The effect of ICT on the development of creative thinking in high school second grade students in Khoy

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ABSTRACT

This study sought to evaluate the impact of ICT on the development of creative thinking in students. The present study applied a semi-experimental method with two groups, experimental and control groups. The study population comprised all second grade students of secondary schools of the city of Khoy in 1641 the number of persons, of these students, 543 Smart schools and 1098 students were enrolled in schools. The sample size was achieved by using 506 Kerjcie and Morgan. Multi-stage random cluster sampling was and coincidentally, the number of smart school children 220 and students from schools to 286 people selected. In order to collect data from a questionnaire survey 60 questions of creative thinking Torrance (1974) was used. The questionnaire has good reliability and validity, Reliability of the test is 80% to 90% above and validity by professors and professionals is appropriate. In order to analyze the data, descriptive statistics and inferential statistics were used and the descriptive statistics of frequency, percentage, mean and standard deviation are used and inferential statistics, independent t-test and analysis of covariance was used. The results showed that the mean score in creative thinking there is a difference between test and control groups. The findings indicated that information and communication technologies in the development of creative thinking and its components has a positive impact on students.

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INTRODUCTION

One of the most essential and sophisticated features of the mankind is subjected to the power of thinking and its application in this regard. The man can take a high potential responsibility, selection and action along with this thinking power; when he uses and takes this power of thinking, he or she can progress, success and satisfaction in the life situation; hence, the role of thinking is one of the most fundamental discussions in the process of real development and full-aspects of the mankind going towards the society [10]. And among this, one of the most complex and complicated appearances of the mankind’s thinking is subjected to the creative thinking. Indeed, a creative person is the one who can make a creative and innovative mind; a thinker or thoughtful is a person who is able to make a combination of phenomenon, resources and life affairs together that they are not acceptable in terms of others’ viewpoint; it is the creation of new ideas, foundation of the development and the whole long-term changes in a community [14]. Creative thinking is one of the most crucial aspects of the educational system that has been paid attention in the new era potentially. The root of creative thinking is dated back to the appearance of critical thinking movement in early 1980s and the prevalence of the post-modernism and training of problem-solving and creative thinking in this case because, due to the changes in the complex world, the most scientific approaches and events agree the point that training the most curious, critical and creative people should be established at the first basically steps of the educational system. These kinds of traits and features are very important in the growth and evolution of the mankind’s civilization. It has been also considered as the regular basis of the scientific and artistic achievements and innovations in this case. The whole communities require creative thinkers to bring and inject innovative approaches along with new methods for the self-blossoming issues in this pavement [3]. The main aim of the creative thinking is subjected to a kind of thinking that leads to the new perspectives, appearance of new approaches and the whole new and modern affairs regarding to the understanding of the objects and situations’ terms in this regard [18]. If the schools could make the most sophisticated and outstanding people into a community, the same society would change into the most regular basis of a thoughtful surrounding. The mankind and the humanistic thinking is the changes of every society based on its own methodology and type of the thoughts transferring into people in school and family setting and they get accustomed in special thinking ways in this case [14]. Today, by the
of the whole aspects of the science and communications as well as the new technological affairs; the new generation of the young people gets entered into the new era of the life; hence, it requires the thinking-based skills development practically achieved in this case; this makes of course a kind of adaptation with the technological world [4]. In the other hand, schools as the formal centers can take a huge number of these students struggling to lead them to bring the most creative affairs in this pavement. Today, in developing countries, the blossoming and nurturing the students’ creative thinking and innovation is one of the most vital activities happening in the whole schools [11]. One of the most essential targets of the education system is subjected to the optimization of the thinking skills; if the students cannot learn how to think, they will face with lots of problem in future period. Since, students interested in applying hi-fi technological tools in their thinking affairs as the greatest media, so these tools are the same technological issues for their applications in this regard [22]. Because, this will optimize their mental subjects as well; Technological affairs not only motivates and upgrades students’ communicative affairs but also it makes some challenging tasks for them to increase their textual issues such as sound, picture and animation that these may lead students to enjoy their affairs as well [7]. In most countries, the application of ICT (information communication technology) has been paid attention highly to optimize and upgrade the quality of learning affairs and approaches in this case. Utilizing the related technology in schools has been considered as a necessity due to educational, economical and social issues and many administrations have invested their supportive programs in this regard [26]. Information new technologies have made this possibility for students and other people to apply their convergent thinking or try to nurture and make their thinking affairs more flexible in this case; for example, different computer-based programs have many abilities to design and give new ideas in this regard. Many different features can give this opportunity for nurturing students’ creative thinking status. Designing and manufacturing various software programs and progressive edits and their change are the results of the creative thoughts that have been constructed along with Fava foundation. This has been published one of the most essential programs in India making high potential economical profits. Students can make their changes and edits and ideas by the use of different computerized programs trying to nurture the process of creation; this let them represent their mental picturesque and imaginations. Using simple software programs such as word-processors, designing software and similar software can lead users to stream their convergent thinking supplementing the whole mental activities; of course, the communicative technologies such as weblogs can make their mental creation to others responsibility. Loveless [23] has defined the application of the FAVA in nurturing students’ mental imaginations along with some samples as following:

The growth of mental imaginations in simulating the most realistic and imaginative status such as adventurous plays and games, the growth of mental imaginations by the use of multi-media issues; generally, one of the most vital targets of the Fava is subjected to the construction of the creative development in the process of educational system. For example, the creative thinking is one of the most comprehensive planning of the information technology development in the educational system established in Singapore [2]. The information technology along with changing of educational methods has changed and conducted the traditional concept of “learning based on memory” into the “dynamic and creative learning” [1]. Due to the importance and development of the communicative and information technology in different educational systems, many various studies have been carried out in this field. Sattari and Mohammadi [9] in their study at high school level, there has been found a significant relationship between the degree of using information technology and students’ success. Zameni and Kardan [13] carried out a study in relation to the impact of technological application in learning mathematics and found that the application of this technology can be effective in changing, stabilizing the attitudes and the deductive skills as well as creation power and finally the active learning of the mathematics. Soleimanpour et al [10] in their study carried out the impact of the teaching methodology in making stability of the natural-science of the primary school grades. In this research, three methods of representing produce electronically context by the principal, connecting to the web and using educational software programs were applied efficiently. The researchers found that the degree of durable learning in technological based teaching method is more efficient than traditional methods. The results of Daieezadeh et al [5] research also emphasizes on the impact of technological application in increasing students’ educational motivation and optimizing the questioning skill, upgrading research temperament, increasing the lesson scores and the students’ educational progression of third grade high school level in this regard. this effectiveness is equal among boys and girls with different lesson grades. Zanghaneh [8] in a research established in Allameh Tabatabaiee University conducted a study titled ‘‘the impact of using technology on nurturing students’ creative thinking at third grade of high school students’’, showed that it can be one of the most effective research based affairs in this case. The related researcher has used semi-experimental method with two groups of experimental and observational people in this regard. the findings of the research indicated the effectiveness of the technological applications in training student’ creative issues; generally, the results of the research represented that the utilization of technological tools can be more influential in blossoming of the students’ creation potentially. The results of Zarezadeh and Kadivar [6] titled the comparison of the self efficacy and creation of students using Internet and non-users, represent the fact that the self-confidence, joking temperament, innovation and students’
creative affairs among those ones using Internet based tools is higher than non-users. Adeyemi [15] in studying the influence of the computer-assisted education on students’ educational progression of high school grade in social studies and concluded that the application of the computer has not got significant impact on the educational progression. Also Owusu et al [25] carried out the impact of the education based on computerized tools on learning of biology lesson among high school students. The results showed that the post test score of experimental group trained with traditional education is better than the post test of experimental group. Although the increase of learning happened in experimental group, they have had better scores in this regard. The results of Elliot’s [17] research about the comparison of the traditional teaching method with multi-media teaching method represent the fact that the function of multi-media educational method is highly moderated and it is better than the observational group. Rumpagaporn [27] in a research titled “students’ critical thinking and their attitudes skills than technological tools in learning setting based on computer”’, has shown that the levels of critical thinking has been increased among students and their attitudes towards the application of technological affairs is positive in this pavement. Martin [24] has carried out the relationship between the critical thinking skills with students’ informational literacy among higher education levels established at Manchester University. The findings of his study showed that there is a significant relationship between the critical thinking and informational literacy as well as critical thinking skills. Antony [16] in Melbourne University carried out a research about the creation and technology and showed that the utilization of computerized abilities can boost the creation in this regard. For example, in the field of painting, by the use of computerized tools, a painting can be designed and then dimensions are given to it making a three-dimensional picture in this case. Or it can be colored by many different colors. Kozma [21] carried out a research on principals and students and concluded that students using technological issues have better mental function such as processing their problems. A research led by Harrison et al [19] cleared that the use of technological tools can impact deeply on students’ creation. Wheeler et al [28] concluded in their study that the creative thinking using technology can be very effective in students’ learning considerably. Hopson [20] studied the relationship between the classes enriched with technology and the growth of high level thinking skills among students. The results of the related study represent that environments enriched with technological tools can increase the level of students’ thinking skills; also, the use of technology and information can assist students to move towards the knowledge potentially. This has also positive impact on students’ motivation and creation significantly; hence, due to the mentioned subjects, the main aim of the study is to evaluate the impact of the information technology on the following hypotheses:

Methods:

This research is an applied study due to its subject’s nature, targets and its hypotheses in the field of learning and education; the research method is a semi-experimental consisting of two groups of experimental and control ones. The statistical community of the present study includes the whole students of secondary high school grade of KHOY City by the number of 1641 ones studying in 2012-2013 educational year. Among this number, 543 students were in high schools having technological tools (intelligent schools) and 1098 ones studying in schools without technological applications (usual schools) and the sample volume was 506 ones using Kerjesi and Morgan tables. The sampling methodology was carried out as multi-clustering accidentally and based on the students the high schools were also taken up in this case. In order to gather the related data, Torrens creative thinking questionnaire (1974) was applied that it also includes 60 questions measuring the whole types of the creative thinking in this case. The related questionnaire has suitable reliability and validity; the validity coefficient of the test was obtained between 80% and 90% in the related study; the reliability has been confirmed by certified experts in this case. In order to analysis the data, T independent test and covariance analysis test were applied and the data was evaluated by the use of SPSS 18 software.

Results:

<table>
<thead>
<tr>
<th>Statistical indices</th>
<th>N</th>
<th>M</th>
<th>Error of mean standard</th>
<th>Df</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students without ICT</td>
<td>286</td>
<td>52.16</td>
<td>9.90</td>
<td>204</td>
<td>-4.264</td>
<td>0.002</td>
</tr>
<tr>
<td>Students with ICT</td>
<td>220</td>
<td>54.60</td>
<td>5.68</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the above mentioned table, the result of T independent test (-4.264) with 204 degree of freedom in level 0.01 and 0.99 confidence level is significant because P-Value is lower than 0.01 and equals with 0.002; as a result, with 99% confidence level, it can be concluded that there is a significant difference between the streaming ability growth means of both groups; thus, the assumption H0 is rejected and the hypothesis of the research is accepted in this case. Therefore, information technology is very effective in schools’ ability growth. So, students having technological tools are better than schools without these issues. Also, covariance analysis has been used for the study hypothesis as following:
Table 2: Covariance analysis based on intelligence-making and streaming ability growth.

<table>
<thead>
<tr>
<th>Distribution source</th>
<th>Total squares</th>
<th>Df</th>
<th>Mean squares</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence making</td>
<td>745.333</td>
<td>1</td>
<td>745.333</td>
<td>18.180</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>20662.983</td>
<td>504</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1454872</td>
<td>506</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to above mentioned table, f of the table equals 18.180 in 1% significant level representing that there is a significant difference between the related groups.

Table 3: T independent test of the comparison the streaming ability growth among students with and without technological tools.

<table>
<thead>
<tr>
<th>Statistical indices</th>
<th>N</th>
<th>M</th>
<th>Error of mean standard</th>
<th>Df</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students without ICT</td>
<td>286</td>
<td>36.65</td>
<td>5.77</td>
<td>204</td>
<td>-2.96</td>
<td>0.003</td>
</tr>
<tr>
<td>Students with ICT</td>
<td>220</td>
<td>38.12</td>
<td>5.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the table, the result of t independent (-2.96) with 204 degree of freedom in 0.01 sig level and with 99% confidence level, it can be concluded that there is a significant difference between both groups; hence, the assumption H0 is rejected and the hypothesis of the research is accepted in this case. Therefore, information technology is very effective in schools’ ability growth. So, students having technological tools are better than schools without these issues. Also, covariance analysis has been used for the study hypothesis as following:

Table 4: Covariance analysis based on intelligence making and streaming ability growth.

<table>
<thead>
<tr>
<th>Distribution source</th>
<th>Total squares</th>
<th>Df</th>
<th>Mean squares</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence making</td>
<td>268.678</td>
<td>1</td>
<td>268.678</td>
<td>8.763</td>
<td>0.003</td>
</tr>
<tr>
<td>Error</td>
<td>15452.856</td>
<td>504</td>
<td></td>
<td>30.660</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>719580</td>
<td>506</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to above mentioned table, f of the table equals 8.763 in 1% significant level representing that there is a significant difference between the related groups.

Table 5: T independent test of the comparison the streaming ability growth among students with and without technological tools.

<table>
<thead>
<tr>
<th>Statistical indices</th>
<th>N</th>
<th>M</th>
<th>Error of mean standard</th>
<th>Df</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students without ICT</td>
<td>286</td>
<td>25.79</td>
<td>4.20</td>
<td>204</td>
<td>-6.012</td>
<td>0.000</td>
</tr>
<tr>
<td>Students with ICT</td>
<td>220</td>
<td>27.78</td>
<td>2.89</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the table, the result of t independent (-6.012) with 204 degree of freedom in 0.01 sig level; As a result, with 99% confidence level, it can be concluded that there is a significant difference between both groups and their flexibility; hence, the assumption H0 is rejected and the hypothesis of the research is accepted in this case. Therefore, information technology is very effective in schools’ ability growth. So, students having technological tools are better than schools without these issues. Also, covariance analysis has been used for the study hypothesis as following:

Table 6: Covariance analysis based on intelligence making and streaming ability growth.

<table>
<thead>
<tr>
<th>Distribution source</th>
<th>Total squares</th>
<th>Df</th>
<th>Mean squares</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence making</td>
<td>493.226</td>
<td>1</td>
<td>493.226</td>
<td>36.148</td>
<td>0.003</td>
</tr>
<tr>
<td>Error</td>
<td>6876.940</td>
<td>504</td>
<td></td>
<td>13.645</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>366908</td>
<td>506</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to above mentioned table, f of the table equals 36.148 in 1% significant level representing that there is a significant difference between the related groups and the flexibility.

Table 7: T independent test of the comparison the streaming ability growth among students with and without technological tools.

<table>
<thead>
<tr>
<th>Statistical indices</th>
<th>N</th>
<th>M</th>
<th>Error of mean standard</th>
<th>Df</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students without ICT</td>
<td>286</td>
<td>24.18</td>
<td>4.53</td>
<td>204</td>
<td>-1.215</td>
<td>0.225</td>
</tr>
<tr>
<td>Students with ICT</td>
<td>220</td>
<td>24.64</td>
<td>3.07</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the table, the result of t independent (-1.215) with 204 degree of freedom in 0.05 sig level; As a result, with 99% confidence level, it can be concluded that there is a significant difference between both groups and their flexibility; hence, the assumption H0 is rejected and the hypothesis of the research is accepted in this case. Therefore, information technology is very effective in schools’ ability growth. So, students having technological tools are better than schools without these issues. Also, covariance analysis has been used for the study hypothesis as following:
According to above mentioned table, f of the table equals 1.477 in 5% significant levels representing the lack of significant difference between the related groups and the flexibility.

Discussion and conclusion:

A short glance at the status of the science progression in different industrial communities and the construction of various movements such as the movement of the aptitude and talents, we figure out the fact that the world is increasingly changing rapidly towards the progression. If we want to have creative adults, it should be planned at the early years of the life for our children in this regard. if the creation and imagination of the students do not courage, they will never change into creative people.

Although the creative thinking ability has been given congenitally to the man, but its appearance requires to be nurtured in this pavement. The man needs to survive struggling to develop and expand students’ creative power. In our society, in spite of having talented forces, one of the most important reasons of its unspecified establishment is subjected to the facilitation and conditions.

The present study is to evaluate the impact of technological application in nurturing the creative thinking of secondary high school students of KHOY City; for the reason, experimental and control groups were used for holding the test. The results of the research showed that information technology is effective in the degree of students’ streaming ability growth; the obtained results of the first hypothesis is significant and it can be concluded that there is a significant difference between the means of streaming ability growth of both groups and the first hypothesis is accepted in this regard. Therefore, this process is very influential in students’ growth. Hence, students using information technology are able to carry out different problem-solving subjects and increasing their mental production level potentially. The obtained results of the study are coincident with the studies of Soleimanpour et al [10], Daieezadeh et al [5], Zanghaneh [8], Zarezadeh and Kadiivar [6], Rumpagaporn [27], Harrison et al [19], Wheeler et al [28] and Hopson [20] but it is not coincident with the results of Adeyemi [15] and Owusu et al [25]. The coincident studies showed that there is a direct significant relationship between the use of information technology and students’ streaming ability. The results of these studies have also shown that the streaming and creation of the students having used technological issues (intelligent schools) is higher than schools without the application of the information technology. The results of the present study indicated that the information technology is effective in growing of students’ innovative ability.

The obtained results of the second hypothesis is significant and it can be concluded that there is a significant difference between the means of the innovative ability growth of both experimental and control groups and the second hypothesis is accepted in this case. Hence, due to the application of the information technology in students’ innovative ability, we will have most sophisticated and creative people in this pavement.

The obtained results of the related research is coincident with Sattari and Mohammadi [9], Soleimanpour et al [10], Zanghaneh [8], Zarezadeh and Kadiivar [6], Elliot [17], Martin [24], Harrison et al [19] and Hopson [20] but it is not coincident with the results of Adeyemi [15] and Owusu et al [25]. The coincident studies have shown that there is a direct significant relationship between the use of information technology ability and the students’ innovative skill. The results of this study represent that the innovation and creation of students having used information technology is better in compare to students without using the application of information technology. The results of the research showed that the information technology is very effective in students’ flexibility; the obtained results of the third hypothesis is significant and it can be concluded that there is a significant difference between the means of the flexibility of both experimental and control groups and for the reason, the third hypothesis is accepted. Therefore, the information technology has a great influence on the students’ flexibility making opportunities for these students to discover their various attitudes in relation to special topics in this regard. Also, the information technology makes the whole students to get flexible for accepting and facing different stimulants at their life easily. The obtained results are coincident with studies of Soleimanpour et al [10], Zanghaneh [8], Zarezadeh and Kadiivar [6], Antony [16], Harrison et al [19], Kozma [21] and Hopson [20] but it is not coincident with Adeyemi [15] and Owusu et al [25]. The results of the research showed that the information technology does not influence on the development of students’ ability. The obtained results of the fourth hypothesis are not significant representing the lack of information technology in the growth of students’ development ability and the fourth hypothesis is not accepted. Hence, the information technology is not effective in students’ development and their abilities. Unfortunately, school trainings are mostly emphasizing on the learning ability and it is considered as the most challenging task among the whole teachers. The easiest approach is that teachers have to be taught the creative thinking method in this regard. For this issue, the schools should plan their programs before the implementation of their targets. The results of the
research are coincident with Adeyemi [15] and Owusu et al [25]. The coincident results showed that there is a direct significant relationship between the use of information technology and students’ development ability. The results of the present study represent that the development and creation ability of the whole students having used information technology (intelligent schools) is lower than students not using information technological affairs. Therefore, the creation is not only confined to the learning of new knowledge at school but the students learn objects and materials being applied at their life that they never experienced them before; they learn topics such as electronically and hyper-textual subjects given by their teachers; so, the construction of the full-aspects materials can help students to get new learning topics at school atmosphere. Consequently, the findings of the present study showed that the information technology has a positive impact on the growth of creative thinking and its three elements among the whole students. Generally speaking, the results of the recent study indicated that the application of the information technology in education can lead to the blossoming of the creative thinking affairs. There have been carried out researches in relation to the same process that they are also coincident with the researches of Sattari and Mohammadi [9], Zameni and Kardan [13], Elliot [17], Rumpagaporn [27], Martin [24], Antony [16], Kozma [21], Harrison et al [19], Wheeler et al [28] and Hopson [20]. The above mentioned studies have been pointed to the importance of different factors of the creation growth. Thus, the process of FAVA program should be highly paid attention as a preliminary and raw material of the creation materials in this field. Hence, due to the significance of utilizing different influences of the information technology tools can be very effective in the educational progression that these have been emphasized in many articles and papers. So, it is concluded that the related process should be planned accurately trying to move the whole topics towards the process of the education.

REFERENCES


