

Exploring the Impact of Ict in Student Creativity

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Abstract

This paper presents results of research related exploring the impact of ICT in student creativity. The author of research works for the Azerbaijan University of Languages and she conducted a survey among students of Azerbaijan universities. This study analyses impact of ICT in student creativity. The survey method have been used in this research to find out the impact of ICT in student creativity in higher education. The self-made survey have been developed in Google Chrome forms and included 16 questions asking also about respondents' sex, age, education level, course year, type of university (public and private), and major. 378 respondents participated in survey from both public and private universities. Survey have been distributed by our fellow colleagues in various universities in the capital city only. The validity and reliability of survey questions have been discussed with different experts and afterwards the survey have been distributed through personal connections among the students of both in public and private universities. Limitations of this study are following: why creativity development is important and how teachers help students to develop their creativity. Therefore, for the future study it is suggested to conduct survey with the participation of higher education teachers. Analysing our research results we have found that implementation of ICT in the teaching and learning process is fostering students critical thinking and their creativity development. Students actively using ICT and its possibilities in all possible lessons and ways not only prepare their classes, but they think that all these possibilities also helping them to develop their creativity.

Keywords: creativity, impact, ICT, student, higher education, technology, innovation

1. Introduction

Charaya and et al (Charaya et al, 2017) believes that creativity is often been used with notions such as, talent spontaneity and coincidence, which are in fact that cannot be influenced or determined but ultimately are left to chance. The contemporary literature on creativity reveals that, although factors such as luck or chance certainly play a role, creativity in higher education can be influenced by both institutional and environmental situations as well as cultural factors.

Creativity and innovation usually have a very strong links with knowledge and learning. While intelligence does not seem to be a precondition for creativity, research shows the

relevance of previous knowledge, both in terms of knowing how to be creative and of domain knowledge. Furthermore, creativity is seen by many researchers as a form of knowledge creation and of construction of personal meaning: it is therefore an essential skill for enhancing the learning process (Ferrari et al, 2009).

Bleakley writes that (Bleakley, 2004), if there is an agreement that creativity is in the centre of the teaching, learning and curriculum in HE, it means that the creativity is not always clear. Universities should be clear how creativity adopted in curriculums.

2. Creativity and education

Charaya et al. (Charaya et al, 2017) indicate that creativity can be developed through education and it is possible in any activity that engages intelligence. They also mention that information and communication technology (ICT) and as well as the digital technologies have a great potential for enhancing creativity by providing tools, processes, audiences of all ages, abilities and also across the curriculum.

According to Ferrari et al. (Ferrari et al, 2009) creativity requires experience and knowledge more than intelligence and it can be seen as a form of knowledge creation, and thus linked to learning. Creativity is not always welcomed in the classroom, especially by the teachers, who often dismiss creative and original outputs on the grounds of their perceived lack of relevance. Teachers are playing a key figures, in case a creative culture is to be implemented. That is why they should be supported, both in terms of training and by ongoing institutional support.

Creativity can be learned, but since it is a thinking skill it can only be “learned by doing” or as “learning in action.” Creativity involves approaches to thinking rather than a set body of knowledge that can be taught. However, we can reinforce and support sustained creativity as a “habit of the mind” (Henriksen et al, 2016).

Roy (Roy, 2019) indicates in his paper that creativity is a learning attitude that requires knowledge. To be innovative with ideas and concepts there is a requirement to have some basic concepts and knowledge. Creative thinking is the thinking that enables students to use their imagination to generate new ideas, questions and hypotheses, experiment with alternatives and as well as to evaluating their own and their peers’ ideas and also final products.

Key words here are:

- Thinking
- Applying
- Imagination
- Experimenting
- Evaluating

Feldhusen and Treffinger (Feldhusen and Treffinger, 1980) provided some recommendations that establishing a classroom environment to conduct a creative thinking:

1. Supporting and reinforcing unusual ideas and responses provided by students.

2. Failures can be used as a positive to help students in order realizing their errors and meet acceptable standards in a supportive atmosphere.
3. Adapt to student interests and ideas in the classroom whenever possible.
4. To give students some time to think and develop their creative ideas. Not all creativity occurs immediately and spontaneously.
5. Create a climate of mutual respect and acceptance between students and between students and teachers, so that students can share, develop, and learn together and from one another as well as independently.
6. Be aware of the many facets of creativity besides arts and crafts: verbal responses, written responses both in prose and poetic style, fiction and nonfiction form. Creativity enters all curricular areas and disciplines.
7. Encourage divergent learning activities. Be a resource provider and director.
8. Listen and laugh with students. A warm, supportive atmosphere provides freedom and security in exploratory thinking.
9. Allow students to have their own choices and yourself be a part of this decision-making process. Let them have a part in the control of their education and learning experiences.
10. Let everyone get involved, and demonstrate the value of involvement by supporting student ideas and solutions to problems and projects.

The OECD (OECD, 2010) proposed a systematic approach to technology-based school innovations, leading to the identification of four axes for the analysis of technology-based innovations in education:

- policy axis: links innovation to policy-making and policy choices that need to be made to facilitate innovation, its impact and its knowledge base. Curriculum, professional development for teachers and school leaders, and assessment are key elements;
- pedagogy axis: it is largely about how technology can contribute to improved teaching strategies and learning outcomes;
- technology axis: reflects the strong importance placing on infrastructure (access to laptops, broadband internet connection, learning management systems, etc.) as an enabler for access and equity with regard to technology in education;
- knowledge axis: it is linked to the role knowledge plays in innovation processes, focusing on three knowledge challenge: i) to secure that a sufficient knowledge base is established; ii) to secure effective dissemination of knowledge; and iii) to use the knowledge base.

Anastasiades (Anastasiades, 2017) indicates the collaborative creativity with the use of information and communications technologies (ICT), as one of the most important tools, which the thinking teacher has in order to respond critically to the demands of our times.

Pandolfini (Pandolfini, 2016) writes that in the majority of studies the understanding of impact often is drawn toward simple outcomes on the individual level (teachers and/or students).

As Nikolopoulou (Nikolopoulou, 2018) says digital information and communications technologies (ICT) can be seen as a set of tools which can be chosen as and when they are

appropriate in the creative process. Creativity can be promoted and extended with the use of new technologies where there is understanding of, and opportunities for, the variety of creative processes in which learners can engage.

Creative uses of ICT can take place both in a specific (physical) space and time (e.g., the use of a computer or interactive whiteboard in the classroom) and also outside the classroom, in other than the school time (e.g., the use of mobile technologies or videoconferencing). The research field of human interaction with digital technologies with the aim to develop and promote creativity is in progress (Casminaty and Henderson, 2016). Nikolopoulou (Nikolopoulou, 2018) writes that allowing students to play with the tools can enhance students' motivation to think, understand, and learn in innovative ways. The process of integrating both technology and creativity into the curriculum is complex. Pandolfini (Pandolfini, 2016) is sure that it is very important to look at how ICTs improve teaching and learning processes within the school, assuming that not all impacts are positive or intended, but there also could be unexpected ones, the analysis of which could reveal also negative latent aspects.

Nikolopoulou (Nikolopoulou, 2018) describes student creativity with usage of ICT in his paper based on citations from different scholars. The author writes that according to *Table 1*. knowledge of the specific characteristics/features of ICT tools (i.e., their dynamics in the educational process) can lead to informed choices about when using such tools, as well as to the evaluation of their use. It is the interaction between the distinctive features of ICT and the characteristics of creativity that opens up new perspectives for the development of creativity in education.

Table 1: Specific characteristics of ICT tools and the basic features of creativity

Characteristics of ICT tools	Basic features of creativity (elements of creative processes)
Interactivity	Inventing
Multiple types of information	Desire for novelty
	Developing new ideas
Capacity	Using imagination
Range	Finding and solving problems
Speed	Linking apparently separate fields
Automatic functions	Being original
Electronic communication	Divergent and critical thinking
Distribution of information/ materials	Autonomy and resilience
	Curiosity
	Effectiveness
	Analyzing and synthesizing skills

Ferrari et al. (Ferrari et al, 2009) stating that the non-creative learning, comprises all learning which favors memorization over understanding; rote-learning and learning of facts. Both creative and non-creative learning are very important for education and should co-exist. It is unavoidable to go through a certain amount of non-creative learning before being able to make any new connection or to embark on understanding a topic. At the same time, non-creative learning is not enough, as understanding is fundamental for the cognitive and cultural development of children and young people.

According to Henriksen et al. (Henriksen and et al, 2016) we have to remember that nowadays technology plays an important role in every aspect, the individual and the field of education. It surely impacts construction of knowledge, its sharing with in the community and its acceptance by the field. That is the reason why we explore this relationship between creativity and technology.

3. Method

The study analyses impact of ICT in student creativity. The survey method have been used in this research to find out the impact of ICT in student creativity in higher education. The self-made survey have been developed in Google Chrome forms and included 16 questions asking also about respondents' sex, age, education level, course year, type of university (public and private), and major. 378 respondents participated in survey from both public and private universities. Survey have been distributed by our fellow colleagues in various universities in the capital city only. The validity and reliability of survey questions have been discussed with different experts and afterwards the survey have been distributed through personal connections among the students of both in public and private universities.

4. Discussion

Implementation of ICT in both high schools and higher schools of Azerbaijan have been started since 2000s, but it is still not covering all of them. Many teachers voluntarily started to implemented ICT in their classes in both high schools and higher education. But in our paper we will focus mostly on creativity of students while using ICT for learning.

Analyzing of collected data on the impact of ICT in student creativity we have achieved following results. As we have mentioned above 378 students answered survey questions out of which 354 students (96.2%) are from public universities and 16 students (4.3%) are from private universities. As well as 338 students (90.6%) are female and 34 students (9.1%) are male. Master students are majority of respondents which are 247 students (66,4%), bachelor students are 130 (34.9%) and PhD students are only 3 (0.8%).

57% of students answered Q7. (Do teachers use information communication technologies (hereinafter - ICT) in the educational process at your university?) in some lessons their teachers using ICT in some classes (Figure 1.). But in the next question (Q8. - How often do your teachers using ICT for teaching and learning?) only 43% of students answered that yes, all the time. Comparing these two answers, we can easily find that there is a contradiction in students' responses.

7. Do teachers use information communication technologies (hereinafter - ICT) in the educational process at your university?

374 responses

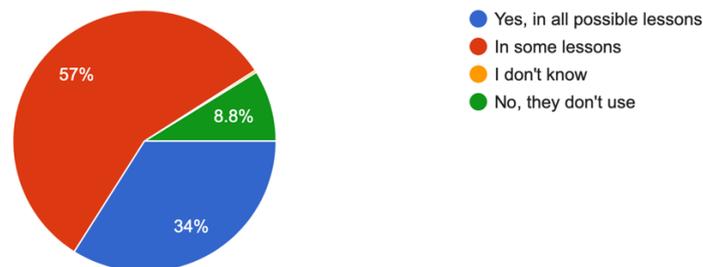


Figure 1.

Ghavifekr et al. stating that (Ghavifekr et al, 2016) due to ICT’s importance in society as well as in the future of education, identifying the possible challenges to integrating these technologies in schools would be an important step in improving the quality of teaching and learning.

In practice we can see many students who are using ICT for learning nowadays in Azerbaijan higher education. Education is developing and changing its methods of teaching and learning also requires modern approach. Although they are not using ICT in all classes, but still there is a lot of students who are trying to use this possibility. So that we wanted to learn how many students are aware of how to use ICT tools for learning and their answer to Q9. (Do you know how to use ICT for your learning?) was as the following (Figure 2).

Shaik et al are writing that (Shaik et al, 2013) design ICT-based learning resources and environments use ICT to support the development of knowledge creation and critical thinking skills of students, support students’ continuous reflective learning, and create knowledge communities for students and colleagues.

Taking into account that students in Azerbaijan starting to learn basic ICT skills in the primary schools, those who are living in big cities usually know how to use at least some programs of Microsoft Office. So that usually students trying to prepare their presentations by themselves using basic ICT skills. That was the reason we wanted to learn how many of students are preparing their presentations by themselves in Q10 and answers were as in the Figure 3.

Nowadays, development of ICT gradually replaces the traditional teaching and learning pedagogy. According to Suryani (Suryani, 2010) ICT can provide a considerable benefit in supporting learning. By using technology in their learning, the students can be active learners. They will be aware of what information they need, why they need it, and how they can get that information. Of course, ICT is not suitable for all fields and/or majors. Therefore it is not implemented in all majors and one cannot force to implement it for teaching and learning purposes in that case.

9. Do you know how to use ICT for your learning?

375 responses

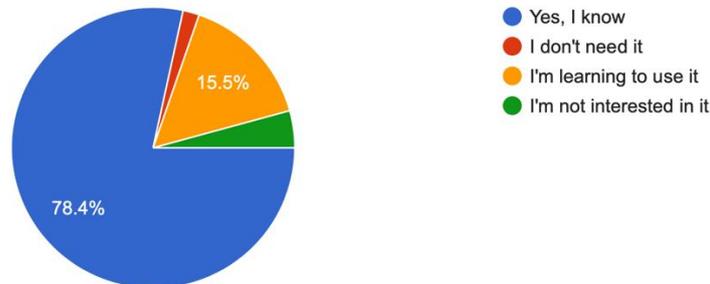


Figure 2.

Roy (Roy, 2015) states that ICT make education system more productive, interesting, give more powerful instruction and also able to extent the educational opportunities to masses and creating information – rich learning environment.

10. Do you prepare presentations yourself?

372 responses

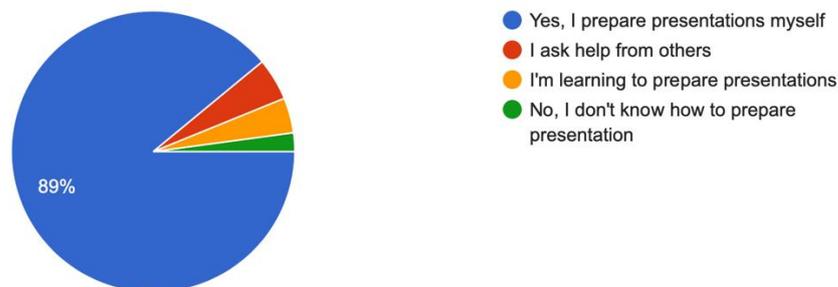


Figure 3.

Casminaty and Henderson writes that (Casminaty and Henderson, 2016) most of the research has revealed a connection between ICT tools, particularly visualization tools, and creativity. However, it must be emphasized that the ICT tools themselves do not guarantee outcomes. Continuing their discussion they argue that the connection between ICT and creativity in many cases is tenuous or assumed – such as the assumption that asking students to create a video leads to creativity. That’s why the next question (Q12) in our survey does using ICT for learning helps you to be creative and 72,5% of students declared that it helps them to be creative, 10,5% responded that it helps them only to prepare their classes, 14,8% of students agrees that it helps them sometimes to be creative and only 2,3% responded that they don’t think that ICT helps them to be creative.

In our survey we wanted to know if students receive the ICT as an innovation, so that our another question was if using ICT as an innovation in classes helps students to be creative. Their answers were as in Figure 4.

Dogruer et al. (Dogruer et al, 2011) writing that regarding students who are obviously accepted as passionate users of the Internet, the use of the Internet is mainly for social and entertainment purposes since the Internet revolution is not just limited to finding information but also bringing people together. Authors (Dogruer et al, 2011) also stating that it is very obvious that the Internet provides not only social connection and entertainment, but also academic and scientific information as well. It is important to be aware of the fact that students are not inactive receivers during the transmission of knowledge via the Internet. The efficacy of students and looking at the picture through their eyes is vitally important in the way to reach success.

14. Using ICT as an innovation in classes helps student to be creative
368 responses

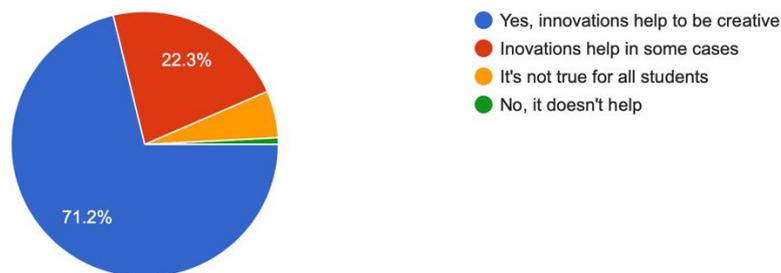


Figure 4.

According to Toprakçı (Toprakçı, 2007) the educational factors denote the student's background before and during university education as well as the education, the place where the education is carried out (e.g. the campus), curriculum (the content of the education), academic staff, administration and technological facilities. For instance, the lack of effective technological infrastructure in terms of computer hardware that will enable the student to have access to the Internet will obviously have an adverse effect on his relationship with the Internet. And, finally, situational factors comprise the student's background before and during university education and all the other things that determine this background.

We have asked in our survey (Q15) if using the internet for your learning is one of the impacts of creativity and answers of students were as in the Figure 5.

15. Using the internet for your learning is one of the impacts of creativity

367 responses

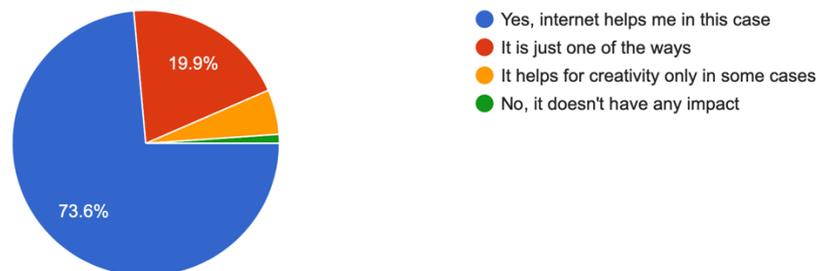


Figure 5

Over past decades, rapid development of information and communication technologies and as well as Internet helped students to acquire many new skills such as multimedia pages, video making and editing, gaming, simulations and etc.

Kosterelioglu (Kosterelioglu, 2016) states that when education that is supported by videos is compared with face-to-face education, it is argued that videos are more effective since they support the process. Video is being used in a variety of ways to support various pedagogical strategies successfully. By no means a comprehensive list, within just the context of problem-based learning, video clips can be used to present a problem to students to trigger problem-solving; to provide information around the topic; or to present solutions to the problem at the end of the process (Rasi and Poikela, 2016).

Academic staff in higher education have to be in charge of the development and speed with technologies and other resources which are can be helpful to teach their students. It supports students to be more creative and use to make videos for their assignments. In order to understand how much are our students supporting this idea we have asked a question in our survey (Q16) if they think that making the video by using ICT is one of the ways to be creative. 63% of students answered that yes, it helps, 29,5% answered that just in some cases, 5,7 % answered that my creativeness is doesn't depend on ICT, and 1,9% answered that no, I don't think so. As we can see, most the students support the idea that how ICT can help them to be creative and making the video is one the ways how they prepare their classes, or assignments. But certainly there are some students decline the role of the video making in their creativity and these students are small part of the respondents.

5. Conclusion

Henriksen et al. writing that (Henriksen et al, 2016) creativity is a concept that has not been well understood, framed, or defined. Education needs a frame to help students and teachers develop creative thinking skills that span disciplines, and use technology tools for creative solutions and outcomes. Agreeing with Henriksen et al. we would note that usage of ICT in higher education institutions helps students not only to get new knowledges, it helps also to develop in them critical thinking and creativity. Although not all teachers and scholars are appreciate the role of ICT in the learning process, but comparing all scholars thoughts

about creativity which are have been mentioned in this paper, we could come into conclusion that the ICT plays a big role in student creativity development and so that we have also tried to explore the impact of ICT in student creativity. Analyzing our research results we have found that implementation of ICT in the teaching and learning process is fostering students critical thinking and their creativity development. Students actively using ICT and its possibilities in all possible lessons and ways not only prepare their classes, but they think that all these possibilities also helping them to develop their creativity. 78,4 % of respondents answered that they know how to use ICT for learning and that they are actively using it. Answering the survey questions 73,6 % of respondents are confirming that using the Internet for learning is one of the impacts of the creativity. Of course, teachers' efforts also should be appreciated for using ICT in their classes for teaching purposes.

Limitations of this study are following: why creativity development is important and how teachers help students to develop their creativity. Therefore, for the future study it is suggested to conduct survey with the participation of higher education teachers.

In conclusion, we recommend widely implement ICT and educational technologies in all possible classes in teaching and learning in order to develop critical thinking and creativity in students. Teachers have to use all possible ways and innovations to make the learning process more effective and interesting for their learners, which will help development of student creativity.

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