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ORIGINAL ARTICLE

The effect of gamifying virtual classes on academic motivation and academic performance of students

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Abstract

Aim: The present study was conducted to investigate the effect of gamification on the academic motivation and academic performance of first-graders in virtual classes. Study design was quasi-experimental with pretest-post-test and a control group. The study population consisted of all first grade students in Khomein, Markazi Province, Iran, of whom 30 female students were selected by convenience sampling. Harter's academic motivation scale (1980) and academic performance researcher-made test were used to collect data. Reliability of the researcher-made test for academic performance was calculated as 0.722 using the Kuder-Richardson Formula 20. The course was run for 10 sessions in Shad software. Covariance analysis was run for inferential analysis of the data. The results showed that gamification of virtual classes had a significant effect on the academic motivation and academic performance of students. It is therefore recommended to use the principles of gamification for the virtual teaching of elementary courses.
Keywords*: Gamification, academic motivation, academic performance*

Introduction

With the spread of the SARS-CoV2 virus and the expansion of virtual education, students gradually experienced a decline in their academic motivation and academic performance (Mosayebi Ardakani *et al*., 2021). Therefore, teachers should use novel teaching methods to make virtual education attractive; one such method is gamification. The current study addressed the effect of gamification on students' academic motivation and academic performance. Gamification refers to the use of game elements in non-game environments. Theoretically, gamification roots in the theory of goal setting, according to which a person consciously attempts to perform an activity (Zayani and Tajfar, 2019). Numerous studies have been conducted on gamification of education. Bagheri and Talimi (2021) reported the significant effect of educational games on learning and memorizing environmental concepts of children. Ghasemi Organeh et al.,(2019) also reported the positive effect of gamification in education on the internal and external motivation of learners. Boudadi and Gutiérrez-Colón (2020) reported the significant effect of gamification on academic motivation, and Smiderle *et al*. (2020) argued that the effectiveness of gamification depends on an individual's personality traits. Alomari *et al*. (2019), gamification had contradictory effects on students' learning; therefore, students should be briefed about gamification before education. Despite its importance, few studies have been conducted on the use of gamification in virtual education in Iran. Virtual education in Iran's Education System is presented through Shad software. Shad is a social network launched to fulfill educational purposes. Given the limitations of this platform in terms of simultaneous communication, image sharing, sending and receiving files, providing feedback, etc., it appears essential to apply educational approaches that can reduce the limitations of virtual

education and improve students' motivation and learning. Therefore, this study was conducted to investigate the effect of gamification in virtual classes on academic motivation and academic performance.

Methodology

The study population of this quasi-experimental study with pre-test post-test design and a control group consisted of all female first grade students in Khomein, Markazi Province, Iran in the academic year 2020-2021; a total of 30 female students were selected using convenience sampling and were randomly assigned into two groups of 15 each, namely, control and experimental groups.

Harter's academic motivation scale (1980) consisting of 33 Likert scale items was used to measure intrinsic and extrinsic motivation. The reliability of this scale was reported 0.92 by Zahiri Naw and Rajabi (2018) and 0.85 in the present study. To collect data on academic performance, a researcher-made test containing 20 questions on mathematics and Persian literature was used, which measures the level of knowledge and higher cognitive levels such as analysis and synthesis. To confirm its validity, the scale was given to ten teachers with experiences of working with first graders. The face validity of the items was confirmed through criteria such as appropriate form and comprehensibility. To examine content validity, CVI and CVR of all items were calculated, which were greater than 0.7, and therefore its content validity was also confirmed. To investigate the reliability of the scale, the Kuder-Richardson Formula 20 was calculated as 0.72.

The study intervention was implemented through ten sessions in the Shad software. To provide students with feedback for the previous day's assignments, the teacher posted the scoreboard in the experimental group every day, and the students could see their scores, avatars, nicknames, and badges. Furthermore, the top students were acknowldedged. In general, each student could go through five steps, and receive a maximum of 20 points for each task according to the predetermined criteria. The images and names of the students were updated every day based on the scoreboard.

In the current study, descriptive statistics such as mean (standard deviation) and inferential statistics (covariance analysis) were used for data analysis.

Results

First, descriptive data including mean (standard deviation) in the experimental and control groups are presented. Then the data are analyzed inferentially.

Table 1. Descriptive data on pretest and post-test scores of academic motivation and academic performance in the control and experimental groups

Test	Groups	N	Mean	Standard deviation
Pretest of learning motivation	Control	15	105.60	16.92
	Experimental	15	101.86	15.62
Post-test of learning motivation	Control	15	100.53	11.70
	Experimental	15	124.40	14.39
Pretest of academic performance	Control	15	12.40	2.79
	Experimental	15	10.86	2.47
Post-test of academic performance	Control	15	34.20	3.00
	Experimental	15	37.73	1.78

Analysis of covariance was used as an inferential statistical test. It is noteworthy that presuppositions such as normality of data distribution and homogeneity of variances were confirmed first.

Table 2. Summary of covariance analysis to find the effect of training on academic motivation and academic performance

Sources of variation	Analysis of covariance (academic motivation)				Significance level
	Sum of squares	*df*	Mean square	F	
Covariance (pretest)	1248.513	1	1248.513	9.435	0.005
Main effect (independent variable)	4770.419	1	4770.419	36.050	0.000
Residual error	3572.820	27	132.327	-	-
Sources of variation	Analysis of covariance (academic performance)				
	Sum of squares	*df*	Mean square	F	Significance level
Covariance (pretest)	5.666	1	5.666	0.926	0.344
Main effect (independent variable)	99.04	1	99.044	16.191	0.000
Residual error	165.168	27	6.117	-	-

The *F* value was obtained 36.050 for the variable of main effect (training) for the academic motivation and 16.191 for the academic performance, which is significant ($P \leq 0.05$) (Table 2). Therefore, by removing the covariance effect (pretest), it can be argued that a significant difference exists between the groups. As a result, training through gamification has a significant effect on the academic motivation and academic performance of students.

Discussion and conclusion

According to the results of this study, gamification-based education has a significant effect on students' academic motivation and academic performance, which is consistent with the studies of Bagheri and Talimi (2021) and Badiei *et al*. (2021), Shayani and Karimi (2020), Boudadi and Gutiérrez-Colón (2020) and Alomari *et al*. (2019). Learning through gamification improved the motivation of learners' academic progress due to certain features such as novelty, informing the learner about educational objectives, providing immediate feedback, stimulating the sense of competition in learners and evaluation through a novel method. Gamification can keep learners on the learning path and enhance their strengths and correct their weaknesses.

It is possible to improve the effectiveness of the education process by adding gamification option in virtual education platforms. Gamification features can also be used in mobile phone-based games that are of interest to children and lead their interest to lessons. It is recommended that different aspects of gamification be addressed in future studies.

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