

**The Comparison of the Influence of the Use of Information Technology on Creative Thinking between Primary Education and Computer Students in Islamic Azad University of Zanjan**

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**Abstract:** *The aim of this research was to compare the influence of the use of Information Technology (IT) on creative thinking of students of computer (software branch) and education (primary school education) in Islamic Azad University of Zanjan. The population included all the male and female students of software engineering and primary school education during the semester of 90-91, amounting to 100 participants. The instrumentation was the test of creative thinking TORRANCE (pictorial form A) and analyzing the data was done with use of descriptive and inferential statistics (T-test) of the independent groups. The result of the research showed a significant difference between the means of software engineering students and that of primary school education regarding the creativity and quad factors of (expansion- fluency- flexibility- innovation). In addition, the results also showed that the use of IT can increase the creativity of students and accordingly, a good opportunity for increasing the quality of education could be achieved.*

**Keywords:** *Creative Thinking, Fluency, Flexibility, Innovation, Information Technology.*

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## **Introduction**

Creativity is the most basic and important features that almost affected all the dimensions and aspects of life and civilizations. Experts consider creativity as an axis of global movement in 21<sup>st</sup> century and label the current century as an innovation and creativity century. Therefore, creative people and new have a grand and valuable status and officials should endeavor to support them (Tasdighi, 2005). Toynbee (1968), a celebrated philosopher and historian, believes that providing an appropriate opportunity to education of creativity in every society is a necessity and those educated persons are of great value to the society. He adds that every civilization that gives old reply to new questions is doomed to degeneration. Toffler believes that creativity is the only benefit in this era (Akbarzade, 2007). As for creativity, Torrance (1959) expresses that human society needs to expand the power of learner's creativity for its survival (cited in Zakariaee, 2007) because education of entrepreneurs plays a great role in the development of knowledge and technology.

Guilford (1999), the founder of psychology of creativity, believes that the important features of creative thinking is its divergence and claims that in divergent thinking, there is no absolute and fixed answer and determines it with 3 features of flexibility, originality, fluid (cited in Seyf, 2001). Torrance considers desire and gusto in creation that exist potentially in everybody with all the age groups and has direct and close connection with social and cultural settings. Torrance postulates appropriate conditions for this natural desire to become realized (cited in Zakariaee, 2009). As Facioni (1998) believes, creative thinking is a kind of thinking that leads to new perspectives, approaches, prospects, and new ways to understanding and perception of objects and location (cited in Zahabioun & Ahmadi, 2009).

Creativity is a talent and is not limited to specific people; everybody is born with this ability. Education is so effective in development and reinforcement of creativity and can increase or decrease this ability. All scientists and researchers believe in the existence of creative thinking in human beings and claim that educational system should fertilize this talent in individuals with initiative and creative methods (Mohammad nezhad, 2003). To answer this question that how to educate creative people in educational system especially at universities, different viewpoints exist. One answer is the use of information technology. Studies show that information technology has the potentials to arouse creative thinking in higher education. Some facilities are weblog, wiki, social networks, and virtual learning environment (Tamannayeeefar & Kashani, 2008). Similarly, Taylor (2000) believes that computers are means of education help develop and reinforce student's capacities in learning (Fontana, 2000). Learners can increase their understanding and comprehension by sharing with and reacting to the other's ideas

(Attaran, 2004). The result of Anthony's (2004) studies regarding creativity at Melbourne University illustrate that we can enhance creativity by using computers. Kampylis et al. (2010) came to this realization that the learning settings utilizing computers can help shape the creative thinking in primary students. Kozma (2002), likewise, in a study on principals and students, came to this conclusion that those students employing Information Technology could show high mental processes in problem solving (Faghieh Aram & Noorani, 2010).

We should know that world today is always changing, thus, traditional methods in educational system do not suffice to meet the needs of humans. This necessitates that educational systems take creative thinking into accounts and focus more on Information Technology. Kingle (1951) considers university as a creative institution. In his opinion, creative university is the educational place and the base of its work is creating and upgrading the quality of knowledge (Rahmani, 2001). It is important to know that structure of a new education system in the current century involves three categories of production of knowledge, transfer of knowledge, and distribution of knowledge. Unfortunately our education experts and authorities pay special attention to the second category of transfer of knowledge (education) and discount the other two categories of production of knowledge (creativity) and distribution of knowledge (technology) (Pirkhaefi, 2004).

Regarding the focus on creativity, the following question is posed:

*Is there any significant relationship between the use of IT and students' creative thinking development?*

The hypotheses of this research are as follows:

1. The students of computer (software engineering) have higher extension scores in comparison to that of education students (primary education).
2. The students of computer (software engineering) have higher fluency scores in comparison to that of education students (primary education).
3. The students of computer (software engineering) have higher flexibility scores in comparison to that of education students (primary education).
4. The students of computer (software engineering) have higher innovation scores in comparison to that of education students (primary education).
5. The students of computer (software engineering) are more creative than the students of education (primary training).

## **Research Methodology**

The current research was a practical and applied research and the design is ex- post facto or causal- comparative. The population included one hundred third-year male and female students of soft-ware computer engineering and primary education in the year 2011-2012. The participants were 100 students (50 software engineering and 50 primary school education students). It is essential to know that in the current research sampling was not used due to the low number of participants and selecting the subjects was carried out through census. To collect the essential data, the pictorial from A of the Torrance creative thinking test was used. Among the available tests for measuring creative thinking, the Torrance test has an international reputation and is also the most practical one in this field (PirKhaefi et al., 2009). This test is made on the basis of Torrance theory and his definition of creativity, and is performable in all educational levels from kindergartens to universities (Abedi, 1993). The content validity of the performed test (1966) is approved by so many educational specialists and also well-known psychologists (Rahmani, 2001). Based on Torrance (1974), the test reliability is between 75% to 87% (PirKhaefi et al., 2009). The reliability obtained by PirKhaefi (1994, 2005) amounted to 80 %.

## **Research Procedure**

The way of performing this exam was as follows:

First, amongst twelve different pictorial creative thinking of Torrance exam activities, in two forms of **A** and **B**, three pictorial activities of making pictures, completing the imperfect pictures and circle activities from form **A** were selected. Then all these activities in a form of booklet were composed and given to the students of both courses. The students of each group had to do all these activities in thirty minutes (ten minutes for each activity). In the next step, by the use of the Torrance test guideline booklet, the creativity scores and its four factors which are fluency, innovation, flexibility, and extension scores in each group were estimated and ultimately by the use of the descriptive and inferential statistical exams, the differences of scores between the two groups were carefully examined.

### Scoring the Torrance Exam

The score of the creativity factor for the activity (1) as the title of making pictures was calculated as follows:

**The innovation Score:** the innovation score of the made images according to the alphabetical list of probable answers were ordered in the performing and scoring creativity test guidance booklet from 0 to 5. This score plus the title score was regarded from 0 to 3, accounted for the final innovation score.

**The Extension Score (Explanation):** Scores were given to each of the definite and pictured details by the examinees which are as follows:

- The grade of 0 to 5 from the details of score 1.
- The grade of 6 to 12 from the details of score 2.
- The grade of 13 to 19 from the details of score 3.
- The grade above 19 from the details of score 4.

It is important to know the invalid answers got no scores. The invalid answers were those answers which the examinees gave irrespective of the picture. Meaningless answers were those answers which were unrelated and repetitive.

Calculating the creativity scores related to the activity (2) - completing the pictures:

- The fluency score: This score was calculated by counting the number of completed and corrected answers.
- The flexibility score: first, the category related to each answer according to the 68 classification in the guidance booklet, for this specified activity was recorded and the calculated and the repetitive ones were removed.
- The innovation score: This score was calculated according to the list of appointed probable answers in the Torrance test guidance booklet.
- The extension score: This score was calculated like that of the activity number (1).
- Calculating the creativity scores related to the activity number (3) in the name of circles:
- The fluency, flexibility, and extension scores of this activity was calculated like that of activity number (2).
- The innovation score: It was calculated according to the regarded alphabetical list for this activity in the Torrance test guidance booklet which was specified and recorded for this activity.
- The grade 0 was given to the answers which included 10 percent or more of the all answers.
- The grade 1 was given to the answers which included 5 to 9 percent or more of the all answers.
- The grade 2 was given to the answers which included 2 to 4 percent or more of the all answers.
- According to the scoring and performing guidance booklet of Torrance test, all the other answers which were unpredictable or were not in the list receive score 3 because they were representative of more creativity.

### Research Findings

The research data analysis carried out in two parts. The first part contains the descriptive findings and the second part contains the report of inferential findings results with the help of (t-test).

The findings concluded from the descriptive statistic are as follows:

**Table (1): The descriptive statistic score of the activities factors in the course of computer software engineering**

Factor	Number	Average	Standard Deviation	Standard Error
Extension	50	8.48	1.89	0.42
Fluency	50	10.23	2.34	0.52
Flexibility	50	8.38	80÷0.1	0.40
Innovation	50	12.17	3.17	0.71
Creativity	50	9.91	1.95	0.43

**Table 2: The descriptive statistic score of the activities factors in the course of primary schools education**

Factor	Number	Average	Standard Deviation	Standard Error
Extension	50	6.08	1.29	0.29
Fluency	50	7.85	1.81	0.41

Flexibility	50	6.65	1.72	0.38
Innovation	50	9.38	2.54	0.57
Creativity	50	7.5	1.67	0.37

## The Inferential Statistics

**Table (3): The result of the t-test for extension factor**

Total Score	T Amount	The Degree of freedom	The Level of significance	The Average Difference	The Standard Error Difference
Extension Activity	4.69	98	0.000	2.40	0.51
Fluency Activity	3.59	98	0.000	2.38	0.66
Flexibility Activity	3.10	98	0.000	1.73	0.56
Innovation Activity	3.06	98	0.000	2.78	0.91
Creativity Activity	4.10	98	0.000	2.37	0.57

## Discussion and Conclusion

Information Technology (IT) is made of a set of different devices and technology sources which is used for communicating, creating, saving, and managing the information. IT focuses on the role of communication and the communication media as an important factor and pays attention to the relationships between information and technology (Yadegar Zadeh et al., 2009). Our speeding and mysterious world today is pacing an exciting path of development, and technology is accelerating this improvement. Technology is putting knowledge into practice, leading to facilitation of the jobs and task performance in the short span of time; hence, this era is called the communication epoch and information revolution to complete the essence of human being. Therefore, technology is not a physical device but a hybrid of mental, cultural, and human fields to connect the talent with the human power (Zofan, 2006), and solve his problems and help him to reach his goals. Hence, in the current world, technology has a crucial and vital role because the economy, culture, politics, communication, education and... are all related to this matter and any development without it is unthinkable (Najafi, 2010). In the recent studies, information technology and communication is known as one of the production factors and is estimated as a person's property in the society; even any costs related to this matter is regarded as a kind of investment, and in order not to fail to keep up with the development pace, we have to note the important traits of the world today which are the predisposition to use the merits of information technology and communication. These advantages are: Public education in anytime or any place without discrimination, with high quality and a little cost, with a long term retention, learning, and creativity (Zamani, 2004). We can use all the factors above and use them to develop the community. The traits and capabilities of information technology and communication for improving the creative recollection are as follows:

1. Weblog: We need to know that mind development does not happen in a static and inactive setting; rather, it requires a dynamic atmosphere to present opinions and the weblogs as a present-day technology is adding colors to the cultivation of human minds by providing mysterious and problematic situations (Namvar et al., 2011).
2. Social Networks: It seems that information technology and communication through providing facilities such as social networks and creating opportunities for team work, sharing ideas and thoughts, reacting to the others beliefs, and persistent feedbacks, has an effective role in individuals' cognitive growth specially creative thinking. Dewey (1983) believes that the process of cooperation and research provides a favorable basis for creative thinking development through exchanging ideas among the members or learners.
3. The virtual learning atmosphere: The virtual atmospheres are safer and exert less physical harms than the real world settings, thus allowing the students to discover their new capabilities (Tamanayi Far and Yazdani, 2008).

As Suler (2004) believes, some of the characteristics of information technology and communication which result in creativity are as follows: flexibility of identity, similar status, endless space, time flexibility, social plurality (Abari, 2008). Nevertheless, we can see that our universities utilize the information technology far less than the foreign universities and the educational capabilities of it is still unknown and it hasn't found its real status in our

country. Therefore, it is essential to have a fresh insight into this matter in the educational system. Accordingly, we are able to establish the education in the best way and also maximize the efficiency and minimize the efforts saving the time and thus remove the problems which are all the significant advantages of information technology and communication (Shekari, 2010).

By virtue of the above-mentioned reports, our education authorities are needed to plan the educational system, in all levels especially the academic levels, on the use of information technology and communication so that we can cultivate creative specialists as an essential means of growth and sustainable development. Nowadays, the success of individuals and organizations are due to their access to sufficient information and its amalgamation with creativity. The combination of these two factors is vital in reaching more appropriate solutions, more efficient ideas, and more developed goals in life. Therefore, the demand for nurturing a creative and innovative generation, able to provide benefits to the organizations, is more and more crucial. The debate of intellectual investment in the last decades in organization is an emphasis on the importance of this topic. In line with the fore-mentioned statements, a question is posed; "How can we nurture creative people in the higher and academic education system"? An appropriate answer to the proposed question is the use of information technology and communication in our education system.

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