

Information and communication technologies as a source of education

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Abstract

It is well known that the application of ICT in education helps us to develop skills for competent and efficient problem solving in the field of professional activities. This paper aims to examine the attitudes of students towards the use of ICT as a source of education. The methodology adopted was that of original research, with a qualitative and quantitative approach. This study included 175 students from Serbia and Bulgaria. The variables of this study were gender and the years of study. In order to assess the attitudes of students towards the use of ICT in education a five-point Likert scale was used across forty-five statements. The results of the research show that students are very interested in using ICT as a source of education. Thus, it is evident that information and communication technologies have become very important pedagogical resources in approaching the teaching and learning processes in an innovative way.

Keywords: attitudes of students; ICT in education; ICT; education technology; education.

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1. Introduction

It is inarguable that the information society has become defined as a knowledge-based society. The world is produced and reproduced through the continuous exchange of information. This underscores the formation of appropriate means of adapting and orientating young people necessary for their successful implementation. The Internet and World Wide Web have had a big impact on the use of ICT (Bouarab-Dahmani, & Tahj, 2015). Lucas, et al, (2017) said that only when teachers are properly trained in the use of ICT, can we talk about the potential use of ICT in education. Education innovation is essential for the prosperity, competitiveness, and integration of ICT (Pérez-Sanagustín et al., 2017).

There is every reason to accept that the whole direction of modern culture has been created and continues to develop rapidly, aimed at the development and integration of ICT in all spheres of human activity (Tomczyk, 2020). This trend reflects an essential characteristic of contemporary society, which determines it as a "society of growing professionalism".

There are a lot of discussions about the use of ICT in supporting student education. The group of technologies that allow users to dynamically create, publish and share knowledge by means of collaboration and communication is commonly referred to as 'Web 2.0' (Kale, 2014). Many studies have shown that teachers are eager to learn these technologies and use them in their teaching (Palaigeorgiou & Grammatikopoulou, 2016; Unal & Uzun, 2019). One analysis of interviews with ADL (asynchronous distance learning) - students also showed that most of the students wanted to have face-to-face instruction in addition to ADL, and this leads to building a BL (blended learning) environment (Gunes, 2019). In Gunes' study (2019), most of the students indicated that being taught at distance decreased their willingness to ask the instructor for support. For instance, Petko et al. (2017) concluded that students' perceptions of the effective application of ICT were prevalent in the teaching of mathematics, reading and science. Now it is more common to use social media. "According to data from the 'We are social' website, 2.80 billion of the world's population actively uses social media" (Kemp, 2017). One negative side to this is that "people spending most of the time on social media networks, demonstrate depressive tendencies and transfer aggressive behaviours into different dimensions" (Eraslan, & Kukuoglu, 2019). However, positive relationships have been reported in some previous studies (Petko et al., 2017).

Therefore, the introduction of the proposed research requires clarification of the dialectic between two of the phenomena typical of culture in general (and in particular postmodern culture):

1) education as a process involving the teaching and learning of specific knowledge, skills and attitudes;

2) information and communication technologies as a resource of education, bringing together all the known ways and means of information exchange.

In the traditional world, the socialization of personality was done through the direct transfer of knowledge, norms and behavior from adults to young people, from parents to children, from teachers to adolescents. The personal life experience of the teacher and their personal socio-cultural orientation were fundamental in the processes of continuity.

The current "giant leap" in the field of ICT is changing the mechanisms of human socialization and acculturation in the present. In the information age, the issues related to the organization of the educational process are of key importance:

- to the interests and needs of the population;
- to the socio-cultural attitudes of the person;
- to the consumer needs of products and services that prepare the individual both freely to pursue their own interests and at the same time serve the needs of the community.

Adaptation to a knowledge-based society has not been *a priori* envisioned. It can only be achieved through:

- redefining paradigms in education;
- operationalization of skills for work with information and communication technologies;
- the adequate deployment of educational programs aimed at reflecting on the upgrading of professional competences in a dynamically changing world.

To upgrade their teaching processes, teachers and students have used many other non-traditional tools to complement their teaching and learning processes (Enrique Hinojosa, 2018). Stratton, et al., (2019) concluded that the application of computers and the internet have not led to successful ICT implementation in education (ICT4E).

The set of systematic activities and approaches that provide the conditions for the adequate development of the ability to objectify knowledge in real life situations, as well as in solving problems in practice, is referred to as functional literacy. Viewed in the context of contemporary educational goals, functional literacy is directly dependent on the informatization of the educational environment.

Due to their combination of dynamics, interaction, and programming, computers are the preferred means of communication in the life of the modern man. This characteristic nominates them as an effective learning tool to accompany the educational process in all its stages and grades. There are three main applications of computer technology to the development of students:

- Learning data;
- The Process of Expression;
- the Process of Programming.

All three applications are based on active human-computer interaction, but the degree of learner self-involvement in the outlined application space is different.

In "learning the data", the computer responds to the students' responses and largely controls (assumes all responsibility), i.e., the computer programs the students.

In the "process of expression", the learner creates / constructs certain material, and the computer is a tool through which the form and content of that material are imparted.

In the "process of programming", the learner controls and directs the interaction to the greatest extent, using a programming language that is understood by the computer.

It is strongly believed that the enhanced use of ICT in education creates real conditions for the learner to be the subject of their cognitive activity, and this contributes to the development of functional literacy in a society of growing professionalism.

In this regard, the study of students' attitudes towards the use of ICT as a source of education has its justification, because it establishes the current state of two cause-and-effect relationships in the preparation of students:

- First, the results of this study reveal the authentic attitude of students towards the use of ICT as a source of education, expressed in the real-conscious level of their importance and meaning in the educational process;
- Secondly, the results registered reflect the desire, attitude, and motivation for continuous learning (growing professionalism) of students in different professional fields, and that corresponds with the qualities of the computerized educational environment.

2. Methodology

The research was conducted in 2017. The methodology adopted was original research, with a qualitative and quantitative approach. The main purpose of this research was to discover the attitudes of students towards the use of ICT as a source of education. In this paper, we present the students'

attitudes and their views on the use of ICT as a source of education. At this stage it should be noted that further research, examining a larger sample and including the opinion of students from different places, is necessary in order to gain a clearer picture of the phenomenon.

2.1. Study group

The purpose of this research was to discover students' attitudes towards the use of ICT as a source of education, and to offer some recommendations for the further implementation of such technologies. The subject of this research is the informatization of the educational environment in higher education establishments. Throughout the research, we sought to clarify the position of the students towards the use of ICT as a source of education. For this research a five-point Likert scale was provided to the participants in the target group in the period March-April 2017. Responses to the questionnaire were collected from 175 students from higher education institutions in the Republic of Bulgaria and in the Republic of Serbia.

Table 1. Distribution of respondents

No	Country	High school	Participants
1	Serbia	College for preschool teachers in Aleksinac	93
2	Bulgaria	"St. Cyril and Methodius" University of Veliko Tarnovo –Vratsa Branch	82

For the purposes of this research, we examined the following:

- Research question 1. It is reliable since the scale as a whole is high.
- Research question 2. The instrument is assumed to be valid, and the factors that will be drawn from the factor analysis will be related to the students' opinions about the use of ICT as a source of education.
- Research question 3. No statistical difference is assumed in the respondents' attitudes about the use of ICT and the place where the respondents live.

2.2. Data collection tools

IBM SPS Statistics v20 software was used for statistical data processing, while Monte Carlo software was used for parallel analysis. Cronbach Alpha was used for the reliability of the scale, while the Kolmogorov-Smirnov test was used to analyze the normal distributions of the respondents ($p > 0.05$). The Shapiro-Vilkov test was used to determine whether the distribution met the more stringent normality criteria. The results of the factor analysis search were confirmed by the Monte Carlo software for parallel analysis. The ANOVA test, two-factor univariate, tested the interconnection of variables in relation to the students' opinions about whether and to what extent students are qualified to use ICT.

The statistical analysis itself was performed at a 95% confidence level. A P-value less than 0.05 was considered statistically significant.

3. Results

The study found that there were statistically significant differences in the respondents' answers compared to the study year of the respondents.

Table 2. Descriptive

	N	Mean	Std. Deviation
First grade	61	192.3279	29.04119
Second grade	31	189.7419	19.48327
Third grade	56	178.0714	18.96299
Fourth grade	12	158.5833	8.33894
Master study	15	114.2000	21.71635
Total	175	178.2971	31.39465

F= 39.27; df = 4; p=0.00

The highest arithmetic mean is in first-year students (M = 192.33). The difference was statistically significant, with $p < 0.05$. Students make the most of ICT at the beginning of their studies and differ in the attitudes of second, third, fourth year and masters students.

The value of the Kaiser-Meyer-Olkin indicators was 0.940. Bartlett's test of sphericity in the chi-square test ($\chi^2 = 9819.381$) was 990 (Table 3). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy test shows a very high value of 0.94, while Bartlett's test of statistical significance is 0.00. This data indicates that performing factor analysis for the purposes of this research is justified.

Table 3. Results of the Kaiser-Meyer-Olkin and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.940
	Approx. Chi-Square	9819.381
Bartlett's Test of Sphericity	df	990
	Sig.	.000

By grouping the variables, one unique variable called ICT could be created. A t-test was performed with the parametric type of testing. It was found that there was no statistically significant difference between the respondents' views on the use of information and communication technologies and the place where the respondents live, with $p > 0.05$. The homogeneity of the response, regardless of the location of the research, dominated.

Table 4. T-test Group Statistics

	Place	N	Mean	Std. Deviation
ICT	Vratsa	82	180.2683	39.63975
	Aleksinac	93	176.5591	21.77527

t= 0.78; df=173; p= 0.44

4. Discussion and conclusion

The findings reveal a high degree of similarity respondents' attitudes towards the use of ICT in the learning process. This finding brings to the foreground the debate on the quality of the educational environment in higher education.

ICT provides excellent and very useful changes to the teaching and learning process. The application of ICT in education improves the quality of learning where learning through ICT plays a significant role

in the acquisition of computer literacy. As a result of the research, students agreed that most colleges and faculties should be technically equipped, and that the application of ICT in faculty should become an integral part of the teaching process of education and learning. The use of ICT at faculties provides opportunities for expansion in the processes of learning and expression. Most students agree that they should be an integral part of education because the use of ICT in education adds a new dimension to the teaching process and that the application of ICT in education makes it possible to engage in learning without the presence of traditional teaching. According to the students' answers, using ICT enables the easier, faster and better acquisition of knowledge. Using ICT gives them control over the things they want to do during the course of their studies, to share their knowledge with other students easily and more effectively. As one of the disadvantages, the students state that the application of ICT is increasing the distance between students and professors, a result of their physical separation from one another. Learning through the ICT environment lacks the inspirational contact brought by face-to-face encounters

In the context of educational strategies and policies, higher education should provide informatization of the educational environment according to the following categorical-semantic fields:

- socializing interaction, combining the processes of personalization and globalization in the context of "all knowledge of the world", mastered through access to information and communication technologies;
- a complex educational process based on the information functions of electronic dialogue and providing input, storage, processing, systematization, structuring, extraction, and the use of information as an object and subject of independent analysis in the process of self-development;
- an inter-individual means of transforming the potential of each human being on the basis of a humane-personal approach towards actual subjective, personal possession.

Derived interrelated dynamic characteristics confirm that the informatization of the educational environment contributes to the implementation of an effective learning process and is an indicator of the quality functioning of the higher education institution.

Earlier research suggests that students' experience and their intentions to pursue particular careers after education can be more directly used to influence the use of particular technologies (Edmunds, et al. 2012). Learning is gained on effective cognitive processing without having distance learning, but the question is only whether students are prepared for the large amount of information they can access (Paas & Ayres, 2014; Guney, 2019).

It is inarguable that students are ready to use ICT in education. Pertinent questions remain, however: "Do the teachers have the ability to use educational technology and is the school sufficiently equipped with all modern technical means?" (Stošić, & Stošić, 2015; Stošić, 2015; Tomczyk, 2019). Much larger and far-reaching research needs to be done to provide a more detailed and realistic picture. Also, the social status of families, the economic status of the state and many other factors should be taken into account in such research. Hu, et al. (2018) confirmed that in order to consider the role of ICT in the broader context of learning, detailed research is needed about the impact on student learning attainment. Since 1997, the American Psychological Association has supported teachers in considering the appropriate technological and instrumental practices for facilitating student-centered learning (American Psychological Association, 1997).

Analyzed in the context of an effective learning process, the opinions of the students identified in this research confirm that the application of ICT in education has become an integral part of the teaching and learning process. Their multifunctional manifestations reveal a whole hierarchy of codes that function in a single and public consciousness as one.

It must be concluded that, as a specific sign system:

- ICTs are unique artifacts. They signify, preserve, transmit and disseminate the achievements of human evolution, and this underlines the sociocultural role of informatization in education (Tomczyk & Oyelere, 2019).

- ICTs mediate the search for similarities and differences, combine and reformulate, transform and analyze facts from the vast information of civilization. It is in this opportunity to categorize knowledge that the heuristic potential of informatization in education stands out.

- ICTs globally mediate the inclusion of an individual or group in existing social relationships and norms. That is, by its inherently integrative nature, informatization in education helps to develop skills for competent and effective problem solving in the field of professional activities.

This study may lead to a better understanding of students' attitudes towards the use of ICT as a source of education and provide some recommendations for the further implementation of such technologies.

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