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To Study the Effect of Combined Learning on Students' Educational Achievement in Mathematics

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Abstract

The main purpose of this research is "to study the effect of combined learning on students' educational achievement at girls' technical schools in Tehran". The research method in this study is semi-experimental or semi-empirical. The statistical universe of this study includes all girl students of Tehran technical schools. At the first stage, 6 technical schools were selected randomly and simply among all technical schools of the studied society and then 12 classes of the first year were chosen (2 test and control classes in mathematics per school). The sampling method of the schools was a simple random case in this study. Totally 240 students attended these classes. The applied tools in this research are writing fiches from pre-test and post-test scores of the students. In fact, the educational achievement has been used by two tests of pre-test and post-test for both test and control groups. The results of t- test in the dependent groups show that there is a significant difference regarding the computed significance level and obtained mean difference in the educational situation of the test group in the case of pre-test and post-test. Meanwhile, the study and comparison of the means in two situations of pre-test (17.1394) and post-test (18.2279) also confirm this issue.

Keywords: *learning, combined learning, traditional learning, educational achievement, technical school*

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Introduction

The aim of combines learning by personal method with the support of educational interface is ensuring of successful learning for learning models. Supporting trainers and educational interface will also ensure that the learner does not feel lonely. Catherine Glass (2008) in his article about guidelines for the design of direct learning refers to the study that has been implemented by Massey (2004) and the roles and responsibilities of the trainers in direct learning and concludes that 88 percent of students and 91 percent of managers have recommended that trainer or educational interface must be part of direct learning. This study gives a great value for existence of monitoring of the trainer or educational interface and if necessary relationship with the learner. Direct evaluation of project and providing feedback, create a direct gathering for participants in the course and thereby, responding to their questions via e-mail becomes possible (Jafarkhani, 2009).

When learners are expected to learn via personal method, they are dealing with materials such as papers, books, computer-based training and web-based training method that contain material on scientific and practical levels. Techniques of this approach are: Create a group learning program that leads to self-improvement, But in terms of time it is limited- Adding the negotiating sessions and revised with the training manual to learning content by personal method- Showing process and procedures through learning workshops (Live on the website) or through the classroom- Learner support via e-mail- Project work design and assignments that help applying learned concepts- Designing a program or web-based project for course content (Aminfar and Associates, 2012).

Learning is one of the most important issues in today's psychology and also is one of the hardest concepts to define. In one of the dictionaries Learning is defined as: "Acquisition of knowledge, understanding, and control access through experience or study." But most psychologists reject this definition; because the ambiguous terms of knowledge, understanding, and control assessment have been used. Instead, in recent years psychologists have shown interest in definitions which refer to changes in observable behavior. The most famous of these definitions is the one which has been proposed by Kimball (1961, p. 6). Kimball has defined learning as a relatively permanent change in the potential behavior (capacitance behavior) occurs as a result of Reinforced exercise.

Although this definition is very popular, it is by no means accepted by all psychologists. We will consider this definition carefully and then we focus on resources which they disagree with. First, learning is a change in behavior. In other words, mobile learning outcomes must be transferable to observable behavior. After learning, the learner will be able to do something that previously could not. Second, these behavioral changes are relatively stable; it means these changes are not temporary, and not permanent. Third, changes in behavior may not necessarily occur immediately after the learning experience. However, as a result of learning, it create a potential ability in the learner for different performance, this ability may not appear immediately on his behavior. Fourth, changes in behavior (or potential behavior) arise from experience or training. Fifth, experience or training should be strengthened. Although the term reward and reinforcement often used synonymously, At least for two reasons they should not considered significant. For example, in the work of Pavlov reinforcing consists of unconditioned stimulus, it means stimulus create a natural and automatic reaction in organisms (animals). In Pavlov's research, using dilute acid or electric shock is quite normal as an unconditioned stimulus. Such incentives can be truly called reinforcements, but they could be hardly called reward. Because assumption is that the reward is desirable thing. Skinnerian also opposed with identifying reward and reinforcements. In their opinion, reinforcements make strong behavior that is performed immediately before its occurrence. In contrast, reward is something that given to anyone for what they have spent considerable time and energy or practice that is favored by society. Moreover, since such desirable behavior is rewarded long time after that, we cannot say that reward makes it powerful. Thus, for Skinnerian the reinforcements make behavior powerful but reward does not do that. Skinner (1986) is explained as follows:

When the reinforcement is called a reward, a strong influence of the reinforcement goes unnoticed. If you walking down the street and look at the on the ground and find a money, and if the money has reinforcing effect on you, you will look at the ground While for a while when you are walking. But it cannot say that reward is given to you for looking on the ground. As the history of the word indicates, Reward means, compensation, something that equals with passing or loss, Even if it only

considered as a cost for the individual efforts. We give medal to champions, scores to students and rewards to famous people. And generally it is assumed that if the work is not done properly, there is no entitlement for a reward (Seyf, 1997, p. 18-19).

The most comprehensive definition of learning that has been provided is defined by Hilgard and Marquiz. These two psychologists have been defined learning as followed: "Learning is a process of relatively permanent changes in behavior potential, as a result of experience" (Seyf, 2001, p. 48). This definition is superior to other definitions; because it has provided a new perspective of learning process and this new perspective can be found in concepts such as process, relatively stable change, the potential behavior and experience. Combined learning as a learning method includes face-to-face learning, live e-learning and learning in a certain way. Blended learning also can be expressed as followed: The combination of various communication technologies such as e-learning, electronic performance support and knowledge management methods which is used to provide training (Golzari, 2004). Blended learning suggests how elements of learning can improve business performance skills. Blended learning is a comparison between:

A) Experiences and performance goals.

B) Methods in which learning groups can learn better.

c) Different ways that learning materials can contribute to learning training.

D) The various resources that can support learning business education and social activities.

E) Techniques to maximize capital (Mitchell Avery, 2004).

3. Another definition of blended learning is as followed:

Blended learning is the ability to choose facilities, technologies and learning materials which has the greatest harmony with the organization's facilities (Mitchell Avery, 2004).

Combined training history can be examined at four different courses.

A) The period before 1983, Educational environment based on trainer: Before computers were widely available. Educational environment based on trainer was the main approach in education. This approach provides the necessary opportunity for students, to get out of working environment and with the presence in the classroom, and have direct contact with their trainers and classmates. But this method was too expensive and this was one of the factors that led

education enters to a new era.

B) From 1984 to 1993, Multimedia training course: Technological requirements of the course were, Windows 1.3, CD-ROMs and Power Points. To the more attractive and better training, computer-based training flourished. In this era CDs were used that the most important feature of it was the ability to train at any time and in any place. Sending CDs also leaded to huge cost savings. In This era, given a new form were given to industry of education. This has sometimes led to reduced motivation in learning for students.

C) From 1994 to 1999, the first wave of e-learning: Along with the development and completion of educational websites, Educators realize how this new technology could lead to the development and improvement of education. E-mail, multiple branch sites, the markup language technology on the World Wide Web documents (hypertext pages), multimedia audio and video animated feature, they all led to the change and the creation of multiple training. However, the low quality and high cost of the course of training led to a new era.

D) From 2000 to 2005, the second wave of e-learning: Creating technological advances, such as: "Java", Internet Protocol addresses using extensive telecommunications network access to applications and advanced web design, are revolutions that have transformed the education industry of today. Lafi (2014) attempted to evaluate the potential interactive of computer technology to teach math skills to young people, low-income urban children. 61 participants were including preschool or kindergarten or grade one child. Children were divided into control and experimental groups and performed a math pretest. Some students also were identified as the risk group (Due to previous behavioral problems) both groups have received the same mathematical training in the classroom. Department of Information and Communication Technology were included in two sessions of 20 to 25 minutes (Including education through computers) per week over a period of 8 weeks. Both groups then responded to questions test Results based on the difference between the pre-test and post-test Information and Communication Technology Group has achieved significant higher scores than the control group. In the experimental group children who were not at risk made higher score than children who were at risk.

Rosas (2013) evaluated method of video

games for teaching basic math skills and reading comprehension for first and second grade classes in schools that are not economically superior in Chile. The performance of the experimental group that used video games were compared with a group from the same school who did not play and with a group of another school that also did not used video games. Although both groups of target school had higher performance than the external group, but there was no difference in their performance.

In a research by Lbalvshy and Lkhalyfa (2013) on three groups of 15 subjects to determine the effectiveness of traditional education, Aside from the traditional teaching, multi-media teaching and multi-media training were compared with each other. In this research first group went through the traditional education learning and the second group was used multimedia beside the traditional method and the second group dealt only with the help of multimedia in teaching learning. The research was conducted on 45 subjects, No significant difference was observed between the first and second groups. In other words, experimental group which was using the traditional method had no significant difference in learning in compared to the group which were using the multimedia approach to learning. But the results of the second group which were utilized of both teaching methods, traditional and multimedia methods, showed 40 percent improvement in learning and retention. In this way students were taught concepts of the course significantly and were more efficient in solving problems.

Christensen and Gerber (2012) studied the impact of computerization of exercises on math performance, in this study; all students were working with computers. In this study, 30 regular students and 30 students with learning disabilities participated (Relative to the average level of mathematical performance ability) in one of two groups, for six minutes per day for 13 days; in three conditions, learning through written drill, playful drill, and practice on the keyboard. For students without disabilities, written test performance was better than the students who participated in standard drill and training program was in a better situation than game program, and no difference was observed between the keyboard and oral exam. Hine (2011) also evaluated needed games for training and analysis in software engineering in higher education level, and their results showed the superiority of the new method over the traditional method.

Hall (2011) in his research found that computer-based training than traditional training of (teacher-centered) have benefits such Providing immediate feedback, avoiding subjective judgment and bias, facilitating the process of individual learning, attention and motivation extended range of learners, Diverse learning, congruence of training abilities of learners, creating a stimulating learning environment away from unhealthy competition, Students' academic abilities, attitudes of students, parents, teachers and educators about the computer programs and their effectiveness, flexibility of programs, optimal utilization of programs from light, sound, color, animation and interaction between teacher, computer programs and tools.

AminiFar Elaheh, Saleh Sedghpour Bahram, Hossein Dabbagh Zadeh (2012) studied on the effect of computer games on children's motivation and math achievement. The aim of this study was to evaluate the effect of teaching methods based on computer games on the motivation and academic achievement of students in math. The statistical population was consisted of forty students in second year of middle school and they were studying in Tehran. The sample included both experimental and control groups and they were divided randomly and appointments. Research method is experimental method with a pretest - posttest with control group. At the end of the post-test training, academic achievement and math achievement motivation of both groups was performed. The results of the analysis showed that the teaching method based on computer games is effective on math achievement, reluctant achievement motivation and attitude toward math, but has no effect on achievement motivation avoidance.

Mahboubeh Arefi, Danesh, Esmat, Yari Safi Zahra (2009) examines the role of educational software “the Tati world” about mathematics achievement of students for mentally retarded student in first grade girls in Complex Tehran's Shahid Sayyad Shirazi. The quasi-experimental research was with pre-test and post-test, and the statistical population of 63 first-grade students in Tehran Girls Sayyad Shirazi Educational Complex. The aim of this study was to determine the effect of educational software “Tati world” in math achievement of students with mental retardation. From 6 class of first grade in this complex three classes were considered as control group and three classes were considered as the experimental group. For the three

experimental groups, Mathematical software was applied for the duration of 4 months, two sessions per week, and forty-five minutes per session. This variable was not applied to these three control groups and mathematical concepts were presented with the traditional Method. Results showed that math test scores of the three experimental groups are higher than the three control groups. Use of software and modern technology can be effective in mentally retarded children for better learning. In this research of Jafarkhani (2009) as the assess the effect of multimedia training on learning of junior high school third grade students with low vision, Using a quasi-experimental plan was carried out on 20 students of low vision, The results show the increasing of learning in the experimental group compared with the control group. Also in complementary findings of this study showed that using multimedia learning leads to increasing of retention power. Result of Sheikhzadeh's research (2004) on the effectiveness of elementary math training software, Based on constructivism approach reflects the impact of computer trainings on improving academic achievement compared to conventional training schools.

Research Method, Society, Sample and Research Tools

It is Semi-experimental or quasi-experimental research method. And according to the type of the tests independent variable (i.e., enjoyment and not enjoyment of combined learning) cannot be changed and the retrospective method is used before the occurrence of the event. And the research's aim is understands the changes of dependent variable (GPA) According to the presence of students in combined and traditional Training courses which is considered as an independent variable Of this study. The study included all female students in vocational schools 2014-2015 academic year in Tehran. First of all among all technical schools 6 vocational schools randomly selected, and then among these schools 12 first-year classes were selected (each School 2 class of test and control). Sampling method of schools in this study is simple random sampling. A total 240 students attended in these classes. This study, in order to examine the relationship between academic achievement and combined learning, taking notes method was used. In total the following tools were used in this study.

Statistical Tests

What is combined learning impact on student achievement?

First pre-test of Control and test groups:

Interpretation: The results of the implementation of t-test on dependent groups (Table 1) show, According to calculated significance level and the difference between the obtained average of educational attainment of both control and test group, There is a significant difference. Therefore, the continuation of the research would not be possible. Accordingly, the researchers again categorize experimental and control groups. In other word, in the research process control, any changes in academic achievement don't mean it is the effect of combined learning. Because this difference of pre-test is highly significant. Eventually study and comparison of the two control groups (16.0756) and test (18.7791) also reflects this theme.

Second pre-test of Control and test groups:

Interpretation: The results of the implementation of t-test on dependent groups (Table 2) show, According to calculated significance level and the difference between the obtained average of educational attainment of both control and test group, There is no significant difference. Therefore, the continuation of the research would be possible. In other word, In the case of research process, any changes in academic achievement means it is the effect of combined learning. Also study and comparison of the two control groups (16.8562) and test (17.139) also reflects this theme.

Table 1. t-test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	govahp1	16.0756	120	2.22375	.33912
	azmonp1	18.7791	120	1.15368	.17593

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	govahp1 - azmonp1	-2.70349	2.48523	.37899	-3.46833	-1.93865	-7.133	119	.000

How Is The Situation In Mathematics Achievement In The Control Group?

Interpretation: The results of the implementation of t-test on dependent groups (Table 3) show, According to calculated significance level and the difference between the obtained average of educational attainment of both control and test group In the case of pre-test and post-test in Mathematics course, There is no significant difference. Also study and comparison of the two situation of pre-test (16.9094) and post-test (17.3445) also reflects this theme.

Table 2. t-test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	govahp1	16.8562	120	2.16295	.20347
	azmonp1	17.1394	120	2.23655	.21040

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	govahp1 - azmonp1	-.28319	3.03449	.28546	-.84879	.28242	-.992	119	.323

Table 3. t-test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	govahR1	16.9094	120	2.23622	.19843
	govahR2	17.3445	120	2.11967	.18809

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	govahR1 - govahR2	-.43504	1.83366	.16271	-.75704	-.12004	-2.674	119	.106

How Is The Situation In Mathematics Achievement In The Test Group?

Interpretation: The results of the implementation of t-test on dependent groups (Table 4) show, According to calculated significance level and the difference between the obtained average of educational attainment of both control and test group In the case of pre-test and post-test in Mathematics course, There is significant difference. Also study and comparison of the two situation of pre-test ((17.2456) and post-test (18.5022) also reflects this theme.

Limitations and Problems of Research

1. According to the empirical research, the ability to control many external variables such as controlling the use of educational technology for students of control group was not possible.
2. There was Difficulty in grouping students at the beginning of the study, eventually investigator was required to regroup the students.
3. Limited research tool to the list of pre-test and post-test, and such lists basically have their own limitations.
4. Although efforts were made to the extent that the selected schools would not limited to the purpose of the study. However, According to research Researcher had to choose only 12 classes from 6 schools is only in mathematics.
5. Another limitation of this study was limited to students Evaluation of vocational schools for girls in Tehran. This will certainly make the generalizability of the study difficult to all schools in Tehran.

Table 4. t-test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	azmonR1	17.2456	120	2.23756	.21049
	azmonR2	18.5022	120	1.04128	.09796

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	azmonR1 azmonR2	-1.25664	2.23768	.21050	-1.67372	-.83955	-5.970	119	.000

Practical Suggestions

According to the approval of combined learning impact on student achievement the following suggestions offered:

Integrate Education and combined learning in the curriculum and school. To accomplish this case, the Ministry of Education must create a group by the name of Design and production of computer content, which consists of experts in fields such as educational technology, curriculum, and software engineering, graphic.

Greater use of computer-based learning training, to improve the educational performance of students in higher levels of learning and intellectual skills Increase the ability to use knowledge in different situations, analysis, synthesis and evaluation of issues.

According to the instructions of the presence of Department of Information and Communication Technology in Schools, It is necessary to employed experts for this job. In addition, having a computer consultant in the school and visiting during problem can help the combined learning process. Arranging Functional in-service courses for teachers by the organization of Education in the field of familiarity teachers with a variety of effective teaching methods such as web-based training, computer, software and multimedia. Teachers also need to consider software, multimedia teaching and learning as part of the out of school children and students.

As the results of this study showed the impact of combined learning has been significant on mathematics Therefore, it is necessary to study this combined learning in schools as a first step in subjects like mathematics. In all the studies related to combined learning, the development of virtual training and e-learning is emphasized, But in this study it is suggested that to consider all IT infrastructure, scientific-educational and financial capacity of teachers and students. Carefully consider the use of the content of e-learning in schools. Because only the use of the new tools regardless of appropriate content can eventually cause damage to the education system.

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