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ORIGINAL SCIENTIFIC PAPER

Use of Information Technologies in Educational Purposes – Case from Serbia

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ABSTRACT

Secondary education in developing countries is largely based on obsolete teaching methods and technologies. The aim of this paper is to analyze the use and preferences of mobile technologies for the needs of education among the high school population, with special emphasis on social media. The paper presents researches conducted in 2016 and 2020 in one high school, based on the analysis of questionnaires on the practice and preferences of using mobile technologies and social media for educational purposes. Results obtained show that the advantages of mobile learning in high school practice are still not sufficiently utilized, since students rarely use the Internet on mobile phones or tablets to acquire new knowledge or information in the educational process. It is noticeable that the trends in the use of information technology in domestic high schools are at approximately the same level as in other countries, as well as that there is room for improving the application of modern information technology in education process. The results of the research are important for future studies, since this was conducted on a sample of high school of economic students, and the possibilities of applying this method of work on different educational profiles arises.

Key words: *information technology, digital media; e-learning; mobile learning; high school education*

JEL Classification: A21

INTRODUCTION

Mobile technologies and social media have become an integral part of the lives of a large part of the world's population (Adel, Thomas, & Ludovic, 2011; European Commission, 2014; Tomić, 2015). Historically, mobile technologies and social media were originally used for entertainment, personal needs and direct communication (Traxler, 2007; Radenković, Despotović-Zrakić, Labus, & Vulić, 2011). Over time, these technologies have gained greater application in business communication and collaboration (Domazet, Zubović, & Lazić, 2018; Pavlović, Vukmirović, & Domazet, 2020). Today, the trend of using these tools in teaching is more and more present, as well as the growing interest of the academic community and the growth of the number of various researches related to these topics (Al-Bahrani & Patel, 2015; Petrović, Stojanović, & Labus, 2018; Domazet & Simović, 2020). The basic idea is to reach a level where mobile devices and applications are not considered a problem in the education process, but as a tool available to lecturers to improve educational practice (Stojanović, Bogdanović, Petrović, Mitrović, & Labus, 2020; Petrović, Jezdović, Stojanović, Bogdanović, & Despotović-Zrakić, 2017).

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The use of mobile technologies and social media allows the combination and integration of several levels of learning processes that have been observed so far:

- There are changes in the time and place of learning - learning is no longer just a desk or classroom, learning can be continuous, in any place with the Internet access (Sølvberg & Rismark, 2012);
- There is a combination of formal and non-formal learning and a combination of individual and learning with others (Wong & Looi, 2011);
- The combination and perception of knowledge from different teaching areas in practice is enabled.

Having in mind the specifics of the Serbian educational system, which, above all, must be harmonized with world trends, the assumption is that there is room for inclusion of communication and exchange of knowledge through social media in secondary education, especially in vocational high schools, and within them with scientific areas, which are characterized by dynamic development.

For the purposes of this paper, two studies on the practice and preferences of the use of mobile technologies and social media by high school of economics students were conducted, based on similar researches in other school systems. The idea was to identify similarities and differences with experiences from other countries based on the obtained results, and to spot the space for most effective improvement of practice in terms of using these technologies in the education process.

This is supported by the EU Kids Online report (Smahel et al., 2020), a survey conducted on a nationally representative sample in 19 European countries (including Serbia). The aim of the research was to gather information on the use of the Internet and digital technologies by children and young people. In addition to the results of research in other countries, this report presents the most important results of research that was conducted in Serbia in the period autumn 2017 - summer 2019. A random, stratified sample, representative of the school population of children aged 9-17, was used. The criteria used for the sampling strategy, which ensured the representativeness of the sample of this research, were: the age of the child, the gender of the child, region and urban/rural area. The research covered a large number of topics in the field of digital media use among children and youth. Some of the topics are: access to and use of the Internet and digital technologies, digital skills and technologies, risks (digital violence, exposure to harmful content) and opportunities on the Internet, social context (mediation by adults and peers in the use of digital devices and the Internet).

LITERATURE REVIEW

Academic research on the use of mobile devices and social media in the field of education has been intensified since 2005, with the student population being analyzed most often, followed by primary and secondary school students. The most frequently analyzed social media used in the education process are *Facebook*, blogs, *Twitter* and *Instagram* (Tess, 2013*;* Czarkowska, Gumkowska, & Gumkowska, 2017). The first research was conducted on the territory of developed western EU countries, where mobile technologies first came to life. In comparison to the survey conducted on the territory of Great Britain (Blair, Millard, & Woollard, 2014), students in Serbia use *Facebook* less than their British counterparts, and incomparably more *the Instagram*. Recent researches are increasingly covering areas of developing societies, such as African countries. In addition to the analysis on the practice and efficiency of the implementation of the education process through mobile technologies and social media, a large number of researches included the development of special applications for specific educational needs on the analyzed sample. (Petrović, Stojanović, & Labus, 2018; Bogdanović, Barać, Jovanić, Popović, & Radenković, 2014). The ultimate goal of application of individual studies usually identified in the improvement of the entire state education system, after synchronized education of lecturers,

improving access to the Internet and mobile technologies and motivating students to use modern technologies for the purpose of acquiring and exchanging knowledge and learning about curricula and activities. (Zollo, 2019; Stojanović, Bogdanović, Despotović-Zrakić, Naumović, & Radenković, 2019; Stojanović et al., 2020).

The largest number of studies on the use of mobile technologies in the field of education, conducted so far, has shown that these devices have a positive effect on learning efficiency in high schools and colleges. (Petrović, Stojanović, Labus, Bogdanović, & Despotović-Zrakić, 2017; Karabatzaki et al., 2018).

Studies have also shown that pupils and students are using modern technologies in the field of education and learning the least, although they state that they are very open to the future application of these technologies in learning. When we talk about the ways in which pupils and students use mobile technologies in the field of education, previous academic studies have shown that they exchange, combine and create new Internet content (Halder, Halder, & Guha, 2015). The Internet also enables joint work on solving problems set by lecturers. In addition to the process of learning and knowledge exchange, mobile technologies can be used for the needs of easier and more efficient organization of teaching activities and communication between teachers and students (Stojanović et al., 2019). The increase in the intensity of the use of modern technologies in the field of education comes with the greater engagement of lecturers and their inclusion on social media, which are already used by students (Labus, Despotović-Zrakić, Radenković, Bogdanović, & Radenković, 2015). Social media has proven particularly effective in specific vocational schools, such as ICT schools, language learning schools or medical schools. (Hajli, Bugshan, Lin, & Featherman, 2013; Khalitova & Gimaletdinova, 2016).

Although mobile technologies and social media offer great benefits in the field of education, primarily because it is assumed that students are already familiar with these communication tools and do not hesitate to accept and use them (Stojanović et al., 2019; Domazet, Simović & Lazić 2014), certain studies have shown that sometimes there is aversion to use these learning technologies by pupils and students, due to the desire to isolate private and "student" life and the fear of being overloaded with always available and practically endless contents (Jones, Blackey, Fitzgibbon, & Chew, 2010; Michailidis, Kapravelos, & Tsiatsos, 2019).

Nevertheless, a large number of lecturers, but also the wider community, are wary of using modern technologies for educational purposes. They are apprehensive about various types of abuse, cheating in the learning process and other psychological, pedagogical and social consequences, which use of these technologies, and connecting teachers and students through social media, could bring (Ertmer, 2005; Asterhan & Rosenberg, 2015).

An additional precondition for the efficient use of mobile technologies in education is the adequate supply of secondary schools with modern equipment and technology. In addition, continuous theoretical and practical education of teachers is necessary, so that they would be the first to understand and accept the role of mobile devices, the Internet and social media in the teaching process, and then to convey this to students (Mannila et al., 2018; Ministry of Education Sciences and Technological Development, 2017).

METHODOLOGY AND RESULTS

In order to analyze the use of mobile technologies, and especially social media among the high school population in Serbia, two surveys were conducted at the School of Economics in Belgrade. In the period February-March 2016, the first research on the practice and preferences of using mobile technologies and social media was conducted among high school students. In order to get the data up to date and to overcome the time distance of four years, the research with the students of the same school was repeated in the period February-March 2020. On that occasion, an identical questionnaire was used as a research instrument as for the survey conducted in 2016. Likewise, the sample was structured in the same way as in 2016 and the survey was

conducted in the identical period of the year (February-March) to ensure full comparability of the obtained results.

The aim of the survey was to determine the current state of application of mobile technologies and social media in education. Students' opinions on the possibilities of improving the teaching process in secondary vocational education by introducing mobile technologies and social media that would make the learning process more efficient and attractive were also included in this survey. The first results of the research were published in 2016 (Stojanović, Bogdanović, & Nedeljković, 2016).

Before creating the questionnaire, previously conducted researches on similar topics in other school systems were analyzed in detail (Bogdanović et al., 2014; Kuzmanović, Pavlović, Popadić, & Milosevic, 2019). The questionnaire, which was used in this research, was designed to enable a comprehensive analysis of the use of mobile technologies among high school students. It consisted of three parts.

In the first part of the questionnaire, students were offered answers where by circling one or more offered answers, the student would have the opportunity to express their opinion. In the second part, the students had the opportunity to express their position on some of the offered claims. Likert's five-point answer scale was used here, where students could choose one of the five options offered: 5 - Always, 4 - Often, 3 - Sometimes, 2 - Rarely, 1 -Never. The third part of the questionnaire contains open-ended questions, where students had the opportunity to give their opinion, as well as recommendations, suggestions or critics.

A total of thirty questions were asked, grouped as follows:

a) Mobile phones - number of mobile phones, frequency and purpose of use;
b) Internet on a mobile phone - time and place of use, frequency, purpose and manner of use for acquiring new knowledge, information and educational purposes;
c) Use of social media via mobile phones;
d) Tablet devices - frequency of use;
e) Internet on tablet devices - purpose and manner of use for acquiring new knowledge, information and educational purposes;
f) The role of professors in encouraging the use of mobile phones for educational purposes;
g) Student suggestions for greater use of mobile phones for educational purposes.

The research was attended by 170 students with very good or excellent success of the third and fourth grade of the high school of economics within the section "Economics and Entrepreneurship". All respondents were between 17 and 19 years old, of whom 35.1% were male and 64.9% female students. The students voluntarily agreed to contribute to this research

Based on the obtained results, similarities and differences with experiences from other countries can be identified and space for future more efficient improvement of the practice of using these technologies in the educational process can be defined. The research was done on the basis of a questionnaire on the use of mobile phones and social media for educational purposes.

Results

The results of a survey conducted in 2016 showed that high school students use mobile devices intensively, so that out of the total number of respondents, 94.59% of them use a mobile phone several times during the day, while the remaining 5.41% use this device once a day, which means the questionnaire contained high-ranking answers. None of the respondents answered the offered options: sometimes, rarely and never. While the results for answering the same

question in 2020 showed that almost all students, 97.30% of them use a mobile phone several times during the day, and only 2.70% use a mobile device once a day.

Similar to most other countries today, students use mobile devices primarily to access the Internet, with 75.68% of respondents, while the remaining respondents use mobile devices to make phone calls, write messages, listen to music, play video games and other purposes. It is interesting that the results of the research conducted in 2016 and 2020 gave identical results, expressed in percentages, in terms of using the Internet, playing video games and listening to music. The difference occurred when using a mobile phone for making phone calls and writing messages, where the percentage of usage decreased.

When it comes to social media and tools for communication via mobile phones based on the Internet, a survey conducted in 2016 showed that high school students use Instagram the most (37.84%), while the use of other tools is uniform, with an obvious lack of Skype communication service practice. The results of the survey conducted in 2020 showed a slightly different structure (Figure 1).

In Figure 1, it can be seen that students, in 2020, stated that Facebook and WhatsApp are used much less, while search, Viber and Skype service are not used by anyone. The frequency of using the Instagram application increased from 37.84% in 2016 to 72.97% in 2020. The same is the case with the use of the *YouTube* service, which students use in a higher percentage in 2020 (21.62%), compared to its use in 2016, when it was 13.51%.

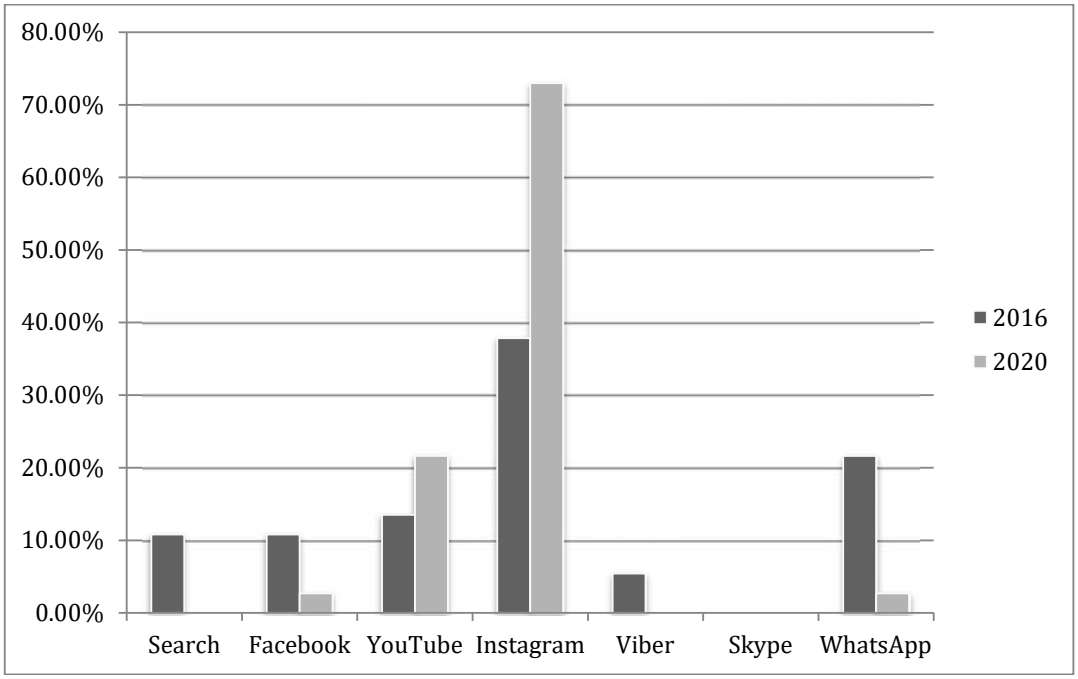

Figure 1. Frequency of using different applications via mobile phone

Source: Authors' survey

The results of the conducted researches in 2016 and 2020 showed certain minor differences in the answer to the question where students use the Internet on their mobile phones the most. In 2016, 78.38% of respondents said that students most often use mobile phones at home, while in 2020 that number slightly decreased, so the number of respondents who use the Internet on mobile phone at home was 72.97%, while some respondents opted for the option "Other" (16.22%). Respondents also stated that they use them the most in the afternoon and evening.

While in 2016 the results of the survey showed that 72.97%, of respondents used Internet on their mobile phones in that time of the day, in 2020, that number increased to 83.78%.

Students who participated in the research in 2016 stated that they rarely use tablet devices, i.e. 67.57% of respondents said that they never use tablet devices, while 13.51% of them use tablets once or twice a week. The results of the survey from 2020 showed that the respondents stated that they never or rarely use tablet devices (91.89%). Answering this question, a large percentage (40.54%) said that they did not have a tablet device.

In contrast to the observed practice with mobile phones, where Instagram is the most frequently used application, the answers on use of tablets obtained in 2016 show that students use these devices for "other" purposes (50%), while the second frequency - 25%, was recorded in the use of tablets for games and listening to music. The results of the survey conducted in 2020 show a slightly different structure. Out of a total of 220 students who declared that they have a tablet, 40.91% use these devices for YouTube, which increased compared to 2016, when it was 15%. What has also changed regarding the answers to this question is the reduction of the number of answers for "other" purposes to 27.27%.

The conducted research showed that students largely use mobile phones for information purposes. In 2016, approximately 60% of respondents said that they were informed about various topics via mobile phone at least once a day, while in 2020 that number decreased to 45%. The number of respondents in 2016 stated that they use a mobile phone for these needs 4-5 times a week in a percentage of 24.32%, while in 2020 the percentage increased to 32.43%.

When it comes to the areas that students are most interested in via mobile phones, the structure of the obtained answers is shown in Table 1.

Table 1. Frequency of using mobile devices for information on different topics

Field	Device type Year 2016		Device type Year 2020	
	Phone	Tablet	Phone	Tablet
Politics	2.70%	5.26%	0.00%	0.00%
Economy	0.00%	0.00%	0.00%	4.55%
Black Chronicle	2.70%	5.26%	0.00%	0.00%
Sports	21.62%	0.00%	18.92%	9.09%
Culture and art	0.00%	0.00%	5.41%	4.55%
General information	27.03%	21.05%	32.43%	18.18%
Fun	45.95%	68.42%	43.24%	63.64%

Source: Authors' survey

In a survey conducted in 2016, the results showed that respondents, using the Internet on a mobile phone, acquire new knowledge during learning through professional sites (51.43%), then through popular sites such as Wikipedia (31.43%) and through social media (17.14%). The results of the 2020 questionnaire show a different structure. Wikipedia is used in an extremely high percentage (70.27%), followed by professional sites (21.62%) and finally social media (8.11%).

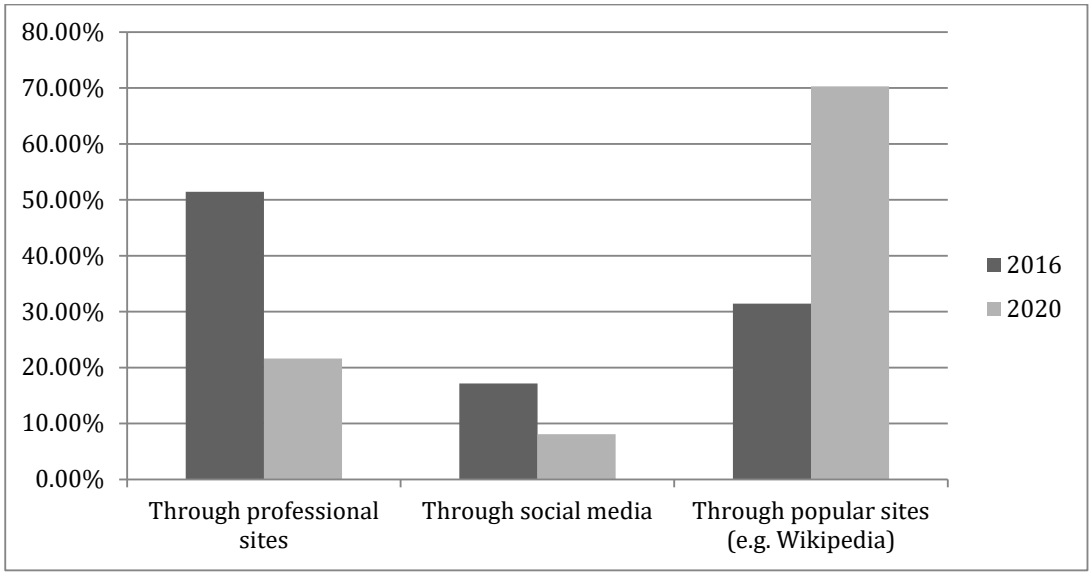

Figure 2. Using the Internet on a mobile phone to acquire new knowledge
Source: Authors' survey

The results, detailed in Table 2, show that students who participated in the research rarely use the Internet on mobile phones or tablets to gain new knowledge while learning about the curriculum and to be informed about school activities. The obtained results also confirm that the frequency of using social media for these purposes is even rarer. These results are similar to the results obtained in other surveys on this topic.

Table 2: Frequency of using mobile devices to acquire new knowledge

Using the Internet to obtain information about school activities	**Device type Year 2016**		**Device type Year 2020**	
	Phone	**Tablet**	**Phone**	**Tablet**
Little use (once a week) or not at all	59.46%	96.15%	48,65%	86,96%
Using social media to obtain information related to school activities	**Device type**		**Device type**	
	Phone	**Tablet**	**Phone**	**Tablet**
Constantly (several times a day)	5.41%	4.00%	16.22%	0.00%
Little use (once a week) or not at all	48.65%	92.00%	45.94%	86.96%
Using social media to acquire new knowledge and information about the school curriculum	**Device type**			
	Phone			
Constantly (several times a day)	8.11%		5.41%	
Little use (once a week) or not at all	67.57%		54.06%	

Source: Authors' survey

When it comes to communication between students and teachers at school, a survey conducted in 2016 showed that it takes place via *e-mail* (58.33%), SMS (22.22%) and mobile phones when making phone calls (5.56%). The analysis of the results of the research conducted in 2020 showed that students largely use *WhatsApp* (44.44%) in communication with teachers. The results additionally show that the participation of the Viber application has increased compared to 2016, as well as that students continue to use e-mail to a certain extent (22.22%), although the participation of this service has significantly decreased compared to 2016. Students use *e-mail*, to communicate with teachers, when they participate in the development of various

projects, seminar papers and other forms of work that require the sending of certain materials of various formats. When it comes to work and communication with teachers and other students that do not require the use of written materials on a larger scale, students prefer to use *WhatsApp* and *Viber* applications.

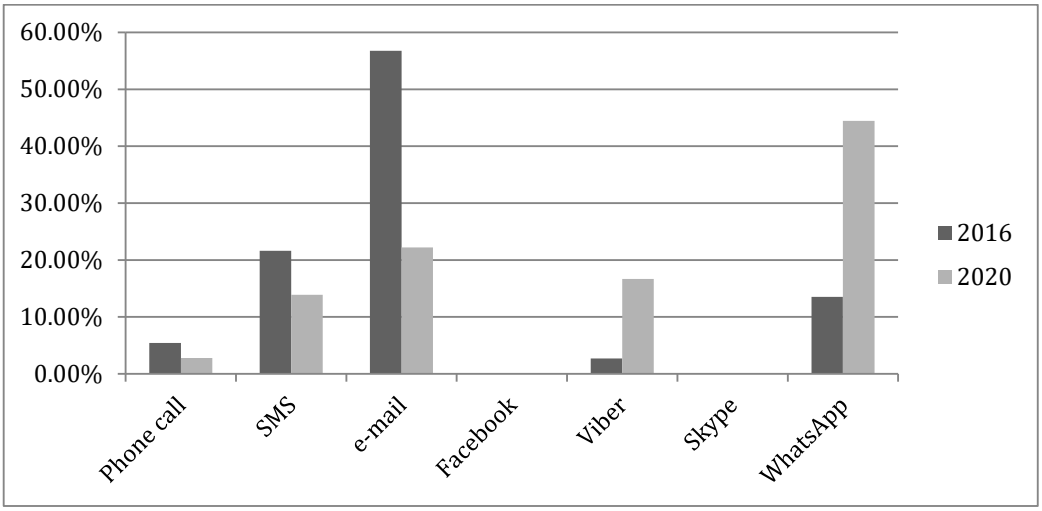

Figure 3. The way of communication with teachers at school

Source: Authors' survey

Of the 170 students who filled out the questionnaire on the use of mobile phones and social media for educational purposes, in 2016 and 2020, none stated that they communicate with school teachers via *Skype* or *Facebook*, although these Internet communication channels have very wide application and possibilities.

Researches have shown that the practice of using mobile technologies and social media among high school students is at approximately the same level as in other education systems where similar surveys have been conducted (Kuzmanović et al., 2019).

CONCLUSION

Teaching activities based on "blackboard and chalk" cannot provide students with enough new knowledge that they need for further education and professional work. The importance of the application of mobile technologies in education is great in terms of providing opportunities for quality education. On the other hand, social media, due to its wide distribution and comprehensive application, is one of the fastest forms of exchange of information, experiences and knowledge, which can significantly contribute to the improvement of secondary education.

The obtained results confirm the assumption that there is room for improving the application of modern information technologies in the domestic educational system. Having in mind the experiences from other countries, it can be assumed that students would be more interested and motivated for this type of pedagogical-educational innovation if lecturers would encourage the use of mobile devices, internet and social media for teaching and learning purposes. It is quite certain that the educational process in high schools would therefore be significantly improved and raised to a much higher level, and students would get a up-to-date and more efficient education system suitable for modern technological development.

New methodological approaches to teaching in secondary schools, based on modern information technologies, can contribute to better vertical integration of the entire educational process, which in addition to secondary and higher education, includes the labor market. In

addition, new technologies and methods of distance learning are an important instrument of education in conditions of various emergencies and crisis situations when circumstances do not allow the continuous performance of traditional, face-to-face teaching. The application of modern technologies in education and distance learning models can provide high quality and continuity of learning in specific, irregular circumstances and should be developed in such a way that decision and policy makers accept distance learning models as solutions to ensure continuity of education.

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REFERENCES

Adel, B. Y., Thomas, L., & Ludovic, R. (2011). Bridging the Learning Gap in the Market for Higher Education : E - learning and Public Subsidies. *Economic Analysis*, *45*(3–4), 1–11.

Al-Bahrani, A., & Patel, D. (2015). Incorporating Twitter, Instagram, and Facebook in economics classrooms. *Journal of Economic Education*, *46*(1), 56–67. https://doi.org/10.1080/00220485.2014.978922

Asterhan, C. S., & Rosenberg, H. (2015). The promise, reality and dilemmas of secondary school teacher–student interactions in Facebook: The teacher perspective. *Computers & Education*, *85*, 134–148. https://doi.org/10.1016/J.COMPEDU.2015.02.003

Blair, R., Millard, D., & Woollard, J. (2014). Perceptions of school children of using social media for learning. In *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 227–237).

Bogdanović, Z., Barać, D., Jovanić, B., Popović, S., & Radenković, B. (2014). Evaluation of mobile assessment in a learning management system. *British Journal of Educational Technology*, *45*(2), 231–244. https://doi.org/10.1111/bjet.12015

Czarkowska, M., Gumkowska, A., & Gumkowska, A. (2017). Facebook, Twitter, Instagram, Pinterest – nowe perspektywy badawcze. *Adeptus*, *0*(10). https://doi.org/10.11649/a.1519

Domazet, I., & Simović, V. (2020). The use of Google Analytics for measuring website performance of non-formal education institution. *In Handbook of Research on Social and Organizational Dynamics in the Digital Era*, 483–498.

Domazet, I., Zubović, J., & Lazić, M. (2018). Driving factors of Serbian competitiveness: Digital economy and ICT. *Strategic Management*, *23*(2), 20–28. https://doi.org/10.5937/straman1801020d

Domazet I, Lazić M, Simović V. (2014) Mogućnosti i pretpostavke za razvoj IKT industrije u Srbiji, In: Drašković B. (Ed.) „Deindustrijalizacija u Srbiji: mogućnost revitalizacije industrijskog sektora". Institute of Economic Sciences, Belgrade, pp. 619-637.

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development*, Vol. 53, pp. 25–39. https://doi.org/10.1007/BF02504683

European Commission. (2014). Digital Agenda for Europe - Rebooting Europe's economy. In *European Commission*. https://doi.org/10.2775/70618

Hajli, M., Bugshan, H., Lin, X., & Featherman, M. (2013). From e-learning to social learning – a health care study. *European Journal of Training and Development*, *37*(9), 851–863. https://doi.org/10.1108/EJTD-10-2012-0062

Halder, I., Halder, S., & Guha, A. (2015). Undergraduate students use of mobile phones: Exploring use of advanced technological aids for educational purpose. *Journal of Media and Communication Studies*, *7*(4), 81–87. https://doi.org/10.5897/JMCS2014.0418

Jones, N., Blackey, H., Fitzgibbon, K., & Chew, E. (2010). Get out of MySpace! *Computers & Education*, *54*(3), 776–782. https://doi.org/10.1016/J.COMPEDU.2009.07.008

Karabatzaki, Z., Stathopoulou, A., Kokkalia, G., Dimitriou, E., Loukeri, P. I., Economou, A., & Drigas, A. (2018). Mobile Application Tools for Students in Secondary Education. An Evaluation Study. *International Journal of Interactive Mobile Technologies (IJIM)*, *12*(2), 142. https://doi.org/10.3991/ijim.v12i2.8158

Kesim, M., & Ozarslan, Y. (2012). Augmented Reality in Education: Current Technologies and the Potential for Education. *Procedia - Social and Behavioral Sciences*, *47*, 297–302. https://doi.org/10.1016/J.SBSPRO.2012.06.654

Khalitova, L., & Gimaletdinova, G. (2016). Mobile technologies in teaching English as a foreign language in higher education: a case study of using mobile application Instagram. *International Conference of Education, Research and Innovation*, 6155–6161. https://doi.org/10.21125/iceri.2016.0395

Kuzmanović, D., Pavlović, Z., Popadić, D., & Milosevic, T. (2019). Internet and Digital Technology Use among Children and Youth in Serbia: EU Kids Online Survey Results, 2018. In *Institute of Psychology, Faculty of Philosophy, Belgrade*.

Labus, A., Despotović-Zrakić, M., Radenković, B., Bogdanović, Z., & Radenković, M. (2015). Enhancing formal e-learning with edutainment on social networks. *Journal of Computer Assisted Learning*, *31*(6), 592–605. https://doi.org/10.1111/jcal.12108

Mannila, L., Nordén, L.-Å., & Pears, A. (2018). Digital Competence, Teacher Self-Efficacy and Training Needs. *Proceedings of the 2018 ACM Conference on International Computing Education Research - ICER '18*, 78–85. https://doi.org/10.1145/3230977.3230993

Michailidis, N., Kapravelos, E., & Tsiatsos, T. (2019). Examining the effect of interaction analysis on supporting students' motivation and learning strategies in online blog-based secondary education programming courses. *Interactive Learning Environments*, 1–12. https://doi.org/10.1080/10494820.2019.1678487

Ministry of Education Sciences and Technological Development. (2017). *Digital Competence Framework - Teacher for the digital age* (p. 24). Retrieved from http://www.mpn.gov.rs/wp-content/uploads/2015/08/Okvir-digitalnih-kompetencija.pdfPavlović, D., Vukmirović, V., & Domazet, I. (2020). Uticaj informaciono-komunikacionih tehnologija na tržište rada mladih. *XXVI Skup TRENDOVI RAZVOJA: "INOVACIJE U MODERNOM OBRAZOVANJU,"* 88–91.

Petrović, L., Jezdović, I., Stojanović, D., Bogdanović, Z., & Despotović-Zrakić, M. . (2017). Development of an educational game based on IoT. *International Journal of Electrical Engineering and Computing*, *1*(1), 36–45.

Petrović, L., Stojanović, D., & Labus, A. (2018). Development of an educational game: Augmented reality approach to edutainment. *In: XVI International Symposium Doing Business in the Digital Age: Challenges, Approaches and Solutions SymOrg 2018*, 96–107.

Petrović, L., Stojanović, D., Labus, A., Bogdanović, Z., & Despotović-Zrakić, M. (2017). Harnessing Edutainment in Higher Education: an Example of an IoT Based Game. *The 12th International Conference on Virtual Learning ICVL*, 318–324.

Radenković, B., Despotović-Zrakić, M., Labus, A., & Vulić, M. (2011). Enhancing e-education process with social networking. *SED 2011, 4th International Conference Science and Higher Education in Function of Sustainble Development*, (October), 1–7.

Smahel, D., Machackova, H., Mascheroni, G., Dedkova, L., Staksrud, E., Ólafsson, K., … Livingstone, S. (2020). EU Kids Online 2020. *Survey Results from 19 Countries. EU Kids Online*. https://doi.org/10.21953/lse.47fdeqj01ofo

Sølvberg, A. M., & Rismark, M. (2012). Learning spaces in mobile learning environments. *Active Learning in Higher Education*, *13*(1), 23–33. https://doi.org/10.1177/1469787411429189

Stojanović, D., Bogdanović, Z., Despotović-Zrakić, M., Naumović, T., & Radenković, M. (2019). An approach to using Instagram in secondary education. *The 14th International Conference on Virtual Learning ICVL*, 247–253.

Stojanović, D., Bogdanović, Z., & Nedeljković, N. (2016). Upotreba mobilnih tehnologija u srednjoškolskom obrazovanju. *Zbornik Radova XLIII Simpozijum o Operacionim Istraživanjima - SYM-OP-IS 2016*, 71–74. Medija centar "ODBRANA."

Stojanović, D., Bogdanović, Z., Petrović, L., Mitrović, S., & Labus, A. (2020). Empowering learning process in secondary education using pervasive technologies. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2020.1806886

Tess, P. A. (2013). The role of social media in higher education classes (real and virtual) – A literature review. *Computers in Human Behavior*, *29*(5), A60–A68. https://doi.org/10.1016/J.CHB.2012.12.032

Tomić, Z. (2015). Analysis of the Impact of Public Education Expenditure on Economic Growth of European Union and BRICS. *Economic Analysis*, *48*(1–2), 19–38.

Traxler, J. (2007). Defining, Discussing and Evaluating Mobile Learning: The moving finger writes and having writ . . . . *The International Review of Research in Open and Distributed Learning*, *8*(2). https://doi.org/10.19173/irrodl.v8i2.346

Wong, L. H., & Looi, C. K. (2011). What seams do we remove in mobile-assisted seamless learning? A critical review of the literature. *Computers & Education*, *57*(4), 2364–2381. https://doi.org/10.1016/J.COMPEDU.2011.06.007

Wu, W. H., Wu, Y. C. J., Chen, C. Y., Kao, H. Y., Lin, C. H., & Huang, S. H. (2012). Review of trends from mobile learning studies: A meta-analysis. *Computers & Education*, *59*(2), 817–827. https://doi.org/10.1016/J.COMPEDU.2012.03.016

Zollo, S. A. (2019). Instagram as a Pedagogical Tool to Enhance Undergraduate Students' Critical Thinking on Specialized Knowledge: A Qualitative Experiment. *Representing and Redefining Specialised Knowledge: Variety in LSP*, 245–280.

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