



Research Article

A Comparative Study on the Effectiveness of Teaching based on Modern Technology and Traditional Methods on Educational Self-Efficacy and Educational Achievement in Subject of Sciences among Junior High School Students in Bandar 'Abbas County

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ABSTRACT

The following research tries to study the effectiveness of education based on modern technologies (multimedia education) on educational self-efficacy and educational achievement among junior high school students in Bandar 'Abbas County. Independent variable in this research included teaching methodology based on multimedia education and the dependent variable included educational self-efficacy and educational achievement in subject of sciences. The statistical sample to this research included 40 second grade junior high school students from Bandar 'Abbas County who were randomly divided into two groups of experimental and control. Data collection tool in this research included researcher-made questionnaire of educational self-efficacy and educational achievement which were of a desirable validity and reliability. The collected data was analyzed through multiple covariance analysis and one-way covariance analysis and results suggested that the experimental group who were taught through multimedia education showed a higher educational self-efficacy and educational achievement comparing to the group with traditional education method.

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Introduction

Applying information and communication technology is a part of moving towards better use of educational technology in modern schools. Teaching special skills to the students, creating responsible spirit in students and using accessible source such as the Internet, are among the objective to information and communication technology. But the ultimate goal in using information and communication technology is to increase teaching impact and improve learning in students. (1)

In today's world, computers use has a unique status in teaching sciences.

-Information and communication technology could make sciences more exciting, more correct and more proper.

-Information and communication technology could provide more opportunities for observations, discussions and analyses.

-Information and communication technology could provide more opportunities for making more relations and cooperation

-Information and communication technology, as a tool, could provide more independence in scientific researches for the students and have a positive impact on teaching and learning the subject of sciences.

To use information and communication technology in sciences, the internet and CDs could be used as information sources to gather scientific information. Digital cameras and camcorders could be used as event-recording tools. Spread sheets and graphic tools could be used to analyze data. Animations and virtual environments are good tools for simulation and modeling. E-mail, portable devices such as laptops, presentation technologies such data-projectors, and interactive boards are useful tools for teaching and learning. Considering the significant role of animation in learning, they could be used in PowerPoint pages for better understanding of teaching materials. Learning subjects such water cycle, cell growth, visual system, auditory system, digestive system, blood circulation system, animals motor system are easier by animation. (2)

The main objective to this research is to compare the effectiveness of teaching methods based on modern technology and traditional methods on educational self-efficacy and educational achievement in subject of sciences among junior high school students in Bandar 'Abbas County.[3]

Statement of Problem

There has been a lot efforts in Iran during the recent decades to substitute traditional teaching methods with modern ones, which are based on students' personal and social needs. The modern methods try to raise students creative and science-producing and open new windows to sciences and technology in Iran. Educational systems and students textbooks changes have been carried out due to the same cause. However, despite these efforts and heavy expenses which Department of Education has withstood, the subject of sciences is still thought through traditional teacher-oriented methods. In most Iranian schools, no changes have been observed in teaching and testing methods. Accordingly, teachers are most often cruelly blamed for not being able to adapt modern teaching methods. Unlike traditional teaching methods, E-learning is student-oriented and it focuses on self-learning. Teaching methods based on information and communication technology helps teachers and students with adopting a leaning-oriented method. (4)

Various researchers in various studies have researched and compared the effectiveness of traditional and teaching methods and teaching methods based on modern technologies, while they have reached contradictory results that some of which suggest the higher effectiveness of teaching methods based on modern technology while some other show the equality in effectiveness of traditional teaching methods and modern methods.

Considering the significance of the aforementioned issues and presence of contradictory results along with research voidance in this area, the main objective to this research is to focus on teaching methods based on modern technologies and if they have higher effectiveness on educational self-efficacy and educational achievement in subject of sciences among junior high school students in Bandar 'Abbas County, comparing to traditional methods. [5]

Materials and Methods

Since this research tries to study the effects of scientific concept teaching methods based on modern technologies (multimedia) on educational self-efficacy and educational achievement among junior high school students in Bandar 'Abbas County, comparing to the traditional methods, to test the hypotheses, the research uses quasi-experiment pretest-posttest design with a control group.

The statistical society to this research included second grade junior high school students in Bandar 'Abbas County during the school year of 2014-2015 which includes 6560 students. The statistical sample included 40 second grade junior high school students. Cluster sampling was used in this research in the following trend: initially among various Bandar 'Abbas district, one district was randomly choses (District 1) and among its schools, one school was randomly chosen and among its second grade classes two classes were randomly chosen and among the students of these two classes 40 students were chosen through simple random sampling and randomly divided into two experimental and con-

trol groups (20 in experimental group and 20 in the control group).

The data collection tool in this research included researcher-made educational self-efficacy and educational achievement questionnaires.

Educational self-efficacy questionnaire included 42 items and the tool reliability was measured to be 89.0, 77.0 and 91.0 through Cronbach's alpha, Spearman-Brown split-half and Guttman split-half, respectively. Also, the validity of the tool was tested through formal validity and concurrent validity and material analysis which suggest a good validity for this questionnaire.[6]

Also, educational achievement test was made based on Sciences textbook for junior high school second grade, by the research author. This test included 20 multiple choice questions. This test included 6 subscales of knowledge, understanding, utilizing, analysis, combination and assessment. The tool reliability was measured to be 74.0, 81.0 and 79.0 through Cronbach's alpha, Spearman-Brown split-half and Guttman split-half, respectively.

Also, the validity of the tool was tested through formal validity and concurrent validity and material analysis which suggest a good validity for this questionnaire. The collected data was analyzed through multiple covariance analysis and one-way covariance analysis.[7]

Findings

Table 1: presents the mean and standard deviation of educational self-efficacy and educational achievement scores in subject of science in two groups of traditional teaching and teaching based on information technology in pretest and posttest.

Subscales	Statistical Indices	Traditional Teaching Method Group		Teaching Group based on Information Technology	
		Pretest	Posttest	Pretest	Posttest
Educational Self-Efficacy	Average	105	106	104	120
	Standard Deviation	5/24	5/26	4/81	5
Educational Achievement	Average	16	16/91	15/99	18/18
	Standard Deviation	1/14	3/06	4/41	3/27

In this part, research hypotheses analysis results are presented:

There is a significant difference between two groups of traditional teaching and teaching based on information technology on educational self-efficacy and educational achievement in the subject of Science among junior high school students.

To study this hypothesis, MANCOVA was carried out on groups' posttest results with the control of research dependent variables (educational self-efficacy and educational achievement) pretest results. Table 2 presents the MANCOVA results on groups' posttest results with the control of research dependent variables (educational self-efficacy and

educational achievement) pretest results. Contents of Table 2 suggest that there is a significant difference between two groups of traditional teaching and teaching based on information technology on at least one dependent variable (educational self-efficacy and educational achievement). To study this impact more accurately, one-way covariance analysis was carried out on dependent variables in MANCOVA context. Results to this analysis are presented in Table 3. Table 3 presents one-way covariance analysis results carried out in MANCOVA context for comparing posttest results with the control of research dependent variables (educational self-efficacy and educational achievement) pretest results in two groups of traditional teaching and teaching based on information technology.[8]

Table 2: MANCOVA Results for Comparing Posttest Score of Dependent Variables of Educational Self-Efficacy and Educational Achievement in Two Groups of Traditional Teaching and Teaching based on Information Technology

Impact	Test	Value	F	dF Hypothesis	dF Error	Significance Level	Impact Size
Group	Pillai's Trace	.78	97.5	2	55	.0001	.78
	Wilks Lambda	.22	97.5	2	55	.0001	.78
	Hotelling's Trace	3.54	97.5	2	55	.0001	.78
	Roy's Largest Root	3.54	97.5	2	55	.0001	.78

Table3:Table of analysis of one way covariance in Mankova contexts on the scores of after testing efficacy variables of education and educational improvements in traditional education and modern education based on information technology in the recent study.

Dependent variable	Total squares	Free rank	Averages of squares	F	Meaningful level
Self- efficacy education	415/4080	1	41/4080	89/107	0001/10
Educational improvement	09/199	1	09/199	86/94	0001/0

The results of table 3 show that the analysis of one way covariance in self- efficacy educational variable (0001/0P= 89/107F=) and educational improvement (001/0p= 86/94F=) are meaningful. In order to understand this difference, it is just enough to compare averages of after testing traditional education and education based on information technology (IT) in accordance with their dependent variables. According to the results of table 4, the average of after testing self- efficacy education and educational improvement in the course of science is more in educational group based on IT than traditional education. Therefore, education based on IT, in comparison to traditional education, has more effects on the increasing of self- efficacy education and educational improvement of student's science.[9]

Conclusion and discussion:

Results of table 3 show that education based on IT, in comparison to the results of the analysis of above hypothesis, is compatible with the result of Juyangi Bani (2010) and Henifin and Vermillion (2000) studies. Findings reveal that use of education based on educational media provides active and dynamic environment for the students and they can learn both individually and internationally. Also when the learners start to learn and involve all their senses, at last they can learn better and it causes that students feel more self-efficacy. But in traditional education because the learner does not have any interferences and activities in the education process and does not control his/her learning, so he/she may feel inactive and not dynamic and learning will become boring. Finally, learning and self- efficacy will decrease. Also results show that education based on IT, in comparison to traditional education, has more desirable effects on educational improvements of students in the course of science. Above findings are in compatible with findings of studies by: AhmadReza & Agha Barati (1390), Amiri (1389), Zareie Zavaraki & Jafar khani (1388), Abbasi (1386), Shiri & Atarans (1386), Taheri (1386), Karami & Ataran (1385), Mehr Mohammadi (1384), Darabi Chaghasiyahi (1389), Gharibi (1388), OSO etal. (2010), Olivet (2010). Shanti & TiygranJohn (2011), Malic (2011), Viti Harold (2005), Kalis (2004), Haskin (2000), Mendol (1999), Askat & Vegner (1999). In the interperatation of this findings, we can say that main feature of multimedia is interaction. Volf Gram (1994) said that people just remember 15 percent of what they hear and 25 percent of what they see. However, they remember 60 percent of what they interact with (10). Because of use of different senses like: seeing, hearing and others in multimedia education, the level of learner's learning increase (11), and because using multimedia was a interesting instrument, but using of lecturing alone as a transferring media of educational message is boring, monotonous and limited (12). It seems that the reasons of meaningful effect of multimedia concepts of science on educational improvements of students, interaction, involvement of different senses and avoiding of monotonous, are a usual ways of class.[13]

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