A Computer Game Implementatıon: Indıvıdually Or In A Group

Serkan Say
Faculty of Education. Pamukkale University, Denizli, Turkey.
serkansay13@hotmail.com

Esra Ucak
Faculty of Education. Pamukkale University, Denizli, Turkey.
eucak@pau.edu.tr

Çigdem Aldan Karademir
Faculty of Education. Mugla Sıtkı Kocman University, Mugla, Turkey.
cakarademir@mu.edu.tr

Yüksel Çekbaş
Faculty of Education. Pamukkale University, Denizli, Turkey.
ycekbas@gmail.com

ABSTRACT
In this research, the effect of playing a computer game individually or in a group on students' academic achievements was investigated. In addition, it was determined that whether students gender significantly differ or not according to playing the computer game individually or in a group. In this study, among the experimental research designs, Solomon research model was used. In the study carried out in the first semester of 2014-2015 academic year at a public school, a total of 90 students took part as 2 experimental (n=45) – 2 control groups (n=45). A science computer game that was played on the internet. Students in experimental groups played the science game as three people in groups in addition to science lessons. Students in control gorups played the game on computer individually. The implementation process lasted 16 weeks. For the analysis of "Academic Achievement Test" ANOVA was used. When the findings from the study were evaluated, a significant difference was determined between students who played the game individually or in a group, in favour of students who played the computer game in a group. As the findings were assessed in terms of gender, there was no significant difference between female and male students in terms of playing the computer game in a group or individually.

Key Words: Science lesson, computer game, students.

INTRODUCTION

Yağız (2007) states that game forms and the qualities of the games changed together with the development of technology; games transferred to many media from computers to mobile phones became a time consuming material for today's children; and exemplifies a research done in 2004. According to this research, while the children used to spend averagely 4 hours at home and in video arcades in the mid 1980's, today, girls spend 5,5 hours for games, and boys spend 13 hours for games among primary and secondary school students. In consideration of the contributions of these games which are becoming widespread fast and very interesting for children, new, different perspectives and techniques have been generated. These new implementations are various activities which motivate the students effectively, take the cognitive processes to the top level, and are introduced to students via educational video games in game-based environment. Nowadays, educational video games are being designed in many areas such as social, historical, military, labor, and health and then are being offered to the users (Doğusoy and İnal, 2006).

Güngörmüş (2007:18) defines educational video games as 'the software programs which are prepared via integrating game features to learning activities in order to achieve educational objectives'. Kaplan-Akıllı (2007:4) define educational video games as 'competition based activities which aim at teaching with motivation through a creative and an enjoyable way, which are limited with specific rules, and which require specific skills'.
Video games including many types which can be single or multi-players require participation for the development of the real skills. Video games achieve this thanks to instantaneous learning (Aldrich, 2009). One can be more active and can participate more in the learning environment where educational video games are used than one who is passive learner in traditional methods. Thus, it can be seen clearly that a learner can understand the topic easier and improve his/her various skills thanks to the experiences from the virtual world easier in this learning environment (Malta, 2010).

It is apparent that games drawing humanity's interest for centuries are continuing to have an effect in computer media thanks to changing technology and opportunities. The fact that the harmony of many features of video games with the interests, needs and habits of the children today's knowledge era has become the basis of the idea of using

video games in education to have an effective and permanent learning. However, it is very crucial to analyze the designing process of the video games and their structures according to learning approaches, and how learning will occur through these video games.
Educational video games, which are designed for the usage of video games for educational purpose, are spreading fast and they are now in front of all of us as a new technology of a possible key for reaching an effective and permanent learning process.

Papestrergiou (2009) indicates the following reasons for strong potency of the educational video games for learning environment:

- Games provide multi-sensory, active, experimental and problem-based learning.
- The obligation of using the previous knowledge for learner in order to step next level supports the activation of the previous knowledge
- Games provide quick feedback to the learner, which let him/her search and learn through the activities.
- Scoring and level mechanisms of the games give the learner an opportunity to go in self evaluation
- Games are also becoming social environments because of their player groups.

Squire and et. al (2004) state that video games are very essential environments because of the fact that they give the learner a chance to be, to think, to discuss and to play the extra ordinary roles in a new world, and the rich virtual worlds realize this situation. According to this, learner experiences concrete realities defined by words and symbols in virtual worlds. Thanks to these experiences and multi medias, he/she is able to understand complex contents without losing connection between summary ideas and real problems. Moreover, the power of virtual worlds in video games also depends on the development of situational learning and some effective social implementations. Towards all these statements, "Is there a significant difference between students' academic achievements according to playing a computer game individually or in a group" is the question of this study. Also as a subquestion, it was determined that whether students academic achievement significantly differ or not according to the common effect of gender and playing the computer game individually or in a group.

METHOD

Research Model

True experimental design was used in the research. Solomon four group design which has two experiment groups and two control groups was chosen in this research. The groups were assigned to the experiment and control groups with draw detachedly. Two of these four group were used as experiment; the other two were used as the control group. Although post-experimental measurements were done in each group, pre-experimental measurements were done only in two groups, one is experiment and the other is control. Learning can occur in the measurement done before the experimental process. Solomon experiment designs are used in order to remove this situation. Solomon four group model is the strongest experiment model protecting both internal and external validity. Symbolic view of the experimental design used in this research is as follows:

Groups	Neurality	Measurement 1		ExperimentalImplementation	Measurement 2	
G1	R	O1.1	O1.2	X	O2.1	O2.2
G2	R			X	O2.1	O2.2
G3	R	O1.1	O1.2		O2.1	O2.2
G4	R				O2.1	O2.2

G1, G2: Experiment Group G3, G4: Control Group R: Neurality in composing the groups
X: Experiment Process O1.1, O1.2: Pre-test O2.1, O2.2.: Post-test

In this design, pretests help the degree of similarity to be known before the experiment, and the arrangement of post test results according to these values. In order to define how effective X, independent variable is, pretest results and posttest results are used together (Karasar, 2005)

Population and Sampling

The population of the research can be assumed as the elementary schools in Mersin province. The sampling of the research is 90 students taken from four 7th grade classes in a state school in Mersin province. There are four classes in the sampling and these classes were assigned with draw as Experiment I (24), Experiment II (21), Control I (22), Control II (23). All of the Science lessons in these experiment and control groups were given by the same teacher.

Data Collection Tools
As data collection tool, 'Academic achievement test' was developed to test the knowledge of the students.

Academic Achievement Test
First, 80 questions from the first 4 units of the 7th grade were collected for the selection of questions used in the game. These 80 questions were thought to be suitable for games. This research was held during the first 4 units. These questions were asked to 108 8th grade students and analyzed at the end of the implementation. ITEMAN 4.0 which is software for the analysis of item and test was used during the analysis process of the questions. Thanks to ITEMAN software, the difficulty level of the questions (p) and point biserial correlation coefficient (biserial) which is used to identify high / low level students were measured. At the end of the analysis, 28 questions whose item difficulty index is between 0, 20 and 0, 80, and whose distinct index is above 0, 30 were chosen. Other questions were removed from the test. Then, the test were analyzed by 2 Science teachers and 3 professors expert in the field, necessary editing was done through their suggestions in order to provide a validity to the test. The reliability of the test was measured using SPSS 22.0 package software, and reliability coefficient was r=0, 78.

Science Game
The game can only be played with three players. At the beginning of the game, three players are paired each other randomly and the games begins. The game takes place in a laboratory. The main aim of the game is to capture the objects in the laboratory. At the first stage of the game, objects are given to the players, who give correct answers to the questions asked. The questions are common. If a player knows the answer, he/she can choose any object he/she wants. After the distribution finishes, the real game starts. The player in turn attempts to capture another player's object. The questions come to the attempting and defending players. Third player watches only. If the player taking the high score is the one who attempted, he/she get the object. If the player taking the high score is the one who defended, it means that he/she could defend his/her object, and enables the opponent to pass. The game ends when all the objects belong to one player.

Game Screen

Implementation Process
In order to conduct the research, the elementary schools were analyzed in the borders of Mersin province. A state school which can give their students the opportunity to use computer laboratory effectively, and has four classes with the same science teacher was chosen as the implementation institution. Interviews were conducted with the science teachers. They were informed about the research and their feedback was taken. On the first day of the first week of the research, pretest was done to the experiment and control groups which were assigned with draw.
On the second day, science game was introduced to the students in experiment and control groups, and information about the rules and steps of the game was given by the science teacher. In the implementation process, lessons were given with the same procedure in both experiment and control group classes. The game was played an hour once a week so they played the game 16 hours totally. The game was played in a different class hour, not in the science lesson hour.

In experiment groups (2), the students were threesome and groups of three students played the game together. But in control groups (2), each student had one computer and they played the game individually. Before the game starts, a student can start the game as a new player or can continue the game with the same name. The students who were sitting with groups of three use multi user option. During the implementation, the science teacher of the school guided students. The implementations lasted 16 weeks. During the week after the implementation finished, pretest was done as posttest to the 4 groups (2: Experiment, 2: Control).

Data Analysis

The equation of experiment 1 and control 1 group students' academic achievement, pre-test scores were analyzed. For this, independent samples t-test was used. Then students' academic achievement scores in four groups (2 experiment- 2 control) were analyzed by One-way analysis of variance (ANOVA). ANOVA was used to determine whether there is a significant difference between academic achievement post-test scores of the students playing the computer game in a group or individually. And also two way ANOVA was used to determine whether students academic achievement significantly differ or not according to the common effect of gender and playing the computer game individually or in a group

FINDINGS

Findings were given below according to the research question and sub-question. To test the equality of groups before the implementation, academic achievement test, pre-test scores, mean, standart deviation and independent t-test results were given at Table 1.

Table 1. t-test Analysis of Academic Achievement Pre-test Score, Mean and Standard Deviation Values of Experiment 1 and Control 1Groups

Groups	N	$\overline{X}$	sd	df	t	p
G1	24	40.33	8.89	44	.521	.605
G3	22	41.63	7.96			

As seen in table 1, before computer game implementation, mean of experiment 1 group (G1) is 40.33 and control group 1 (G3) is 41.63. According to the independent t-test analysis of academic achievement pre-test score, there was found no significant difference between experiment and control group students (p=.605).

Findings of the question "Is there a significant difference between students' academic achievement according to playing a computer game individually or in a group" was given at Table 2:

Table 2. One-Way Analysis of Variance (ANOVA) Results of Academic Achievement Post-test Score According to the Groups.

Source	df	SS	MS	F	p	Meaningful Difference
Between Groups	3	1424.53	474.84	6.51	.001	**G1-G3** **G1-G4**
Within Groups	86	6272.75	72.93			
Total	89	7697.289				

As seen in table 2, one-way analysis of variance technique (ANOVA) was used so as to determine whether students' academic achievement levels show a significant difference according to the group variable. At the end of the analysis, the difference according to the group variable was found statistically significant (F= 6.51; p<.05). According to the results of post hoc tests, significant difference was found in favor of students played the computer game in a group ($\overline{X}$ =83.75) than individually (G3 $\overline{X}$ =74.81, G4 $\overline{X}$ =75.47). This result can be because of group interaction. When the students played the computer game in a group, group members could be motivated the others during the game.

The sub-question of this study was indicated as "whether students academic achievement significantly differ or not, according to the common effect of gender and playing the computer game individually or in a group. According to the analysis of this sub-question, two-way analysis of variance (ANOVA) results were given at Table 3:

Table 3. Two-Way Analysis of Variance (ANOVA) Results of Academic Achievement Post-test Score According to the Common Effect of Gender and Playing the Computer Game Individually or in a Group

Source	df	SS	MS	F	p
Groups	3	1405.69	468.56	1.11	.347
Gender	1	376.78	376.78		
Groups*Gender	3	232.68	77.56		
Error	82	5689.70	69.38		
Total	90	570652			

As seen in table 3, it was seen that there was no significant difference according to playing the computer game individually in a group among the female and the male students. ($F = 1.11$; $p > .05$). This can be because of all students, male or female, doesn't matter, interest on technology and playing diffrent games on the computer. Though all of the male and female students have the same situations and chance during the instruction. And this can be also because of all students want to have fun during learning by playing the computer game.

RESULT

Today, the children's intense interest on video games and their habit of spending their most of the time in front of these games have brought the idea of utilization from video games in education. It's observed that particularly in recent years, researches on this field have increased notably not only in Turkey but also in the world because of the idea that video games may offer both education and fun together. In this research, the effect of video game played with groups or individually on the academic success of the students. Moreover, it's determined that whether students' playing the video game with groups or individually has a significant difference or not according to the gender. As the findings were analyzed, it's observed that there is a significant difference between the students who played the video game individually and those who played with groups, in favor of the students who played in groups. When the literature was analyzed, no research comparing those playing in groups with those playing individually was encountered with. Researches are mostly comparisons of video game based instruction with traditional instruction. For instance, Obut (2005) analyzed the effect of individual instruction with educational video games and traditional instruction on student success. A total of 70 students at 7th grade participated to the research, and experiment and control groups were determined randomly. In the research, a new video game soft ware, which is suitable for the content was created in the computer. This was going to be used in experiment group. According to the findings of the research, it was observed that the instruction through educational video games were more successful and effective than the traditional method.

When the findings were analyzed in terms of gender, it was observed that there is no significant difference among the female and male students with regards to playing video game with groups or playing individually. According to the literature, there are researches on the effects of gender on perspectives to video games. For instance, İnal and Çağıltay (2005) found that some factors effecting the students' video game playing habits and preferences are level of income, having his/her own computer, socio-economic condition of the place she/he lives in, and gender. In another research, Kinzie and Joseph (2008) searched the game playing preferences of the students in the prime school and in the second stage, and suggested some game designs. In the study, it was observed that contrary to the male students, female students have more positive attitudes to the problem solving games and social games; however, the difference was not statistically significant.

According to the results of this study, parallel to the other research results, computer games must be used during the instruction in science lessons and also in other lessons. Other researchers, must study in other lessons using the computer games and the research results must be compared. While using computer games during the instruction, students must play the computer games in a group with 2-3 members rather than playing individually.

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