

Effect of Educational Computer Games on Student Creativity

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Abstract: At present age, students to cope with the amazing developments of third millennium, should improve their critical thinking and creative skills to make good decisions and solve society complex problems present era is the era of computers and technology which are result of human creativity. Video games are sample of human innovations that are full of new samples with day by day increasing popularity. Because of its great appeal for many people, many social sciences, education, psychology and other researchers are attracted. Also this study goal is investigation of the impact of educational computer games on students' creativity to measure their creativity. The research has 4 hypotheses. In order to test hypothesis, paired comparison test and SPSS 16 software were used. Data analysis results using educational computer games lead to increase in dimension of originality, fluidity and flexibility of students' creativity but not in extension dimension.

Keywords: Computer games, creativity, flexibility, fluidity, originality

INTRODUCTION

One of the very interesting and controversial topics in different scientific fields, especially the educational sciences and psychology is creativity or innovation. In any era of history this topic, as the fundamental power of human mind, has been main objective of schools and training center. Today, great cultural, social and economic changes and new problems consequently lead to new expectations for schools and education systems in the world. Economic structure of communities prevents from relying on primary sources through quick development in various field, accumulation of knowledge, the science of communication and information processing tools and replaces it by arrangement of specialist human resources, access to information and practical wider use of scientific findings. At present age, students to cope with the amazing developments of third millennium should improve their critical thinking and creative skills to make good decisions and solve society complex problems. They should develop their problem solving and search mood skills. One of the most complex and highest aspects of human thinking is creative thinking. Creativity means creating of new, appropriate and worthy design. In the other words, the creative is usage of mental abilities to create a new idea or concept (Keating, 1986).

Creativity includes elements such as skill's domain, creative thinking skills and motivation. In

order to advent and strengthen people's creativity, the confluence point of these three elements must be determined, because this point is a powerful combination that can propel a person towards creativity (Torrance, 1968).

Development and growth of creativity is depended on various individual and social factors such as intelligence, family, personality characteristics and ... although human is potentially and mentally placed by creative thinking ability, but it requires the appropriate education. Torrance (1989) believes that human for survival and organizations survival in the future need to expand the creative ability of today children. He believes that creating opportunities to foster creativity for every community is like a life and death. So it is long time that most communities to identify creative children and teenagers start serious planning through innovative educational methods. In the study of fundamental factors in educating of students creativity, Gatzels and Jackson (2001) believe in type of their teachers' look to creativity issue and creative students.

Wallas (1986) has shown, thinking is worth more than a memory in the creative classes and considers creativity factor as balancing factor between psychological security and student's liberty for doing risks.

In a stud, Albert (2005) considers inner motivation as creativity factor. His research showed that worthy works of creative individuals, is accompanied with intrinsic motivations. So he has shown that on the

contrary to externally motivated people, people who are internally motivated, risk easily.

Sterenberg (2003) in his study showed that innovative students have features such as high achievement motivation, great curiosity, a keen interest in the work order, the ability to self-expression and self-sufficient character, perseverant and disciplined at works, independence, critical thinking, motivation, enthusiasm and sense of beauty, interest in art, high sensitivity to social issues, intuitive thinking and ability to influence others.

Video games and its impact on users: Medias are overflowed by samples of new entertainment which are more popular day by day and because of their charm for many people, have encouraged public concern.

Computer games are not out of this rule (Durkin and Barber, 2002; Gunter, 1998).

While some studies show that video games increase the level of aggression and aggressive behavior (Anderson and Dill, 2000; Anderson and Bushman, 2001; Williams and Clippinger, 2002),

Patience declining in front of failure (Antonietti and Mellone, 2003), Addiction and dependency (Griffiths and Hunt, 1998), reduction of social relationships and poor academic performance (Durkin and Barber, 2002), other studies show that these games could have a positive impact on the players and improve self-imagination and learning (Rosas *et al.*, 2003), problem solving thinking (Hong and Liu, 2003), growth of spatial reasoning and specific cognitive abilities (Okagaki and Frensch, 1994) in children.

Children are growing and living in innovative technology world like us, therefore, we could not avoid them involving with these tools in everyday activities, education and variety of games.

So it is required to focus on how make process of education and children activities targeted and meaningful as well as enrich various cognitive processes such as their creativity and imagination power.

Creativity and invention are processes which won't be used in adulthood unless develop in childhood and since today's children life have been associated with technologies, one of the most important ways to educate creativity is technology tools. In the century of information and communication and era when basic and infrastructure programs are made up of technologies, main and unique features of creativity could lead to scientific and cultural growth and excellence of societies and prevent them from many backwardness.

Now, basic skills education has gone beyond reading, writing, calculating, reasoning boundary and in

the recent century basic core of general education is ICT.

Undoubtedly, Computer games are one of the most important step to enter computers world and computer game world is full of wonders, where take children to somewhere their dreams are achieved and throw them through world of excitement and adventures. In such a world children win as well as fail, are forced as well as are freed; simply, they are immersed in the game atmosphere.

It is hard to ignore High educational power of this game and simulated games that are constantly attracting specialists.

Factors such as Satisfaction of users's curiosity and adventure senses, topics such scheme of tomorrow fantastic world, technology in future world, scheme of world of imagination and legend, taking adventurous roles to women and ...lead to grow skills like development of imagination and creativity and problem solving.

Liyo (1998) investigated effect of Ultra-Media self-learning on creative thinking of students through computer- assisted training over fourth grade elementary-schooled students. He studied three levels of students as the following: sharp and average students with no additional training needs and weak students who needed additional training. He found that test groups scores at creativity test was higher than control group at creativity test; In the other words, scores of fluidity, flexibility, originality and elaboration factors significantly in the test group.

With regard to above-mentioned cases, the main objective of this study is investigation of effect of educational computer games on creativity of students.

RESEARCH METHODOLOGY

Present research method is a semi-empirical one which investigate and compare creativity of two group of students through available samples.

In this study statistical population consist of all students in third grade and fourth grade of Khiabani School in Tabriz at 2011-2012.

Sampling method was sampling through available groups. Four elementary third and fourth grades were randomly selected as available samples and they were totally 91 students.

Research tools: The main goal of the research was to measure and compare the creativity of students before and after the intervention of an independent variable, to evaluate the impact of educational computer games on the growth of each dimensions of creativity.

So to evaluate the creativity of subjects it required a reliable tool. For this purpose Torrance creativity test was chosen. Torrance test is established on the basis of theory and definition of creativity by him (Torrance, 1968, 1989). Torrance considers creativity consisting of four main factors as the following:

- Fluidity(ability to offer many ideas)
- originality (ability to produce innovative , unusual and fresh ideas)
- Flexibility(talent to produce ideas or many various methods)

Elaboration (talent to pay attention to details).

Selection of educational computer games

I Spy, Treasure Hunt educational computer game is one associated with creativity and creativity technology as independent variable tool and goals of creativity growth, Problem solving, thinking and language skills growth. This game is for ages of 6 to 10 years.

Data analysis: In order to analyze the obtained data the paired comparison test was used. This test is usually used for empirical researches and showing effect of a type of intervention.

In this research data collected before and after the intervention of the independent variable and then its effect is examined by this test in order to investigate impact of educational computer games on the creativity of students.

Analysis of first hypothesis: To investigate this claim that rate of fluidity factor (ability to produce many ideas) does not significantly varied from creativity factors' average after computer game intervention, H0 and H1 are defined as following: (it represents difference between two variables)

$$\begin{cases} H_0 : Nd = 0 \\ H_1 : Nd \neq 0 \end{cases}$$

Table 1 shows the t-test results. Sig test is smaller than 5%. Then (H0 = Nd = 0) is denied and (H1= Nd ≠ 0) is accepted; In other words, there is a significant difference between average of fluidity factors after independent variable intervention and before it at error level of 5%. There is a 95% confidence interval for fluidity factor's average difference as the following:

$$1.88313 \leq Nd \leq 5.11687$$

Since upper and lower limits has been positive, fluidity factor's average after applying educational computer game is more than before of educational computer game applying.

Analysis of second hypothesis: To investigate this claim that rate of originality factor do not significantly varied from creativity factors' average after computer game intervention, H0 and H1 are defined as following: (It represents difference between two variables)

$$\begin{cases} H_0 : Nd = 0 \\ H_1 : Nd \neq 0 \end{cases}$$

Table 2 shows the t-test results. Sig test is smaller than 5%. Then (H0=Nd=0) is denied and (H1= Nd ≠ 0) is accepted; In other words, there is a significant difference between average of originality factor's average after independent variable touch and before it at error level of 5%. There is a 95% confidence interval for originality factor's average difference as the following:

$$2.77515 \leq Nd \leq 5.39877$$

Since upper and lower limits has been positive, fluidity factor's average after applying educational computer game is more than before of educational computer game applying.

Analysis of third hypothesis: To investigate this claim that measure flexibility factor (ability to produce ideas and various methods) does not significantly varied from creativity factors 's average after computer game intervention, H0 and H1 are defined as following: (it represents difference between two variables)

$$\begin{cases} H_0 : Nd = 0 \\ H_1 : Nd \neq 0 \end{cases}$$

Table 3 shows the t-test results. Sig test is smaller than 5%. Then (H0 = Nd = 0) is denied and (H1= Nd ≠ 0) is accepted; In other words, there is a significant difference between average of flexibility factors after independent variable intervention and before it at a error level of 5%. There is a 95% confidence interval for fluidity factor's average difference as the following:

$$1.36195 \leq Nd \leq 5.55109$$

Table 1: Paired samples test for first hypothesis

Paired differences			95% Confidence interval of the difference		t	df	Sig. (2-tailed)	
Mean	Std. deviation	Std. error mean	Lower	Upper				
Pair 1 a2 – a1	3.50000	7.80744	.81398	1.88313	5.11687	4.300	91	0.000

Table 2: Paired samples test for second hypothesis

Paired differences			95% Confidence interval of the difference		t	df	Sig. (2-tailed)	
Mean	Std. deviation	Std. error mean	Lower	Upper				
Pair 1 b2 – b1	4.08696	6.33437	0.66040	2.77515	5.39877	6.189	91	0.000

Table 3: Paired samples test for third hypothesis

Paired differences			95% Confidence interval of the difference		t	df	Sig. (2-tailed)	
Mean	Std. deviation	Std. error mean	Lower	Upper				
Pair 1 c2 – c1	3.45652	10.11409	1.05447	1.36195	5.55109	3.278	91	0.001

Table 4: Paired samples test for fourth hypothesis

Paired differences			95% Confidence interval of the difference		t	df	Sig. (2-tailed)	
Mean	Std. deviation	Std. error mean	Lower	Upper				
Pair 1 d2 – d1	0.31522	4.01078	0.41815	-0.51539	1.14583	0.754	91	0.453

Since upper and lower limits has been positive, flexibility factor’s average after applying educational computer game is more than before of educational computer game applying.

Analysis of fourth hypothesis: To investigate this claim that rate of elaboration factor does not significantly varied from creativity factors’ s average after computer game intervention, H0 and H1 are defined as following: (it represents difference between two variables)

$$\begin{cases} H_0 : Nd=0 \\ H_1 : Nd\neq 0 \end{cases}$$

With regard to Table 4 There is a 95% confidence interval for elaboration factor’s average difference as the following:

$$-.51539 \leq Nd \leq 1.14583$$

Since lower limits has been negative and upper limits has been positive, elaboration factor’s average after applying educational computer game has not much differed from before of educational computer game applying.

CONCLUSION AND DISCUSSION

with their unique features offer charm, applying multiple senses simultaneously, learner interaction with subject, learning environment and attractive educational environment to the learners to the learners in order that start learning spontaneously and confidently. In this environment, elements such as repeatability and quick feedback, lack of fear of punishment and freedom in the learning process and learning contingency coincide with learners ’s enough speed and ... increase motivation, depth and stability of learning as well as student's positive attitude towards learning and desired skills.

All above-mentioned elements result psychological security of students; thus, increase confidence and develop various skills.

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