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## Analysis of Video Games Effect on Mathematical Creativity of Elementary School Students at Shahid Shakoori School in Anguran Village

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### ABSTRACT

This study aimed to investigate the impact of computer games on development of mathematical creativity of elementary school students. This was applied semi-experimental research. The population consisted of all elementary school fourth grade students at Shahid Shakoori School in Anguran village in 2015-2016 (N= 16). Due to limited sample size, all 16 students were considered as sample. They were randomly divided in two groups: treatment (n = 8) and control (n = 8). The research tool included Torrance's Creativity (Form A, Visual). The content validity of research tool was confirmed. Torrance (1974) showed that this test has a reliability of 75% to 87%. Using software SPSS, the covariance analysis was conducted to study the mean differences in groups. The findings showed that there was significant difference between students in treatment and control groups in terms of mean score in three (fluency, flexibility, innovation) creativity components. Also, the findings showed that there was no significant difference between students in treatment and control groups in terms of mean score in students' creativity development component. However, it was concluded that the computer games developed the mathematical creativity of elementary school students in Anguran.

**Keywords:** Creativity, Fluency, Flexibility, Innovation, Development, Computer Games.

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### PROBLEM STATEMENT

The importance of creativity and its growing process have attracted the attention of educational researchers and planners to analyze the creativity from educational perspective. The educational systems play an important role in activation or undermining the creativity in people. Therefore, the revision and modification of curricula and educational programs has been considered by most societies to help develop this ability in children and adolescents. The creativity is one of the important and basic abilities which is developed from childhood in humans. Therefore, the education of creativity and innovation should start from the first years of life. According to Torrance (1962), the children are born creative, but the creativity of most of them drops in about 10 years old (Quoted by Hosseini, 2002). However, the factors of creativity development in childhood should be determined.

One way to develop children's creativity and innovation is performing standard activities such as computer games. These are the results of human brain creativity and may develop children's creativity (Farhoodi, 2008). Meantime, the computer games, electronic games, and video games include any type of games which may be done by computer. The machines for playing the games include general-purpose computers, home console, and handheld consoles (Koster, 2005). The video games impact on children's creativity because playing them, the children learn varied and exciting information and subjects and increase their capacities and capabilities. In addition to reinforcing the intelligence, they improve the innovation capability in children; they encounter with various questions, problems, and puzzles in games and try to answer and solve them in new ways. The children play video games without afraid of mistakes and evaluation of others. The educational computer games provide unique features such as attractiveness, simultaneous use of multiple senses, and engaging the learner in subject. These games are enjoyable learning environment and educational context for learners in which they learn spontaneously and with confidence. In this context, the repeatability and rapid feedback, adjustability of learning speed, lack of fear of punishment, freedom in learning process, and etc. increase learning motivation, depth, and stability and positive attitude towards learning and skills. All these factors provide psychological safety for students and thus, they increase their self-

confidence and various skills development, including creativity (Farhoodi, 2008). In their study, Colin Tea and McCarty (2001) concluded that the computer simulation games impacted on learning and teaching of secondary school students. Also, they found that these games impact on creativity of students in fluency and flexibility aspects. According to above, the importance and necessity of this study is explained; the results may be used by educational principals, courses planners, and primary school teachers.

### **Theoretical Framework**

The playing is a series of mental and physical movements and activities which leads to happiness, vitality, joy, and communication with others. It is a main part of human child's life which starts with curiosity and motivation to understand the surrounding world (Encyclopedia of Children and Adolescents, 1999, p. 6). In the book entitled (Theory of Fun in Game Design), the playing is defined as an interactive experience in which the player faces with a series of challenging patterns; he/she must learn the patterns (Koster, 2005). There are various theories for game. The general theory states that the game is a type of entertainment. The theory which is considered more is that the game is a kind of targeted training and preparation which is played by training and repetition (Mojib, 2011). Herbert Spencer considers playing as a necessary activity which may drain the excess energy of children. According to him, the playing is based on this excess energy which is not found in animals, but in humans. Some of this energy is consumed for meeting vital needs and its excess is consumed in playing. In addition, he believed that the playing is imitative and has an instinctive origin (Quoted by Hoffmen, 1999). For this reason, this theory is refereed as instinctive theory.

### **METHODOLOGY**

This was applied semi-experimental research. The population consisted of all elementary school fourth grade students at Shahid Shakoori School in Anguran village in 2015-2016 (N= 16). Due to limited sample size, all 16 students were considered as sample. They were randomly divided in two groups: treatment (n = 8) and control (n = 8).

The research tool included Torrance’s Creativity (Form A, Visual). The content validity of research tool was confirmed. Torrance (1974) showed that this test has a reliability of 75% to 87%. Using software SPSS, the covariance analysis was conducted to study the mean differences in groups.

### **Findings**

The descriptive indicators of creativity and its dimensions are measured in control group; the results are provided in figure 1. According to table, there is no significant difference in mean scores of creativity (total, fluency, flexible, development, and innovation) in pretest and posttest of control group.

The descriptive indicators of creativity and its dimensions are measured in treatment group; the results are provided in figure 2. According to table, there is significant difference in mean scores of creativity (total, fluency, flexible, and innovation) in pretest and posttest of treatment group. The computer games increase the creativity (total, fluency, flexible, and innovation), but they have no impact on development of creativity.

### **Hypothesis Test**

First hypothesis: The computer games impact on students' mathematical flexibility.

The analysis of covariance was used to test this hypothesis. The results are provided in following table.

**Table1.** Results of analysis of covariance for flexibility

Source	Sum of squares	Degree of freedom	Mean of squares	F-value	Sig
Modified model	7.668	2	3.834	4.006	0.044
Width from the origin	6.521	1	6.521	6.814	0.022
Pre-test	3.152	1	3.152	3.293	0.043
Group	7.353	1	7.353	7.683	0.016
Error	12.442	13	0.957		
Total	1201.750	16			
Total modified	20.109	15			

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According to above table, the F-value is significant for flexibility; therefore, the null hypothesis is rejected. However, it can be concluded that there is difference between two groups in terms of mean scores in post-test. According to above table, the mean scores of flexibility in control group was 7.50 and 8.06 in pretest and posttest, respectively; in treatment group, while, they were 6.19 and 8.94, respectively. Considering the significant difference between two groups in terms of mean scores in post-test, it is concluded that by elimination of pre-test effect, the flexibility increases.

Second hypothesis: The computer games impact on students' mathematical innovation.

The analysis of covariance was used to test this hypothesis. The results are provided in following table.

**Table2.** Results of analysis of covariance for innovation

Source	Sum of squares	Degree of freedom	Mean of squares	F-value	Sig
Modified model	23.158	2	11.579	19.934	0.000
Width from the origin	4.110	1	4.110	7.075	0.020
Pre-test	7.158	1	7.158	12.323	0.004
Group	7.905	1	7.905	13.609	0.003
Error	7.552	13	0.581		
Total	434.720	16			
Total modified	30.710	15			

According to above table, the F-value is significant for innovation; therefore, the null hypothesis is rejected. However, it can be concluded that there is difference between two groups in terms of mean scores in post-test. According to above table, the mean scores of innovation in control group was 3.29 and 4.03 in pretest and posttest, respectively; in treatment group, while, they were 3.93 and 6.03, respectively. Considering the significant difference between two groups in terms of mean scores in post-test, it is concluded that by elimination of pre-test effect, the innovation increases.

Third hypothesis: The computer games impact on students' mathematical development.

The analysis of covariance was used to test this hypothesis. The results are provided in following table.

**Table3.** Results of analysis of covariance for development

Source	Sum of squares	Degree of freedom	Mean of squares	F-value	Sig
Modified model	0.063	2	0.032	0.769	0.483
Width from the origin	0.581	1	0.581	14.074	0.002
Pre-test	0.023	1	0.023	0.569	0.464
Group	0.061	1	0.061	1.480	0.245
Error	0.537	13	0.041		
Total	130.560	16			
Total modified	0.600	15			

According to above table, the F-value is not significant for creativity; therefore, the null hypothesis is confirmed. However, it can be concluded that there is no difference between two groups in terms of mean scores in post-test. According to above table, the mean scores of development in control group was 2.73 and 2.90 in pretest and posttest, respectively; in treatment group, while, they were 2.95 and 2.80, respectively. Considering that there is no significant difference between two groups in terms of mean scores in post-test, it is concluded that by elimination of pre-test effect, the development does not increase.

## CONCLUSION

This study aimed to investigate the impact of computer games on development of mathematical creativity of elementary school students. This was applied semi-experimental research. The population consisted of all elementary school fourth grade students at Shahid Shakoori School in Anguran village in 2015-2016 (N= 16). In general, it was concluded that the computer games developed the mathematical creativity of elementary school students in Anguran. The video games impact on children's creativity because playing them, the children learn varied and exciting information and subjects and increase their capacities and capabilities. In addition to reinforcing the intelligence, they improve the innovation capability in children; they encounter with various

questions, problems, and puzzles in games and try to answer and solve them in new ways. The children play video games without afraid of mistakes and evaluation of others. The educational computer games provide unique features such as attractiveness, simultaneous use of multiple senses, and engaging the learner in subject. These games are enjoyable learning environment and educational context for learners in which they learn spontaneously and with confidence. In this context, the repeatability and rapid feedback, adjustability of learning speed, lack of fear of punishment, freedom in learning process, and etc. increase learning motivation, depth, and stability and positive attitude towards learning and skills. All these factors provide psychological safety for students and thus, they increase their self-confidence and various skills development, including creativity. According to above, it can be concluded that the computer games impact significantly on development of students' mathematical creativity; therefore, the education courses for children should include creativity development.

## **REFERENCES**

- [1] Pirkhaefi, A. (2009). Effects of creativity on meta-cognitive components of students' creative thinking. *Journal of Educational Leadership and Management*. Volume 3, Number 2 (8); pp. 51-61.
- [2] Torrance, E.P. (1993). *Talents and skills of creativity*. Translated by Hassan Ghasemzade. Donyaye Noo.
- [3] Cheragh Cheshm, A. (2007). The effect of creativity-based teaching methods on students' learning. *Journal of Islamic Education*. Volume 3, Number 5; Pp. 7-36.
- [4] Haji Hasani, S. (2008). *Creativity, its foundations and barriers*. *Journal of Teacher Development*. Issue 229.
- [5] Haji Dokht, B. (2008). *The relationship between organizational culture and creativity of female high schools principals in Orumia*. Master's thesis. Ministry of Science, Research and Technology, University of Urumia.
- [6] Kaffashi, H.R. (2010). *Educational software*. *Journal of Educational Technology, Culture magazine*, issue 8.