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Extended Abstract

The Effect of Teaching Biology by Technology Enabled Active Learning (TEAL) Method on Academic Motivation of Students

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Introduction

The new technologies have become the focus of attention in classrooms in recent years. The rapid technological changes in teaching learning process have resulted in significant changes. They have aimed at improving the quality of teaching in schools. Technology Enabled Active Learning (TEAL) could be defined as a method in which a combination of group research teaching method in laboratory and simulation (using film, internet, animation or 3-dimensional pictures) and short speech in different situations are used. The classroom and laboratory are not separated from each other in this method. Every student can have his/her own special homework through email (Belcher, 2005). Animations and simulations have been incorporated into course materials to help students visualize and understand biological contents. TEAL was used for the first time in MIT University in physics. In this method the learners, who were 9 persons, were divided in to groups of 3 sitting around one table. There is a computer for each group together with some tools for conducting the experiment. The learners will do the experiment and start their group searching in the laboratory (Belcher, 2004). They use simulations, pictures and films to test what they cannot see with eyes (such as the nervous system) or they use computers for their

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calculations and drawing diagrams if needed. The students explore new concepts through using educational technology, experiment and gaining experience. Dori and Bechler implemented TEAL method in physics on 180 students at the end of 2001 and they also tested the method on 600 more students successfully in 2003. The results of research showed in general the group that was taught in TEAL method got significantly improved scores in physics. Dourmashkin conducted another research on physics lesson in 2008. In this research, the percentage rate of those failed in this lesson decreased from 13% to less than 7% after using TEAL learning method. Another, quality motivation of students depends on method of teacher's teaching. One aspect of motivation is academic motivation of students. With regard to the above-mentioned points, the present research hypothesis would be as follows:

-There is a difference between the academic motivation of students in biology in the two TEAL and usual traditional teaching method.

Method

This research is considered as semi-experimental with pre-test, post-test and control group. For achieving the goal of the research, among high schools of Khomeynishahr city, two classes of 27 students, one as the control group and another as the test group were selected by random multistage cluster sampling method.

Tools

In this research, we used two tools; one was Rayven's Intelligence Test that was performed for the first time by Barahani (1974) in Tehran. The reliability of the test was reported in different studies between 0.7- 0.9 (Anastazi, 1995). Another one was the Vallerand's educational motivation questionnaire whose validity was confirmed by Bahgeri (2000).

Investigated Variables

The teaching methodology was considered as the independent

variable and academic motivation as the dependent variable. Parents' education, parents' age, the number of family members, IQ score and the last year's average score were also considered as helper variable in this research.

Reserch Implementation

Vallerand's educational motivation questionnaire was used in the first session of training in both test and control groups. Then the test group was taught in TEAL for 18 training sessions (90 minutes each) and the control group in biology was taught in the usual method (lecture). After finishing the 18 training sessions Vallerand's academic motivation questionnaire was used.

Data Analysis

The mean and standard deviation were used in descriptive statistics level, and co-variance analysis (ANCOVA) was used for investigating research hypothesis.

Results

In order to test this hypothesis, a normality pre assumption and then the variance equality pre assumption were investigated.

The results of investigations indicate that with regard to significance, the pre-assumption works and also the results reveal that the assumption of equality of variances works here as well.

The mean (modified or adopted) of the academic motivation of the two groups (control and test) was 177.45 and 124.22 respectively after controlling the modified variables.

Table 1: the results of co-variance test on the difference between the two controls and test groups in academic achievement variable.

Source of variance	SS	df	MS	F	P	Partial Eta ² square	Observed power
Father education	0.008	1	0.008	0.001	0.970	0.000	0.050
Mother	0.499	1	0.499	0.093	0.762	0.002	0.060

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Source of variance	SS	df	MS	F	P	Partial Eta ² square	Observed power
education							
Father profession	16.255	1	16.255	3.032	0.086	0.067	0.398
Father age	0.003	1	0.003	0.001	0.098	0.000	0.050
Mother age	0.046	1	0.046	0.009	0.927	0.000	0.051
Number of children	0.217	1	0.217	0.041	0.841	0.001	0.054
Economic status	3.448	1	2.448	0.643	0.427	0.015	0.123
IQ	97.386	1	97.386	18.165	0.001	0.302	0.986
Pre-test	0.142	1	0.142	0.026	0.872	0.001	0.053
Last year average score	4.445	1	4.445	0.829	0.368	0.019	0.144
Group	662.920	1	662.920	123.648	0.001	0.746	1.000
Error	225.176	42	5.361				
Total	11922.250	54					

The data in table 1 show the results of the analysis of the single-variable covariance (ANCOVA). Based on the data in the table, there is a significant difference between the academic motivation of students in TEAL and the usual methods in biology lesson. Considering the Eta square roots it could be claimed that 89.1 of these changes have been either the improvements resulting from the effect of involvement or teaching through TEAL method.

Discussion and Results

The results of covariance analysis (ANCOVA) in the first hypothesis showed that with regard to the parents' education, parents' age, father's profession, number of family members, IQ score and the last year's average score in biology as the helper variables, teaching biology TEAL had a significant effect on the academic motivation of students compared with the usual teaching methods. The effects of this teaching method on academic motivation of students with regard to Eta-squared had been 89.1 of the changes. This is because using

animation and 3- D spaces as well as stimulating several senses at the same time would lead to better understanding of the concepts by learners and it will result in their academic motivation. Learning through TEAL is also effective in creating and developing learning opportunities.

One of the most important results of this research was that convergence active teaching in laboratory and technology could promote the results of active teaching efficiently compared with the usual method. This convergence was manifested through stimulating the senses of research, and making knowledge by student. The student's interest in working with computer leads to a faster learning. Stimulation and using computer provokes students' curiosity and brings success to them. In the other word, when teaching plan is good, learning through educational technologies, social interaction and constructionalism improves and a significant improvement is observed in academic motivation.

Keywords: Technology enabled active learning (TEAL) method, Academic Motivation.