Comparison of Collaborative and Individual Learning in Online Learning

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ABSTRACT
In the online learning environment, it is seen that problems arise in the absence of interaction. In order to prevent these problems, this study, which was carried out by taking into consideration the principles that are formed using the community of inquiry framework, took place during the 2014-2015 Spring Semester using 30 students from a vocational college located in the Turkish Mediterranean Region who enrolled in the "Graphic Animation" course. The study was used a pretest-posttest control group design. The control group constituted of students working with online problem based individual methods while the experimental group constituted of students working with online problem based collaborative learning methods. The groups were compared in terms of academic success, motivation and satisfaction. It was determined that the motivation was higher in the experimental group, while there was no difference in the achievement and satisfaction in the experimental group and the control group.

Keywords: cooperative/collaborative learning; distance education and telelearning; interactive learning environments; teaching/learning strategies

INTRODUCTION

There are different definitions of online learning, which is the realization of the learning-teaching process in a software environment (Govindasamy, 2002). While Carliner (1999) identifies online learning as the educational material presented by the computer, Ally (2004) defines it as the acquisition of learning experiences and the construction of personal meanings by using the internet in accessing learning materials, ensuring the interaction of learners with content, teachers and other learners in order to obtain information and support the learning process. Jolliffe, Ritter, and Stevens (2012) on the other hand, reported online learning was a process where students were asked questions online, received answers to the same questions, and were evaluated online. As can be seen, the previous definitions emphasize the use of material on the internet, and the next definitions are the outcome of interaction. Interaction, which is expressed as mutual communication (Garrison, 1993) is among the skills needed in the 21st century (Cheryl, 2003). In this environment, individual learning is important but not ideal (Anderson & Garrison, 1998). Individual work in an online setting should not be considered loneliness. The student should interact both with the instructor and with those preparing the lesson throughout the process (Keegan, 1986) and active involvement must be achieved (Hung & Chou, 2015). Meyer (2014) stresses the importance of interacting with other students, the instructor, and the content to ensure the quality of learning. It is known that student-student and student-instructor interaction is valuable (Navarro & Shoemaker, 2000) and increases education quality (Phipps, 2015) in an online learning environment.

In many existing studies on online learning environments, it has been established that interaction is one of the most important factors in determining student satisfaction (Kuo, Walker, Belland, & Schroder, 2013; Summers, Waigandt, & Whittaker, 2005; Navarro & Shoemaker, 2000;Gould & Padavano, 2006) and that it has the influence to increase performance and success (Paulus, 2003; Saba, 2000;Navarro & Shoemaker, 2000). Many studies have established the importance of interaction in the online learning environment (Kauffman, 2015; Bowers & Kumar, 2015; Kuo, Walker, Schroder, & Belland, 2014;Song, Singleton, Hill, & Koh, 2004; Drange, Sutherland, & Irons, 2015). However, critics emphasize that interaction is not at desired levels in these environments, which introduces a big problem (Ozkose, Ari, & Cakir, 2013; Baris & Cankaya, 2016; Zhu, 2012; Muirhead, 2000). It has been observed that learning models with limited interaction have been used in online learning environments as a result of one-way communication (Anderson & Garrison, 1998). As a result of

examination of various studies conducted by Cho and Berge (2002), it has been determined that lack of interaction is expressed as a problem. For this reason, it has been determined that the students do not feel themselves as belonging to the community (Vrasidas & Mclsaac, 1999). Lack of interaction, which is important for success in online learning, is considered to be as a major weakness in online education, and should be increased (Paulus, 2003). Display quotations of over 40 words, or as needed.It is known that in an online learning environment, interactive and student-focused methods (Brooks & Brooks, 1999) including practices based on objective and constructive theories (Deryakulu, 2000) lead to success (Simonson, Smaldino, Albright, & Zvacek, 2002). Vrasidas and Mclsaac (1999) expressed that teaching objectives could be achieved by interaction strategies. According to the methods used in interaction strategies, students need to take an active role in the process (Tinto, 1997). During the active role stage, a learning method based on cooperation was used, among other methods, to increase the learning experience and effectiveness of students (Curtis & Lawson, 2001). One of the models that incorporates learning methods based on cooperation is the online learning model. In his online learning model, Anderson (2008) states that learning in an online environment develops in two primary ways. The first of these is learning based on cooperation, the second is independent learning. Cooperation based learning speaks of group learning and focuses on the need and desire of students for support from a teacher. As a result of this interactions are kept within a community of inquiry based on either synchronized or unsynchronized collaborative activities, computer mediated communication devices (CMC) which include, phones, emails, voicemails, and online chatting are implemented.

Group work is emphasized throughout the online learning process (Ergul, 2006). As a result of this, the group learning method, being the first method in the online learning model defined by Anderson (2008), has been used in the study. In order to establish student to student and student to instructor interactions, Collaborative learning methods, community of inquiry (COI), and computer mediated communication devices (CMC) have been utilized. In addition, collaborative work has been performed based on problem solving methods. Collaborative problem solving which has been defined by Nelson (2009), is realized through the implementation of nine steps. These steps are listed as preparations, forming and norming groups, determining problem situations, distributing the tasks, finalizing the solution, synthesis and reflection, formative and summative evaluation, and ending the process. In the Problem based collaborative learning process, firstly students are given an ill-structured problem. During the process of solving the ill-structured problem, students are expected to use their own knowledge and to take personal responsibility in their group work (Bridges, 1992). Through this process, students come together to achieve a common goal and solve problems through cooperation as well as by incorporating their own experiences into the problem solving process (Yeh & She, 2010). Thus students form a social agreement with each other (Savery & Duffy, 1995). Within the ill-structured problems, authentic scenarios are created and solutions to the problems or other alternatives are not clear (Jonassen, 1997). The review of various studies which used this method revealed that it provides improvements in student learning, success, and collaborative abilities (An, 2006; Akarasriworn, 2011).

Another component in the community learning phase of the online learning model is the Community of Inquiry – (COI). The COI, which is expressed as a model used in the process of meaningful learning in the online learning environment, consists of three main elements; social, cognitive, and instructional (Garrison, Anderson, & Archer, 2000). It has been determined from previous studies that attention should be paid to certain issues when creating an online community of inquiry. These issues, including the number of students who will participate in the study and the actions of the students and the instructor in the working process, are aimed at making communication more effective.

The importance of interaction in an online learning environment can be seen in existing studies. It has been established that the dropout rate in the online environment is higher compared to the traditional environment (Foust, 2008; Carr, 2000). Increasing interaction in the online environment may be a solution to this situation. For this purpose, the collaborative learning model, community of inquiry, and computer mediated communication components were utilized in order to seek answers to the following questions.

(1)When comparing students in an online learning environment where problem based collaborative learning method is implemented and those in an online learning environment where problem based individual learning method is implemented;
(a) Is there a significant difference in academic successes?
(b)Is there a significant difference in satisfaction?
(c)Is there a significant difference in motivation?

METHOD

During the study, a pretest-posttest, randomly ordered matched control group method was used. In this method, similar participants are randomly assigned to the control group or experimental group. During this study, implemented in the scope of the "Graphic Animation" course, students taking the course were randomly assigned to either the control group or experimental group by considering their department, gender, learning style, grade average, pretest results and motivation before the experiment.

Working Group

The study took place in the "Graphic Animation" course during the 2014-2015 Spring Semester. In order to determine the participants, the instructors announced to their students that a Graphic Animation course would take place and collected 130 application forms. After the course's content and topics were finalized, the participant number was lowered to 30. Out of these 30 participants, 15 were assigned to the experimental group which worked collaboratively in an online learning environment, and the remaining 15 were assigned to the control group which worked individually in an online learning environment. While creating the collaborative learning groups, certain criteria was considered and the groups were made to be heterogeneous. Table 1 and Table 2 show the characteristics of the participants. As seen in Table 1, students were paired according to their department, gender, grade average, and learning styles. In addition, the pretest and posttest results and motivation rates were used in pairing the groups.

During analysis of the pretest and motivation rates, it was established that the data showed normal distribution. Therefore, an "independent sample T-test" was used in order to determine if there was a significant difference between the two groups. The analyses, pretest and posttests, and motivation rates indicated that there was no significant difference between the two groups.

Table 1: Demographic characteristics of participants

Variables		Experimental Group (n)	Control Group(n)
Department	Office Management	2	3
	Call Centre	5	5
	Foreign Trade	2	1
	Accounting	6	6
Gender	Female	10	9
	Male	5	6
General Grade Average	1.00-2.00 (Low)	3	3
	2.01-3.00 (Medium)	8	9
	3.01-4.00 (High)	4	3
Learning Style	Independent	2	3
	Evasive	4	3
	Cooperative	2	2
	Dependent	3	3
	Competitive	3	2
	Participative	1	2

Table 2: Profiles of participants working in collaborative groups

Group Name	Gender	Departments	GPA	Learning Styles
Group 1.	2Female/ 1Male	Accounting/Office/Call Centre	Low/Mid/High	Dependent/Participative/Collaborative
Group 2.	2Female/ 1Male	Accounting/Call Centre/ Foreign Trade	Low/Mid/High	Competitive/Independent/ Evasive
Group 3.	2Female/ 1Male	Call Centre/ Accounting/ Accounting	Low/Mid/High	Independent/Evasive /Collaborative
Group 4.	2Female/ 1Male	Call Centre/Office/ Accounting	High/Mid/Mid	Competitive/Evasive /Dependent
Group 5.	2Female/ 1Male	Call Centre/ Accounting/ Foreign Trade	Mid/Mid/Mid	Dependent/Competitive /Evasive

As indicated by Johnson and Johnson (1999), while creating the groups it is important that they are heterogeneous. The experimental group consisting of 15 people was divided into 5 groups made up of 3 people, and as shown in Table 2, it was ensured that each group was as heterogeneous as possible within each group.

Data Collection Tools

The study aimed to identify student successes by process and product evaluation. During this process, an indicator table for learning objectives created by the researcher was taken into consideration. The indicator table was finalized with expert opinions.

The evaluation of the process was based on the activities on the indicator table. The product evaluation was based on the projects prepared for ill-structured problem situation and the achievement scores on the achievement test prepared by the researcher and the instructor teaching the class. However, in spite of all the measures and incentives implemented in the process, it was observed that data was lost due to the fact that very few of the students submitted projects and the achievement was therefore measured only by the test. During the process of creating the achievement test, questions were generated by the researcher and the instructor teaching the class. Other than the researcher and the course instructor, two experts were consulted to ensure the content validity of the test. After implementing experts' opinions, a factor analysis was conducted to ensure that the items on the test were valid and reliable. In order to perform the item analysis, the first achievement test, which was composed of 82 questions, was conducted on 90 students who had taken the Graphic Animation course.

As a result of the analyses; The KR - 20 Reliability Coefficient was calculated as 0.91. The average difficulty of the test was calculated to be 0.53. The difficulty ratings of the items in the test range from 0.24 to 0.85. According to this; There are 12 easy questions with item difficulty coefficients between 0.70 and 1.00, 36 moderately difficult questions between 0.40 and 0.69 and 16 difficult questions between 0.00 and 0.39. The discriminant coefficients range from 0.20 to 0.59. According to this; There are 16 low discriminative questions with item discrimination coefficients ranging from 0.20 to 0.29, 17 moderately discriminative questions between 0.30 and 0.39, and 31 very discriminative questions between 0.40 and above.

In order to determine the motivation level of students, the motivation section of the Motivated Strategies for Learning Questionnaire developed by Pintrich, Smith, Garcia, and McKeachie (1991), which had been adapted to Turkish by Buyukozturk, Akgun, Kahveci, and Demirel (2004) and named as the "Motivation and Learning Strategies Scale was used. The use of this scale on 852 students from two different universities by (Buyukozturk et al., 2004) determined that this scale which had been adapted to Turkish from the original Questionnaire was comprised of six separate factors. The Cronbach's Alpha values for the motivational scale ranged from 0.86 to 0.59. It was determined that the Cronbach Alpha values were 0.86 to 0.59 in the scale of recalculation of the reliability value, and between 0.94 and 0.54 in the pilot application and between 0.83 and 0.54 in the application.

The "Satisfaction Scale Related to the E-Learning Process", developed by Gulbahar (2012) was used in order to determine satisfaction in the e-learning process. According to the reliability analysis results of 2963 students, the Cronbach's alpha reliability coefficient was determined as .97. According to the exercise that took place with 81 students before the study, Cronbach's alpha value was found to be .97, 81 for pilot and .91 for practice.

Implementation process

The study took place during the 2014-2015 Spring Semester at a vocational school in a public university located in the Mediterranean Region. In the course, the students in the experimental group worked collaboratively in different roles such as designer, developer, and coordinator, while the students in the control group worked individually. Figure 1 shows how the implementation process was carried out. The study was divided into three stages. During the first stage, online lessons, the experimental and control group were given weekly, hour-long lessons through LMS. The second stage, online work, took place after the online lessons.

During this step the students working collaboratively divided into 5 groups consisting of 3 people. Each group was observed by the instructor and researcher throughout the online working process. The third stage, participation in the discussion group, took place asynchronously. The purpose of this step was to carry out the exercises that could not be conducted synchronously. Another goal was for formal and informal communication to be provided through LMS During the pilot application, communication in this step was limited to email. This caused students to develop negative feelings regarding the use of forums. For this reason, it was left as an optional stage during the actual exercise.

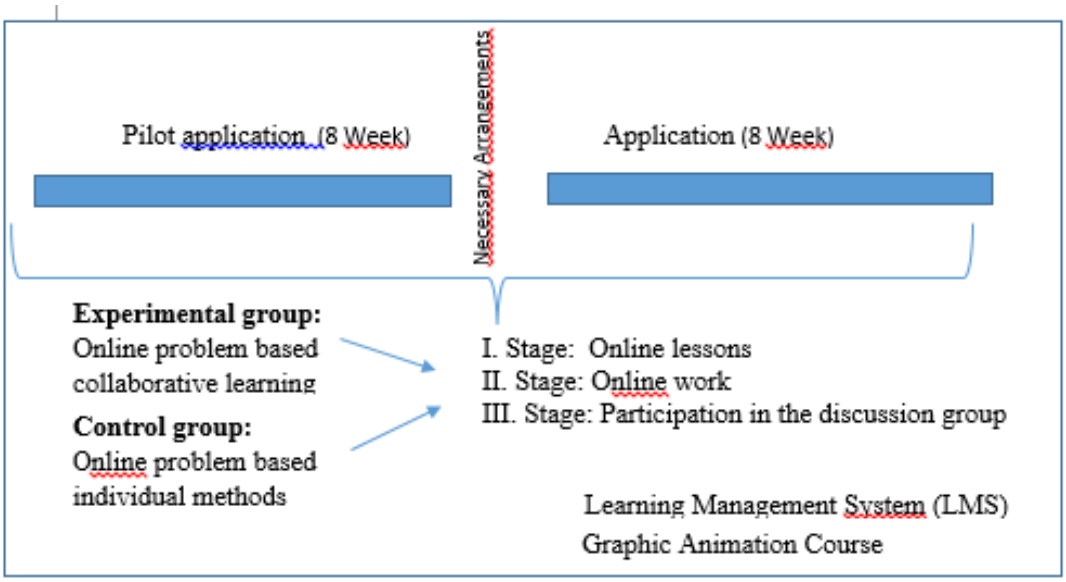

Figure 1: Implementation Process

FINDINGS

As indicated before, achievement test results were used order to specify if the difference in academic success between the collaborative learning method and individual learning method in an online learning environment was significant or not. As both the pretest performed before the study and the posttest performed after the study indicated normal distribution, the difference between the groups was examined by an "independent sample T-test."

Table 3: Pretest and posttest results of students who participated in the exercise

Pretest Points						
Group	N	$\bar{X}$	S	sd	t	P
Experimental Group	15	20.93	15.47	28.00	.483	.506
Control Group	15	16.33	13.89			
Posttest Points						
Group	N	$\bar{X}$	S	sd	t	p
Experimental Group	15	55.07	16.39	28.00	.525	.413
Control Group	15	44.20	13.75			

In Table 3, it is seen that there is no difference in test points between the experimental group and the control group, both before the exercise [t(28.00) =.483, p>.05] and after the exercise [t(28.00) =.525, p>.05]. This shows that the method used does not alter achievement scores.

In the study, an "independent sample T-test" was implemented on the data that showed normal distribution in order to specify if the difference in motivation between the collaborative learning method and individual learning method in an online learning environment was significant or not.

In Table 4, it is seen that there is no difference in motivation rates between the experimental group and the control group before the study [t (28) =1.376 p>.05]. The motivation test results after the study, however, show a significant difference in motivation rates between the experimental group and the control group [t (28) =2.329 p>.05]. The motivation of participants in the collaborative learning (experimental) group ($\bar{X}$=154,80), was determined to be higher than those in the control group working individually($\bar{X}$= 140,87). This is thought to be related to the fact that the collaborative learning method increases student's motivation.

Table 4: T-test results of the motivation factor before and after the study

Before						
Group	N	$\bar{X}$	S	sd	t	p
Experimental Group	15	152.53	22.38	28.00	1.376	.180
Control Group	15	163.67	21.92			

After						
Group	N	$\bar{X}$	S	sd	t	p
Experimental Group	15	154.80	17.47	28.00	2.329	.027
Control Group	15	140.87	15.21			

In the study, an "independent sample T-test" was implemented on the data that showed normal distribution in order to specify if the difference in satisfaction between the collaborative learning method and individual learning method in an online learning environment was significant or not.

Table 5: T-test results of the satisfaction factor according to groups

Group	N	$\bar{X}$	S	sd	t	p
Experimental Group	15	121.73	18.58	28.00	.449	.657
Control Group	15	124.20	10.33			

According to the analysis results in Table 5, it was established that that there was no significant difference in satisfaction between the experimental group and the control group, and that satisfaction was high in both groups [t(28)=.449 p>.05].

DISCUSSIONS AND CONCLUSION

At the end of the study, it was established that the achievements of the students working collaboratively were not different compared to those of the students working individually. Therefore, it is thought that methods and activities based on collaboration are at least as effective as other methods. Although this method puts an additional load on students and teachers, it does not impair academic achievement. The research finding is supported by previous studies in which there was no apparent difference between the collaborative learning method and other learning methods. (Dennis, 2003; Depriter, 2013; Gokhale, 1995; Kamin, Glicken, Hall, Quarantillo, & Merenstein, 2001; Mazzoni, Gaffuri, & Gasperi, 2010; Nam, 2016; Nickel, 2010; Sendag & Odabasi, 2009). However, in certain studies (Lin, Yang, She, & Huang, 2015; Boling, 1996; Atici & Gurol, 2002; Uribe, Klein, & Sullivan, 2003; Gursul & Keser, 2009; Tarmizi & Bayat, 2012) it was seen that there was a difference between the groups and success was generally higher in those working collaboratively.

Before the study, the experimental group and control group were placed in order to be equal in terms of motivation. At the end of the study, it was established that the experimental group's motivation was higher. The higher motivation of the students working collaboratively can be credited to the fact that they worked together. This finding is supported by previous studies (Tsai, 2010; Sulaiman, 2013) which found that student's manner of work varied under different methods.

During the study it was established that the experimental group and control group's satisfaction did not differ and was high in both cases. It is thought that the design principles of the study in which problem solving method was used in both groups implemented throughout the process prevented a difference in satisfaction between the groups. In Capdeferro and Romero, (2012)'s studies on disappointments related to collaborative learning experiences, it was found that despite dissatisfaction with many situations, the majority of students were pleased overall with the study.

At the end of the study these suggestions were offered; The study was conducted with two different groups that worked in a learning environment designed based on principles of community of inquiry framework. Since the student satisfaction was high in both groups, instructional designers should pay attention to these principles while designing a learning environment based on problem based learning method. It was determined that the collaborative learning activities that took place in the experimental group increased student's motivation. Therefore, instructors may be encouraged to use collaborative learning activities in the online learning environment. Before the study began, it was expected that students should have been graded on the projects they submitted throughout the term in order to determine academic achievement. However, when the course was completed, it was seen that the number of projects submitted were not as high as expected. Students should be given tasks that aroused their attention more effectively. As is the case with every social study, there were restrictions. It was found that not all of the planned collaborative learning activities were implemented. This situation may have been caused by the fact that the study was carried out as part of an extracurricular course. For this reason, the study could be repeated within the scope of a regular program class.

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