



Attitudes of Teachers to Using Information and Communication Technology in Teaching – Advantages and Obstacles

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Abstract: This paper analyses the attitudes of teachers to using information and communication technology in teaching. The study was conducted on a sample of 269 teachers in the Republic of Serbia. The purpose of this research is to look at the intensity of ICT use in teaching, as well as to identify the benefits and obstacles that teachers face when using this technology. The study was based on a descriptive research methodology. Surveying and scaling techniques were used to measure the attitudes of teachers. It was concluded that teachers often use ICT in teaching. The greatest advantage of ICT use, as seen by teachers, is improved quality of teaching, a possibility to deliver interesting lessons and quick and easy access to information. The greatest obstacles emphasized by teachers were underdeveloped competencies of teachers, limited access to ICT in schools and insufficient trust in the use of new technologies.

Keywords: ICT in teaching, advantages of ICT in teaching, obstacles of ICT in teaching, innovation, modern teaching.

Introduction

A fundamental characteristic of modern society is informatization of all segments of human life and work. It is essential to consider the significance of informatizing the school as a whole whereby both teachers and students should adopt fundamental attitudes towards the role information science plays in modern society and master the use of information technology in the coverage of both technical and general learning content. Information and communication technology is the most significant innovation for the improvement of teaching in schools. The integration of ICT into teaching has many advantages over traditional teaching. However, this is by no means a simple process that depends on numerous factors and hence encounters many obstacles.

There is a great number of studies dealing with advantages and obstacles to integrating ICT into teaching. The major advantages of using ICT (Ramboll, 2006; Balanskat and Blamire 2007; Vard and Parr, 2010; Džigurski et al., 2013; Braš Roth, Markočić-Dekanić and Ružić, 2014; Andevski, Vidaković and Arsenijević, 2014; Linberg, Olofsson and Fransson, 2016; Scherer and Hatlevik, 2017; Agrawal and Mittal, 2018; Al-Ansi, Garad and Al-Ansi, 2021; Thaheem et al., 2021; Nurliani, Sinaga and Rusdiana, 2021) include the fact that ICT has an overall positive impact on teaching and learning; it provides quick access to information and is a simple way to exchange information, communicate with other teachers, students and parents by e-mail; it offers flexibility in terms of time and space, the use of search engines to access new and relevant information, assistance with spelling; improves the quality of teaching, has strong motivational effects, enhances concentration and attention of students in class, has a positive impact on behaviour, communication skills and thinking, academic achievements in school, and provides a greater degree of curriculum differentiation designed according to students' individual needs.

Most studies single out the following most common obstacles (Ramboll Management, 2004; Empirica, 2006; Machin, McNallya and Silva, 2006; Balanskat and Blamire 2007; Vard and Parr, 2010; Vastiau et al., 2013; Sipila, 2014; Vrasidas, 2015; Villalba, González-Rivera and Díaz-Pulido, 2017; Bhatti et al., 2021; Nurliani, Sinaga and Rusdiana, 2021; Tsegay et al., 2022) underdeveloped competencies of teachers, poor quality ICT equipment, low motivation, insufficient trust in the use of new technologies,

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limited access to ICT in schools, low level of information about the possibilities of ICT use, teacher's inclination to traditional teaching.

Information technology – new reality in teaching

Information science brings along structural changes to the society, communication and in the way individuals think and behave. The position an individual will have in social relations and ultimately his financial status will significantly depend on his knowledge, particularly his information knowledge. Those who can quickly adjust to constant changes where information competence plays an important part will do best in social environment. 'The main drive for the development of information society (Molnár, 2014, p. 421) is computer technology and quick growth in telecommunications'.

Informatization of teaching through introduction of powerful information technology allows for fundamental changes in the traditional concept and creating conditions where each student is his own master, able to manage his own work and achievements and progress according to his own abilities. Transition from traditional to modern information technology is very complex and highly demanding. According to Mandić, D. (2009), this involves changes in methods, form and the organization of the teaching process. With its various possibilities, innovative information technology constitutes an extraordinary modelling tool used not only for shaping quality and efficient teaching, but also for all school activities involving responsible and challenging tasks in a learning society. It ingresses the field of education content, teachers' activity, teaching forms and methods, learning styles, assessment, and the entire operation of school.

Informatization of education includes: a) universal information technology (redacted texts, graphic packs, database management systems, electronic tables, modelling systems, expert systems); b) computer telecommunication devices; c) computer teaching and controlling programs, digital textbooks; d) multimedia products. Informatization treats students as the focal point in the education process. Informatization of the education process is an interesting and appealing concept for the students as it reduces psychological strain since the subjective relationship between a teacher and a students is replaced by a relationship student - computer - teacher; it increases the efficiency of work, stimulates creativity and allows for the knowledge gained at school to be extended at home. Informatization is appealing for teachers as it enables them to improve the resultative aspect of their work. Informatization of the education process places the personality of a student in the centre of the teaching activity by providing favourable and comfortable environment for learning and the development of natural potential. In such conditions, a student is not just a subject but a priority subject, an objective of the education system.

The paper is structured as follows: Section 1 presents introduction, Section 2 presents the materials and methods used in the preparation of the paper. In this section we set the main and auxiliary hypotheses, the nature and type of the sample and statistical test and the parameters used. Section 3 reveals the preliminary results of our research. Discussions of our research was presented in Section 4. Conclusions are drawn in Section 5.

Materials and Methods

The subject of this study is to analyse current situation regarding the implementation of ICT in teaching. The aim of the present study is to establish the attitudes and the opinions of respondents regarding the degree of ICT use in the classroom and determine the advantages offered by ICT and obstacles teachers encounter in the implementation of ICT in the teaching process. The tasks of this study are to: 1. determine the level at which ICT is used in the teaching process by teachers; 2. identify the advantages offered by the implementation of ICT in the classroom; 3. identify the obstacles teachers encounter when using ICT in the classroom.

Hypothesis 1. Respondents use ICT in teaching to a high degree.

Hypothesis 2. It is assumed that the implementation of ICT in the teaching process allows teachers to deliver more interesting lessons and improve the quality of teaching.

Hypothesis 3. It is assumed that teachers in the course of their educational work do not come across obstacles in using ICT in education.

For the purpose of this paper, a descriptive research method was used. To measure the degree of ICT use, teachers were provided with a five-point scale. Data on advantages and obstacles to using ICT in teaching were collected by designing a Likert-type scale with the list of ten statements related to the advantages of ICT implementation in the classroom and the list of nine statements regarding the obstacles to ICT use in teaching.

The study was conducted in the period from January to March 2022. The basic cohort of this study comprised 269 teachers from primary schools in the Republic of Serbia. The sample was that of a stratified simple random nature.

Statistical tests and parameters

The data were analyzed with the SPSS statistical package (IBM SPS Statistics Version 20). The study was based on a descriptive research methodology. Surveying and scaling techniques were used to measure the attitudes of teachers. All values skewness are a negative sign that indicates that most respondents achieved more than an arithmetic mean. This also shows the values of kurtosis. As a measure of vertical deviation from the normal distribution, in this case, it is found that the respondents mostly agree with each other that Clarity, Suitability and Innovation of Contents ($Ku = 6,76$) the real characteristic of effective teaching. Ultimately, the Kolmogorov-Smyrna test values were applied to check that the normal distribution of scores is or our split scores deviate from the normal ones. All obtained values are statistically significant at the level of 0.01 which indicates that the distribution does not deviate from normal distribution.

Two characteristics according to which the respondents have a different opinion, such as: Students do all their activities, including homework, at school ($M = 3,09$). Very high arithmetic mean ($M = 47,71$), high value of fashion as the most common individual result ($Mod = 48,00$), negative skewness ($Sk = 0,68$) and χ^2 square ($\chi^2 = 2,87$) which is statistically significant at the level of 0.01 only further confirm the previous findings. All arithmetic values exceed 4.00 in the range of 1-5. For every 16 features of the effective school, the arithmetic values are 3.00 and they are close to $M - 4,00$ and slightly exceed this mean ($M - 4,00$) and approach the optimal values in the range of 1-5 scale.

Results

Attitudes of teachers regarding the degree of ICT use in teaching

To measure the degree of ICT use, teachers were provided with a five-point scale. Teachers answered separate questions on how often they use ICT in the classroom as per the following scale: I never use ICT in teaching, I rarely use ICT in teaching, I use ICT in teaching to an average extent, I often use ICT in teaching, I always use ICT in teaching. The obtained results are shown in Table 1.

Table 1
Intensity of attitudes regarding ICT use in teaching

Degree of use	Scale value	no.	%
I never use ICT in teaching	up to 1.5	0	0.00
I rarely use ICT in teaching	from 1.6 to 2.5	15	5.10
I use ICT in teaching to an average extent	from 2.6 to 3.5	51	22.46
I often use ICT in teaching	from 3.6 to 4.5	129	43.88
I always use ICT in teaching	from 4.6 to 5.0	74	28.57

Attitudes of teachers regarding the advantages of ICT use in teaching

Table 2 shows the list of advantages the use of ICT in the classroom offers. It can be seen that mean scores for each statement were moved towards the higher end of the 1 to 5 scale. All the mean values are far closer to the top end (5) than the bottom value (1).

Table 2
Advantages of ICT use in the teaching

Statements	M	SD	Sk	Ku	t	p	χ^2
Improving the quality of teaching	4.15	3.03	-8.79	82.72	0.48	0.63	199.42
Possibility to deliver more interesting lessons	4.05	0.89	-0.53	-0.65	-0.99	0.33	53.92
Quick and easy access to information	4.04	0.83	-0.49	-0.43	1.61	0.11	67.07
With the use of ICT, teaching contents are more accessible and of better quality	3.99	0.91	-0.55	-0.46	-1.26	0.21	50.51
Flexibility in time and space	3.95	0.89	-0.39	-0.58	-2.00	0.05	47.93
Enhancing students' motivation	3.91	1.04	-0.79	-0.10	-1.45	0.15	91.80
Easy way to exchange information	3.91	0.80	-0.32	-0.43	-1.98	0.05	74.47
Improving concentration and attention in class	3.88	0.94	-0.99	0.81	-1.74	0.08	161.40
Exchanging experience with other teachers	3.74	0.97	-0.20	-0.98	-1.77	0.08	22.88
Simpler correlation between teaching content	3.70	0.88	-0.36	-0.51	-3.09	0.00	59.52

Attitudes regarding the obstacles to ICT use in teaching

Table 3 shows the attitudes of teachers regarding the obstacles they come across in teaching when using ICT. In this table, like in the one above, the mean score values were moved toward the higher end of the 1 to 5 scale for each statement. All the mean values are far closer to the top end (5) than the bottom value (1). The results indicate that all the deviations of the χ^2 test are statistically significant at the level of 0.01. Such interpretation is backed up by negative and minimum skewness values.

Table 3
Obstacles to using ICT in teaching

Statements	M	SD	Sk	Ku	t	p	χ^2
Underdeveloped teachers' competencies	4.04	0.81	-0.43	-0.48	-0.21	0.84	72.46
Limited access to ICT in schools	3.91	0.82	-0.50	-0.13	0.79	0.43	82.00
Insufficient trust in the use of new technologies	3.91	0.82	-0.07	-1.00	-2.72	0.01	61.10
Lack of adequate technical conditions	3.90	0.78	-0.21	-0.54	1.06	0.29	78.33
Technological complexity	3.88	0.83	-0.40	-0.35	-2.14	0.03	68.91
Insufficient time	3.81	0.89	-0.31	-0.67	-0.93	0.36	44.08
Inadequate knowledge of English	3.76	0.85	-0.55	0.52	-3.13	0.00	228.75
Low motivation	3.75	0.92	-0.43	-0.21	-2.61	0.01	103.23
Teachers' inclination to traditional teaching	3.60	0.91	-0.51	-0.22	-3.55	0.00	131.88

Discussion

The purpose of this study was to establish the attitudes and the opinions of respondents regarding the degree of ICT use in the classroom and determine the advantages offered by ICT and obstacles teachers encounter in the implementation of ICT in the teaching process.

In Table 1 we see the analysis of the results distributed in such a way shows that teachers most often rate the use of ICT as above-average, i.e. very good or excellent, as reported by most teachers, which confirms the hypothesis assuming the respondents use ICT in the classroom to a high degree.

It can be seen that 43.88% of teachers reported “they often use ICT in teaching”, 28,57% of teachers reported always using ICT in teaching (Balanskat and Blamire, 2007; Ramboll Management, 2004; Vard and Parr, 2010; Džigurski et al., 2013; Braš Roth, Markočić-Dekanić and Ružić, 2014; Stošić and Stošić, 2015). The implementation of ICT in education is necessary for modern establishment. Traditional forms of teaching that do not use ICT are not interesting to students. Teachers find it difficult to match students. A contemporary sequel that focuses on active student learning with the use of modern technology offers countless opportunities for learning and increasing student motivation.

Only 22.46% of teachers reported they used ICT in teaching to an average extent, whereas 5.10% of teachers reported they hardly ever used ICT in teaching. On the other hand, the obtained results show that not a single teacher rated the degree of ICT use as “I never use ICT in teaching”. The obtained results demonstrate that general attitudes of teachers towards the use of ICT in the classroom are not distributed per normal distribution, but vary significantly, as it is evident that there is a much higher number of teachers with positive attitudes than those with undecided or negative attitudes.

From Table 2 it can be seen that the use of ICT in the classroom contributes to the improved teaching quality (Scherer and Hatlevik, 2017) for most with $M=4.15$. Provides the possibility to deliver more interesting lessons and offers quick and easy access to information with $M=4.05$ and $M=4.04$ respectively, as perceived by teachers and confirmed by the study conducted by (Džigurski et al., 2013; Al-Ansi et al., 2021; Thaheem et al., 2021), who highlighted as key advantages of ICT use the delivery of higher quality lessons and quick access to information. This confirms the hypothesis that the implementation of ICT in the teaching process allows teachers to deliver more interesting lessons and improve the quality of teaching.

Respondents agree that the transformation of traditional school environment is irreversible and that the teaching concept hitherto based on textbooks and workbooks is no longer sufficient to attract and keep the attention of generations of students growing up in a multimedia environment. Therefore, teachers using ICT testify from experience that lessons delivered in this way result in a better focus of students on the material, encourage creativity, engage and develop an inquisitive mind. Furthermore, if used to its full potential, in an illustrative and interactive way, technology achieves a closer humane relationship between a teacher and a student (Džigurski et al., 2013, p. 47). In the last place on the list of advantages of the use of ICT in the classroom teachers put the exchange of experience with other teachers with $M=3.74$ and a simpler correlation between teaching materials with $M=3.70$. Materials they create themselves in electronic form and share online become more visible and contribute to both exchanging experiences with other teachers and a better positioning of teachers in a wider professional community. Additional motivation with the students causes when they prepare their own presentations because they care to do it well and get more praise on the analysis of the done.

In Table 3 we see the what most teachers $M=4.04$ see as the obstacle to successful use of ICT are underdeveloped competencies in teachers for the use of ICT in the classroom, as confirmed by other studies (Ramboll Management, 2004; Balanskat and Blamire, 2007; Džigurski et al., 2013; Sipilä, 2014; Lindberg, Olofsson and Fransson, 2016; Agrawal and Mittal, 2018). ‘Methodological training of teachers on the use of ICT in the classroom is of utmost importance’ (Stamoulis and Plakitsi, 2009, p.349). In Europe, depending on the country and the school type, there are different levels of teacher competence for the use of ICT in the classroom. In primary schools a significantly lower competence level was established with only 30% in possession of necessary skills, as opposed to 46% and 47% in secondary and vocational schools (Korte and Hüsing, 2006). The use of ICT in education is of key importance when it comes to modernizing the teaching process that involves more efficient, economical and effective teaching. For some teachers insufficient time is the problem (Legrain et al., 2015; Villalba, González-Rivera and Díaz-Pulido, 2017). ICT-assisted delivery of lessons requires a lot more time to find appropriate digital resources for teaching and learning.

Research shows that despite increased access to information and communication technologies, their potential advantages for learning and their ability to enhance or transform teaching and learning, teachers rarely use computers in the classroom, and if they do, they mostly use them at a basic (traditional) level

(Wachira and Keengwe, 2011; Barak, 2014). According to Kadjevich, the main reason for this should be sought in the fact that teachers lack sophisticated knowledge to support efficient integration of information and communication technologies (acc. to Milutinovic, 2016).

Insufficient trust in the use of new technologies (Hixon and So, 2009; Almekhlafi and Almeqdadi, 2010) with $M = 3.90$, it is caused by fear of mastering these technologies, given the high digital competence of the students themselves.

Limited access to ICT in schools, lack of adequate technical conditions and technological complexity found their place in the next group of obstacles and in the research that has been conducted (Machin, McNally and Silva, 2006; Balanskat and Blamire, 2007; Wastiau et al. 2013; Vrasidas, 2015) with $M=3.91$ and $M=3.88$, respectively. Teachers encounter difficulties and make a lot of effort (Linberg, Olofsson and Fransson, 2016) in the attempt to keep up with technological developments while keeping pace with the demands posed by teaching and students. Teachers do not feel confident about using the methodologies they have not mastered themselves. Moreover, most teachers lack knowledge of the English language, and computer programmes are poorly translated into Serbian or come with inadequate explanations. In addition, there are not enough appropriate training programmes that deal with practical use of technology in the teaching of certain subjects. Recent studies focusing on adopting ICT in education found that technological complexity has a significant direct impact on the attitudes regarding the use of computers (Teo, Milutinović and Zhou, 2016). A lack of motivation (Lane and Lyle, 2011) is mainly caused by the lack of continuous technical and methodological-didactic support in schools necessary for the adequate application of ICT in teaching. The lack of motivation is more noticeable with older teaching staff. Younger teaching staff, because of the much greater use of ICT outside of school, are also more motivated to teach using new technologies.

Respondents put Teachers' Inclination to Traditional Teaching in the last place on the list of obstacles with $M=3.60$. Things that are familiar and safe come much easier as does the sticking to the traditional way of teaching, which is simpler than embracing the challenge posed by the use of ICT in teaching. The hypothesis assuming that teachers encounter obstacles in the course of education when using ICT in the classroom was not confirmed as the list of obstacles faced by teachers during ICT use was identified.

The first research conducted online that included 27 countries was the research on the ICT use in the classroom carried out by the European Commission (2013) called "Survey of Schools: ICT in Education, Benchmarking access, use and attitudes to technology in Europe's schools", in the academic year of 2011/2012. Results indicate that teachers are not sufficiently informed about all the possibilities of ICT use in education, and hence they do not wish to engage in using something they are not familiar with.

Conclusion

Positive outcomes of informatizing the teaching process should result in intellectual efforts, the development of logical, prediction and operational thinking; specialization of cognitive processes; formation of specialized content motivation appropriate for computers in order to solve student's tasks; increased trust in computerized world; individualized teaching.

With this research, we wanted to point out the attitudes and the opinions of respondents regarding the degree of ICT use in the classroom and determine the advantages offered by ICT and obstacles teachers encounter in the implementation of ICT in the teaching process. establish the attitudes and the opinions of respondents regarding the degree of ICT use in the classroom and determine the advantages offered by ICT and obstacles teachers encounter in the implementation of ICT in the teaching process. When making recommendations, we started from the assumption underdeveloped competencies of teachers, limited access to ICT in schools and insufficient trust in the use of new technologies.

Gaining information professional competencies by future teachers will depend mostly on information literacy that they should have acquired in the course of their secondary education. Therefore, it is necessary to include information technology in the education content as much as possible. Education based on such technologies expands the area of cognitive tasks, allows for the transition to systematic management of the teaching activity, changes its structure and dynamics. In order to achieve this, operational and technical aspects of education need to be rearranged, spatial and time limits of their mutual action changed, and a self-regulation system created for working with information technology.

The contribution of this work is to point out the advantages and obstacles of using ICT in teaching as well as the possibility of their application or modification. Research can be the basis for further improvement of this topic "ICT needs to be integrated into education" (Hu et al., 2018).

This study provides educational policy makers looking at ICT integration in education with several

implications. Teachers' responses provide researchers with an account of the gaps that must be addressed in the implementation of ICT in education and the main drivers for the application of this technology in teaching. To increase the intensity of ICT use, it is necessary for teachers to: 1. Provide seminars and workshops for teachers to acquire digital competencies. 2. Provide better technical support and equipment in schools. 3. Intensify the use of ICT in teaching more intensively. 3. Form teams to advance the role of ICT at school level. 4. Introduce the obligation to train teachers for using ICT.

One of the limitations in this research is the school equipment, which is very different and varies with the profile and size of the school, the level of economic development of the municipality in which it is located. It is necessary, on a planned and on the basis of needs analysis, to invest in the provision of equipment (The National Education Council, 2013, p.105). In addition, most teachers lack English language skills, and computer programs in Serbian have poor translation and poor explanations. Also, there are not enough adequate trainings dealing with the practical application of technology in teaching specific subjects.

The acquisition of knowledge and skills in the ICT area is one of the preconditions for social involvement in the modern society. ICT needs to be integrated into the educational system in order to achieve good quality education for everyone. Previous practical experiences, pedagogical and especially psychological results, show that, apart from wider and narrower social factors, characteristics of teachers significantly influence the introduction of ICT in schools. Namely, there is no doubt that the teachers' attitudes and opinions, as a very important characteristic of each one of them, more or less have an effect on their behavior at school and readiness to make an effort to introduce ICT and modernize the teaching process. Therefore, teachers' attitudes on the introduction of ICT in teaching is a very important question because it significantly influences the efficiency of the work at school.

Conflict of interest

Authors declare no conflict of interest

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