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The Role of Simulation Software in Learning and Reminding (Case Study on Matlab, Packet Trace, Pspice and Opnet)

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ABSTRACT

Since the main goal of educational technology is bringing an ease to the learning and an improvement to the performance, educational simulators, as a technology, could be a means of achieving this goal.

In this paper the degree of effectiveness of the simulator software on the learning and remembering of engineering students of Nonprofit universities on n

The research method is semi-experimental and pretests and posttests are used. The population is divided into experimental and control groups, the first is taught using simulator software and the latter using traditional method. The research data is analyzed using t-test. The results confirm that educational simulator software had a positive effect on increasing the learning.

KEY WORDS: educational simulation, learning, remembering

1- INTRODUCTION

Development of educational system at the time of information and communication technology is one of the main challenges for educational policy makers. Reviewing educational system's process is an important thing because of impressive effect of information technology and its growing influence in different principals of educational system. Therefore it should be paid attention to gain a coordinated systematic arrangement in information arena (Rastgar Pour, 1383, P182). One of tools which could have important impact on the growth and educational quality are simulators. Simulation is a version from some real tools and devices or job situations and it tries to show some behavioral aspects of a physical or abstract system by means of other system's behavior. In simulation by means of a simulator or other tool in an artificial situation, it could be reconstructed real effects of some probable conditions and it could be used in education effectively. Engineering, sciences and technology fields are very dynamic because of recent progresses in computer and other technologies. Graduated people in engineering and technology fields should have an exclusive background for a greater area of technical subjects and should have ability in use of scientific and engineering equipments of control experiences and effective representing of results. A cost effective way for this purpose is use of simulator tools. These software packages have an important role in education, from simulating electrical simple circuits to complicated tasks such as electromagnetic filaments, thermal transition by means of materials, network, computer circuits, game program writing, electron flow in semi conductors or ray loading and final purpose is providing examples from concepts which are not simply imagined and comprehended.

Table 1 – List of Widely Used Software Packages and their usage

Name of Software	Primary Application Areas
PSPICE	Electric and Electronic Circuits (Analog and Digital)
Electronics Workbench (Multisim)	Electric and Electronic Circuits (Analog and Digital), Communication
VisSim	Electric and Electronic Circuits (Analog and Digital), Communication
Logic Works	Digital/Microprocessor Design
Design Works	Digital/Microprocessor Design/Computer Organization MatLab
MatLab	Mathematics, Control Systems, Power Systems
Mathematica	Mathematics

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The purpose of this research is investigation of simulation softwares' role in education and learning lessons in comparison with traditional method of teaching. By regarding to above mentioned subjects, the researcher has decided to use from four simulator software (packet trace, Pspice, opnet and Matlab) in four classrooms and has investigated their effect on learning of lessons and for this reason has tried to answer the question that if simulation software have effects on the amount of learning of technical students in universities in comparison with traditional method?

This research investigates the impact and role of education by means of simulator software in traditional method and it is important because this subject has been considered for the first time in geographical arena.

REVIEW OF LITERATURE

A. Swan, P Anderson and Kurapaty [1] conducted a research in 2007 entitled "The role of simulation software in academic achievement in technical courses". The results indicate the effect of using this software on student achievement in technical courses. A similar study was done by Wolf et.al. [2] in 2002 entitled "Study of teaching architecture courses using similar instruments". The experiment group was made up of architecture students in whose classes Simulation tools were used. The results suggest the favorable effect of software on learning the lesson. In 1999 Rymon and Sheppard [3] also conducted a research entitled "Role of software simulation in a learning environment ideal" with two groups: experiment and control groups. At the end of study, results showed the effectiveness of Software Multimedia on teaching students in technical courses. Also Rymvn and Shepard [5] In 1996, based on their research titled "Analysis of problem-solving methods", admitted the positive role of the Simulators. Tobin [4] in 1997 during the research entitled "Role of the pspice software on engineering courses" acknowledged the favorable effect of educational simulation software in learning. Graham R. Johnson`s [6] Research in 2006 entitled "structural organizing in technical courses " made similar results to the above. Also, research results of Silo and Holmes [7] in a book titled American Behavior Survey in 1999, points the effectiveness of educational simulator instruments and the constructive role of the method.

METHODS

This research is pseudo experimental one and it corresponds with pre-test and post-test plan with control group. For investigation of homogeneity of two groups, it was performed a pre-test first. Then a number of students were placed in test group and others in control group randomly. The test group was trained by simulator software and the control group was trained traditionally. Then a test was taken from both groups and finally after passing one month, learning test was taken from both groups. Statistical society of the present research is the whole students of technical fields of non- financial universities of Sari city in educational year of 1388-89 and 200 of them were selected randomly as a sample. For collecting data, it was used from questionnaires. They were pre-test questionnaire tool (test questions of related course) and post-test questionnaire tool of learning. In this research the impact of educational simulator software such as Matlab, Op net, Packet Trace and Pspice have been investigated in learning. In this research, the group of students who were used simulation pattern was considered as the experiment group and another group who didn't use from simulation pattern was considered as control group.

Validity and reliability

The validity of both questionnaires has been determined by confirmation of professionals in this field. Therefore, it can be said that the questionnaires have acceptable validity (pre-test and post-test questionnaires were prepared by means of related professors). To determine validity and stability, the questionnaire was performed in a 30 people group of students and it was used from splitting method. Stability coefficient of each semi-test was 0.7 and stability coefficient of test's total was 0.8.

Research assumptions

1- Use of simulation software causes more learning in comparison with traditional method of teaching

2- Use of simulation software causes longer maintenance of learned information in comparison with traditional method of teaching

RESULTS

Analyzing obtained results from the performed tests of control and experiment group (using SPSS software) showed that the amount of learning was greater in the group who use from simulation software. Therefore the first hypothesis is accepted.

Analyzing obtained results from the performed tests of control and experiment group after 4 weeks showed that the amount of learning in the group who use from simulation software was greater a little. Therefore the second hypothesis was accepted.

Table 2-Summary of the first output and a second statistical analysis theory

kind	method	N	Mean	Std. Deviation	Std. Error Mean
pretest	classic	100	12/90	2/32	0/232
	software	100	12/71	2/23	0/223
learning	classic	100	13/51	2/45	.1/245
	software	100	15/50	1/72	0/172
reminding	classic	100	11/56	1/65	.0/165
	software	100	14/16	1/69	0/169

Table 3-Summary of the second output and a second statistical analysis theory

kind	t	df	sig
pretest	0/589	197/753	0/556
learning	-6/622	177/479	0/000
reminding	-10/970	197/860	0/000

It is observed that the average of test scores in two educational groups in traditional method and by means of simulation software was almost at the same level at first(prior of test) and also the amount of obtained(0.556) probability shows that there is no meaningful difference between two groups prior of test.

After an educational period, the average of learning scores increased in educational group traditionally (11.56) and education by means of simulation software (14.16). The amount of obtained probability from table 3(0.000 times) shows that there is a meaningful difference between average scores of two groups with 95% of confidence. Also, after educational period, the average of learning scores increased in traditional educational group (13.51) and education by means of simulation software (15.50). The amount of obtained probability from table 3 (0.000 times) shows that there is a meaningful difference between average scores of two groups with 95% of confidence.

DISCUSSION AND CONCLUSION

The present results showed that using simulation software in teaching causes improvement in learning quality. Although, because in all cases in experiment group it was used from traditional method, but in control group (in which simulation software was used in teaching), the teacher was present and gave guides to the students. Therefore, it can be concluded that simulator software are like a strong and proper complementary for traditional methods when are used along with traditional methods and they have desirable impact on the learning.

Suggestions

- by regarding to the impacts of this method on the lessons' attraction and educational progress and practicability of its performing in schools , it is suggested to the teachers that have maximum use from these methods proportional to the course material and their time.
- For familiarity of teachers with educational simulation softwares and multi-media software, it is suggested that an educational class be hold for these methods and in training teacher centers and educations to the teachers in different sections of learning, these methods trained to them.
- It is suggested performing competitions based on the construction of educational simulations in relation with subject materials and encouragement and establishment of exhibitions related to this.
-Designing and planning educational simulation software based on the psychological principals of learning
-Using multi-media software for educating children with special needs
-Modern methods of teaching and performing tests by means of simulators and necessity of correct viewing to the future of simulators.

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