

The Effect of Using Google Earth Application on Learning and Retention of Geography

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Abstract: The current study aimed to investigate the effect of using Google Earth Application on students' learning and retention of geography. The statistical population of the study consisted of 600 students in fourth grade of elementary school studying in 2013-2014 school year. In this study, random sampling was used by which 60 students were randomly selected into two groups, 30 students in the experimental group and 30 students in the control group. Pre and post-test were used to gather the data needed. The students were taught by Google Earth application in 8 sessions of 1.5 h. The method used in this study according to the topic and its objectives was experimental. Analysis of Covariance (ANCOVA) was used to analyze the data and the results indicated teaching geography by the use of Google Earth Application had positive effect on students' learning and retention which the difference of variances in the two group of experimental and control was confirmed.

Key words: Google earth application, learning, retention, student, analysis of covariance

INTRODUCTION

The present time has been dubbed the time of changing industrial society to post-industrial society. Information, knowledge and awareness are the most fundamental assets for individuals and societies. Development of new technologies in today's society is so fast that the value of considering it is regarded as the most important index of development for developing countries. The present time is a different world in which new technologies are its leader. The important feature of the technologies is that they have facilitated and improved the relationship between human being and environment. Human being have applied oral tools to each and learn for a long time, but today, encyclopedias have been arisen by the combination of multimedia help learners beyond the physical composition of media to achieve their learning goals and needs. New information technologies have provided learners the equipment today more than ever (Afzalnia, 2005). Every aspect of human life has been unintentionally or intentionally affected by increasing expansion of information and communication technologies. The world today is being change due to developments in technology and explosion of constant information. Therefore it is needed to review plans especially in the field of education and educational programs can better match with post-industrial society by replacing traditional approaches with new educational

approaches. Now that the knowledge or the production of information is increasing, the remarkable thing is the creation of diversity and the form of information and tools to transfer them. Today due to severe restrictions on global resources on the one hand and rapid growth of consumers population on the other hand, productivity and increasing efficiency in all areas of human life has become a serious issue and the efforts of many individuals and organizations have been focused on ways to achieve them.

The education system with millions of students, teachers and other people involved is one of the most widely used social organizations recognized which desperately needs projects and methods to increase individuals' productivity. Perhaps, it is possible to mean increasing productivity in education as the students' accessibility to more stable, prosperous, learning and deeper learning and developing their talents in exchange of financial and human resources. Effective learning significantly depends on the compliance and agreement of type of educational material and the method to present them to learners and teachers should be aware of different methods of teaching and by the use of the most effective and correct methods try to increase the effectiveness of teaching. Today, satellites are one of the most useful software tools to transfer data in the world and one of the most important ones is Google Earth satellite maps application (Jobea and Holt, 2012). Google Earth is a

program to receive and view geography data of the world designed by Kay Hole Company and is called three-dimensional map of the Earth. The images of Google Earth map are sent and directed from two sources, satellites and aircraft and the images are taken digitally. In 2012 and 2013, this application was one of the best software to learn and is introduced as the subset of Google map. Teachers can use this application as one of the most important tools in more effectively teaching geography and maps (Jobea and Holt, 2012). Now, given the above issues, the research question is whether or not using Google Earth application make differences on the learning and retention of the students in fourth grade of elementary school in compare to traditional teaching.

Problems in teaching geography: The importance of teaching geography in education system is not secret to everyone. Students increase their power in thinking about the environment by learning geography. Quantitative and qualitative failure in teaching geography in the world and especially in our country is a problem whose effects on the shortage of the required forces are tangible soon. The following problems are among the most important problems can be mentioned.

Tendency to see students similar: learning occurs when new issues are connected to the issues experienced by sensory, visual, tactile and auditory methods. All the tools that make students familiar with the concepts and terminology of geography should be provided.

Students' apathy: Most of our students are not interested in geography and think it is useless and difficult. Therefore, teachers should use the methods with understandable and useful materials.

Using unidirectional method in teaching: unidirectional method in teaching geography in class has no results except depriving the students from group discussions, critical thinking, creative thinking and logical learning and its least effect is the students' discouragement in learning geography.

The method of teaching in the unit: In the majority of the schools in our country lecturing is the only way to teach. Today, it has been approved that students learn geography better based on their activities than pure listening to their teachers. Therefore, the basis of teaching should be based on making the concepts meaningful. Of course the idea is not to ignore the central role of teachers but also means rejecting the teacher's pure rhetoric role in the classroom.

Teaching geography using computers: Computer assisted instruction is called as educational learning opportunities between students and computers. In the method of teacher oriented in which teacher is responsible for teaching, creates the learning environment through selecting and analyzing the teaching materials and ensure that each of the students have acquired knowledge, skills and input attitudes necessary for engaging in business activities. Teacher controls learning and regulates it based on the students' needs and follow the activities designed to remember and transfer what they learned. Regardless of the underlying philosophy of the classroom, practice, virtual simulation and virtual reality are strategies that teachers and students can use in teaching geography in the following each of them was studied.

Practice: Practice is a scheduled way to strengthen teaching by repeating the exercise to transfer skills and concepts acquired into students' long-term memory. In the past, in order to obtain the goals, written homework and spoken exercises were used by teachers but computer programs provide the students more effective way. Teacher in geography lesson with introducing the position of the geography and the name of the desired location asks student to find the location in question by the use of the application and their homework is evaluated when they take pictures from the position and e-mail it to their teacher.

Virtual simulation: Virtual simulation is another strategy used by teachers to help students in the educational environment. In this way, learning takes place by seeking and discovery as well as using and evaluating the new skills, concepts learned. In simulation programs an example of an opportunity to solve the students' real problem can be introduced and provide real exercises in class without any limitations of real life.

For example by the use of searching application of Google Earth without any time and place limitations, a complete simulation of Caspian Sea and Persian Gulf can be provided for the students.

Virtual reality: Virtual reality is a computer-based technology creating imagination and illusion of real situations and immerses the participants in the artificial environment that is quite real, very interactive and multi-sensory and it is clear enough that they think they are in real spaces. For example, being along the Persian Gulf is very welcoming and understandable sense for students. Google Earth is an application used to see the satellites images of satellite imagery, aerial photography, GIS3D companies from throughout the Earth planet. Using

this program makes it possible to view the map of cities and villages in the world. Searching hotels and restaurants and tourist sites are among other features of the program. In order to use the various features of Google Earth such as searching cities, hotels, restaurants and other tourist sites, it is needed to activate Google option from layers section. To see layers it is required to activate sidebar option or toolbar from the menu of view. Three sections of search layer are in Tools. In order to find the position of a certain city or place, the associated title should be searched using search tools. After searching, the program automatically transferred to the air plan of the place. The Earth Planet is the first image seen while performing the Google Earth application.

What is GIS?: Geographic Information Systems (GIS) can be used as a computer-based technology to access geographic data digitally and to absorb, store, analyze and display a various set of spatial or geographic data. Basically, GIS is spatial database and digital maps in which the data of different phenomenon and places are stored. With the use of GIS student and teachers can get the answers to their geography questions. GIS as a tool of communications, information processing and research in the 21st century will help to develop students' abilities to monitor, evaluate, integrate, create and analyze issues and information on different scale and places known (Brown *et al.*, 1998).

A framework for the use of GIS in teaching and learning: Geographic cycle has a simple and useful use to plan and implement GIS in the classroom:

- Using and asking geography questions
- Obtaining the geographical sources
- Exploring and geographic information
- Analyzing geographic information
- Discovering geographic law and knowledge

Web-based tools like Google Earth and educational resources integrated with educational materials show there are great potential in promoting spatial thinking among students. Using Google Earth has been introduced as an educational tool to develop spatial thinking skills (Bodzin *et al.*, 2014). Google Earth is designed to learn the Earth, environment and technology of the Earth space. Global Positioning Systems (GPS) and global visualization tools such as Google Earth and GIS application are geographic information and two-dimensional and three-dimensional images based on web from the perspectives on the lands, oceans and easily and

widely available. This tool is used to visualize, map, organize and analyze different points on the Earth (Bendarz *et al.*, 2006).

Literature review: Several studies were carried out on the impact of educational software after the 1980s. The main basis of the studies was to compare the software and the effect of teaching a single topic through traditional method and using new media as well as comparing media performance in playing the role of teaching with teachers. Most of these studies concluded that new software is more effective in teaching. Summary of researches associated with the impact of educational media on teaching and learning processes show that educational software is a valuable tool in the process of teaching and learning. Also, transferring the educational message through the application influences the cognitive processes.

Today, many communities review and revised their educational systems to compensate for past shortcomings and remove barriers and in order to prevent repeating the mistakes and imposing high cost by keeping the scientific values and their beliefs, they use the outcome of scientific and technical research and the experiences of other countries appropriate to their circumstances and needs. One of the valuable and useful experiences is conscious and strategic use of different aspects of instructional technology.

In 2000, Rouz and Peter William conducted a study on teaching history and geography using a computer at the University of California in which students were allowed to use computer resources and achieve their information through computers. At the end of the study, the results indicated that students received more information and experiences using computers and computer resources and it was a suitable tool for learning. In the study conducted by Tod in 2007, Google Earth was known as a simple and suitable tool to reduce students' problems in using deductive logic and receiving positive results to develop analytical skills. In the study carried out by Deatscherin 2011, teachers' view on using Google Earth application was evaluated and most of them confirmed that it had positive effects in learning. They believed that students can see the world differently by the use of this application and understand many difficult concepts in geography and geology through visualization and virtual world.

Wang *et al.* (2013) proposed using Google Earth application as an application to integrate geography knowledge. They concluded that using Google Earth application helps to create thinking and knowledge as well as critical skills that lead to higher levels of learning.

MATERIALS AND METHODS

Choosing the method of research depends on the objectives and nature of the study as well as its executive features; therefore when the nature of the research topic, objectives and scope of the research are known it is possible to make decision about the type of research. The research hypotheses are also the factors determining the research method. Since the effect of using Google Earth application was investigated; therefore, pretest-posttest method was used in control group.

Population: In the current study, population consisted of all girl students (600 students) in fourth grade of elementary school in area one, region 20 of Shahr e Ray in the school year of 2013-2014. Through the statistics provided by Education system, 60 students were randomly selected, 30 students in experimental group and 30 students in control group. Firstly, the list of all elementary schools for girls in area one, region 20 of Shahr e Ray was prepared. In order to choose the required schools, three elementary schools in area one were randomly selected by the use of sampling method. Finally in coordination with the expert in charge of schools in the Department of Education, one school (Mirdamad School) was chosen for the study and among classes in fourth grade two classes each consisting 30 students were chosen and placed in control and experimental groups.

Instrument: In order to collect the required data the pre-test (including 4 lessons of geography of fourth grade) and post-test (including 4 lessons of geography of fourth grade) were used. In the study, the application of Google Earth was used to teach 4 lessons. The pre and post-test as well as recalling tests were all provided by the researcher. The questions were provided and the help of some experienced teachers teaching geography based on the research objectives and were analyzed and approved.

The validity of the test: In this study, content validity was used to test the test validity. To ensure the validity coefficient of the test provided, the researcher gave the questions to some experienced teachers teaching geography of fourth grade in region 20 of Shahr e Ray and after analyzing the questions some improper questions were omitted and the rest was approved and used as the questions in the tests. In this study, Cronbach's alpha method was used to determine the reliability of the test. The reliability coefficient obtained was 89% which shows the reliability of the test is significant.

RESULTS

Data analysis: In this study descriptive statistics method was used to organize, display the findings and Analysis of Covariance (ANCOVA) was used to analyze the findings and conclusion. Cronbach's alpha coefficient was used to prove the final question test. According to a lot of researchers, Analysis of Covariance (ANCOVA) is the most important method to analyze statistical data of the projects with pre-test especially in the studies in which learning is measured and the researcher can find the effect of pr-test scores from post-test scores based on the statistical test (Bris *et al.*, 2010, translated by Ali Abadi and Samadi).

First hypothesis: using Google Earth satellite maps application has a positive effect on learning geography: According to the results of covariance analysis in Table 1, the participants were different before the intervention ($p = 0.01$). After removing the effect of pre-test by the method of covariance analysis, the effect of intervention in the experimental group was significant ($p = 0.01$, $F = 41.069$). Therefore, it can be concluded there was statistically difference between the mean score of learning in control and experimental group.

According to the information in Table 2 using Google Earth satellite maps application with mean difference of (0.883) between experimental and control groups and significance level of ($p < 0.01$) had positive effect on learning geography.

Table 1: Results of covariance analysis of the effect of pre-test scores on learning (first hypothesis)

Source of changes	Sum of squares	Degrees of freedom	Mean of squares	F-values	Significance level
Fixed	55.343	1	55.343	194.193	0.01
Pre-test	34.672	1	34.672	121.662	0.01
Group	11.704	1	11.704	41.069	0.01
Error	16.244	57	0.285		0.01
Total	19846.100	60			

Table 2: comparing control and experimental group (Pre-test)

Group (I)	Groups (J)	Mean differences (I-J)	SE	Significance level
Experimental	Control	(*)0.883	0.138	0.01

Table 3: Results of covariance analysis of the effect of pre-test scores on retention (second hypothesis)

Source of Changes	Sum of squares	Degrees of freedom	Mean of squares	F-values	Significance level
Fixed	169.31	1	169.31	150.537	0.010
Pre-test	0.458	1	0.458	0.407	0.526
Group	10.417	1	10.417	9.626	0.004
Error	64.109	57	1.125		
Total	21019.000	60			

Table 4: Comparing control and experimental group (post-test)

Group (I)	Groups (J)	Mean differences (I-J)	SE	Significance level
Experimental	Control	(*).0.883	274	0.004

Second hypothesis: using Google Earth satellite maps application has a positive effect on retention of geography: According to the results of covariance analysis in Table 3, the participants were not different before the intervention ($p = 0.526$). After removing the effect of pre-test by the method of covariance analysis, the effect of intervention in the experimental group was significant ($p = 0.004$, $F = 9.626$). Therefore, it can be concluded there was statistically difference between the mean score of retention in control and experimental group.

According to the information in Table 4 using Google Earth satellite maps application with mean difference of (0.883) between experimental and control groups and significance level of ($p < 0.004$) had positive effect on retention of geography.

DISCUSSION

In this study entitled “The Effect of Using Google Earth Application on Learning and Retention of Geography” first the statistical population were equally and randomly divided into two groups of experimental and control. To measure the students’ previous knowledge of the instruction topic, they were given pre-test. Since, the organizing the classes at the beginning of the school year was based on the scores of academic achievement in last year and putting all three groups of weak, average and strong students in the classes equally, the classes were expected to be homogeneous. Based on the pre-test, the variance of control group and the experimental group scores were obtained. According to the results of Levin test regarding the similarity of variances, investigating the variances similarity in the two group indicates there is not significant difference between experimental and control group (F is not significant in the significance level of 0.927). This means there was not any differences between experimental and control group in terms of the required knowledge to teach; therefore, the groups were homogeneous. Then eight sessions of instruction lasting for 1.5 h were considered for the classes and after every two sessions the two groups were simultaneously given post-test from the content of instruction. The questions

of the test were prepared by the researcher and the assistance of teachers of fourth grade of as well as geography teachers in elementary school. After reviewing the questions and determining the scores, the variance of the scores in the two groups were calculated and it was seen that there was a significant difference between the variance of scores in the experimental and control groups.

First hypothesis: After covariance analysis it was found that in the significant level, the hypothesis of using Google Earth satellite maps application has a positive effect on learning geography is confirmed.

Second hypothesis: After about a month, the retention test was taken from both groups. This test measures the rate of students’ retention of materials taught in geography class during the course. The content of the pre-test questions was parallel with the content of the post-test questions. The results indicated that there was a significant difference between mean scores in the experimental and control group. After analysis of covariance it was found that in the significant level, the hypothesis of using Google Earth satellite maps application has a positive effect on retention of geography is confirmed.

Using Google Earth application as an integrated educational tool, students not only learn how to study but also learn how to research, create new knowledge and solve the problems which are expected to learn. Instructional technologies in every country are located in the framework of the limitations of educational system of the society. New instructions have benefits experienced by the researcher. For example, observing high motivation to learn in students of experimental group and their interests to participate in class and facilitate instruction for the teacher and engage all students in class. Despite of many benefits of educational software in addition to the implementation of the research, some of them are not experienced at schools. There have been some barriers to develop and apply and ideal results at schools discussed here with some suggestions.

One of the reasons was lack of instructional equipment. It was observed that the a few students in

limited time were allowed to use these devices. Teachers are another factor of failure the application of technology in this century. Researchers in the study of using technologies in classrooms since 1920 have found that the failure of using instructional technology and methods and matching them with the methods of teaching in the classroom are teachers. Although, the cause of all these failures cannot be attributed to teachers but the main obstacles are teachers who do not know the culture of using the technologies as well as the techniques and methods in classes and if these devices are available for them they cannot use it. The most challenging problem is to create changes in the culture of teaching. For beginners, the traditional role of the teacher is substantially changed in this new class. In the individual collaborative learning opportunities teachers are a facilitator and a guide rather than being a leader (Nourian, 2010). Today's teachers are not trained for this role. In addition to this, they should be familiar with the technology and have very close interaction. Appropriate and effective use of technology at schools is not an easy task. Technologies are reflected at the school when the teacher and student know the roles and importance of the technologies in the process of teaching-learning and math them with the methods of teaching and learning. Instructional technology is not only the use of hardware technology such as computers, videos or televisions in the classroom but knowing the role of the hardware along with knowing the objectives and the method of teaching, learners and learning strategies and effective methods of teaching as well as the ways to apply hardware to fulfill the instructional objectives.

Today's, information and communication technologies are the most popular issues in advanced educational system. But, the words are based on the research findings especially the findings of Educational Sciences, Developmental Psychology, Science and the arts of education. Therefore, it should not be forgotten when to use various technologies in education, sciences and arts are prior to technology. Yet, it is also necessary to remember that without new information and communication technologies, fundamental changes in practices, attitudes and educational skills appropriate to the age of knowledge will not happen. However, to successfully coordinate the technology and instruction, fundamental changes should be made. It is necessary that all the scientific, research and training centers consider the effectiveness of educational technology as an experience. The least benefit of this work in practice is to discover or choose pedagogies appropriate to the circumstances to develop educational professionals' skills and abilities to understand the roots of the problems of

education and awareness of how the rest of the world with new technology in education will solve similar problems. Understanding and awareness of the features of new media and technologies plays an important role in motivating and enhancing the creativity of teachers. Undoubtedly, teachers who are unaware of the benefits and efficiency in the use of media resists on applying them. To resolve this problem, teachers' skill levels and abilities should be increased by providing instructional workshops or it is natural for the teachers to feel that these new technologies endangers their job security. Initial studies and observations indicated that one of the real problems in the integration of information technology and environment education returns to technical issues which should be solved simultaneously with general education. Inadequate technical support and hardware/software problems are environmental problems that need non-instructional solutions. In addition, teachers who participate in computer general courses are completely unaware of the use of computers in the curriculum and teaching methods. Hence, along with general education, instructional workshops should be held with the emphasis on certain lessons. Following professional training or development, teachers should be supported in the realization of what they have learned. The first stage of the support is given in their teaching places and next support can be delivered through telephones or internet.

CONCLUSION

Continuous support is an important factor in successful instruction. In the position of informed teachers when students are using computers, their feelings to understand the concept of communicating with technology should be stimulated and they should be asked to be critical thinkers. For this purpose, higher levels of learning should be promoted to higher levels of Bloom's taxonomy such as analysis, synthesis and judgment. One of our main tasks is to teach children to understand technology and think of its consequences and relationship to human development. Teachers should also be provided the possibility to integrate what they have learned from previous training with ongoing training so that, new areas of technology to be introduced to them. To cover the effectiveness of the ability of information technology to improve learning, the following basic requirements should be provided:

- Students and teachers should have enough accessibility to digital technology and the Internet in the classroom

- Internet and digital content with high quality, meaningful and related to culture should be available for students and teachers
- Teachers should have knowledge and skills in the use of resources and digital tools to help students progress and reach high level of standards

The necessity of the cases mentioned above were experienced and confirmed by the researcher.

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