Comparison of Three Methods of Face to Face and On Line Teaching and a Combination of These Two Methods in Learning Science on Junior High School Students

Raheleh Ghazi Ardakani[1], Madine Alikhani[2], Fatemeh soltani[3]

[1]Industrial Management, Ardakan Branch, Islamic Azad University, ardakan, Iran
[2]Education and Training Employee, Koohrang, Iran
[3]Industrial Management Institution, Ardakan, Iran

Abstract: The purpose of this study was comparison between two face-to-face and virtual teaching methods and combination of these two methods in learning science. Using cluster sampling, three classes with 20 students in each class from the students of first grade of Tehran city's junior high schools was chosen, and for 45 days, each of the experimental variables ran on them. The experimental pre-test - post-test method was used to collect data. Data analysis was performed using T test and ANOVA. Results showed that there is no significant difference between the virtual and face-to-face methods (t=0.41) and variance analysis showed there is a difference between the three educational methods, face-to-face, virtual and the mixture (F=7.008). There are also differences in the survival rate of learning in three ways (F=6.78). HSD test results showed that students had a better performance in learning science with the combinational method rather than two other methods and the survival rate of the learned contents is better too.

Keywords: face-to-face learning, virtual learning, combined learning

1. Introduction

The widespread use of modern global technologies has created the concept of information society. This concept is looking at the stunning advances in processing, storing and transmitting of information that is actually led to application of information technology at all aspects of social life. (Hassanpour, 2011). One of the computer applications, is its application in education. Computer in terms of human weaknesses, such as fatigue, forgetfulness and other reasons that can cause loss in learning performs with none of those and its accuracy, speed, and unique characteristics, can play an important role in the process and learning (Fazeliyan, prosperous, 2011).

Nowadays with the advent of computers, all aspects of human life have changed. If until yesterday, the learning only have benefited from teachers and instructors, and the books was considered as the main source of information in learning, today learning meets the new communicational environments and tools. Recent advances in computer and information science, appearance of new local, regional and international information networks and especially the Internet, multimedia and communication technology, makes the designers, planners, managers and executors learning program face with new tools and methods. Penetration of new technologies of information from schools to universities and even homes had generally changed the simple relationships

of the teachers and students. Thus, the traditional patterns of learning are changing and users are facing with a large amount of knowledge and information (Fathnejad, Mokhtari, 2012).

According to Reeves (1994), from the superior characteristics of Computer Assisted Learning, information processing ability, fast response, diversification, learning and creating backgrounds for thinking can be named. In recent years, the Computer Assisted Learning is also considered from the fundamentalists, because the basics of such trainings are creating plenty of opportunities and giving more accessibility to learners for producing the science, so that learners can create new ideas individually. In fundamental approach a computer it is a tool for gathering and organizing information, to show what the learners have learned. In this section the learner as an active explorer updates his or her information through the process of new information, (quoted Sheikh Zadeh, Mehr Mohammadi, 2008).

The first problem that we face in virtual learning is change in physical learning environment. Applying technological tools will causes to change in the classroom environment and the teacher's role. Here there are no limitations of time and space any longer and the concept of classroom extends. Through the virtual learning method, learners have access to more information and. In this method, automated learning is in mind. Learners take the responsibility for their

learning and have access to educational content when they want and ease of use in this method is more.

In science, when the students themselves take the responsibility for learning, learning will be deeper and more accurate because learning is the result of their intellectual efforts. On the other hand, in the face-to-face method regarding that the content detail will be expressed by the teacher, it can facilitate the learning process. The presence of the science teachers in the class, students will be able to resolve the problems. Predetermined time schedule, induce the necessary learning order to the students and the abundant resources that all of which are in line with traditional training makes this method of learning looks easier. Finally, it seems that these two teaching styles have their weakness and strength that has caused their effectiveness in the learning rate is not significantly different. One of the features of computers is its freedom of any fatigue, and offering training and lessons repeatedly. When the condition for success in science is exercise at various levels of difficulty, then the computer will meet this goal and practice and repetition will ensure lasting lessons in mind. Besides offering lessons from teachers and see examples of it in the computer, help students to have multi sensational experience in understanding the content that the depth of learning increases and it is obvious that the durability of the material learned through more senses is much more. Therefore, for these reasons, it appears that the combination of the two methods of learning will increase the durability of learned material.

Mirzaei (2009) compared the traditional methods and the use of ICT in teaching science and concluded that the use of IT and ICT technologies in science education is effective. Sheykhzadeh and Mehrmohammadi (2008) in their study concluded that applying the software to increase the level of cognitive learning and academic achievement is effective. Saadatmand (2007) declares that new technologies like computers and related areas improve the process of teaching-learning. Erfaniyan and Khadivzadeh (2012) and Ghassemi (2010) reported that effects of computer-based learning are positive and significant. Similarily Melisen and Dernet (2008), Mortazavi Nasiri (2000), Barnon (2003) Vagan (2006) also found same results.

Sitzmann and colleagues (2006) reported that in total E-learning is 6 percent or more effective in providing training. Although the rate of students learning reported to be same in each method, but in long-term studies that were compared to control group, web based training with regular feedback from the instructor, was 19 percent more effective than in-person training (quoting Zolfaghari et al, 2012). Qeshmy (2010) reported that durability of learned

content via multimedia method is more than control group that trained science through traditional method. Also in the course of English learning, new technologies are effective in comprehension and retention of new words and phrases, Saadatmand (2007) said. Erfanian and Khadivzadeh (2012) also stated that education via simulation method result in faster reminding of the content.

2. Material and Methods

All of the statistical populations of this study are male (89-90) first semester Junior high school students in the district 2 of Tehran's Shaheed Nawab Safavi junior high school. Number of Junior high school students in the first semester was 375. Using cluster sampling, three class of first grade Junior high school were selected as samples. Each class includes 20 students and the total number was 60. Randomly each of three face-to-face, virtual and combinational methods was used in each class. In the present study, the experimental methods and pre-test, post-test designs with three groups was used.

Using draw the face-to-face, virtual and combined method were used to A, B and C classes respectively. From each class, in the same conditions, a same pre-test was taken no significant difference between the knowledge of students of three classes was found.

Groups B and C, took required training to use computer software, network and communicate with other students through the central system within two weeks and finally a practical test of knowledge were taken from students and the two groups detected to be in the same level of information. One teacher was selected to educate the three groups with similar examples and exercises, and students were asked to restrict the education to the classroom environment and have no education out of class time.

After each period, the post-test was taken from each group in the same condition. The test includes 10 questions that were initially evaluated by experts in the field of science and after the required changes approved by experts, then were used in the study and the scores were used for analysis.

To examine the persistence of learned material in the groups, a test from taught contents was taken after 10 days. It is noteworthy that the in the distance between the test and retention test (ten days), subject have no education related to content taught in this study.

In this study, first theoretical data were collected. Books, articles and dissertations that were the subject of virtual and face-to-face education, such as in person education, non-person education, distance education, traditional education, electronic education, computer-assisted education and education via the

Internet, were studied. Then, for collecting desired data, the teacher made written test was used. The written test was based on educational content and headlines and was taken in the same conditions, and the scores of the test was the criterion for measure the achieved learning.

In order to ensure validity and reliability of the prepared questions for pre-test and post-test, these tests exposed to the teachers and experts in the field of science education, and meetings were held with them. After analyzing the content of the test and hearing their comments, their views were considered in the tests.

To ensure validity and reliability of prepared software, consultations made with several computer engineering, programming experts and experts in the field of science education. This software is from a series of multimedia educational software that the designed and produced in the Department of Education unit of Samin Tarasheh engineering Co. The consulting group diagnosed this software to be in desired level of content and type of providing education. On the other hand, this software was used in Sharif non-profit institution and presented to students to be used at home for more training and after a semester usage of this software and its teaching methods, approved by teachers.

3-4- Methods of data analysis

To test the hypotheses one-way analysis of variance (ANOVA), Scheffe post hoc test and T test was used and data analysis was performed by SPSS 16 software.

3. Results

First, the sameness of variance in all three face-to-face, virtual and combined groups tested using one-way analysis of variance (ANOVA).

According to the results in Table 1, because the Calculated F (F=0.094), in 95% confidence level (α=5%) and degree of Freedom 57 and df =2 is smaller than the F in the critical table(F=3.16) therefore, the zero hypothesis is confirmed. In other words, the mean difference between pre-test scores for all three methods is not meaningful.

Then, to verify the hypothesis, the one-way analysis of variance test on the test scores of the three groups was used again.

Table: 1 Results of one-way analysis of variance test for pre-test scores for all three educational methods

	Sum of squared	Mean square	df	F	Significant level
Inter group	0.233	0.117	2		
Within a group	70.500	1. 237	57	94%	0.910
Total	70.733		59		

Table 2: Results of one-way analysis of variance test on post-test scores for three educational methods

	Sum of squared	Mean square	df	F	Significant level
Inter group	233.233	116.617	2		
Within a group	984.500	16.640	57	7.008	0.002
Total	1181.733		59		

According to the results in Table 2 because the calculated F (F = 7.008) in 95% confidence level (α = 5%) And freedom degree of 57 and df=2 is larger than F in critical table (F=3.16) therefore the zero hypothesis rejects and the versus hypothesis is confirmed, in other words there is a significant difference in learning science between the three face to face, virtual and combined methods.

To determine which difference between these methods is significant, the Scheffe post hoc test was used.

Table 3: Scheffe post hoc test results for post-test scores

i method	j method	The mean difference	Sig	95% confidence interval between	
				Low limit	High limit
Face to face	Virtual combined	-0.600-4.450/4*	0.8980.004	-.3 8424-7.6924	2.6424-1.2076
Virtual	Face to face combined	0.600-3.850*	0.898 0.016	-2.6424-7.0924	3.8424-0.6076
combined	Face to faceVirtual	4.450*3.850*	0.0040.016	1.20760.6076	7.69247.0924

As can be seen in Table 3 this difference between virtual and face-to-face methods with combinational method is significant. Nevertheless, the average difference between the virtual and face-to-face is not significant, then it can be concluded that, a more effective learning occurs when the two face-to-face and virtual methods are combined rather than each one alone.

To investigate difference in durability rate of science learning for these three methods one-way analysis of variance test was used.

According to the results in Table 4, because the Calculated F (F=6.784), in 95% confidence level (α=5%) And freedom degree of 57 and df = 2 is larger than the F in critical table (F=3.16) therefore, the zero hypothesis rejects and the versus hypothesis is confirmed. In other words, there is a significant difference for durability of science learning between three methods of learning science.

To determine that the difference between which of these educational methods is significant, the Scheffe post hoc test was used.

Table 4: Results of one-way analysis of variance test for retention test scores of three educational methods

	Sum of squared	Mean square	df	F	Significant level
Inter group	224.223	112.117	2		
Within a group	641.950	16.575	57		
Total	1166.183		59	6.784	0.002

Table 5: Results of Scheffe post hoc test for durability test scores between three methods

i	j	The mean difference	Sig	95% confidence interval between	
				Low limit	High limit
Face to face	Virtual	0.100	0.997	-3.1311	3.3311
	combined	-4. 050*	0.010	-7.2811	-0.8189
Virtual	Face to face	-0.100	0.997	-3.3311	3.1311
	combined	-4.150*	0.008	-7.3811	-0.9189
combined	Face to face	4.050*	0.010	0.8189	7.2811
	Virtual	4.150*	0.008	0.9189	7.3811

As seen in Table 5 this difference between virtual and face to face with combination of methods is significant, but the average difference between the virtual and face-to-face is not significant. Therefore, it can be concluded that durability in the science learning for students who trained using a combination of both methods is larger than face-to-face and virtual methods alone.

4. Discussions

This study was compared two methods of teaching science, face to face and virtual methods. With respect to the analysis of the data obtained from T-test it can be resulted that there is no significant difference between teaching via virtual and face to face methods and this is consistent with research results of Fletcher and Capper (1996), Moore and Thompson (1997), Carter (1996) and Sitzmann and colleagues (2006). Also Melisen and Drent (2008), Mortazavi nasiri (2008), Barnon (2003) and Vaughen have found similar results.

The results obtained from analysis of data showed that there is significant difference for

durability of learning science between face-to-face, virtual and combined methods. In addition, this difference is between the combined method and the two face-to-face and virtual methods, but there is no significant difference in the durability rate between the face-to-face and virtual methods. This result is consistent with the results of some researchers such as Qeshmi (2009), Saadatmand (2008), and Erfaniyan & Khadivzadeh (2012). The effect of computer use on learning have reported positive and significant. In addition, Mlysn and Drnt (2008), Mortazavi Nasiri (2000), Barnvn (2003) Vagan (2006) found similar results.

Results from analysis of data showed that, the survival rate of learning science have significant difference in face-to-face, virtual, and combined methods. Moreover, the difference is between combined teaching methods with two face-to-face and virtual methods, but there is no significant difference in survival rate between of two face-to-face and virtual training methods. The results of some researchers, including Qeshmy (2009), blissful (2008),

and Khadivzadeh Erfaniyan (2012) are consistent with our results.

Considerations in the selection of appropriate tools that are suitable for learners' situation are one of the elementary principals to improve the quality of learning. Combinational learning with using a variety of tools and advanced technology tries to improve the quality of learning and develop the quantity of activities in both horizontal and vertical dimensions. Horizontal dimension tries to expand domain of learning assistant tools in teaching process, so that the highest quality obtained through the optimum combination of these tools. Vertical dimension considers to the depth of learning and better understanding of various learning materials and understanding that which techniques in which times leads to better understanding of content and optimized learning. Because the most common type of training that covers a wide stratum of society is traditional training, this type of training, is always accompanied by drawbacks. For example, in science, because that major part of teaching-learning process is taken by the teacher the class faces with lethargy and malaise and these deficiencies affects their impact on learning. While to present a high quality of education in large scale, using virtual method along with the traditional method and using combinational method makes it happen. In fact, the class teacher's presence and his or her experience, along with the opportunities of virtual learning promote the learning rate.

At all stages of study it should be noted that, after learning lessons by students and passing the exams, the training process has not achieved its goal completely. What is important, is the lasting of materials taught. Obviously, offering training in various methods, there is possibility of being differences in the durability rate and the preferred method is the one with more lasting. Besides, in science, it is more important because the materials taught today are basic lessons of a higher stage and how most we assure that all students acquire the necessary proficiency in science but it comes to mind that how much of this material will remain in the minds of students and will not forgotten over time. Then the best way for the teacher is the one to meet this goal as well. According to survey results of this study, it appears that the combination of the two face to face and virtual methods have the most durability rate in science, teachers can use this method to achieve higher levels of durability rate and can take advantage of this teaching method.

Generally it can be stated that according to the results obtained from the research hypotheses, virtual learning with all of its disadvantages, such as the absence of teachers, lack of infrastructural facilities, lack of virtual learning resources and so on, has been able to overcome these weaknesses with its capabilities such as, having no spatial and temporal limits, diverse learning environment, easy access to information, etc. and have the influence on learners like traditional method. To increase the scientific level community, all people, should have equal levels of education. Most of people using traditional method can learn the science, but there are special people who do not have the accessibility to this education, such as nomads or students in faraway villages due to the spatial restrictions, or some people cannot use traditional education system, such as people with body disabilities or workers who have limited mobility or time. Thus, this learning method provides opportunities for these people to continue education and overcome the limitations. In such circumstances, there is concern that changes in the type of education from face to face to virtual can cause to learning be less effective, but results indicate that the rate of learning in both face to face and virtual methods are same and virtual learners can use it without any concern. of course, this is notable that the more we have necessary tools for virtual learning the more quality we have in this type of education.

According to the research, our recommendations are as follows:

1 - The rise of smart schools in order to rise the using of computers in education;

2 – Placing computer introductory classes at lower levels to enhance computer literacy;

3 - In-service classes for teachers and administrators to make them familiar with the benefits of virtual learning;

4 - In-service classes to familiarize teachers with the necessary software and tools in virtual learning;

5 - Equipping schools with adequate facilities;

6 - To consider the special scores for teachers who use this type of training.

7 -Regarding that this research has done in the field of science learning, it is recommended that researchers investigate this subject on the other fields.

Corresponding Author:
Raheleh Ghazi Ardakani
Industrial Management, Ardakan Branch, Islamic Azad University, ardakan, Iran

References
1. Bates, Tophi (2003). Effective teaching via technology in higher education, Translated by Zamani and colleagues (2010). Tehran: SAMT publications.
2. Erfanian, Fatima & Khadivzadeh Talaat (2012). Effects of two methods of simulation-based and traditional education on midwifery students to

perform pelvic examinations. Journal of Knowledge Horizons, Volume 14, Issue 2.

3. Fathnejad, Faramarz & Mokhtari, Amir (2012). Virtual education, Aspect of the third scientific revolution. Tadbir No. 138.

4. Fazeliyan, Pourandokht & Saadatmand, Mohsen (2011). Effect of Computer Assisted Instruction (CAI) in comparison with traditional teaching methods on learning English in first year junior high school. Foreing Language Teachig Journal. nineteenth period, No. 72.

5. Fazeliyan, Pourandokht (1379). Application of computer education. MA. thesis. Teacher Training University in Tehran.

6. Ghassemi, Maryam (2010). Effect of using information and communications technology (ICT) on learning and information literacy of male students of third grade guidance school students in experimental sciences course. Thesis of the Master, Teacher Training University of Tehran, Faculty of Psychology and Educational Sciences.

7. Hassanpour, Jaffar (2011). The right to development in the information society. Monthly information on the political, economic, nineteen years, the numbers 11, 12.

8. Mehrmohammadi, Mohammad (1379). Educative training for teachers and managers. Tehran, School publications.

9. Mirzaei, Rahim (2009). Using ICT for Teaching Science and its comparison with traditional methods. MS Thesis. Kerman University of shahid Bahonar, Faculty of Science and Computer.

10. Nassiri, Alireza (2008). Management of Virtual Universities and E-learning centers. Tehran, Tehran University Press.

11. Qeshmi, Mohammad (2010). Comparing effects of computer-based teaching and multi grade teaching classes in Anguran, Zanjan. MS Thesis. Arak University, Institute of the Humanities and Social Sciences.

9/25/2016