The Effect of the Flipped Classroom Model on Learners' Academic Achievement, Attitudes and Social Presence

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Abstract

Flipped learning reverses the traditional teacher-centered understanding of education and provides a more active learning experience. In the traditional understanding of education, the teaching of a topic is carried out in a classroom setting using a teacher-centered approach, while its assimilation is carried out by learners outside the classroom through activities such as homework. The flipped learning approach is a model in which learners study prepared content before courses, generally at their homes, and assimilate the topic in the classroom through various activities. A well-designed learning process enables learners to develop positive affective attitudes and to increase their perception of social presence, which positively affects academic achievement. This study aimed to design a face-to-face course using the flipped classroom model and to investigate this course on learners' academic achievement, their attitudes towards e-learning and their perception of social presence in e-learning environments. This study was designed as a pretest/posttest with no control group study. The results indicated that the flipped classroom model has a significant effect on these three different dependent variables. As a consequence, instead of the traditional face-to-face learning model, educators can use the flipped classroom model in which learners are more active and can get more support.

Keywords: Flipped classroom, academic achievement, social presence, e-learning attitudes

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Introduction

Models of teaching systems and learning processes have developed and diversified from past to present. The main reason for this pursuit of change is to meet learners' needs and to provide learning experiences that can be adapted to real life. In particular, advancements in information technologies facilitate the design of new models, making them essential tools for educational environments. Even though there are various definitions for the reflection of technological advancements to learning environments, the e-learning environment is the most common. E-learning provides quite rich and interactive learning environments, mainly through the use of various internet-based technologies. E-learning is defined as the presentation of learning content using electronic devices (computers, laptops, tablets or smartphones) in order to support learning (Clark & Mayer, 2016).

Learners should be able to benefit from e-learning environments not only to receive content, but also to discuss and cooperatively study it, to get support and to understand the process itself. Determining learners' social presence in e-learning environments and their ability to reflect their character when they are in such environments is also significant. Social presence is the term accepted in the literature for this phenomenon. Social presence is defined as the degree of acceptance of an individual's presence in a communication in synchronous or asynchronous environments, in spite of being in different places (Lowry, Roberts, Romano, Cheney, & Hightower, 2006), or as the learners' feeling of presence in e-learning environments, their level of awareness and their sense of belonging to the environment (McLellan, 1999; Tu, 2002). As learners' social presence increases, they increase their affective commitment and exhibit positive attitudes. Therefore, they are more able to interact and to increase their sense of belonging. However, their achievement is dependent on their prior knowledge and research abilities in e-learning environments. It is incorrect to assume that all learners are equipped with these characteristics. Learners should be able to obtain the

support of teachers through either distant or face-to-face interaction. This support prevents them from getting lost in the learning process.

A well-designed e-learning environment enables learners to develop positive affective attitudes and to increase their perception of social presence (Jakobsen & Knetemann, 2017), which positively affects academic achievement. Learners' abilities to access learning content, to rearrange it and to study it at their pace are the most important emphases of today's understanding of education (Bishop & Verleger, 2013). Learners should be guided and monitored by a learning model in which they can actively participate. Educators generally suggest that students should be present in a classroom environment with their peers and teachers when they have problems (Reich, 2012).

It is a quite important advantage for learners to be in the same environment with teachers in the face-to-face learning process. However, intense content in face-to-face environments causes learners to be passive. It is inevitable that learners will turn into listeners in a limited amount of time, even though the teacher may attempt to include learners in content investigation processes. In order to eliminate this problem, students' out-of-class time should also be accessible. Learners can be more prepared for courses if they have the opportunity to reach course material in out-of-class time. In this case, more time can be allocated to in-class activities. In a study by Günel, Kabataş, Memiş and Büyükkasap (2010), students indicated that their level of participation was low in the normal teaching process and that using different methods made courses more entertaining, ensuring their active participation and better learning. Similarly, Bülbül et al. (2006) highlighted that additional methods that can be used in out-of-class time should be included in the teaching process in order to reinforce instruction in the classroom setting and to reinforce and assess students' learning. Unlike the traditional approach, the description, flipping classrooms, is apt for this approach.

Flipped learning reverses the traditional teacher-centered understanding of education and provides a more active learning experience (Keengwe, Onchwari & Oigara, 2014). In the traditional understanding of education, the teaching of a topic is carried out in a classroom setting using a teacher-centered approach, while its assimilation is carried out by learners outside the classroom through activities such as homework. The flipped learning approach is a model in which learners study prepared content before courses, generally at their homes, and assimilate the topic in the classroom through various activities (Görü-Doğan, 2015). It is defined as pulling in-class activities outside the classroom and out-of-class activities into the classroom (Lage, Platt & Treglia, 2000). The flipped classroom model has recently become a popular pedagogical approach in science, mathematics and other courses (Ogden, Pyzdrowski & Shambaugh, 2014).

Justification

In flipped classrooms, students can watch course videos outside of class using their computers, tablets, smartphones or other media players, and participate more actively in the learning process by doing their homework in the classroom (Knewton.com, 2011). Students learn more efficiently in an environment when they are active and take responsibility for their own learning (Fulton, 2012). Bishop and Vergeler (2013) described flipped classrooms in detail and asserted that they consist of two parts: in-class interactive group-based learning activities and out-of-class computer-based individual learning activities (Figure 1).
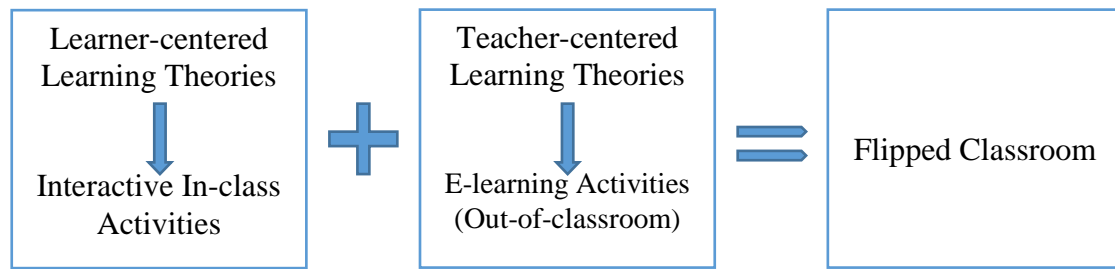
Figure 1. Model of A Flipped Classroom

As Figure 1 shows, learning content is an out-of-class activity. This model requires e-learning environments. The perception of social presence in e-learning environments is a significant component of effective e-learning experiences and is directly proportional to learners' satisfaction (Gunawardena & Zittle, 1997; Wise, Chang, Duffy & del Valle, 2004; Richardson, Swan, Lowenthal & Ice, 2016). Similarly, cognitive presence is negatively affected when social presence is perceived less (McGuire, 2016). The main justification of this study is to determine the validity of this argument. The researchers designed a face-to-face course using the flipped classroom model. Students generally have positive attitudes towards flipped classroom activities, and such activities boost learner-learner and learner-teacher social interactions (Flumerfelt & Green, 2013). These are the reasons for choosing the flipped classroom model. Face-to-face classroom time was used for the in-class activities, and a course enriched with communication, content and assessment tools and based on a learning management system was designed for the out-of-class activities.

Aim and Research Questions

This study investigated the effect of flipped classrooms on learners' academic achievement, their attitudes towards e-learning and their perception of social presence. Answers to these questions were sought:

- Does the flipped classroom model affect learners' attitudes towards e-learning?

- Does the flipped classroom model affect learners' perception of social presence?

- Does the flipped classroom model affect learners' academic achievement?

Methodology

This study was designed as a pretest/posttest with no control group study. Experimental research models are intended to determine cause-effect relationships under the control of the researcher (Karasar, 2009).

Participants

This study designed the web design course using the flipped classroom model and investigated its effectiveness. A total of 32 undergraduate students enrolled in this course in the fall term of the 2017-2018 academic year were the participants. All the participants were included in the implementation, but only the data of the 26 participants who fully completed the pretest and posttest were included in the study.

Research Design

This study's research design is shown in Table 1.

Table 1

Research Design

Group	Pretest	Implementation	Posttest
EG*	**T1, T2, T3**	**Flipped Classroom Model**	**T1, T2, T3**

*Experimental group

This study was conducted with a single group and no control group. The Attitude Scale Towards E-learning (T1), the Social Presence Scale (T2) and an achievement test were used as the pretest and posttest. The implementation of the flipped classroom model lasted 11 weeks.

Data Collection Tools

This study investigated the effect of a flipped classroom design on learners' attitudes towards e-learning, perception of social presence and academic achievement. Three data collection tools were used to measure these dependent variables.

The attitude scale towards e-learning

The Attitude Scale Towards E-learning was used in the study. Its reliability and validity studies were carried out by Haznedar and Baran (2012). The scale has 20 items in 2 factors: tendency towards e-learning and avoiding e-learning. The second factor contains ten negative items. The reliability coefficients of the factors were found to be .93 and .84. The negative items were used in this study as they are on the original form, and the item scores were changed at the scoring stage. This scale was administered before and after the implementation to determine its effect on the students' attitudes towards e-learning.

The social presence scale

The Social Presence Scale for E-learning Environments was used in the study. Its reliability and validity studies were carried out by Kılıç-Çakmak, Çebi and Kan (2014). The scale has 17 items in 3 factors: interaction, belonging, and affective statements. The reliability coefficients of the factors were .76, .81, and .75, respectively. This scale was administered

before and after the implementation to determine its effect on the students' perception of social presence.

The achievement test

The achievement test was developed by the researcher. The implementation was based on a web design course for students with no prior knowledge of web design. An achievement test with 25 multiple-choice questions that cover the topics of HTML, CSS, and JAVASCRIPT was developed. Two field experts experienced in the web design were consulted in order to determine the content validity of the test. Based on their opinions, the JAVASCRIPT questions were excluded in order to narrow the range of topics. Thus, an achievement test with 20 questions was used to cover all the activities carried out during the course. The highest possible score on the test is 20.

Implementation

The researcher opened a formal course on the learning management system. The learners studied the course content for the out-of-school activities using the learning management system and carried out collaborative group-based activities of the content they studied in the course:

- The syllabus was set up as the homepage (objectives, structure, scope, weekly content, assessment, resources, instructor, tools and communication process).

- An announcements tab was created to deliver announcements to the learners.

- A modular structure was chosen in order to include weekly content and other tools. The content for each week was presented together with explanations and objectives.

- The content of each week was embedded in the system in order for learners to study it with ease.

- Self-testing tools were added at the end of each week's content.

- Discussion forums were set up for students to discuss unclear points among themselves or with the course coordinator. Open-ended questions allowing students to express their own opinions were also included in the discussion forums. Thus, the learners were encouraged to discuss a particular heading, even if they have no unclear point regarding the content.

- Group activities were added to each week's content for the learners to review before attending class along with their instructions, duration and scope.

- The implementation of the course with all its content started during the orientation week (learners' role, weekly schedule, in-group responsibilities, activity submission conditions, participation in out-of-class activities, general assessment of the course, in-class and out-of-class communication and role of the instructor).

- The learners were provided with the opportunity to study the out-of-school content prior to attending the course, to test themselves, to communicate with their peers and to review the weekly activities.

- Each week's content was followed in the classroom, and a three-hour lesson plan was prepared. Learners were able to communicate with the instructors while carrying out group activities and got instant help with problems.

- The instructors moved around the groups and provided guidance.

- A randomly-chosen member from each group presented their activity to the class after each group activity.

- Finally, each learner uploaded their group work as individual homework to the learning management system for detailed evaluation.

Data Analysis

Prior to the data analyses, the data were investigated in terms of suitability for the analysis, and the following results were obtained:

- Incomplete data check: The data were ensured to be entered completely before conducting the statistical tests, and the frequency distributions were obtained. The pretest and posttest data of each participant were matched. The data of three participants who only did the pretest and the data of two participants who only did the posttest were excluded from the data analyses.

- Recoding: The negative scale items were inverted to positive on a scale of 1 to 5.

- Normality Test: The skewness and kurtosis analyses were carried out for the factor and item total scores in order to obtain reliable results. The skewness and kurtosis values are shown in Table 2. They vary between -1 and +1, which indicates a normal distribution.

Table 2

Skewness and Kurtosis Values of the Data Collection Tools

Test	Skewness Value	Kurtosis Value
Pretest of the attitude scale towards e-learning	0.011	-0.424
Posttest of the attitude scale towards e-learning	-0.409	-0.979
Pretest of the social presence scale	0.278	-0.234
Posttest of the social presence scale	-0.324	0.253
Pretest of the achievement test	0.530	-0.276
Posttest of the achievement test	0.494	0.098

- Descriptive Analyses: arithmetic means, standard deviations and maximum and minimum values were calculated before the inferential statistics. According to the

minimum and maximum values in Table 3, all the data collection tools cover enough

of the expected range.

Table 3

Descriptive Analyses' Results Regarding the Data Collection Tools

Test	Min	Max		SS
Pretest of the attitude scale towards e-learning	44	78	63.03	8.74
Posttest of the attitude scale towards e-learning	54	95	75.73	11.67
Pretest of the social presence scale	52	73	61.11	5.39
Posttest of the social presence scale	53	78	67.27	6.09
Pretest of the achievement test	2	7	3.88	1.37
Posttest of the achievement test	7	19	11.69	3.00

Based on the results, the t-test was conducted to compare the pretest and posttest data.

Results

This section includes the results and discussion regarding the research questions.

Results for the First Research Question

Table 4

Comparison of the Students' Pretest/Posttest Attitude Scores Towards E-Learning

Test	N		SS	Sd	t	P
Pretest	26	63.03	8.74	25	-4.78	.000*
Posttest	26	75.73	11.67			

*p<.001

As Table 4 shows, the t-test determined that the difference between the students'

pretest (63.03) and posttest (75.73) scores was significant (*p*<.001) and in favor of the posttest

scores (t (25)=-4.78).

In order to determine the students' attitudes towards e-learning, a 20-item measurement was carried out in the sub-dimensions of tendency towards e-learning and avoiding e-learning. The negative items were scored reversely. The students' pretest scores were quite high. This result shows that they had positive attitudes towards e-learning environments. The increasing trend of the students' scores regarding e-learning environments during the experiment and on the posttest indicates that the students' attitudes regarding e-learning environments improved. This statistically significant increase proves that their attitudes towards e-learning reached a high level.

Results for the Second Research Question

Table 5

Comparison of the Students' Social Presence Pretest/Posttest Scores

Test	N		SS	Sd	t	P
Pretest	26	61.11	5.39	25	-4.47	.000*
Posttest	26	67.26	6.09			

*p<.001

As Table 5 shows, the t-test determined that the difference between the students' pretest (61.11) and posttest (67.26) scores was significant (*p*<.001) and in favor of the posttest scores (t (25)= -4.47).

The Social Presence Scale was used in the pretest and posttest to determine the level of the intensity of the students' interaction in a virtue environment, affective commitment and sense of belonging. Their mean score on the pretest was high, indicating that the tendency of the learner profile in internet technologies and virtual environments was at a particular level. After the implementation of the flipped classroom model, the students' levels of interaction in virtual environments, positive attitudes and sense of belonging increased significantly,

proving that the implementation significantly contributed to their perception of social presence.

Results for the Third Research Question

Table 6

Comparison of the Students' Pretest/Posttest Achievement Scores

Test	N		SS	Sd	t	P
Pretest	26	3.88	1.37			
				25	-12.79	.000*
Posttest	26	11.69	3.00			

*p<.001

As Table 6 shows, the t-test determined that the difference between the students' pretest (3.88) and posttest (11.69) scores was significant (*p*<.001) and in favor of the posttest scores (t (25)=-12.79).

The students' mean pretest score on the 20-item achievement test was low, as expected. However, their mean score increased to a quite high level after the implementation. This significant difference is an expected result. The fact that this increase paralleled the increases in the other variables also implies that the flipped classroom model is effective.

Discussion and Conclusion

This study investigated the effectiveness of the flipped classroom model in terms of three variables. Crews and Butterfield (2004) in their study asked their participants to think about their favorite face-to-face course and to indicate why they chose this course. The same group was also asked about the most striking feature of their favorite course. A vast majority of the participants highlighted their interaction with other learners and the teacher, as the most

effective feature of a face-to-face course. The interaction rate decreased in the online course question; however, the structured course content rate became the highest. This result may imply that students prefer structured, planned course content; however, they may also feel the need for interaction. In a study by Philipps and Philipps (2016), the participants ascertained that problem-solving activities are very effective. Through effective out-of-class course materials, the flipped classroom model can attract students' attention and meet the need for interaction between teachers and learners within in-class activities. As Marks pointed out (2015), more time for interaction between learners and teachers by including activities in the classroom, students' ability to manage their own learning through self-paced out-of-class activities, more interaction both in virtual and real environments and increased peer support in small collaborative groups (Jakobsen & Knetemann, 2017) are among the evidence for the importance of this model.

Akcaoglu and Lee (2016) investigated social presence and its sub-variables: sociability, coming together and social domain. They found a significant difference in favor of small groups in all the sub-dimensions. Therefore, forming small collaborative groups in this study might have affected the students' social presence scores. Social presence manifests itself more in environments where teacher control is relatively low, and the learners' interactions increase, as Costly (2016) noted. Enabling group interactions through out-of-class activities, students' ability to express their own thoughts in discussions and their active participation in in-class activities are among the reasons for their increased social presence scores.

Out-of-class activities are the first stage of learning in a flipped classroom. E-learning environments are designed for this stage. Satisfaction, attitudes towards the process, the perception of social presence of learners who are not under the control of their teachers are directly related to their academic achievement. This perspective is corroborated by the

significant increase in the three dependent variables of this study (academic achievement, social presence and attitudes towards e-learning). Alsowat (2016) investigated the effect of the flipped classroom model in terms of the variables of learners' satisfaction, commitment and high-level thinking skills, and found that all three were significantly improved. Since high-level thinking skills include analyzing, evaluating and creating (Richland & Simms, 2015), Alsowat's study (2016) is directly supported by the results of this study.

Unal and Unal (2017) found that students are satisfied with the flipped classroom application and that they are successful. Özpinar, Yenmez, and Gökçe (2016) found a significant difference in favor of students who were taught using the flipped classroom model regarding their academic achievement and motivation scores.

Sun and Wu (2016) did an experimental study that compared students' achievement and perception of interaction in traditional classrooms and flipped classrooms. They found a significant difference in favor of the students who were taught in flipped classrooms. However, no significant difference was found between the control and experimental group regarding their perception of interaction. This result supports this study in terms of not only the academic achievement variable, but also the social presence variable. The fact that the interaction scores were not significantly higher in favor the group receiving face-to-face education may indicate that the perception of interaction, a sub-factor of the perception of social presence can be provided equally well in e-learning environments.

Having investigated the effectiveness of the flipped classroom model, this study showed that learners desire to take responsibility for their own learning. The increase in this desire with an appropriate design is another important result of this study. The flipped classroom model should be investigated further in terms of different variables. Similar studies will contribute to moving away from the traditional approach and to increasing students' participation in learning processes.

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