleştirmesine imkân sağlar.

Bu çalışmada, sınıf ortamının memnuniyet, katılım, işbirliği, görev yönelimi, öğrenci bağlılığı, zorluk gibi psikososyal özellikleri incelenmiştir. Sınıf ortamının psikososyal özellikleri son yıllarda daha fazla ilgi görmektedir ve öğrencilerin bilişsel ve duyuşsal gelişimi için olumlu sınıf ortamı yaratmanın önemi vurgulanmaktadır. Bu nedenle, sınıf ortamının psikososyal özelliklerinin hem ters-yüz öğrenme hem de geleneksel sınıf ortamlarında araştırılması ve bu doğrultuda uygun ders tasarımlarının hazırlanması gerektiği düşünülmektedir.

Alanyazında ters-yüz öğrenme ile ilgili yapılan çalışmalar incelendiğinde, pek çok araştırma sonuçları, öğrencilerin geleneksel sınıflara göre ters-yüz öğrenme ortamlarında daha iyi öğrendiğini gösterse de, bu sonuçlar hala belirsizdir. Ayrıca, öğrencilerin ders öncesi hazırlık, öğrenme etkinlikleri, videolar ve öğretmen-öğrenci etkileşimi hakkındaki algıları ve bunların öğrenci başarısı, katılımı, memnuniyeti üzerindeki etkileri net değildir. Bu nedenlerle, bu çalışma ters-yüz öğrenmenin öğrenci başarısı ve sınıf ortamı algılarına etkisini daha iyi anlamayı planlamaktadır.

Bunlara ek olarak, ilköğretim ve ortaöğretim düzeyinde ters-yüz öğrenme ve sınıf ortamı ile ilgili birçok çalışma yapılmasına rağmen, yükseköğretim ve üniversite düzeyinde az sayıda çalışmaya rastlanmıştır. Bu nedenle, bu deneysel çalışmanın, ters-yüz öğrenme ortamlarında öğretmen adaylarının sınıf ortamı algılarına ilişkin yapılan ilk çalışmalardan biri olması ve öğretmen eğitiminin etkinliğini arttırmayı amaçlaması büyük önem taşımaktadır.

Alanyazında, ters-yüz öğrenme materyalleri ve ders tasarım süreci ile ilgili bir boşluk bulunmaktadır. Ters-yüz öğrenmeyi uygulamadan önce kullanılacak materyaller, kaynaklar ve dersin tasarım süreci ayrıntılı bir şekilde planlanmalıdır. Bu bağlamda, mevcut çalışmanın, materyaller, ders öncesi görevler, sınıf içi etkinlikler, videoların hazırlanması ve öğrenme sürecinde kullanılması hakkında bilgi sağlayarak bu boşluğu dolduracağı düşünülmektedir.

## Yöntem

### Araştırma Deseni

Bu çalışmada, hem nitel hem de nicel veriler toplanmıştır. Çalışmada açıklayıcı karma yöntem araştırma deseni kullanılmıştır (Creswell, 2012). Bu tasarımda, genel

olarak nicel verilere öncelik verilirken nitel veriler nicel veri analizinin sonuçlarını daha detaylı açıklamak için kullanılır (Creswell, 2012).

Araştırmanın nicel bölümünde, Öğretim İlke ve Yöntemleri dersinde ters-yüz öğrenmenin öğrenci başarısı ve sınıf ortamına ilişkin algılarına etkisini araştırmak amacıyla yarı-deneysel araştırma deseni kullanılmıştır. Ters-yüz öğrenme veya geleneksel öğretim yaklaşımları bağımsız değişkenler olarak tanımlanırken; öğretmen adaylarının başarıları ve sınıf ortamı algıları bağımlı değişkenler olarak tanımlanmıştır. Ters-yüz öğrenme ilkelerine göre tasarlanan öğretim deney grubunda uygulanırken, kontrol grubunda geleneksel öğretim ilkelerine göre ders planlanmıştır.

## Çalışmanın Katılımcıları

Deney grubunda 30 öğretmen adayı ve kontrol grubunda 26 öğretmen adayı yer almıştır. 30 öğretmen adayının 25'i kadın, 5'i erkektir. Ayrıca, kontrol grubunda yer alan 26 öğretmen adayının 18'i kadın, 8'i erkektir.

Araştırmanın nitel kısmına katılan öğretmen adayları, maksimum çeşitlilik örnekleme yöntemine göre seçilmiştir. Örneklem, çeşitli bakış açılarını veya özellikleri temsil etmek için seçilmiştir (Fraenkel & Wallen, 2009; Gall, Gall, & Borg, 2003). Bu sayede, verilerin ve bulguların zenginliği daha iyi sağlanmaktadır (Cohen vd., 2007). Görüşmenin katılımcıları, Öğretim İlke ve Yöntemleri dersindeki başarılarına göre seçilmiştir. Öğretmen adayları hem başarı testi puanlarına hem de final notlarına göre farklılaşmaktadır. Bazı öğretmen adaylarının başarı testi puanları düşük iken, ders öncesi hazırlık çalışmaları ve sınıf içi veya dışı ödevleri tamamlamaları nedeniyle final notları daha yüksektir. Diğer taraftan, bazı öğretmen adaylarının başarı testi puanları yüksektir fakat ders öncesi hazırlık çalışmalarını ve sınıf içi veya dışı ödevlerin hepsini tamamlamamaları nedeniyle notları fazla artmamıştır.

## Veri Toplama Araçları

Çalışmada araştırma sorularına cevaplamak için araştırmacı tarafından geliştirilen Öğretim İlke ve Yöntemleri dersi Başarı Testi, Öğretmen Adaylarının Sınıf Ortamı Algıları Ölçeği (CEPSPT), Ters-Yüz Öğrenme Öğrenci Anketi ve Görüşme formu uygulanmıştır. Veri toplama araçları aşağıda sırayla açıklanmıştır.

**Öğretim İlke ve Yöntemleri Dersi Başarı Testi**

Öğretmen adaylarının Öğretim İlke ve Yöntemleri dersinde başarı düzeylerini belirlemek amacıyla araştırmacı tarafından geliştirilen başarı testi hem deney hem de kontrol gruplarında ön test ve son test olarak uygulanmıştır. Başarı testi, çoktan seçmeli sorular ve beş maddeli eşleme tipi bir soru içermektedir. Sorular, dersin amaçları ve içeriği dikkate alınarak geliştirilmiştir. Öncelikle, Yükseköğretim Kurulu tarafından belirlenen dersin amaç ve hedefleri doğrultusunda 14 hedef geliştirilmiştir. Amaçların ve ilgili öğelerin dersin içeriğini kapsadığını doğrulamak için belirtke tablosu hazırlanmıştır. Başarı testi hazırlanırken, Öğretim İlke ve Yöntemleri ders kitapları, ilgili alanyazın ve diğer araştırmacılar tarafından geliştirilen araçlar incelenmiştir. Daha sonra, başarı testinin görünüş geçerliliğini sağlamak için uzman görüşü alınmıştır. Sorular Bloom Taksonomisinin bilgi, kavrama ve uygulama aşamalarındadır. Başarı testinin ilk formu, 44 çoktan seçmeli sorudan ve beş maddelik bir eşleme tipi sorudan oluşmaktadır. Eşleme tipi soru, eğitim, öğretim, öğrenme, program geliştirme, halk eğitimi ve hizmet içi eğitim gibi kavramlarla ilgilidir. Çoktan seçmeli sorular ise, eğitimin amaçları ve hedefleri (eğitimde amaç ve hedeflerin belirlenmesi, hedef türleri, hedeflerin sınıflandırılması ve Bloom taksonomisi), öğretimin planlanması (plan çeşitleri, planlamanın önemi), öğretim kuram ve modelleri (Yapılandırmacılık, Gagne'nin öğrenme ve öğretme kuramı, tam öğrenme, Keller'in bireyselleştirilmiş öğretim modeli, Carroll'un okulda öğretim modeli) öğretim stratejileri (sunuş yoluyla öğretim, buluş yoluyla öğretim, araştırma ve inceleme yoluyla öğretim ve işbirlikli öğrenme), öğretim yöntemleri (anlatım, tartışma, örnek olay, proje temelli öğrenme, gösterip yaptırma, problem temelli öğrenme), öğretim teknikleri (soru-cevap, beyin fırtınası, rol oynama, kavram haritaları gibi farklı teknikleri) konularından oluşmaktadır.

Başarı testinin ilk formu 2016-2017 eğitim-öğretim yılı bahar döneminde Öğretim İlke ve Yöntemleri dersini alan 486 ikinci sınıf öğrencisine uygulanmıştır. Test analiz programı (TAP, versiyon 14. 7. 4) başarı testinin madde ayırt edicilik indeksi, madde güçlük indeksi ve güvenilirlik katsayısını incelemek için kullanılmıştır. Analiz sonrasında, testten dokuz madde çıkarılmıştır. Kalan maddelerin ortalama madde güçlük indeksi 0.51, ortalama ayırt edicilik indeksi 0.37 ve KR-20 değeri 0.78 olarak bulunmuştur.

**Öğretmen Adaylarının Sınıf Ortamı Algıları Ölçeği (CEPSPT)**

Öğretmen Adaylarının Sınıf Ortamı Algıları Ölçeği (CEPSPT) hem deney hem de kontrol gruplarında son test olarak uygulanmıştır. CEPSPT geliştirirken öncelikle öğrenme ortamı araçlarının psiko-sosyal özellikleri ile ilgili kapsamlı bir alanyazın taraması yapılmıştır. Alanyazında çok sayıda sınıf ortamı aracı bulunmasına rağmen, öğretmen eğitimi sınıflarını ve özellikle Öğretim İlke ve Yöntemleri dersini değerlendirmek için uygun bir ölçme aracına rastlanamamıştır.

Alanyazında, yükseköğretim kurumları yerine ilköğretim veya ortaöğretim okullarının psiko-sosyal ortamını değerlendirmek için birçok araç geliştirilmiştir fakat yükseköğretim kurumlarında sınıf ortamlarını değerlendirmek için ölçme aracı sıkıntısı bulunmaktadır. Diğer taraftan, yükseköğretim kurumları sınıf ortamlarını incelemek için geliştirilen araçlardan biri olan CUCEI, lisans dersleri için değil, lisansüstü veya seminer sınıflarını değerlendirmek için geliştirilmiştir.

Bunlara ek olarak, yükseköğretim kurumlarındaki psiko-sosyal sınıf ortamlarını değerlendirmek için geliştirilen araçların çoğu, genel olarak, öğrencilerin belirli bir sınıf ortamındaki algılarından ziyade, yükseköğretim kurumlarındaki sınıf ortamlarına ilişkin algıları hakkında genel bilgi sağlamaktadır.

Ayrıca, yükseköğretim kurumlarındaki öğrencilerin algısını değerlendirmek için geliştirilen bazı araçların (ör. Fen laboratuvarı ortamı envanteri), doğa bilimleri dışındaki sanat ve beşeri bilimler ile ilgili alanlardaki sınıf ortamları için daha az uygun olabileceği düşünülmektedir. Farklı ölçekler dikkate alındığında, bu araçların hiçbirinin hizmet öncesi öğretmen eğitimi sınıflarında kullanılmasının uygun olmadığı söylenebilir.

Öğretmen adaylarının sınıf ortamının psiko-sosyal boyutları ile ilgili algılarını değerlendirmek üzere geliştirilen araç yapılandırmacılık, çevre uyum kuramı, ters-yüz öğrenme ilkeleri ve aynı zamanda Fraser ve meslektaşlarının (Fraser, 1980; Fraser, Anderson vd., 1982; Fraser & Fisher, 1983; Fraser vd., 1992; Fraser vd., 1996; Fraser & Treagust, 1986; Rentoul & Fraser, 1980; Taylor vd., 1997; Trickett & Moos. 1973) çalışmalarıyla uyumlu olarak geliştirilmiştir. Bu araç, sınıf ortamlarının durumunu kapsamlı olarak sunmak için Moos'un (1974) üç genel kategorisini (ilişki, kişisel gelişim ve sistem bakım ve sistem değişikliği boyutları) içerecek şekilde geliştirilmiştir.

Son olarak, CEPSPT, 38 maddeden oluşan 5'li likert tipinde (1-kesinlikle katılmıyorum 5-tamamen katılıyorum) geçerli ve güvenilir altı ölçekten oluşmaktadır: 1. Memnuniyet, 2. İşbirliği, 3. Katılım, 4. Öğrenci Bağlılığı, 5. Görev Yönelimi ve 6. Zorluk. 'Memnuniyet' ölçeği 10 maddeden oluşmaktadır (Ör: Öğrenciler bu derse gelmeyi dört gözle bekler), 'İşbirliği' ölçeği yedi maddeden oluşmaktadır (Ör. Her öğrenci bireysel veya grup çalışmalarında görevlerini tam olarak yerine getirmeye çalışır), 'Katılım' ölçeği yedi maddeden oluşmaktadır. (Ör. Öğrenciler sınıfta yürütülen etkinlikleri tamamlamak için çaba gösterir), 'Görev Yönelimi' ölçeği beş maddeden oluşmaktadır (Ör. Öğrenme görevleri açıkça ve dikkatle planlanmıştır), 'Öğrenci Bağlılığı' ölçeği beş maddeden oluşmaktadır (Ör. Öğrenciler birbirlerini iyi tanırlar) ve 'Zorluk' ölçeği dört maddeden oluşmaktadır (Ör. Öğrenciler sınıfta yürütülen grup çalışmalarında zorlanırlar). Faktörlerin güvenirlik katsayısı .72 ve .85 arasında değişmektedir.

**Ters-yüz Öğrenme Öğrenci Anketi (SQ)**

Deney grubunda yer alan öğretmen adaylarının videoları izleme ile ilgili alışkanlıkları, videolar ile öğrenmenin ve ters-yüz öğrenme ile ilgili algıları SQ aracılığıyla incelenmiştir. Öğrenci anketinin ilk kısmı kişisel sorular, ikinci bölümü ise 33 madde içermektedir. Anketin pilot çalışması için, özel bir üniversitede derslerin tümünü ters-yüz öğrenme ilkelerine göre öğrenen 259 öğrenciden anketi doldurmaları istenmiştir. Anketin Cronbach Alpha güvenirlik katsayısı .95 bulunmuştur. Ters-yüz Öğrenme Öğrenci Anketinin maddeleri mevcut araçlardan uyarlanmış ya da yeni geliştirilen olumlu ve olumsuz ifadelerden oluşmaktadır (Clark, 2013; Day & Foley, 2006; Enfield, 2013; Gaughan, 2014; Kecskemety & Morin, 2014; Turan, 2015; Ziegelmeier & Topaz, 2015; Zappe vd., 2009).

**Görüşme Formu**

Görüşmeler, deney grubunda yer alan öğreten adayları ile yapılmıştır. Görüşmeler öğretmen adaylarının ters-yüz öğrenme etkinlikleri, materyalleri, ödevleri, grup çalışmaları, öğretim elemanı ve akranları ile iletişim ve sınıf ortamı algıları hakkında görüşleri hakkında derinlemesine bilgi edinmek için yapılmıştır. Bu amaçla 14 görüşme sorusu hazırlanmıştır. Görüşme formu, mevcut araçlardan

uyarlanan veya yeni geliştirilen sorulardan oluşmaktadır (Alsancak-Sırakaya, 2015; Clark, 2013; Gaughan, 2014; Turan, 2015). Tüm öğretmen adaylarına aynı sorular aynı sırayla sorulmuştur. Öğretmen adaylarının izni alınarak görüşmeler kaydedilmiştir. Kayıtlar satır satır yazılıp, okunduktan sonra ters-yüz öğrenme ile ilgili alanyazın da dikkate alınarak kodlanmıştır.

**Öğrenci Performansını Değerlendirme Rubrikleri**

Öğretmen adaylarının farklı etkinlikler için performanslarını değerlendirmek amacıyla araştırmacı tarafından Öğrenci Performansını Değerlendirme Rubrikleri geliştirilmiştir. Bu çalışma için üç rubrik geliştirilmiştir. İlk rubrik haftalık video ödevlerini değerlendirmek, ikinci rubrik ise öğretim tekniği sunum planını değerlendirmek amacıyla geliştirilmiştir. Son olarak, üçüncü rubrik, iki bölümden oluşan öğretmen adaylarının öğretim tekniği sunumlarını değerlendirmek amacıyla geliştirilmiştir. Birinci bölüm, öğretmen adaylarının uygulamalarını değerlendirmek içindir ve "Uygulama Becerileri" (50 puan) olarak adlandırılmıştır. Bu rubriğin ikinci bölümü, öğretmen adaylarının iletişim ve sunum becerilerini değerlendirme kriterlerini içermektedir ve "Sunum Becerileri" (50 puan) olarak adlandırılmıştır.

Öğretmen adayları ödevlerini teslim ettiklerinde, öncelikle rubrik kullanılarak araştırmacı tarafından değerlendirilmiştir. Daha sonra, hem ters-yüz öğrenme hem de geleneksel öğretim grubu için her hafta rasgele seçilen altı ödev, beş öğretim tekniği sunum planı ve beş öğretim tekniği sunumu iki ayrı akademisyen tarafından rubrik kriterleri dikkate alınarak değerlendirilmiştir.

**Pilot Çalışma**

Çalışmada, gerçek uygulama sırasında karşılaşılabilecek sorunları ortadan kaldırmak için bir pilot çalışma yapılmıştır. Pilot çalışmada, videoların süresi, netliği ve anlaşılırlığı, video içeriğinin miktarı ve yüz yüze ders etkinlikleri gerçek uygulamalardan önce karşılaşılabilecek herhangi bir sorunu tespit etmek amacıyla kontrol edilmiştir.

Pilot çalışma 2016-2017 bahar döneminde Ege Bölgesi'nde bulunan bir devlet üniversitesinde Rehberlik ve Psikolojik Danışmanlık Bölümü'nde Öğretim İlke ve Yöntemleri dersinde gerçekleştirilmiştir. Anabilim dalındaki iki bölümden biri pilot

çalışma grubu olarak seçilmiştir. Grup, 15 kadın ve 15 erkekten oluşan 30 öğretmen adayından oluşmaktadır.

Pilot çalışma uygulamaları ara sınavlardan sonra başlamış ve altı hafta sürmüştür, ancak araştırmacı, ders akışını gözlemlemek ve pilot çalışma öncesi öğretmen adaylarını tanımak için dönemin başından itibaren derslere katılmıştır

Araştırmanın sonuçları, öğretmen adaylarının derse yeteri kadar hazırlıklı gelmediklerini göstermiştir. Bu nedenle gerçek uygulamada öğretmen adaylarının ders öncesi hazırlıklarının notlandırılması ve dersin yüz yüze kısmında soru sormalarının teşvik edilmeleri düşünülmüştür. Pilot çalışmada, teslim edilen yansıtıcı raporlar analiz edildiğinde, öğretmen adayları Kahoot ve Socrative gibi bilgisayar destekli uygulamaların motivasyonlarını ve katılımlarını arttırdığını belirtmiştir. Bu nedenle, gerçek uygulamalarda da dersin yüz yüze bölümünde Kahoot ya da Socrative uygulamalarının gerçekleştirilmesi planlanmıştır. Ayrıca, öğretmen adaylarının ders videolarında öğretim elemanın sesinin arkasında müzik istedikleri için gerçek uygulamalarda öğretim elemanın sesinin arkasında müzik yer almıştır.

**Verilerin Toplanması**

Bu çalışma, 2017-2018 eğitim-öğretim yılı güz döneminde, Temel Eğitim, Sınıf Öğretmenliği Bölümünde haftada üç saat olan Öğretim İlke ve Yöntemleri dersinde 11 hafta boyunca gerçekleştirilmiştir. Dönemin ilk haftası olan oryantasyon sürecinde, öğretmen adaylarına yapılacak uygulamalar, dönem boyunca kullanılacak ders materyalleri ile ilgili bilgi verilmiş, ders yönetim sistemi-Edmodo ile Facebook, WhatsApp gruplarına üyelikleri sağlanmıştır.

Deney grubunda ters-yüz öğrenme ilkelerine göre ders işlenirken, kontrol grubunda aynı araştırmacı ile aynı ders içeriği geleneksel öğretim ilkelerine göre işlenmiştir. Ters-yüz öğrenme sırasında, öğretmen adaylarına videolar dersten önce gönderilmiştir ve uygulamalar ile ödevler genellikle grup olarak ders zamanında yapılmıştır. Öğretmen adaylarının dersten önce video dersleri izlemeleri ve videoların içeriğinden öğrendiklerini özetlemeleri ve bunları ders yönetim sistemi (Moodle)-Edmodo'da paylaşmaları beklenmiştir. Her öğrencinin, videolarla ilgili en az bir soru ve video ders içeriklerine ilişkin aldıkları notlar ile derse gelmeleri beklenmiştir. Her

videoda, deney grubundaki öğretmen adaylarının konuyu öğrenip öğrenmediklerini test etmek için konuyla ilgili sorular yer almaktadır.

Yüz yüze derslerde, öncelikle öğretmen adaylarına, dersin amaçları ve hedefleri hatırlatılıp, içerik hakkında kısaca bilgi verilmiştir. Öğretmen adaylarının her bir konunun önemli noktalarını öğrenip öğrenmediklerini kontrol etmek için soru-cevap ve tartışma yapılmıştır. Daha sonra, deney grubundaki öğretmen adayları soru-cevap oyun etkinliği olan Kahoot veya Socrative uygulamalarına yönlendirilmişlerdir. Son olarak, deney grubundaki, öğretmen adayları öğrendiklerini tartıştıkları ve uyguladıkları haftalık ödevleri sınıfta tamamlamışlardır. Deney grubunda yer alan öğretmen adayları, ödevlerin değerlendirilmesi için Edmodo'ya ödevlerini yüklemişlerdir. Yüz yüze dersin süresi deney grubu için iki saatken kontrol grubu için üç saattir.

Kontrol grubunda ise, dersin konusu, araştırmacı tarafından PowerPoint slaytları kullanılarak açıklanmış, ancak ev ödevi veya diğer uygulamalar ders saatinin dışında bireysel olarak tamamlanmıştır. Deney grubu için hazırlanan ders videolarında yer alan sorular ile Kahoot ve Socrative etkinlikleri sırasında sorulan sorular kontrol grubuna sunum sırasında sınıf içinde sorulmuştur.

**Verilerin Analizi**

Çalışmada, başarı testi ve sınıf ortamı ölçeğinden toplanan veriler, tanımlayıcı ve çıkarımsal istatistiksel analiz teknikleri kullanılarak analiz edilmiştir. Verilerin analizinde SPSS 22.0 kullanılmıştır ve analiz için alfa düzeyi .05 olarak belirlenmiştir. Ters-yüz öğrenmenin öğretmen adaylarının Öğretim İlke ve Yöntemleri Dersi başarıları ve sınıf ortamı algılarına etkisini incelemek amacıyla Çok Değişkenli Varyans Analizi (MANOVA) kullanılmıştır.

Anketlerden elde edilen verilerin frekans, yüzde, ortalama ve standart sapma değerleri açıklanmıştır. Görüşmelerden elde edilen veriler, hem içerik hem de betimsel analiz teknikleri kullanılarak kodlanmış ve sonrasında temalar altında toplanmıştır (Cohen, Manion & Morrison, 2007; Fraenkel ve Wallen, 2009). Nitel veriler doyum noktasına ulaşılana kadar tekrar gözden geçirilip analiz edilmiştir (Creswell, 2012).

## Bulgular

Bu bölümde, her bir araştırma sorusu için elde edilen bulgular sırasıyla sunulmuştur.

### Ters-Yüz Öğrenmenin Öğrencilerin Öğretim İlke ve Yöntemleri Dersi Başarı Testi Puanlarına ve Final Notlarına Etkisi ile ilgili Bulgular

Çalışmada, öğretmen adaylarının başarı testleri ve final notlarına göre deney ve kontrol grubu arasında anlamlı bir fark olup olmadığını araştırmak için, başarı testi ve sınıf etkinlikleri ile toplanan veriler MANOVA kullanılarak analiz edilmiştir. Öğretmen adaylarının final notları, haftalık video ödevlerinden alınan toplam puanların % 20'si, bir öğretim tekniği sunumu & planından alınan puanların %30'u ve başarı testinden alınan puanların % 50'si alınarak hesaplanmıştır.

MANOVA analizlerinden önce, deney ve kontrol gruplarının denkliği bağımsız gruplar t-testine göre kontrol edilmiştir. Daha sonra, MANOVA analizi için verilerin uygunluğunu kontrol etmek amacıyla MANOVA varsayımları test edilmiştir. Analizi sonrası, betimsel istatistik sonuçları deney grubunda yer alan öğretmen adaylarının ortalamalarının ($M$ = 73.27, $SD$ = 9.22) kontrol grubunda yer alan öğretmen adaylarının ortalamalarına ($M$ = 62.08, $SS$ = 9.53) göre daha yüksek olduğunu göstermektedir. Ayrıca, ters-yüz öğrenme grubunda yer alan öğretmen adaylarının final notları ($M$ = 82.80, $SD$ = 5.90) geleneksel öğretim grubundaki ($M$ = 74.13, $SD$ = 6.53) öğretmen adaylarına göre daha yüksektir ($M$ = 82.80, $SD$ = 5.90).

MANOVA sonuçlarına göre, grup değişkeni her iki bağımlı değişken üzerinde anlamlı bir etkiye sahiptir. Diğer bir ifadeyle, ters-yüz öğrenme grubunda yer alan öğretmen adaylarının başarı testi puanları ($F$ (1, 54) = 27.21 $p$ < .025 ve final notları $F$ (1, 54) = 19.89 $p$ < .025 kontrol grubunda yer alan öğretmen adaylarına göre anlamlı olarak daha yüksektir.

### Ters-Yüz Öğrenmenin Öğretmen Adaylarının Sınıf Ortamı Algılarına Etkisi ile İlgili Bulgular

Çalışmada, ters-yüz öğrenmenin öğretmen adaylarının sınıf ortamı algılarına (memnuniyet, işbirliği, katılım, görev yönelimi, öğrenci bağlılığı ve zorluk) etkisini incelemek amacıyla da MANOVA kullanılmıştır. Öncelikle, verilerin uygunluğunu

test etmek için MANOVA varsayımları kontrol edilmiştir. Betimsel analiz sonuçlarına göre, iki gruptaki öğretmen adaylarının sınıf ortamının tüm boyutlarında benzer ortalama puanları vardır. Başka bir ifadeyle, ters-yüz öğrenme ve geleneksel öğretim gruplarındaki öğretmen adayları sınıf ortamını benzer seviyelerde algılamışlardır. Örneğin, ters-yüz öğrenme grubunda yer alan öğretmen adaylarının memnuniyet boyutu için ortalamaları $M$ = 41.03 ($SD$ = 4.99) iken geleneksel öğretim grubunda yer alan öğretmen adaylarının ortalamaları $M$ = 42.33 ($SD$ = 3.91) dür. Benzer şekilde ters-yüz öğrenme grubunda olan öğretmen adaylarının, öğrenci bağlılığı için ortalamaları $M$ = 21.47 ($SD$ = 3.14) iken geleneksel öğretim grubunda yer alan öğretmen adaylarının ortalaması $M$ = 20.96 ($SD$ = 2.57) dır.

MANOVA sonuçlarına göre, bağımsız değişken 'grup', bağımlı değişkenler üzerinde anlamlı bir etkiye sahip değildir F (6, 49) = .63 p > .05. Diğer bir ifadeyle, ters- yüz öğrenme grubunda veya geleneksel grupta yer almanın öğretmen adaylarının sınıf ortamı algıları üzerinde anlamlı bir etkisi yoktur. Memnuniyet $F$ (1, 54) = .98 $p$ > .008; işbirliği $F$ (1, 54) = .35 $p$ > .008; katılım $F$ (1, 54) = .80 $p$ > .008; görev yönelimi $F$ (1, 54) = .88 $p$ > .008; öğrenci bağlılığı $F$ (1, 54) = .43 $p$ > .008 ve zorluk $F$ (1, 54) = .54 $p$ > .008.

## Öğretmen Adaylarının Ters-Yüz Öğrenmeye İlişkin Algıları ile İlgili Bulgular

Öğretmen adaylarının ters-yüz öğrenmeye ilişkin algıları Ters-Yüz Öğrenme Öğrenci Anketi (SQ) ve görüşme formundan elde edilen verilerin analizine göre aşağıda sırasıyla incelenmiştir.

### *Öğretmen Adaylarının Ters-Yüz Öğrenmeye İlişkin Ters-Yüz Öğrenme Öğrenci Anketinden Elde Edilen Görüşleri*

Ters-Yüz Öğrenme Öğrenci Anketi (SQ) analizine göre, öğretmen adaylarının videoları izlerken her zaman not aldıkları (% 86.7) ve bazı bölümleri tekrar izledikleri (% 50) bulunmuştur. Diğer taraftan, öğretmen adaylarının % 43'ünün sınıfta sorulmak üzere soru yazmadıkları sonucuna ulaşılmıştır.

Bunlara ek olarak, öğretmen adaylarının algılarına göre, videolarla öğrenmek, geri dönüp tekrar tekrar izleme olanağı sunması ve dersleri kendi kendilerine telafi etme fırsatı sağlaması nedeniyle öğretmen adaylarının öğrenmelerini olumlu yönde

etkilemiştir (% 100). Ayrıca, sesli görseller içermesi (% 90), öğretim elemanı ile sınıf içi ve dışı etkileşimi artırması (% 90) ve istenilen ortamda ders içeriğine erişim sağlaması (% 86.6) nedenleriyle öğretmen adaylarının derse olan ilgileri artmıştır. Diğer taraftan, öğretmen adaylarının % 76.7'si videolar ile öğrenmenin teknik sorunlar nedeniyle yetersiz kaldığı, % 66.7'si ise diğer derslerde kullanılan yöntemlerden daha zor olduğu görüşlerine katılmamaktadır.

Öğretmen adaylarının algılarına göre, öğretmen adayları, ters-yüz öğrenmenin diğer yöntemlerle öğretilen derslerden daha fazla kazanım sağladığını (% 86.7), öğrenmeyi desteklediğini ve kolaylaştırdığını ve teorik bilgileri uygulamada etkili olduğunu görüşlerine katılmaktadır (% 90). Ayrıca, öğretmen adaylarının algılarına göre ters-yüz öğrenme eğlencelidir (% 76.7) ve farklı teknolojilerin kullanımı nedeniyle diğer yöntemlere göre ilgilerini daha çok çekmiştir.

Kişisel öğrenmeye katkısı bakımından öğretmen adayları, ters-yüz öğrenmenin kendi kendine öğrenme (% 86.7), bağımsız öğrenme (% 93.3), planlı ve sistematik çalışma (% 76.7), araştırma ve keşfetme (% 63.3) becerilerini desteklediğini ve sosyal etkileşimi (% 73.4) artırdığını ifade etmiştir. Diğer taraftan, öğretmen adaylarının % 46.7'si ters-yüz öğrenmenin daha fazla zaman gerektirdiği ve % 70'i çok fazla etkinlik olması nedeniyle dikkat dağıtıcı olduğu fikirlerine katılmamıştır.

### *Öğretmen Adaylarının Ters-Yüz Öğrenmeye İlişkin Görüşmelerden Elde Edilen Görüşleri*

Betimsel ve içerik analizi sonuçlarına göre üç tema ortaya çıkmıştır. Bunlar, "öğretmen adaylarının ters-yüz öğrenmeye ilişkin algıları", "öğretmen adaylarının ders öncesi bölüm ile ilgili algıları" ve "öğretmen adaylarının ders süreci ile ilgili algıları"dır.

### *Öğretmen Adaylarının Ters-Yüz Öğrenmeye İlişkin Algıları*

İçerik analizine göre, öğretmen adaylarının ters-yüz öğrenme teması hakkındaki algılarının iki alt temaya sahip olduğu belirlenmiştir. Bunlar ters-yüz öğrenme ile ilgili "ilk izlenimler" ve "algılardaki değişiklikler" dir.

İçerik analizine göre, ilk olarak öğretmen adayları ters-yüz öğrenme hakkında olumlu görüşlere sahip olmadıkları belirlenmiştir. Çok başarılı öğretmen adayları,

diğer sorumluluklarının yanı sıra, bu yöntemden kaynaklanan etkinlikler ve ödevler nedeniyle korkmuşlardır. Orta ve daha düşük başarılı öğretmen adayları ise aşina olmadıkları bir yöntem olması nedeniyle korkmuş ve şaşırmışlardır. Ayrıca, öğretmen adayları, ilk derste ters-yüz öğrenme aktiviteleri ve görevleri ile ilgili yapılan açıklamalar nedeniyle ağır bir iş yükü hissettiklerini belirtmişlerdir. Bu nedenle, dönem başında tüm öğretmen adaylarının önyargılı olduğu belirlenmiştir. Öğretmen adaylarının ilk izlenimleriyle ilgili bir yanıt şöyledir:

> *Me (Düşük Başarı): Çok önyargılıydım çünkü bilmediğimiz bir yöntemdi ve bana çok fazla çaba sarf etmem gerek gibi gelmişti. Bununla birlikte, bu şekilde öğrenme çok daha kolaydı, konular birikmedi…sınav için çalışacağım, ama diğer derslere çalıştığım gibi çalışmayacağım çünkü sınıfta çok şey öğrendim.*

Bununla birlikte, öğretmen adaylarının dönem başında ters-yüz öğrenme ile ilgili düşünceleri ile dönem sonundaki düşünceleri arasında çok fazla fark olduğu belirlenmiştir. Başlangıçta öğretmen adayları video izlemenin öğrenmeye katkısı olacağına inanmadıklarını belirtseler de, dönem sonunda videoların düşündüklerinden çok daha fazla katkıda bulunduğunu ve videolarla öğrenmenin kalıcı olacağına inandıklarını belirtmişlerdir.

Ayrıca, öğretmen adaylarının değişen algıları ters-yüz öğrenme ile ilgili yaptıkları tanımlarda da görülebilir. Öğretmen adaylarının yaptıkları tanımlamalar, görüşmede yer alan tüm öğretmen adaylarının ters-yüz öğrenme ile olumlu görüşleri olduğunu göstermektedir. Öğretmen adaylarının ters-yüz öğrenme ile ilgili yaptıkları tanımlamalarından bazıları şöyledir:

> Ga (Yüksek Başarılı): İstediğimiz ortamda öğrenmeyi sağlayan bir yöntem.
>
> Nu (Yüksek Başarılı): Hem eğlenceli hem de öğrenmesi kolay bir yöntem.
>
> Ra (Yüksek Başarılı): Kalıcı öğrenmeyle sonuçlanan bir yöntem.
>
> Fa (Orta Başarılı): Zor ama öğretici bir yöntem.

Bunlara ek olarak, öğretmen adaylarının ters-yüz öğrenme ilkelerine göre planlanan bir başka dersi de almaya istekli olmaları düşüncelerinin dönem başına göre olumlu yönde değiştiğini göstermektedir.

### *Öğretmen Adaylarının Ders Öncesi Bölüm ile ilgili Algıları*

İçerik analizine göre, öğretmen adaylarının ders öncesi bölüm hakkındaki algılarının üç alt temaya sahip olduğu belirlenmiştir. Bunlar 1) videolar, 2) materyaller ve 3) hazırlık süreci'dir.

Öğretmen adaylarının videolarla ilgili cevapları yedi alt tema altında sınıflandırılmıştır. Bunlar: öğretmen adaylarının 1) videoların ses ve görüntüsü, 2) videolardaki bilgi miktarı, 3) videoları izleme isteklerini artıran ve azaltan unsurlar, 4) videoların tekrar tekrar izlenmesinin öğrenmeye etkisi, 5) videoların gönderilme zamanının uygunluğu, 6) öğretmen adaylarının yüz-yüze dersler öncesi videoları izleme zorunluluğunun öğrenmeye etkisi ve 7) internet videoları hakkındaki düşünceler.

İçerik analizi sonuçlarına göre, görüşme yapılan tüm öğretmen adaylarının genel olarak videolarla ilgili görüşlerinin olumlu olduğu belirlenmiştir. Öğretmen adayları, videoların seslerinin ve görüntülerinin açık ve anlaşılır olduğunu belirtmiştir. Ayrıca, öğretmen adayları videoların yeterli bilgi içerdiğini ve konuyu öğrenmelerine yardımcı olduğunu belirtmiştir. Öğretmen adayları, görsel bileşenleri, slaytlar yanında öğretim elemanının açıklamalarını, sınıf etkinliklerine ve tartışmalara katılma isteklerini ve video sorularını doğru cevaplama isteklerini videoları izlemeye teşvik eden unsurlar olarak belirtmişlerdir. Diğer taraftan, öğretmen adayları internetten kaynaklanan problemleri ve arka fondaki müziği, video izleme isteklerini azaltan unsurlar olarak belirtmişlerdir. Öğretmen adaylarının videoları izleme isteklerini etkileyen unsurlar hakkındaki bazı yorumları şöyledir:

> Bu (Yüksek Başarılı): Videoları izleme isteğimi azaltan hiçbir unsur yoktu, ancak videoyu izlemediğimde, ertesi gün sınıf etkinliklerine katılmayacağımı biliyordum. Bu durum beni videoları izlemeye teşvik etti...Sınıfta konuşmak istediğimden videoları dinledim.
>
> Me (Orta Başarılı): Hem sorular vardı hem de maviyle belirtilmiş farklı videolar ekliyordunuz… Bence oldukça yeterli ve faydalıydılar.

Ayrıca öğretmen adayları, ne zaman ihtiyaç hissederlerse videoları tekrar izleyebildiklerini belirtmişlerdir. Ayrıca, öğrenci anketinde tüm öğretmen adayları, videolarda geri dönme ve tekrar izleme imkanının olmasını öğrenmelerini olumlu yönde etkilediğini belirtmişlerdir (bkz. Tablo 4.7).

Öğretmen adayları, dersi öğrenmek için konuyla ilgili internet videolarını izlemediklerini belirtmişlerdir. Öğretim elemanı tarafından gönderilen videoların, internet videolarından daha anlaşılır açık ve kısa olduğunu belirtmişlerdir. Ters-yüz öğrenmede kullanılan videolarla ilgili bir öğretmen adayının görüşleri şöyledir:

> Bu (Yüksek Başarılı): İnternette yer alan videolardan izledim, yaklaşık iki saat civarında sürüyor...konuyu çok uzun anlatıyorlar…ama gönderdiğiniz videolar ile konuyu net bir çerçevede kısa sürede öğrenebildik…

Bunlara ek olarak, öğretmen adayları ders kitaplarını ve internette yayınlanmış makaleleri kullandıklarını belirtmişlerdir. Ancak, yüksek, orta ve düşük düzeyde başarılı olan öğretmen adaylarının, farklı kitaplardan ve internetten öğrenmek yerine video içeriğini öğrenmeyi tercih ettikleri gözlemlenmiştir. Ters-yüz öğrenmede kullanılan materyaller ile ilgili bazı öğretmen adaylarının görüşleri şöyledir:

> Ga (Yüksek Başarılı): Başlangıçta Kpss kitabından çalıştım… ama video derslerinin içeriğini daha faydalı buldum. Bu nedenle tamamen kitapları bıraktım ama şimdi sınava hazırlanırken bir kitaptan sorular çözeceğim.
>
> En (Yüksek Başarılı): Ders kitabından yararlandım...ve hatta ders kitaplarını bazı uygulamalarda kullanmak üzere sınıfa getirdik.

Öğretmen adaylarının ödev göndermek ya da video izlemek için kullanmaları gereken ders yönetim sistemi Edmodo hakkında hem olumlu hem de olumsuz düşünceleri bulunmaktadır. Ters-yüz öğrenmede kullanılan Edmodo ile ilgili görüşlerden bazıları şöyledir:

> Nu (Yüksek Başarılı): Bence Edmodo ile ev ödevi göndermek güzeldi...Bence elde yazmaktan daha kolaydı.

> En (Orta Başarılı): Edmodo bana çok fazla katkıda bulunmadı çünkü kullanıcı adımı ve şifremi aldıktan sonra unuttum...Bireysel ödevlerin çoğunu elden teslim ettim videoları Facebook'tan izledim…

Bunlara ek olarak, öğretmen adayları, ters-yüz öğrenme ile diğer derslerin hazırlanma sürecindeki benzerlikleri ve farklılıkları da belirtmişlerdir. Yüksek, orta ve düşük düzeyde başarılı öğretmen adayları, diğer derslere hazırlanmadan katıldıklarını belirtmişlerdir. Derslere hazırlık süreci ile ilgili olarak bir öğretmen adayının görüşleri şöyledir:

> Mu (Yüksek Başarılı): Diğer derslere hazırlanmadan katılıyoruz… Yani, herhangi bir hazırlık çalışması yapmıyoruz...dersle ilgili herhangi bir kitap ya da makale okumadık...Bu derse hazırlanırken videoları izliyor ve özetliyorduk ve derse hazır geliyorduk ki bu durum daha iyi öğrenmemize katkıda bulundu...sınıfta yapılan etkinliklere katılmak için konuyu bilmemiz gerekiyordu.

### *Öğretmen Adaylarının Ders Süreci ile İlgili Algıları*

İçerik analizine göre, öğretmen adaylarının ders sürecine ilişkin algılarının dört alt temaya sahip olduğu belirlenmiştir. 1) öğretim materyalleri, 2) katılım, 3) etkinlikler ve 4) etkileşim.

Öğretmen adayları Kahoot ve Socrative uygulamalarını çok sevdiklerini belirtmiştir çünkü bu bilgisayar destekli etkinliklerinin hem eğlenceli olduğu hem de öğrenmeyi teşvik ettiği belirtilmiştir. Bu durum aynı zamanda sınıf ortamının algılanan memnuniyet özelliği ile de eşleştirilebilir. Ters-yüz öğrenme sırasında kullanılan bu farklı materyallerin, öğretmen adaylarının, etkinliklerde kontrollü yarış, eğlenme ve öğrenme duygusu ile dersten memnun olmalarına yardımcı olduğu belirlenmiştir. Bu nedenle de, sınıf ortamının algılanan zorluk özelliği de azalmıştır. Öğretmen adayları sınıf içi etkinliklerden memnun olduklarında, ders katılımlarının arttığı ve dolayısıyla da sınıf ortamının algılanan zorluk düzeyinin azaldığı belirlenmiştir.

Bunlara ek olarak, sınıf içi aktivitelerle ilgili olarak, yüksek, orta ve düşük düzeyde başarılı öğretmen adayları, laboratuvar dersi dışında, diğer derslerde herhangi bir etkinlik yapılmadığını belirtmişlerdir. Diğer derslerin yoğun olarak geleneksel yaklaşımlara uygun olarak işlendiği belirtilmiştir. Öğretmen adayları, öğretim

elemanlarının çoğunlukla slaytları okumaları nedeniyle, sınıfa gitmenin fazladan bir katkısı olmadığını belirtmiştir.

Diğer taraftan, Öğretim İlke ve Yöntemleri dersinde öğretmen adayları sınıfta çeşitli görevler / etkinlikler gerçekleştirmişlerdir. Öncelikle, öğretmen adayları ters-yüz öğrenmenin güçlü yönlerinden birinin teorik bilgiyi uygulayabilmek olduğunu belirtmişlerdir. Örneğin, kavram haritaları ve örnek ders planları hazırlamanın yanında farklı grup görevlerini tamamlamışlardır. Dolayısıyla, öğretmen adaylarının görüşlerine göre öğrenme daha kalıcı olmuştur. Bunlara ek olarak, çeşitli görevlerin sınıfta birlikte tamamlanması samimi bir ortam yaratmış, öğretmen adaylarının birbirleriyle olan iletişimi gelişmiştir, birbirlerine karşı önyargıları kırılmış ve yeni arkadaşlar edinmişlerdir.

Ayrıca, öğretmen adayları diğer derslerde fazla ödev olmadığını, olsa bile internetten kopyalayıp yapışmanın kabul edildiğini belirtmişlerdir. Diğer taraftan, Öğretim İlke ve Yöntemleri dersinde öğretmen adaylarının özgün ödevler hazırlamaları istenmiştir, örneğin farklı öğretim tekniklerinin hangi derste hangi konuları öğretirken kullanılabileceği ile ilgili özgün örnekler yazmaları beklenmiştir.

Bunlara ek olarak, öğretmen adayları ters-yüz öğrenmenin öğretim elemanı ile ve akranları ile aralarındaki iletişim ve etkileşimlerini olumlu yönde etkilediği ve olumlu sınıf ortamına katkıda bulunduğunu belirtmişlerdir. Öğretim elemanının, öğretmen adaylarının duygu, düşünce, öneri ve fikirlerini dikkate aldığı belirtilmiştir. Ayrıca, ters-yüz öğrenme grubunda yer alan öğretmen adaylarının derste yapılan etkinlikler nedeniyle akranlarıyla olan etkileşimleri ve iletişimleri artmıştır, öğretmen adayları grup çalışmalarında birbirlerine yardımcı olmuş ve öğrenciler üzerlerine düşen sorumlulukları yerine getirmişlerdir. Bunlar sınıf ortamının işbirliği ve öğrenci bağlılığı özellikleri ile ilgilidir. Böyle ortamlarda öğrenciler birbirlerine yardım eder ve destekler. Ayrıca, bu çalışmada da deneyimlendiği gibi, öğretmen adayları konuları öğrenirken veya görevleri tamamlarken birbirleriyle rekabet etmek yerine işbirliği yapmışlardır.

## Tartışma ve Öneriler

Bu bölümde, her bir araştırma sorusu için elde edilen bulgular alanyazın ve önceki araştırmalar doğrultusunda tartışılıp, ters-yüz öğrenme ve sınıf ortamı ile ilgili uygulamaya dönük ve gelecekteki araştırmalar için öneriler sunulmuştur.

### *Ters-Yüz Öğrenmenin Öğrencilerin Öğretim İlke ve Yöntemleri Dersi Başarılarına Etkisi*

Araştırmanın sonuçlarına göre, ters-yüz öğrenme grubunda yer alan öğretmen adaylarının geleneksel öğretim grubunda yer alanlara göre başarı testi puanları ve final notları anlamlı olarak daha yüksek bulunmuştur.

Bu sonucun nedenlerinden biri, ters-yüz öğrenme grubunda yer alan öğretmen adaylarının, video izleyerek, özetleyerek ve bilgiyi dersin yüz yüze kısmında uygulayarak ders için geleneksel grupta bulunan öğretmen adaylarına göre daha fazla zaman harcamaları olabilir. Ters-yüz öğrenme grubundaki öğretmen adayları, ders videolarını izlerken ihtiyaç duyduklarında geri dönme ve bazı bölümleri tekrar tekrar izleme ve not alma fırsatı bulmuşlardır. Diğer bir ifadeyle, ters-yüz öğrenme grubunda bulunan öğretmen adaylarının ders hazırlıkları, kontrol grubunda bulunan öğretmen adaylarından daha fazladır. Ayrıca, ters-yüz öğrenme grubunda bulunan öğretmen adaylarının, ders konularına slaytlar yanında öğretim elemanının açıklamaları, You Tube'den örnek videolar ve ders kitapları gibi farklı yollarla ulaşma imkânına sahip olmaları, farklı öğrenme stilleri ve tercihlerine sahip öğretmen adaylarının derse katılımını artırmış olabilir.

Ayrıca, ters-yüz öğrenme grubunda bulunan öğretmen adaylarının soruları, kontrol grubundaki öğretmen adaylarına göre yüz yüze derslerde öğretim elemanının etkinlik esnasında sınıfta bulunması nedeniyle daha çabuk yanıtlanmıştır. Ters-yüz öğrenme grubunda bulunan öğretmen adayları, dersin yüz yüze bir bölümünde kontrol grubuna göre farklı aktiviteler gerçekleştirmeleri, arkadaşlarıyla ve eğitmenleriyle grup etkinliklerinde yer almaları nedeniyle birbirlerinden öğrenme fırsatı bulmuşlardır ve hepsi ortak görevleri için çaba harcamışlardır. Öğretmen adaylarının teknolojiyi kullanmaları hem sınıfta hem de sınıf dışında arkadaşlarıyla ve öğretim elemanlarıyla olan iletişimlerini geliştirmiştir. Belirtilen tüm bu özellikler ters-yüz öğrenme grubunda bulunan öğretmen adaylarının öğrenmelerini olumlu yönde etkilemiş

olabilir. Bunlara ek olarak, Kahoot ve Socrative gibi öğrenci yanıt sistemlerinin derste kullanılması öğrencileri motive etmiş ve tartışmaların kalitesini ve öğrencilerin performanslarını da artırmış olabilir (Cohn & Fraser, 2015; Guess, 2008; Martyn, 2007). Bu nedenle, öğretmen adaylarının başarıları artmıştır ki bu bulgu alanyazında yer alan pek çok çalışmanın bulguları ile de uyumludur (Alsancak-Sırakaya, 2015; Boyraz, 2014; Davies vd., 2013; Day & Foley, 2006; Fulton, 2012a; Guc, 2017; Love vd., 2014; Mason vd., 2013; Saglam, 2016; Talley & Scherer, 2013; Tune vd., 2013; Turan, 2015; Wilson, 2013).

### *Ters-Yüz Öğrenmenin Öğretmen Adaylarının Sınıf Ortamı Algılarına Etkisi*

Çalışmada, sınıf ortamı ölçeğinden elde edilen bulgulara göre, ters-yüz öğrenme ve kontrol grubundaki öğretmen adaylarının sınıf ortamı algıları istatistiksel olarak farklı değildir. Bunun nedeni öğretim elemanının desteğinden kaynaklanmış olabilir. Her iki gruptaki öğretmen adayları sorun yaşadıklarında sorunlarının öğretim elemanı tarafından çözülebileceğini bilmeleri ve öğretim elemanının her iki grup tarafından da e-posta veya WhatsApp yoluyla ulaşılır olarak algılanması, iki grupla da sorunları olduğunda ilgilenilmesi öğretmen adaylarının sınıf ortamının özelliklerini benzer algılamalarına neden olmuş olabilir.

Ters-yüz öğrenme ve kontrol grubundaki öğretmen adayları sınıf ortamını istatistiksel olarak benzer algılamalarının bir başka nedeni anket yorgunluğundan kaynaklanabilir. Bu ölçek, öğretmen adaylarının üniversite genelindeki ders değerlendirme anketini tamamlamalarının gerektiği ve birçok sınava girdikleri yarıyıl sonunda uygulanmıştır ki bu durum birçok öğrencinin ölçeği doldururken kaliteli zaman ve çaba harcamamasına neden olmuş olabilir. Bu durum da öğretmen adaylarının sınıf ortamına yönelik algılarının farklılaşmamasına neden olmuş olabilir. Bunlara ek olarak, CEPSPT'nin maddelerinin 5'li Likert tipinde olması (5-kesinlikle katılı, 1-kesinlikle katılmıyorum), ters-yüz öğrenme ve kontrol grubundaki öğretmen adaylarının algıları arasındaki farkı yansıtacak şekilde geniş bir yelpazede cevap seçenekleri sunmamış olabilir. Pek çok öğretmen adayının dar bir aralıkta cevap vermesi, onların sınıf ortamı algılarını daraltmış ve benzer olmalarına neden olmuş olabilir.

Ayrıca, ters-yüz öğrenme ve kontrol grubundaki öğretmen adayları, sınıf ortamının memnuniyet özelliğini benzer algılamışlardır. Ters-yüz öğrenme grubundaki öğretmen adaylarının memnuniyetinin nedeni, dersin yüz yüze kısmında yürütülen grup görevlerinden ve farklı materyal kullanımından kaynaklanmış olabilir. Ters-yüz öğrenme grubundaki öğretmen adayları Kahoot ve Socrative gibi bilgisayar destekli etkinliklerin çok eğlenceli olduğunu, kontrollü yarış ve azim duygusu yaşadıkları için konuyu öğrenmede etkili olduğunu belirtmişlerdir. Bu tür etkinliklere yer vererek öğrenmenin bir kitaptan konuyla ilgili soruları çözmekten daha teşvik edici olduğunu belirtmişlerdir. Diğer taraftan, hızlı internet bağlantısının olmaması ve öğretmenin sesinin arkasındaki müzik gibi farklı teknolojik sorunlar, öğretmen adaylarının memnuniyetini olumsuz yönde etkilemiş olabilir. Ayrıca, bazı öğretmen adayları için videolar çok ilgi çekici bulunmamış olabilir ve haftalık toplam video süresi uzun olabilir ki bu durum da ters-yüz öğrenme grubundaki öğretmen adaylarının memnuniyet puanlarını olumsuz yönde etkilemiş olabilir. Bu nedenle, ters-yüz öğrenme ve kontrol grubundaki öğretmen adayları benzer sınıf ortamı memnuniyet puanlarına sahip olmuş olabilir.

Bu çalışmada, ters-yüz öğrenme ve kontrol grubundaki öğretmen adayları, işbirliği açısından benzer sınıf ortamı algısına sahiptir. Bunun nedeni, ters-yüz öğrenme grubundaki çalışmalarda, bazı grup üyelerinin diğer öğretmen adaylarına göre pasif kalmış olması olabilir. Ödevler gruplar halinde tamamlandığında, grup arkadaşlarından bazılarının pasif olması halinde, diğerlerinin daha fazla çalışması gerekmiş olabilir ki bu durum bazı öğretmen adayları için sınıf ortamının katılım, öğrenci bağlılığı, işbirliği ve memnuniyet özelliklerini olumsuz yönde etkilemiş olabilir.

Çalışmada, ters-yüz öğrenme ve kontrol grubundaki öğretmen adayları, sınıf ortamının görev yönelimi özelliğini benzer düzeylerde algılamışlardır. Bu durumun nedenleri, her iki gruptaki öğretmen adayları için de öğretim sırasında dikkat edilmesi gereken kural ve işlerin açıkça belirlenmiş olması, faaliyetlere uygun yönlendirmeler yapılması, başarı için uygun standartların belirlemiş olması ve dersin hedeflerine ulaşmak için sıkı bir şekilde yönlendirilmeleri olabilir. Ayrıca, bu sonucun bir başka nedeni, ters-yüz öğrenme grubunda bulunan öğretmen adayları teknolojik materyalleri kullanmaları gerektiği için ve kendi öğrenmelerinden kontrol grubundaki öğrencilere

göre daha fazla sorumlu olmaları gerekmiştir. Bu gruptaki öğretmen adayları doğru yolda olup olmadıklarını öğrenmek için kendilerine sağlanandan daha fazla yönlendirmeye ihtiyaç duymuş olabilirler. Öğretmen adaylarının yeterli yönlendirme yapılmadığını düşünmeleri bu boyuttaki puanlarını olumsuz yönde etkilemiş olabilir.

Çalışmada, ters-yüz öğrenme ve kontrol grubunda bulunan öğretmen adayları sınıf ortamını zorluk yönünden benzer algılamışlardır. Ters-yüz öğrenme hem sınıf öncesi hazırlık hem de sınıf içi aktif katılım gerektirmesine rağmen, ters-yüz öğrenme grubundaki öğretmen adayları bu görevleri zor olarak algılamışlardır ve kontrol grubundaki öğretmen adaylarına benzer düzeyde zorluk algılayıp dersten memnun kalmışlardır.

### *Öğretmen Adaylarının Ters-Yüz Öğrenme ile ilgili Algıları*

Öğretmen adaylarının ters-yüz öğrenme ile ilgili algıları incelendiğinde öncelikle bu yönteme alışkın olmadıkları için korktuklarını ve şaşırdıklarını belirtmişlerdir. Bunun nedeni, öğretmen adaylarının öğrenme ve duyuşsal sonuçlar açısından yararlarını fark edinceye kadar yeni bir yönteme alışmaları için zamana ihtiyaç duymaları olarak açıklanabilir. İçerik analizi sonuçlarına göre, öğretmen adaylarının, dönem sonunda alanyazın bulguları ile de uyumlu olarak, ters-yüz öğrenme hakkında olumlu görüşleri vardır (Alsancak-Sırakaya, 2015; Bishop & Verleger, 2013; Butt, 2014; Ceylaner, 2016; Cibik, 2017; Clark, 2013; Davies vd., 2013; Findlay-Thompson & Mambourquette, 2013; Gaughan, 2014; Guc, 2017; Love vd., 2014; Murphree, 2014; Turan, 2015). Bu sonucun nedeni, öğretmen adaylarının, ters-yüz öğrenmenin olumlu yönlerini fark etmelerinden kaynaklanmış olabilir. Öğretmen adaylarının görüşleri bu yöntemin aktif öğrenme imkânlarını içermesi, esnek ve etkileşimli öğrenme ortamı sağlaması, öğretimde teknolojiye yer vermesi nedenleriyle eğlenceli olarak algılanması ve öğretmen adaylarının öğretim elemanı ve akranlarıyla etkileşiminin artması gibi birçok avantajı nedeniyle olumlu yönde değişmiş olabilir.

## Öneriler

Bu bölümde, elde edilen sonuçlara göre uygulamaya dönük ve gelecekteki araştırmalar için önerilerde bulunulmuştur.

Öğretmen adayları, görsel bileşenlerin, slaytlarla birlikte öğretim elemanının açıklamalarının, You Tube'den eklenen videoların ve videolarda yer alan soruların video izlemelerini teşvik eden unsurlar olduğunu belirtmiştir. Bu nedenle videoların, uzun ders anlatımları yerine kısa ve anlaşılır olması, internet linkleri ve sorularla zenginleştirilerek etkileşimli olmaları önerilmektedir.

Öğretmen adaylarının ders öncesi çalışmalarını desteklemek, öğrenme sırasındaki yüklerini hafifletmek ve katılımlarını arttırmak amacıyla sosyal medya kullanımı yoluyla öğrencilerin kendi aralarında ve öğretim elemanı ile etkileşimleri sağlanmalıdır.

Bazı öğrenciler, hızlı bir internet bağlantısı olmadığında, Edmodo'nun yüklenme süresinin fazla zaman aldığını belirtmiştir. Bu problem nedeniyle, öğretmen adayları bazen görevlerini geç teslim etmişlerdir ya da güçlü bir internet bağlantısına erişmek için fakülteye gelmeleri gerekmiştir. Bu nedenle, ters-yüz öğrenme uygulamalarından önce, teknolojik ekipman ve güçlü internet bağlantısı sağlanması önerilmektedir. Ayrıca, öğrencilere videoları izlemeleri, haftalık özetleri ve soruları hazırlamaları ve öğretim elemanına geri göndermeleri için yeterli süre sağlanması önerilmektedir.

Ters-yüz öğrenmenin belirtilen sınırlılıklarından biri, öğrencilerin bir konuyu öğrenmek için uygun olmayan zamanlarda da videoları izleyebilmeleridir. Örneğin, öğrenciler futbol maçı ya da film izlerken de videoyu izleyebilirler. Bu nedenle, öğrencilerin sınıf içi etkinliklerde yer alacak kadar hazır oldukları ve öğrendikleri ders notları, sınıf tartışmaları, video soruları veya quizler yoluyla kontrol edilmesi önerilmektedir.

Sınıf ortamına ilişkin önemli faktörlerden biri, öğrencilerin sınıf içi etkinliklerden memnun olmalarıdır ki bu durum hem öğrenmeye ve hem de olumlu sınıf ortamı algılarına katkıda bulunmaktadır (Afari, 2013; Arısoy, 2007; Chionh & Fraser, 2009; Dorman vd., 2003; Dotterer & Lowe, 2011; Fraser, 1998; Fraser & Treagust, 1986; Goh & Fraser, 2000; Haertal vd., 1981; Roth, 1998; Velayutham & Aldridge, 2013; Zandvliet, 1999). Öğrenciler Kahoot ve Socrative gibi bilgisayar uygulamalarını kullanarak yarıştıkları için, dersin yüz-yüze yapılan kısmında çok eğlendiklerini belirtmişlerdir. Ayrıca, birçok öğrenci bu oyunlarda başarılı olmak için ders öncesinde videoları izlediklerini belirtmişlerdir. Bu nedenle, öğretim elemanlarını

farklı bilgisayar uygulamaları, yazılımlar ve oyunlar hakkında bilgilendirmek için hizmet-içi kurslar düzenlenmesi önerilmektedir.

Araştırma sonuçlarına göre, uygun bir sınıf ortamının öğrenci katılımı için önemli olduğu görülmektedir. Öğretim elemanları gerektiğinde öğrencilerin sorunlarını çözmelerine yardım ederek ve onlara destek olarak öğrenci katılımını artırmak, öğrenciler arasında işbirliği ve etkileşimi teşvik ederek, belirli görevlerin tamamlanmasını sağlamak ve öğrencilere içeriği orta zorlukta sunarak olumlu sınıf ortamının sağlanmasında önemli rol ve sorumluluklara sahiptir. Bu nedenle, sınıf ortamı boyutlarının önemi hakkında öğretim elemanları için hizmet-içi kurslar düzenlenmesi önerilmektedir.

Bazı öğrenciler daha önce kullanmadıkları Edmodo'ya ve diğer teknolojik materyallere kolayca adapte olmadıklarını belirtmişlerdir. O nedenle ters-yüz öğrenme ile ilgili farklı bir çalışma tasarlanırken, öğretmen adaylarının dönem başında sınıf etkinlikleri, ödevler, Edmodo, video dersler ve sosyal medya hesaplarına üyelik ve kullanımları ile ilgili bilgilendirilmeleri önerilmektedir.

Çalışmada, öğrencilerin akranlarıyla ilişkilerinin öğrenmelerini olumlu yönde etkilediği belirlenmiştir. Bu nedenle, öğrencilerin konuyu öğrenirken birbirlerine yardımcı olabilecekleri, birbirlerini destekleyebilecekleri olumlu bir sınıf ortamı oluşturmak için öğrencilere birlikte çalışma fırsatları sunulması önerilmektedir.

Çalışmada, öğrenciler sınıf içi grup etkinliklerde yer aldıklarını, sorular sorduklarını, görüşlerini açıkladıklarını, fikirlerini grup üyeleriyle paylaştıklarını, poster ve örnek ders planları hazırladıklarını ve birlikte sunduklarını belirtmişlerdir. Bunlar, öğrencilerin öğrenme sürecini aktif olarak etkileyen, öğrencilerin öğrenmeleri üzerinde önemli bir etkiye sahip olan sınıf ortamının katılım boyutu ile ilgilidir. Bu nedenle, öğrencilerin teorik olarak öğrendiklerini uygulamaları için farklı fırsatlar sunulması önerilmektedir.

Çalışmada, öğretmen adayları grup çalışması sırasında bazılarının pasif olduğunu belirtmişlerdir. Ters-yüz öğrenmenin özerklik ve akran öğrenmeye birlikte önem vermesi nedeniyle, öğretmenlerin sürekli olarak öğrencileri izlemeleri ve grup çalışmaları sırasında tüm öğrencilerin aktif olarak çalışmasına dikkat edilmesi önerilmektedir. Ayrıca, eğitimcilerin dersin yüz-yüze bölümünde yürütülen grup

çalışmaları sırasında öğrencilerin sadece etkinlikle mi ilgilendiği yoksa ders dışı konuşmalar mı yaptıkları konusunda dikkatli olmaları önerilmektedir.

Ayrıca, bazı öğrenciler videolardan etkili bir şekilde öğrenebilirken, bazıları ders kitabını okuyarak, dersi dinleyerek veya uygulama sorularını tamamlayarak daha etkili öğrenebilirler. Bu nedenle, tüm öğrenci ihtiyaçlarına uygun bir öğretim için videolar, ders kitapları, örnekler, grup çalışmaları, ders planı hazırlama etkinlikleri, öğrenci-yanıt sistemleri ve kavram haritalarının hazırlanması gibi farklı öğretim yöntemleri ve materyallerine üst düzey öğrenme fırsatları için yer verilmesi önerilmektedir.

Özetle, çalışmanın bulgularının, eğitimciler için kendilerini sınıf ortamının olumlu ve olumsuz özelliklerini dikkate alarak öğretimi tasarlamaları konusunda yararlı bulgular sağladığı düşünülmektedir. Daha kapsamlı ve derin eğitimsel sonuçlar ve çıkarımlar için, yeni araştırmalara ihtiyaç duyulmaktadır. Bu nedenle, bu çalışmanın bulgularına dayanarak, gelecekteki araştırmalar için yapılabilecek bazı öneriler aşağıda belirtilmiştir:

Ters-yüz öğrenmenin uzun vadede etkisini görmek için boylamsal bir çalışma tasarlanabilir. Ters-yüz öğrenme ve kontrol grubunda yer alan öğretmen adayları, hangi yöntem ve teknikleri uyguladıkları konusunda okul deneyimi dersinde gözlemlenebilir. Bu iki farklı grupta yer alan öğretmen adayları öğretimlerinde aktif öğretim yöntem ve tekniklerini kullanmaları konusunda karşılaştırılabilir.

Öğretmen adayları ile yapılan görüşmelerde sınıf ortamının farklı boyutlarının başarılarını etkilemiş olabileceği belirlenmiştir. Bu nedenle, gelecek araştırmalarda sınıf ortamının hangi boyutlarının öğretmen adaylarının ders başarılarını önemli ölçüde etkilediği araştırabilir.

Çalışmada, öğretmen adaylarının gerçek sınıf ortamına yönelik görüşleri araştırılmıştır. Daha sonraki araştırmalarda, öğretmen adaylarının hem gerçek hem de daha çok tercih edebilecekleri sınıf ortamı algıları araştırabilir ve öğrenme ortamları arasındaki farklılıkları azaltmak için gerekli önlemler alınabilir.

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