

Innovative Redesign of Teacher Education ICT Courses: How Flipped Classrooms Impact Motivation?*

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Abstract

The purpose of this study is to determine the impact of the flipped classroom method on student motivation and what related factors increase and decrease motivation. The study followed the mixed research method and the sample of the study consisted of 116 first grade early childhood education undergraduate students at a university in Turkey. This study was conducted in an introductory computer course. The flipped classroom method is compared to traditional techniques in this study. Data were collected through semi-structured interviews and a course interest survey in this 10-week mixed method study. Inferential and descriptive analysis methods were applied to the data. An independent samples t-test was used to determine the difference between experimental and control groups in terms of motivation. The interviews were analyzed with descriptive analysis method. Results showed that students who were trained with the flipped classroom method had more motivation than students who were trained with traditional methods. Students reported that hands-on in-class activities, group work, and gamification activities increased their motivation. Additionally, students reported that the difficulty level of in-class activities, watching videos, and dealing with the course outside of the classroom decreased their motivation. Consequently, when designed effectively, the flipped classroom method can increase the students' motivation towards the course. Also, suggestions for practitioners were discussed in this study.

Keywords: flipped classroom, teacher education, blended learning, flipped learning

* This study is derived from the first author's PhD dissertation.

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Öğretmen Eğitiminde Bilişim Teknolojileri Derslerinin Yenilikçi Şekilde Yeniden Tasarımı: Ters Yüz Sınıf Yöntemi Motivasyonu Nasıl Etkiler?

Öz

Bu çalışmanın amacı, ters yüz sınıf yönteminin öğrenci motivasyonuna etkisini ile yöntemin kullanımında motivasyonu artıran ve azaltan etkenleri belirlemektir. Çalışmada karma araştırma yöntemi kullanılmıştır ve çalışmanın örneklemini Türkiye’de yer alan bir üniversitede öğrenim görmekte olan, 116 birinci sınıf okul öncesi öğretmenliği bölümü lisans öğrencisinden oluşmaktadır. Bu çalışma bilgisayar dersi kapsamında yürütülmüştür. Çalışmada, ters yüz sınıf yöntemi geleneksel yöntemle karşılaştırılmıştır. 10 hafta boyunca yürütülen bu karma çalışmada, veriler yarı yapılandırılmış görüşme formu ve ders ilgi anketi aracılığıyla toplanmıştır. Çıkarımsal ve betimsel analiz yöntemleri kullanılarak veri analizi yapılmıştır. Bağımsız gruplar t-testi kullanılarak deney ve kontrol grupları arasında motivasyon açısından oluşan farklılık belirlenmiştir. Yarı yapılandırılmış görüşmeler ise betimsel analiz yöntemi kullanılarak analiz edilmiştir. Bulgular; ters yüz sınıf yöntemi ile eğitim gören grubun geleneksel yöntemle eğitim gören gruba göre motivasyonunun daha yüksek olduğunu göstermiştir. Öğrenciler, sınıf içi uygulamalı aktivitelerin, grup çalışmasının ve oyunlaştırma aktivitelerinin motivasyon düzeylerini artırdığını belirtmişlerdir. Bunlara ek olarak, öğrenciler, sınıf içi uygulamalı aktivitelerin zorluk düzeylerinin, videoları izlemenin ve ders dışında da ders ile ilgilenmenin motivasyonlarını azalttığını belirtmişlerdir. Sonuç olarak, ters yüz sınıf yöntemi, etkili bir şekilde tasarlandığında, öğrencilerin derse karşı motivasyonlarını artırtabileceği söylenebilir. Ayrıca bu çalışmada, uygulayıcılar için öneriler de tartışılmıştır.

Anahtar Sözcükler: ters yüz sınıf yöntemi, öğretmen eğitimi, karma öğrenme, ters yüz öğrenme

Introduction

Parallel to the rapid changes in the field of information technology, the role of people in society has been transforming, too. Access to information has become widespread, requiring more meaningful environments and focused use of instructional technologies in school education (Kong, 2014). Education, also affected by these technological changes, plays a crucial role in raising productive members of contemporary society. These changes have prompted new instructional approaches and improved technology integration in education from preschools to universities. In order to train students for the future, preservice teachers need modern education, since they are the key to technology integration (Krueger, Hansen, & Smaldino, 2000). In this respect, teachers should be well educated and use technology in a professional manner (Cavanaugh, 2003; Koh, 2011). Mishra and Koehler (2006) reported that computer using competencies of teachers is the main component required for technology integration. Studies in the literature have revealed that technology use in schools is inadequate and that teachers do not use tools appropriately (Akarawang, Kidrakran & Nuangchalerm, 2015). The inability of teachers to use emerging technologies has brought teacher education to the center of attention. In their studies, Ertmer, Evenbeck, Cennamo, and Lehman (1994) showed that class activities, experiences applied in the classroom to improve computer skills, were more effective than time spent working with a computer independently. Additionally, Akarawang, Kidrakran, and Nuangchalerm (2015) stated that ICT training should contain more practical applications and blended training. Increasing activities in the classroom and applying a constructivist learning approach, the flipped classroom method can be beneficial for ICT courses in teacher education. In addition, even though the demand for student-centered education has become widespread, inefficient and antiquated teaching methods are still being promoted in teacher education and utilized in schools (Sykes, Bird, & Kennedy, 2010). Accordingly, it is important to analyze the use of the flipped classroom in teacher education alongside active and effective learning methods.

The flipped classroom is an instructional approach that differs from the traditional lecture by switching the places and times of homework and lectures and by providing the opportunity to study more actively and collaboratively (Abeysekera & Dawson, 2014; Chen, Wang, Kinshuk, & Chen, 2014; Fraga & Harmon, 2014; Street, Gilliland, McNeil & Royal, 2015). The flipped classroom is not a new teaching method but a subset of blended learning (Staker & Horn, 2012). Staker and Horn (2012) stated that blended learning has four different subcategories, including rotation, flex, self-blend and enriched virtual, and flipped classroom method fall into the rotation category.

Insufficient studies were found in the literature on flipped classrooms in teacher education. Despite its popularity, experimental studies related to the topic is quite limited (Abeysekera & Dawson, 2014; Chen et al., 2014; Fraga & Harmon, 2014; Kong, 2014; Roach, 2014). While flipped classrooms can be created in many ways, the general process includes recording course content as a video, sharing the video with students, and doing classroom activities under the guidance of the teacher (Tucker, 2012).

Several factors affect the success of students within the learning process. One of these factors is motivation, which may be the most important factor of instructional design (Keller, 1979). Studies on motivation in the literature have identified a positive correlation between motivation and learning (Means, Jonassen, & Dwyer, 1997). Keller (1983) defined motivation as a concept that affects the direction and magnitude of behavior, which later affects revealed effort. In this study, motivation was analyzed pursuant to the ARCS theory

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of Keller, who identified four critical components that affect motivation during learning: attention, relevance, confidence and satisfaction.

Newby, Stepich, Lehman, and Russel (2006) have underlined how the usage of technology in a learning environment may have both positive and negative effects, depending on the teaching method. Therefore, it is important to analyze the effects of the flipped classroom method on motivation in order to decrease concerns about the method and extend its usage.

This study aims to determine the effects of the flipped classroom, which is considered an effective teaching method, on motivation. This study is important in terms of accelerating research on teacher education and directing transformations to programs and curriculums in this area. Additionally, this research will contribute the literature related flipped classroom. Four research questions led the study:

1. What are the attention (A), relevance (R), confidence (C), and satisfaction scores of experimental and control group students at the end of this learning process?
2. Is there a meaningful difference between the general motivation (ARCS) of the experiment and control group students at the end of the learning process?
3. What are the opinions of students about the factors that trigger motivation in a flipped classroom?
4. What are the opinions of students about the factors that adversely affect motivation in a flipped classroom?

Method

Mixed research methods were applied in this study, which analyzed factors that increased or decreased motivation in the flipped classroom method and the effect of this method on student motivation. More specifically, mixed research classification was used, as explained by McMillan and Schumacher (2010). Concurrent triangulation was also applied since there were research questions for both qualitative and quantitative paradigms and since qualitative and quantitative data were collected with equal priorities, simultaneously and without considering any order. Posttest control group quasi-experimental design was used for the quantitative dimension of the study. For the qualitative dimension, interviews were conducted with students to determine their views on factors that affected their motivation.

Sampling

This study was conducted in an introductory computer course class with 116 first grade early childhood education students at a major university in Turkey. Participants were divided into experimental and control groups, with 58 students receiving education via a flipped classroom and the remainder receiving traditional lessons.

Data Collection Tools

For the quantitative dimension of the study, the Course Interest Survey (CIS) scale of Keller and Subhiyah (1987) was used. The survey was used to measure the motivation of students toward the course. The five-point Likert scale consists of 34 items and 4 dimensions: attention, relevance, confidence, and satisfaction. The scale was translated to Turkish by Acar (2009). The reliability of scale was found as 0.93. Data were collected via semi-structured interviews for the qualitative dimension of the study.

Application Process

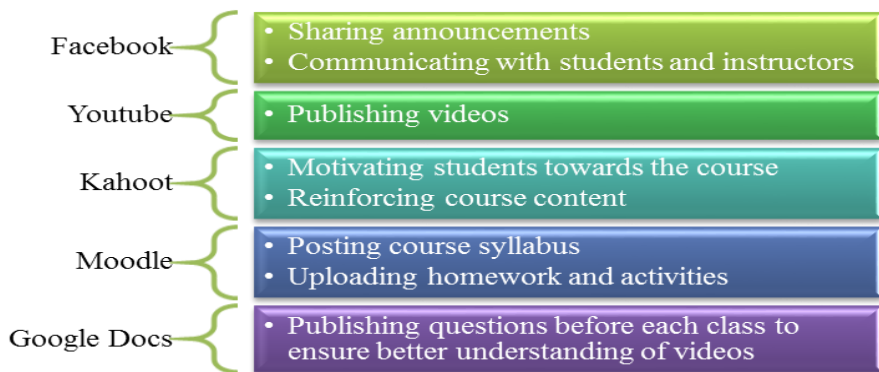
The study was conducted in a teacher education computer course designed to enhance fundamental computer skills of preservice teachers such as use of presentation applications, spreadsheet applications, and general Internet and teaching technologies. The application lasted 10 weeks. The students in the control group covered course topics in traditional ways, whereas the experimental group covered the same content using the flipped classroom method. In the flipped classroom, videos were given to students before classes and homework was done during class time. In traditional teaching, content was covered during class and activities were assigned as homework. Surprise questions were placed in the videos to encourage students in the experimental group to watch them. The same questions were asked to control group students and gave the same reinforcements to control external variables between control and experimental groups.

Separate Facebook groups were created for the experimental and control groups. The flipped classroom videos and worksheets were posted on Facebook group, as well as announcements regarding course content. In addition, a YouTube channel was created to publish videos. Before each lesson, the videos prepared by the researchers were uploaded and announced on the Facebook group. Worksheets were prepared using Google Docs and given to experimental students before class to reinforce important parts of the videos. The same questions were asked of the experimental and control group students on worksheets and end-of-course evaluations, respectively, to control the external variables in two groups.

In the flipped classroom application, students were asked whether they understood the whole content of the videos, and questions about the videos were answered before starting the lesson. Later, a question-answer activity about course content was conducted using an online website called Kahoot. The Kahoot activity was also applied to the control group students at the end of the lessons. This application generated a Top 5 list of successful students, which was shared in both of the Facebook groups with the aim of increasing student motivation.

In the flipped classroom method, the new directive for the week was uploaded to the learning management system Moodle after completing the Kahoot activity. The course syllabus was also posted on Moodle, and students in the experimental group used it to submit in-class activities, while control group students uploaded their homework answers to Moodle. All online websites and applications used in the study are shown in Figure 1.

Figure 1. *Tools used in experimental and control groups and their aims*



Data Analysis

An independent samples t-test and descriptive analysis methods were used to determine whether there was a difference between the experimental and control groups in terms of the motivation variable. Descriptive analysis was applied to interview responses to determine the motivation scores of experimental group students. All statistical analysis was based on a 0.05 significance level.

Role of the Researchers

In order to avoid potential effects of teacher differences, all lectures of both groups were conducted by the one of the researchers. Qualitative interviews were conducted by different PhD students to encourage frankness in participants. The analysis of all qualitative and quantitative data was done by the researchers.

Findings

Motivation Levels of Experimental and Control Groups Students

This section reveals the descriptive analysis of answers from students trained with the flipped classroom method and traditional method based on the CIS scale in dimensions of attention, relevance, confidence, and satisfaction. The CIS scale is a five-point Likert scale (1 is agree least and 5 is agree most).

Descriptive data related to attention for the experimental and control groups

The descriptive analysis of answers given by students in the experimental and groups to questions in the attention dimension of the scale is shown in Table 1.

Table 1. *Descriptive data for experimental and control groups students related to attention*

Item No	Item	Experimental Group		Control Group	
		M	Sd	M	Sd
24	The instructor uses an interesting variety of teaching techniques.	4.10	1.266	2.81	1.277
21	The instructor does unusual or surprising things that are interesting.	3.41	1.451	2.22	1.402
1	The instructor knows how to make us feel enthusiastic about the subject matter of this course.	3.38	1.268	2.66	1.001
29	My curiosity is often stimulated by the questions asked or the problems given on the subject matter in this class.	3.16	1.348	2.50	1.260
15	The students in this class seem curious about the subject matter.	3.12	1.186	2.48	1.080
4	This class has very little in it that captures my attention.	2.28	1.152	2.79	1.281
10	The instructor creates suspense when building up to a point.	1.55	.976	1.62	.895
26	I often daydream in this class.	1.33	.846	4.36	1.195

As shown in Table 1, outstanding findings showed that the students found the methods and techniques used in the flipped classroom interesting (Items 24, 21, and 1) and thought that the questions and problems sparked curiosity in the experimental group. In addition, the students agreed least that the instructor created suspense while teaching or that they daydreamed in class. However, the students who were in control group agreed most the they daydreamed in class. Additionally, the motivation means of control group students generally lower than experimental group students' motivation levels.

Descriptive data related to relevance for the experimental and control groups

The descriptive analysis of answers given by students in the experimental and groups to questions in the relevance dimension of the scale is shown in Table 2.

Table 2. *Descriptive data for experimental and control groups students related to relevance*

Item No	Item	Experimental Group		Control Group	
		M	Sd	M	Sd
2	The things I am learning in this course will be useful to me.	4.12	.993	3.81	1.221
28	The personal benefits of this course are clear to me.	4.03	1.108	3.55	1.314
22	The students actively participate in this class.	3.55	1.079	2.67	1.098
5	The instructor makes the subject matter of this course seem important.	3.36	1.224	2.79	1.361
23	To accomplish my goals, it is important that I do well in this course.	3.34	1.505	2.86	1.357
20	The content of this course relates to my expectations and goals.	3.16	1.089	2.67	1.316
13	In this class, I try to set and achieve high standards of excellence.	3.10	1.483	2.59	1.439
25	I do not think I will benefit much from this course.	1.59	1.243	4.03	1.376
8	I do not see how the content of this course relates to anything I already know.	1.29	.795	4.28	1.268

As shown in Table 2, students gave the highest scores to “The things I am learning in this course will be useful to me,” “The personal benefits of this course are clear to me,” and “The students actively participate in this class.” On the other hand, students gave the lowest scores to the following items: “I do not think I will benefit much from this course” and “I do not see how the content of this course relates to anything I already know.”

However the students who were in control group gave the highest scores to “I do not see how the content of this course relates to anything I already know” and “I do not think I will benefit much from this course”.

Descriptive data related to confidence for the experimental and control groups

The descriptive data of the answers given by the students in the experimental group to questions in the confidence dimension of the scale are shown in Table 3.

As shown in Table 3, students who were in the experimental group gave the greatest scores to “As I am taking this class, I believe that I can succeed if I try hard enough,” “I find

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the challenge level in this course to be about right: neither too easy nor too hard,” and “Whether or not I succeed in this course is up to me.”

The lowest scores were given to the following items: “You have to be lucky to get good grades in this course” and “The subject matter of this course is just too difficult for me.” In contrast, students who were in the control group gave the highest score to “The subject matter of this course is just too difficult for me” and “You have to be lucky to get good grades in this course”.

Table 3. *Descriptive data for experimental and control groups students related to confidence*

Item No	Item	Experimental Group		Control Group	
		M	Sd	M	Sd
27	As I am taking this class, I believe that I can succeed if I try hard enough.	3.81	1.191	3.28	1.436
30	I find the challenge level in this course to be about right: neither too easy nor too hard.	3.48	1.246	3.17	1.230
9	Whether or not I succeed in this course is up to me.	3.45	1.287	3.60	1.324
3	I feel confident that I will do well in this course.	3.41	1.364	3.05	1.220
17	It is difficult to predict what grade the instructor will give my assignments.	3.33	1.456	2.47	1.477
34	I get enough feedback to know how well I am doing.	3.21	1.239	2.81	1.370
6	You have to be lucky to get good grades in this course.	2.22	1.612	3.57	1.488
11	The subject matter of this course is just too difficult for me.	2.00	1.124	3.66	1.264

Descriptive data related to satisfaction for the experimental and control groups

The descriptive data of answers given by the students in the experimental group to questions in the satisfaction dimension of the scale are shown in Table 4.

Table 4. *Descriptive data for experimental and control groups students related to satisfaction*

Item No	Item	Experimental Group		Control Group	
		M	Sd	M	Sd
33	The amount of work I have to do is appropriate for this type of course.	3.62	1.335	3.40	1.297
7	I have to work too hard to succeed in this course.	3.50	1.246	2.83	1.216
19	I feel satisfied with what I am getting from this course.	3.38	1.485	2.83	1.546
18	I am pleased with the instructor’s evaluations of my work compared to how well I think I have done.	3.05	1.480	2.52	1.405
32	I feel that I get enough recognition of my work in this course by means of grades, comments, or other feedback.	2.97	1.414	2.81	1.486
16	I enjoy working for this course.	2.86	1.382	2.22	1.243
12	I feel that this course gives me a lot of satisfaction.	2.83	1.403	2.22	1.093
14	I feel that the grades or other recognition I receive are fair compared to other students.	2.38	1.211	2.79	1.166
31	I feel rather disappointed with this course.	2.22	1.51	3.83	1.523

As shown in Table 4, the highest scores were given to “The amount of work I have to do is appropriate for this type of course,” “I have to work too hard to succeed in this course,” and “I feel satisfied with what I am getting from this course.” The lowest scores were given to the following items: “I feel that the grades or other recognition I have received are fair compared to other students” and “I feel rather disappointed with this course.” In contrast, control group students gave the highest score to “I feel rather disappointed with this course”.

Effects of the Flipped Classroom on Motivation of Students

In the study, an independent samples t-test was applied to determine whether there was a difference between the motivation scores of the experimental and control group students. The Kolmogorov Smirnov test was also conducted; the data were distributed normally, $p = .200$. As shown in Table 5, the score of the experimental group, $\bar{X} = 116$, was greater than that of the control group, $\bar{X} = 101$ ($t = 3.190, p = .002 < .005$).

Table 5. *Differences between general motivation scores of the two groups*

Group	N	\bar{X}	Sd	t	p
Experimental	58	116.08	24.34	3.190	.002
Control	58	101.75	24.03		

Student Views on Factors That Affect Motivation

Students were asked about factors that increased and decreased motivation in the flipped classroom method (see Table 6).

Table 6. *Views on factors that increased and decreased motivation in flipped classroom*

Category	Code	f
Increasing Factors	Hands-on in class activities	13
	Group work	8
	Kahoot	7
	Surprise questions	3
	Guidance of the instructor	2
	Being active in-class	2
Decreasing Factors	Difficulty level of in-class activities	7
	Videos	5
	Dealing with the course outside the classroom	1

As shown in Table 6, the factors that increased motivation the most were application of in-class activities (N = 13), group work (N = 8), and the gamification activity Kahoot (N = 7). Other factors that increased motivation were surprise questions (N = 3), videos (N = 2), help received from teachers (N = 2), and complete lessons. Some students made more specific observations:

“It feels better and increases my motivation as I do better in the applications. I feel better when I help the others since it shows that I have learned more.”
(Student15, female)

“Various activities, group works and the applications increased my motivation.” (Student22, female)

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“The in-class activities motivated me and I even made a crosscheck for the activities at home to be prepared for the lesson. That really motivated me. Also the Kahoot activity motivated me, I thought that I should study and I should become the first in the class.” (Student24, female)

As shown in Table 6, Factors that decreased motivation towards the lesson were difficulty (N = 7), watching the videos (N = 5), and “Dealing with this course outside the classroom” (N = 1). Students had the following to say:

“I got bored when I could not achieve. I got bored when it was hard. Also when I saw things that were not related to my department, I did not want to do the activity anymore.” (Student20, female)

“Mine were the videos. Sometimes I got pushed for time to watch the videos. I was watching the videos probably 5-6 hours before class. I could not understand well. This time my motivation became very low. I was always saying that I will not be able to do it.” (Student24, female)

“Everyday dealing with this, I was full of apprehension, wondering whether they shared anything on Facebook about the course when I could not log on to Facebook.” (Student12, female)

Conclusion and Discussion

The motivation of the experimental and control group students toward the course was determined by the aid of a motivation survey (CIS). The motivation for students in the experimental group was greater than that of the control group. Only a limited number of studies on effects of the flipped classroom on motivation have been undertaken, but Davies, Dean, and Ball (2013) found in their quasi-experimental study that it increased student motivation. In addition, other studies in the literature have indicated that the flipped classroom method increases student participation and satisfaction (Chen et al., 2014; Missildine et al., 2013; Musib, 2014). Therefore, the flipped classroom can be said to have positive effects on motivation.

Motivation was analyzed in the current study within the scope of the ARCS motivation theory: attention, relevance, confidence, and satisfaction. When the motivation scores of experimental group students were analyzed in terms of attention, it was seen that the students found the methods applied by the teacher interesting and thought that the teacher knew what should be done to increase their attention. The attention level of students toward the course was clearly high. Based on these findings, course content covered via the flipped classroom method may be more successful at capturing students' attention. This finding is important because sustaining student attention to instruction is considered critical for learning (Proske, Roscoe, & McNamara, 2014). When motivation levels of students in the experimental group were analyzed according to relevance, students were seen to recognize the advantages and benefits that they would gain from what they learned. Thus, students who use the flipped classroom method may find course content more useful. For confidence, as long as students studied regularly, they could successfully complete the course, and the degree of difficulty of the course was rated at the optimum level. The students expressed positive feelings about confidence and the course. Finally, for the satisfaction dimension, the homework and

activities were deemed suitable for this course type, and students mentioned studying a lot to pass. Overall, the students found the flipped classroom suitable for the computer course.

The leading positive motivational factor in the flipped classroom method was hands-on activities, which may stem from the interest of the students in the course. Other important factors that increased motivation were group work and the gamification activity Kahoot. Concordant to this finding, Musib (2014) has stated that giving quizzes can increase student motivation. The leading negative motivational factor was difficulty. Applications used in lessons should be planned carefully. In parallel with this finding, Kim, Kim, Khera, and Getman (2014) have indicated that enough time should be reserved for activities during the lesson. Difficulty levels should be consider the limited amount of time during class. Based on the findings and discussions presented here, the several recommendations are offered for practitioners.

Suggestions for practitioners:

- Activities in which students create and release a product could be used during lessons.
- Teamwork could be promoted in lessons.
- Gamification strategies could be used actively in lessons.
- Difficulty levels of in-class activities should be arranged in a way so that tasks can be completed during class time.
- Motivating factors could be added to videos to encourage watching.

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