The Effect of a Flipped Classroom Model on Academic Achievement, Self-Directed Learning Readiness, Motivation And Retention*

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ABSTRACT

This study examined the effect of a flipped classroom model on students' academic achievement, self-directed learning readiness and motivation. The participants of this study were a total of 66 students who took the "Scientific Research Methods" course and were studying in two different classes in the Faculty of Education at Ahi Evran University in the fall term of the 2014 – 2015 academic year. One class was designated as an experimental group and the other one was the control group. We applied the flipped classroom model to the experimental group while a classical blended learning method was applied to the control group. An achievement test, a self-directed learning readiness scale and a motivation scale were used as data collection tools. To analyze the collected data, this study used the t-test, MANOVA and ANCOVA analyses. Study findings showed that there was a significant difference between groups in terms of academic achievement, motivation and retention. However, no significant difference between the experimental and control groups in terms of self directed learning readiness was found.

Keywords: *Flipped classroom, academic achievement, self-directed learning readiness, motivation, retention*

INTRODUCTION

Changes in information and communication technologies have also changed the qualifications and abilities expected from people in the current information age. In the 21st century, named as the information age with changes encountered in science and technology, people are expected to be active in creating and interpreting knowledge rather than directly obtaining information presented and needing to be directed. It is quite important for people to acquire these abilities named as 21st century skills (Romiszowski, 1996). Now, educational institutions also attempt to encourage individuals to think, criticize, know how to acquire knowledge, and have these skills, and thus develop curricula in this respect (Seferoglu & Akbiyik, 2006). In the curricula, which are changed accordingly, teacher and student roles have also changed to promote the learning of these 21st century skills. Students actively participate in the knowledge acquisition process rather than being passive listeners; teachers take a counselor role and direct students in this process.

As a result of the changes in teacher and student roles, the teacher-centered approach has given way to the student-centered approach which requires students to take responsibility for their own learning, to actively participate in learning processes, to control their own learning processes and create the environment where students play a central role. Among these abilities expressed as the 21st century skills, problem solving, critical thinking, communication, creativity, information and media literacy, cooperation and self-direction skills are included. Self-directed learning is an important skill for students who are expected to take an active role in creating and interpreting knowledge.

Self-direction is important in that students themselves can take responsibility for their own learning in the student-centered educational process. Knowles (1975) defined self-directed learning as a process

whereby students take the initiative with or without receiving support, diagnose their learning needs, formulate learning goals, determine human and material resources for learning, choose and implement an appropriate learning strategy for the knowledge to be learned, and evaluate learning outcomes. In the self-directed learning process, individuals set their learning goals, make their own decisions to acquire knowledge, use information acquisition methods actively and fulfill and evaluate learning on their own (Salas, 2010).

Although different definitions for self-directed learning exist, Caffarella (2000) indicated the common points of these definitions as that individuals take responsibility for their own learning, plan for the learning process and fulfill and evaluate their learning. In the current information age, picking the necessary information out of the ever-increasing knowledge stack, formulating appropriate strategies and being able to manage their own learning process are important for educational process effectiveness. Therefore, acquiring these skills has become a necessity. Acquiring these skills so important in the educational process can be possible in the educational environment especially when teachers use information and communications technology in creating student-centered educational environments. Because of the ever-increasing technological developments and the fact that students use technology and the Internet extensively in their daily lives, use of the most recent technologies in education has become inevitable.

The distance learning process which started with correspondence courses has continuously changed to satisfy different needs and limitations. The flipped classroom model has become one of the latest learning methods in recent years and it requires technology use. Although the flipped classroom (FC) model is not a new educational method, it has gained popularity with technology use in education (Jensen, Kummer, & Godoy, 2015). The FC method gives students the opportunity to learn course concepts outside the classroom environment with online educational materials such as video, film and voice so that classroom time is used for active learning such as problem solving and practical applications (Bergmann & Sams, 2012). This method, whereby students learn the theoretical part of the course at home before class, allocates classroom time for active learning practices such as question-answer, discussion and problem solving. In the FC model, students take responsibility for their own learning and progress at their own speed (Davies, Dean, & Ball, 2013). Students fulfill independent and active learning by accessing the learning environments presented through the Internet whenever and wherever they want (Baker, 2000). The assessment of this model in terms of Bloom's taxonomy steps showed that students fulfill learning with regard to knowledge and comprehension by watching videos before class and they fulfill learning with regard to application, analysis, synthesis and evaluation by participating in classroom activities (Rutkowski & Moscinska, 2013). With the characteristics of the flipped classroom model where the learning environments provide a personal learning experience (Hamdan, McKnight, McKnight, & Arfstrom, 2013), teachers take a counselor role and students are active participants (Halili & Zainuddin, 2015; King, 1993), students take on the learning responsibility and progress at their own speed (Davies et al., 2013).

Self-direction skills are quite important for online learning media where students have more control, independence and responsibility in personal learning processes in comparison with face-to-face learning environments (Kocdar, 2015). Online learning has an effect on self-direction (Song & Hill, 2007); studies have shown that a relationship exists between self-directed learning and achievement. Students having higher levels of self-directed learning skills also have higher levels of achievement with knowledge acquisition and management (Merriam & Caffarella, 1991). Similarly, Salas (2010) reported that online courses in higher education and distance learning programs are considered among important steps that support self-learning. The flipped learning which requires students to take more control over their learning with its dimension that is fulfilled on the Internet (Gunawardena & McIssac, 2003) can ensure that students engage in self-directed learning more effectively by providing them independence and flexibility (Sahin, 2010).

On the other hand, the flipped classroom model requires students to manage and maintain motivation for both implementing self-directed learning and enabling students to manage their own learning processes. Student motivation is an important prerequisite for managing their learning process (Boevé et all., 2016). Song and Hill (2007) defined one of the three main characteristics of self-directed students as motivation. Motivation is the reason people make an effort (Kurt, 2005), and self-directed students should make an

effort for their learning process. Therefore, motivation is a prerequisite for self-directed learning. Students having higher motivation also have higher levels of self-directed learning skills (Candy, 1991). Hence, in the learning environment, motivation is a dimension that should be taken into consideration (Dede & Argun, 2004). Learning environments that set students in motion, in which students have adequate capabilities, reveal their own values and can experience achievement and failure, can affect motivation (Unsal, 2012). In recent years, it has been reported that student motivation is an important factor in terms of increasing achievement in educational environments which have been differentiated with technological developments (Deveci-Topal, 2013). Studies have concluded that web-based learning, online learning, and blended learning environments, which became part of the educational process along with technology, influence student motivation (Acar, 2009; Deveci-Topal, 2013; Unsal, 2012).

This study aimed at examining the effect of the flipped classroom model on individuals' self-directed learning skills and motivation. It was thought that the flipped classroom model may have an effect on self-directed learning and motivation in the light of its characteristics as mentioned before. Therefore, this study aimed at examining the effect of the flipped classroom model on self-directed learning readiness, achievement and motivation. While the flipped classroom model is compared with the traditional learning environment in existing studies, this study compared FC with the classical blended learning method. For this reason, it is thought to contribute to the literature. These are the research questions to be answered in line with this purpose:

1. Is there a significant difference between the experimental and control groups in terms of academic achievement scores?
2. Is there a significant difference between the experimental and control groups in terms of self-directed learning readiness levels?
3. Is there a significant difference between the experimental and control groups in terms of motivation levels?
4. Is there a significant difference between the experimental and control groups in terms of retention scores?

METHOD

Research Design: This was a quasi-experimental pre-test–post-test study with a control group. This design unbiasedly assigns groups not to be changed as an experimental and a control group. Groups were measured using a pre-test before the study and measured twice using a post-test after the study (Buyukozturk, Kilic-Cakmak, Akgun, Karadeniz, & Demirel, 2008).

The Sample: The sample of this study included a total of 66 students, in two branches with 32 and 34 individuals, respectively, in each class, who took the "Scientific Research Methods" course in the Department of Psychological Counseling and Guidance, Faculty of Education at Ahi Evran University in the spring term of the 2014 – 2015 academic year. Existing groups were assigned randomly as an experimental and a control group.

Data Collection Tools: Within the scope of this study, motivation and learning strategies scales, a self-directed learning readiness scale and an academic achievement test were used as data collection tools.

General Academic Achievement: To determine student academic achievement in the "Scientific Research Methods" course, this study used an achievement test, weekly quizzes and activities for higher-order learning. The total academic achievement score was calculated as 40% from the achievement test, 20% from weekly quizzes and 40% from the higher-order learning activities.

Achievement test: This study used the achievement test developed by the researcher. The validity and reliability analyses of this test were also performed by the researcher. The achievement test was created in

accordance with the table of specifications prepared in the light of acquisitions specified for the course. Firstly, expert opinions on the achievement test were noted and necessary changes were made according to the opinions. Some items have been revised or removed. After the implemented changes, test item analysis was performed. The item analysis of this achievement test was performed with 252 students from the Departments of Primary School Teaching, Science Teaching and Turkish Language Teaching at Ahi Evran University and Niğde University; they had taken the "Scientific Research Methods" course and were not part of the actual study. After the item analysis, the items with a discrimination less than 0.30 (16 items) were removed from the test and a final test consisting of 40 questions was made. The Kuder-Richardson-20 (KR-20) reliability coefficient of the final form of the 40-item multiple choice achievement test was found to be 0.80.

Weekly quizzes: Weekly quizzes were developed to test for subject content. These quizzes included multiple choice questions. Firstly, expert opinions on the prepared items were noted. As a result of the pre-application made after necessary changes were implemented, item analysis was performed, and the items with a discriminatory power below 0.30 were excluded from the quizzes. The remaining questions were used as weekly quizzes on the subject of the week. After item analysis, a total of 30 questions remained to be used in the weekly quizzes. Moreover, some questions of the achievement test, which was developed by Olpak (2013) for the “Scientific Research Methods” course, and of which the KR-20 reliability coefficient was 0.90, were used in the weekly quizzes.

Activities for higher-order learning: The researcher developed activities at the levels of analysis, evaluation and creation according to Bloom’s taxonomy. For the activities, opinions from six experts were collected and necessary changes were made. All group members achieved the same scores on group work activities. Activities were assessed out of 100 in the light of the specified answer key. In the application process, the researcher and the subject matter expert separately scored the first two activities, and it was shown that there was a high-level positive correlation between the respective scores (r1= .91, $p = 0.00 < 0.01$ and r2 = .96, $p = 0.00 < 0.01$). To provide feedback on activities to students during course hours, the researcher, who was also the course teacher, did the scoring for the other activities.

Self-directed Learning Readiness Scale (SDLRS): To determine students' self-directed learning readiness levels, this study used the Self-directed Learning Readiness Scale (SDLRS) developed by Fisher et al. (2001) and adapted in Turkish by Sahin and Erden (2009). This scale included three sub-factors: self-direction, willingness to learn and self-control abilities. This is a 5-point Likert-type grading scale which was structured as strongly disagree (1), disagree (2), partially agree (3), agree (4), and strongly agree (5). This study found the Cronbach’s alpha coefficient to be .93 for the entire scale, .87 for the self-direction subdimension, .86 for the willingness to learn subdimension, and .79 for the self-control abilities subdimension.

Motivation and Learning Strategies Scale (MLSS): The MLSS scale developed by Pintrich, Smith, Garcia, and McKeachie (1991) was adapted into Turkish by Buyukozturk, Akgun, Ozkahveci, and Demirel (2004). This scale consists of two main parts: a “motivation scale” comprising 6 factors and a “learning strategies scale” comprising 9 factors. This is a 7-point Likert-type grading scale varying between “Definitely wrong for me” (1) and “Definitely right for me” (7). To determine student' motivation levels within the scope of this study, intrinsic goal orientation (4-item), extrinsic goal orientation (4-item), task value (5-item), control of learning beliefs (4-item), self-efficacy for learning and performance (4-item), and test anxiety (5-item) factors of the “motivation scale” dimension of the scale were examined.

Learning Environment: The online learning environment used in this study was created taking the characteristics of the target group and design principles into consideration. This study had consulted four experts in the Computer and Instructional Technologies Teaching field about the developed learning environment and necessary changes were made. Moreover, the field experts had also examined the content, and in the light of criticisms, it was revised.

To test the learning environment performance, this study administered a pre-application test on a group consisting of 10 third year students from the Department of Computer and Instructional Technologies Teaching, Faculty of Education at Ahi Evran University. In the pre-application process, this study ensured that

students logged into the site simultaneously and determined the current technical problems by accessing the content, watching videos, answering questions, discussing among themselves on forums and sending private messages. Therefore, the problems encountered by users in the application process were eliminated before the process began. After the test, semi-structured interviews were administered to the students; they had positive opinions on the system, showing that the problems had been solved. We then began the experimental method after the web environment was appropriate and ready.

Students in both groups logged into the learning environment with their user names and passwords. They logged into the system using the same screen; however, they were directed to different pages and content according to their groups. The learning environment included a home page, teaching plan, forum, announcement and contact pages. It was possible to access menus and the content from the home page. The curriculum and weekly schedules were presented on the teaching plan page. Students directed their questions to the course teacher and other students using the forum page. They could create a new question and respond to or display the existing questions. Course teachers could share their announcements on the announcement page. Furthermore, there was a Submit Assignments menu for the control group, and students could submit their weekly homework using this menu.

Experimental Procedure: In the application process, this study administered the flipped classroom model to one group and a classical blended learning method to the other one. Students in both groups used the learning environment developed by the researcher as a system. Both groups receive lectures from the same teacher. Only registered users could access the online content. Students in the experimental group learned the theoretical part of the course at home before class by watching content-oriented videos and then taking weekly quizzes at the end of the videos within the scope of the flipped classroom model. Thus, in course time spent in the classroom, they participated in active learning activities in the form of question-answer and discussion. These students also did higher-order learning-oriented activities, which were developed by the researcher, in the classroom environment. However, within the scope of the classical blended learning method, students in the control group learned the theoretical part of the course in the classroom and then they answered the same questions that the other group responded to at the end of the videos in the online classroom environment. They did higher-order learning-oriented activities as homework and submitted it through the system. The experimental group learned lessons at home and did homework in school while the control group did just the opposite. In out-of-school time, students in both groups could ask their questions to the course teacher and other students via the forum.

Data Analysis: In the data analysis period, this study performed an independent sample *t*-test, MANOVA analysis and ANCOVA analysis to examine the effect of the implemented educational method on academic achievement and self-directed learning readiness, on motivation, and on retention, respectively.

RESULTS AND DISCUSSION

Before the analyses, it was checked whether the parametric test assumptions were met. For *t*-test, normality and homogeneity of variance assumptions were tested. For MANOVA, sample size, normality, linearity, homogeneity of variance-convergence matrix and multicollinearity (Field, 2009) assumptions were checked. According to these results *t*-test, Mann Whitney *U* and MANOVA test were used in the data analysis.

Pretest Analyses

Before the data analysis, to examine whether the experimental and control groups were equal, the groups were compared in terms of academic achievement, self-directed learning readiness and motivation. This study used an independent sample *t*-test to compare academic achievement and motivation of the groups and performed a Mann Whitney *U* analysis to compare self-directed learning readiness. Mann Whitney *U* test was used to compare the self-directed learning readiness pre-test averages of the groups, because self-directed learning readiness pre-test scores were not normally distributed. The analysis results are illustrated in Table 1.

Table 1. Independent Sample *t*-test results for pre-test Scores of the Experimental and Control Group on Academic Achievement, Motivation and Self-directed Learning Readiness

	Groups	N	$\bar{x}$	S	df	*t*	*p*
Academic achievement	Experimental Group	32	61.8	10.4	64	1.7	0.09
	Control Group	34	57.2	11.4			
	Groups	**N**	$\bar{x}$	**S**	***SD***	***t***	***p***
	Experimental Group	32	4.5	0.6	64	0.3	0.72
Motivation	Control Group	34	4.4	0.7			

Experimental Group: The group that experienced the flipped classroom model

Control Group: The group that underwent the classical blended learning method

Table 2. Mann Whitney *U* analysis results for pre-test Scores of the Experimental and Control Group on Self-directed Learning Readiness

	Groups	N	Mean Rank	Sum of Ranks	Mann Whitney *U*	*z*	*p*
Self-directed Learning Readiness	Experimental Group	32	31.56	1010	482	-0.604	0.55
	Control Group	34	34.39	1135			

Experimental Group: The group that experienced the flipped classroom model

Control Group: The group that underwent the classical blended learning method

This study found no significant difference between mean scores of the groups in terms of achievement [$t(64) = 1.7$, $p > 0.05$], motivation [$t(64) = -0.3$, $p > 0.05$], and self-directed learning readiness [$z = -0.604$, $p > 0.05$]. According to these findings, it can be concluded that both the experimental and control groups were equal in terms of achievement, motivation and self-directed learning levels.

The effect of the implemented educational method on general academic achievement

This study performed an independent sample *t*-test to analyze the difference between general academic achievement scores which were calculated using weekly quiz scores, higher-order learning activities scores and achievement test scores of the students in both the experimental and control groups. The findings of the mean scores of groups are shown in Table 3.

Table 3. Independent Sample *t*-test results for academic achievement scores of the experimental and control groups

	Groups	N	$\bar{x}$	S	*SD*	*t*	*p*	η^2
General Academic Achievement	Experimental Group	32	79.41	7.35	64	3.47	0.00	0.159
	Control Group	34	72.04	9.63				

Experimental Group: The group that experienced the flipped classroom model

Control Group: The group that underwent the classical blended learning method

Table 3 showed that there was a significant difference between post-test mean scores of the experimental and control groups on general academic achievement [$t_{(64)}$= 3.47, p < 0.05]. This finding indicated that the flipped classroom model has the effect of increasing students' achievement. As a result of the analysis, this study found the effect size to be η^2 = 0.159. This value indicated a high-level of effect power.

In terms of academic achievement, scores of the students who used the flipped classroom model were higher than scores of those who used the classical blended learning method. This result showed that students using the FC model were more successful. This can be the result of the fact that because students learn the theoretical part before the class in the FC model, they can ask their questions in the classroom, receive immediate feedback and also interact with the course teacher during the lesson. The characteristics of the flipped classroom model such as students can come to class prepared in advance (Halili & Zainuddin, 2015; Zappe, Leicht, Messner, Litzinger, & Lee, 2009), increased student-teacher interaction (Arshad & Imran, 2013; Bergmann, Overmyer, & Wilie, 2013; Bergmann & Sams, 2012; Halili & Zainuddin, 2015; Kim, Patrick, Srivastava, & Fellow, 2014; Rutkowski & Moscinska, 2013) and students have opportunity to receive immediate feedback (Arshad & Imran, 2013; McGivney-Burelle & Xue, 2013; McLaughlin et al., 2014; Milman, 2012) explained the students' achievement increase. Baepler, Walker, and Driessen (2014) reported that interacting with the course teacher, asking questions and receiving answers have a positive effect on student achievement. Furthermore, this study also found that student motivation in the experimental group was higher than that in the control group. It is likely that the higher motivation level caused higher achievement in the experimental group.

Motivation is an important factor in increasing achievement (Deveci-Topal, 2013). Kettle (2013) found that students with higher motivation had higher achievement levels. The findings of studies in the literature that the flipped classroom model has increased student achievement (Boyraz, 2014; Chao, Chen, & Chuang, 2015; Cook, 2013; Day & Foley, 2006; Hung, 2015; Kim, Patrick, Srivastava, & Fellow, 2014; Lemley et al., 2013; Love Hodge, Grandgenett, & Swift, 2014; Mason, Shuman, & Cook, 2013; Pierce & Fox, 2012; Street, Gilliland, McNeil, & Royal, 2015; Tune, Sturek, & Basile, 2013; Turan, 2015; Wiginton, 2013) are aligned with the findings of this study. Although many studies in the literature have supported the findings of this study, some studies found that the flipped classroom model has no positive effect on achievement (Davies et al., 2013; Findlay-Thompson & Mombourquette, 2014; McLaughlin et al., 2013; Overmyer, 2014). In other words, results have differed in studies examining the effect of the flipped classroom model on student achievement. This difference can be attributed to the different processes, materials and environments used in applying the FC model. The effect of this model on student achievement showed a difference because different materials were used during different lessons. The types of materials used and the surrounding learning environment can affect achievement. Moreover, educationists managing the process plan it in different ways and do different classroom activities. These differences in activities probably generated different results.

The effect of the implemented educational method on self-directed learning readiness

To analyze whether there was a significant difference between self-directed learning readiness sub-factors and total scores of students in the FC group and students in the classical blended learning group, this study performed an independent sample *t*-test. The findings of the self-directed learning scores of the groups are shown in the following Table 4.

Table 4. Independent Sample *t*-test results for self-directed learning readiness and post-test scores of the experimental and control groups

Scores	Groups	N	$\bar{x}$	S	*SD*	*t*	*p*
Self-direction	Experimental Group	32	4.21	0.32	64	1.55	0.13
	Control Group	34	4	0.73			
Willingness to learn	Experimental Group	32	4.10	0.37	64	0.75	0.46
	Control Group	34	4	0.70			
Self-control abilities	Experimental Group	32	3.93	0.46	64	0.36	0.72
	Control Group	34	3.88	0.63			
Self-directed Learning Readiness	Experimental Group	32	4.05	0.30	64	0.64	0.52
	Control Group	34	3.97	0.63			

Experimental Group: The flipped classroom group

Control Group: The classical blended learning method group

Table 4 showed that no significant difference existed between both self-direction [$t(64)= 1.55$, $p > 0.05$], willingness to learn [$t_{(64)}= 0.75$, $p > 0.05$] and self-control abilities [$t_{(64)}= 0.36$, $p > 0.05$] subdimensions of self-directed learning readiness total scores [$t_{(64)}= 0.64$, $p > 0.05$] according to the study environment of students. In other words, students' scores on self-directed learning readiness and sub-factor scores did not change according to the learning environment.

This study found no difference between self-directed learning readiness levels of students under the flipped classroom model and those using the classical blended learning method. Although it was reported in the literature that the FC learning environment can have a positive effect on self-directed learning (Rutkowski & Moscinska, 2013), studies examining this effect cannot be found. The self-directed learning process is a variable that has been examined for the effectiveness of the process in the studies which have been conducted in the blended and online learning environments, which are not flipped classroom models, but where students still take on responsibility for their own learning, and technology is used. Among these studies, Zizan-Sasa (2011) stated that blended learning has a positive effect on self-directed learning. Ayan (2010) reported that information and communications technology tools can indirectly develop self-directed learning skill. However, this study concluded that the flipped classroom model has no effect on students' self-directed learning readiness. The reason for no difference between the experimental and control group students' self-directed learning readiness levels can be due to sample characteristics. Analysis of the pre-test results showed that students' levels of self-directed learning readiness were already high. High learning readiness levels could account for the fact that there was no significant increase in self-directed learning readiness after the application. Also, the application process might not be enough to cause a change in this characteristic. This study measured the self-directed learning readiness using a self-response measurement tool; maybe the students did not give true answers. It is possible to perform different measurements and obtain different results measuring the self-directed learning readiness by observing or by monitoring activities done in the process. Moreover, strategies and tools such as feedback, discussion forums, blogs, wikis, games, hints and adaptable decreasing support enable the development of self-directed learning (Koçdar, 2015). This study only used feedback and discussion forums for both groups. The fact that no difference between groups was noted in terms of self-directed learning skills can be attributed to this. Different results might have been obtained using other strategies together.

The effect of the implemented educational method on motivation

To analyze whether there was a difference between post-application motivation general score and sub-factor scores of students in the flipped classroom group and students in the classical blended learning group, a MANOVA test was performed. There are some assumptions for the MANOVA test, namely sample size, normality, linearity, homogeneity of the variance- covariance matrix, and multicollinearity (Kalayci,

2010). Analysis results showed that these assumptions for MANOVA were met. Findings of the MANOVA test are shown in Table 5.

Table 5. Results of Multi-factor Variance Analysis for General Motivation and Sub-factor Score Differences of the Experimental and Control Groups

Variance Resource	Dependent Variable	Sum of Squares	*SD*	Mean Squares	*F*	*p*	R^2
Group	Intrinsic Goal Orientation	9.25	1	9.25	5.84	0.02	0.08
	Extrinsic Goal Orientation	0.21	1	0.21	0.12	0.73	0.00
	Task Value	9.45	1	9.45	7.83	0.01	0.11
	Control of learning beliefs	7.62	1	7.62	8.96	0.00	0.12
	Self-efficacy for learning and performance	2.998	1	2.998	2.85	0.01	0.04
	Test Anxiety	0.054	1	0.05	0.04	0.85	0.00
	General Motivation	3.057	1	3.06	5.15	0.03	0.07

(Wilks' Lambda = 0.790, F (2,101)= 2.197, p =< 0.05)

The one-way MANOVA test used to determine the effect of education with the flipped classroom model on motivation and its sub-factors showed a significant difference existed between the experimental and control groups in terms of motivation total scores and its sub-factors (Wilks' Lambda = 0.790, F(2,101) = 2.197, p = 0.048 < 0.05).

According to the examination of the results of multi-way variance analysis in Table 5, intrinsic goal orientation (F(1,64) = 5.84; p = 0.02 < 0.05), task value (F(1,64) = 7.83; p = 0.01 < 0.05), control of learning beliefs (F(1,64) = 8.96; p = 0.00 < 0.05), and general motivation (F(1,64)= 5.15; p = 0.03 < 0.05) scores of the groups showed a significant difference in favor of the experimental group; there was no significant difference on extrinsic goal orientation (F(1,64) = 0.12; p = 0.73 > 0.05), self-efficacy for learning and performance (F(1,64) = 2.85; p = 0.01 > 0.05), and test anxiety F(1,64) = 0.04; p = 0.85 > 0.05).

The motivation levels of students using the flipped classroom model were higher than those in the classical blended learning group. This result shows a similarity with other study results in the literature (Chao et al., 2015; Davies et al., 2013; Turan, 2015). It is thought that the basic characteristics of the flipped classroom model account for this result. It is known that the flipped classroom model has advantages such as allocating time spent in the classroom to interactive activities (Zappe et al., 2009), presenting different types of materials to students and addressing students with different characteristics (Lage, Platt, & Treglia, 2000; Mason et al., 2013), increasing students' interest and participation (Enfield, 2012; Nat, 2015), ensuring students take responsibility for their own learning (Thoms, 2012). Higher motivation levels of the experimental group students could be attributed to these advantages of the FC model.

Higher motivation levels could also result from active learning activities done in the classroom. Active learning is one of the effective ways to increase motivation (Day & Foley, 2006). Students accessed learning resources whenever they wanted and progressed at their own pace; this may ensure students remain motivated. This is supported by other studies having similar results in the literature (Arshad & Imran, 2013; Boyraz, 2014; Chao et al., 2015; Davies et al., 2013; Strayer, 2012; Turan, 2015). Moreover, Hamdan et al. (2013) emphasized that because students prepare before the lesson outside the class environment in the flipped classroom model, they are more motivated and feel secure in the classroom. Trucker (2012) did not present measurable data but argued that the FC model provides more motivation in higher education. Abeysekera and Dawson (2015) developed a model offering definitions and logical explanations for the

flipped classroom model and hypothesized that this model would increase motivation. The reported study results and opinions are in line with the findings of the experimental group's high motivation level.

The effect of the implemented educational method on retention

To analyze the change in post- and pre-test scores of students in the experimental FC group and students in the control group undergoing classical blended learning method, this study performed the one-way analysis of covariance (ANCOVA).

The retention means which were adjusted after the experimental operation was completed according to academic achievement post-test scores of the students in both the experimental and control groups are given in Table 6.

Table 6. Descriptive Statistics of Retention Scores by Groups

Groups	N	Mean	Adjusted Mean
Experimental Group	32	81.88	80.94
Control Group	34	72.21	73.09

Experimental Group: The group applying flipped classroom model

Control Group: The group applying the classical blended learning method

According to Table 6, the mean of the retention test which was administered 5 weeks after the application was 81.88 for students in the experimental group and 72.21 for the control group. This study found that the experimental group students' retention mean score adjusted according to post-test was 80.94, and the control group students' retention mean score adjusted according to post-test was 73.09.

The results of ANCOVA conducted to determine whether the difference between groups' adjusted retention mean scores was significant are shown in Table 7.

Table 7. Results of ANCOVA on retention scores adjusted according to post-test by groups

Resource of Variance	Sum of Squares	*SD*	Mean Squares	*F*	*p*	η^2
Pre-test (Reg.)	1194.55	1	1194.55	6.46	0.01	
Group	972.49	1	972.49	5.26	0.03	0.11
Error	11652.50	63	184.96			
Total	14388	65				

Table 7 showed that between the groups to which different educational methods were applied, there was a significant difference in terms of retention scores adjusted according to post-test scores [$F_{(1\text{-}63)=}5.26$, p <.05]. In other words, students' retention scores adjusted according to post-test scores changed with the applied educational method. The retention levels of students in the FC group were higher than those in the classical blended learning group. As a result of the analysis, this study found the effect size to be $\eta^2 = 0.11$, indicating a high effect size.

The retention levels of students using the flipped classroom model were higher than those in the classical blended learning group. Learning materials used in the flipped classroom model appeal to many different sensory organs, and this can be effective in ensuring more permanent learning for students in the flipped classroom. Among these learning materials, especially video which enables students to both listen and watch and appeals to different sensory organs could make learning more permanent. The more sensory organs the learning environment appeals to, the more permanent the learning is (Nalçacı & Ercoşkun, 2005; Yalın, 2006). Dale's Cone of Experience reported that the least permanent learning is by receiving information

presented passively through verbal symbols, while the most permanent learning is through learning activities involving active student participation (Dale, 1969). Videos used in this model take place in the middle of Dale's Cone of Experience. In this respect, videos ensure more permanent learning in comparison with verbal expression; as stated in Dale's Cone of Experience, things students learn on their own rather than while receiving support from others are more permanent (Dale, 1969). However, the flipped classroom method is also a learning model that fulfills active learning processes for students (Baker, 2000; Bergmann & Sams, 2012; Demetry, 2010; Hamdan et al., 2013; Shimamoto, 2012). In this model, students are active participants rather than a passive listeners in the learning process (King, 1993). Fulfilling active learning in the flipped classroom model can be reported as a reason for more permanent learning in the experimental group. In studies supporting this finding, students stated that they fulfilled more effective learning with class activities (Frydenberg, 2013; Zappe et al., 2009). Analysis of studies in the literature showed that very few studies have examined the effect of the flipped classroom model on retention, and the limited number of studies have shown similarity with the findings of this study. A study by Boyraz (2014) compared retention scores of both groups who received traditional education and flipped education and found that the flipped education had a positive effect on academic achievement and retention. Similarly, Kim et al. (2014) concluded that the flipped education had a positive effect on retention and that FC students' retention scores were higher than those who used the traditional education method.

SUGGESTIONS

Suggestions for Application

Firstly, educationists who plan to use the flipped classroom model should have the necessary skills. This is important for ensuring process efficiency. Therefore, training programs can be provided to educationists to acquire the skills necessary for applying this model. In the flipped learning process, it is important to ensure that students watch the videos before coming to class. In further studies, students can be encouraged to watch the videos before class by using methods such as answering questions, summarizing the video and discussing open-ended questions about the videos on the forums. This study allowed students to ask their questions on the forums. To establish synchronous communication, further studies can allow students to discuss their questions with all students and the course teacher in virtual meetings scheduled at a particular time.

Suggestions for Further Studies

This study was carried out with 66 students who took the "Scientific Research Methods" course and were studying in the Department of Psychological Counseling and Guidance. Further studies can be conducted with different sample groups in different courses. The effect of the flipped classroom model on different theoretical courses and applied courses can be examined in further studies. These studies can also examine the effect of the FC model on self-directed learning by using strategies and tools for improving self-direction skills. Moreover, this study was conducted at the level of higher education, and further studies can include primary and secondary school students.

Educationists can structure the flipped classroom model differently. Materials used, components of the online learning environment, and classroom activities can be varied. Further studies can examine the effect of different materials, environments and activities on the process.

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