

THE POSSIBLE IMPACT OF THE ONLINE LEARNING ON THE QUALITY OF EDUCATION IN SERBIA DURING THE COVID-19 PANDEMIC

Lidija Madzar

Faculty of Finance, Banking and Auditing, Alfa BK University, Belgrade, Serbia
lidi.madzar@gmail.com

Dusica Karic

Belgrade Business and Arts Academy of Applied Studies, Belgrade, Serbia
prof.dusica@gmail.com

Dusanka Paspalj

Auto-Moto Association of Serbia and PhD student of Faculty of Applied Management,
Economics and Finance MEF, Belgrade, Serbia
duskapaspalj@gmail.com

Abstract

The Covid-19 coronavirus pandemic of 2020 brought huge changes, leaving unforeseeable consequences for the global economy, the business community and people's lives. It has led many companies to resort to working from home. The pandemic also forced many educational institutions around the world and from the Republic of Serbia to adapt to the new reality by actively implementing electronic teaching. The aim of this paper is to determine whether this new teaching method could have affected the quality of teaching outcomes and educational processes in the country. In the article, Wilcoxon signed rank test was conducted on the grades of a selected sample of 100 students from a higher public school of economics from Serbia in order to determine the size and statistical significance of the difference between median samples, before and after the transition to electronic learning. The results of the analysis showed that the transition to electronic teaching most likely improved the quality of educational processes and results in Serbia, indicating a statistically significant difference between the sample medians. Despite the described limitations of the study, it is possible that this type of teaching has improved the quality, inclusiveness and resilience of educational processes in the country.

Keywords

Republic of Serbia; e-learning; e-teaching; quality of educational outcomes; Wilcoxon signed rank test

JEL Classification

I21; I23; C14

1. Introduction

At the end of the December 2019, an epidemic of the hitherto completely unknown strain of coronavirus appeared in the Chinese city of Wuhan, which spread rapidly to other Chinese cities, as well as to the entire Asian region. By February 2020, at least 25 countries were affected by a new virus strain that was spreading to the rest of the world very quickly. Wu, Chen and Chan (2020) state that this severe pneumonia, i.e. a serious acute respiratory syndrome caused by new and insufficiently researched pathogens, got its official name Coronavirus Disease-2019, while in February 2020 the World Health Organization (WHO) renamed it to Covid-19. The virus caused by the pathogen Covid-19 is a potential zoonotic disease and it is highly contagious. The number of people suffering from this disease has risen sharply around the world, and on March 11, 2020, the WHO declared it a global pandemic. Johns Hopkins Medicine's website (2021)

stands out that the severity of this atypical disease varies from person to person, as it carries symptoms such as cough, fever, shortness of breath and breathing difficulties, muscle aches, sore throat, headache, chronic fatigue, nausea, attention deficit disorder, loss of hair, dyspnea, etc. Research by Lopez Leon, Wegman-Ostrosky, Perelman, Sepulveda, Rebollo, Cuapio and Villapol (2021) indicates that there are more than 50 long-term effects of this illness, among which are chronic fatigue, headache, insomnia, joint pain, blood pressure problems, anosmia, stroke, heart attack, diabetes mellitus, a depression, anxiety, etc. Wu et al. (2020) estimated that the mortality rate due to this illness is moderate and ranges from 2% to 5%. In December 2020, the first vaccines against this disease appeared which calmed the world to some extent, while their effectiveness at this moment remains insufficiently clear and blurred.

The Covid-19 health crisis has certainly left its unforeseeable consequences on the business world and the global economy. The pandemic has triggered one of the deepest economic recessions in the last 100 years, directly threatening human health, global economic activities, social welfare, living standards and employment. The dramatic decline of the world economy since the outbreak of this health crisis has been accompanied by a sharp slowdown in international trade flows, global financial flows and world production activities. In addition, Borio (2020) highlights that global financial market has experienced major turmoil and disruptions, moving from a phase of liquidity crisis to a phase of their insolvency, all in the context of limited and dwindling space for economic policy management. Although there is no precise way to predict the economic damage from this pandemic, for 2020 Szmigiera (2021) estimated the global gross domestic product (GDP) to decline by 4.5%. According to other assessments by Statista (2021), in 2020 alone, global GDP amounted to about \$84.54 trillion, which was almost \$3 trillion (by 3.21%) less than in 2019. Many contemporary countries have been forced to launch their fiscal, monetary, macro prudential and other anti-crises measures, as well as various aid packages to mitigate the unfavorable economic consequences of the Covid-19 pandemic. The recent appearance of the Delta strain of this virus suggests that this global pandemic could continue at least until 2023, leading to concerns that the risks of recovery will remain high over the next year. Although vaccination campaigns are underway in most countries of the contemporary world, the Conference Board (2021) emphasizes that the high rate of transmission of the Covid-19 virus Delta strain has led governments to re-establish strict restrictions on mobility, voluntary consumers' lock-in and on working from home. Such circumstances have led necessarily and inevitably to the new reality that the global business community is facing today.

Many companies have quickly adapted to the new circumstances, switching to work from home (WFH) in order to continue their business activities and protect the health of their employees. Telecommuting or distance working is an alternative work arrangement in which company staff performs their tasks from another place, most often from home. In this model, employees use the Internet and other modern technological tools to collaborate with various stakeholders, hold meetings and perform their regular working tasks. This issue has been studied by (Turin Rahman & Uddin Arif, 2020, pp. 291-292) who found that most employees were reasonably satisfied with working from home, while facing anxiety, social isolation, and general concerns about the course of the pandemic. This study also found that the perceived level of employee productivity was higher in their WFH activities than in the office space. Until the appearance of the global pandemic, telecommuting was only an additional opportunity and convenience, while since its outbreak, 66% of the surveyed employees have become forced to work from their homes full-time. Nielsen (2020, p. 3) states that these respondents generally enjoyed the benefits of WFH, trying to achieve a balance between business and private life. This new type of performing duties implied a massive

change in lifestyle, as well as an increase in the level of employee engagement depending on their gender, race, ethnicity, educational level, working position, size and activity of the company. Finally, Teodorovicz, Sadun, Kun and Shaer (2021) have shown that the forced transition to work from home was associated with a dramatic reduction of commuting time, as well as an increase in time spent at work, in meetings and/or in performing personal activities. They also state that it seems that the transition to the WFH model did not significantly affected the perceived well-being of employees, while many of them caught the fancy of this new way of doing business. The pandemic has also led most education institutions to switch to new ways of doing business, with special emphasis on the implementation of electronic teaching (e-teaching). This was also the case with higher educational institutions from the Republic of Serbia (RS), which were forced to adopt innovative business solutions and teaching and learning methods in order to retain, serve and meet the educational needs of their students in the best possible way. During the spring of 2020 and restrictions of movement caused by curfew, Serbian schoolchildren attended classes from their homes, mostly watching special TV programs with educational content. At the same time, students of higher education institutions from Serbia mostly attended classes in closed electronic sessions held by their professors, learning from materials attached to their schools' and faculties' electronic classrooms. This practice continues today with the introduction of the so-called combined model of teaching, i.e. a combination of attending the classes physically and following classes from home, depending on the situation with the pandemic.

The Republic of Serbia is a developing country that belongs to the regions of Southeast Europe and Western Balkans. It is a high-middle income economy with about 6.9 million inhabitants, a GDP of \$52.96 billion (World Development Indicators Database, 2021), while the RS Official Bureau of Statistics reports (2021) the unemployment rate of 11.1%. On March 1, 2012, Serbia became an official candidate for membership in the European Union (EU). Since then, after changing the methodology of the EU accession, the country has opened only Negotiating cluster 1. European Western Balkans portal suggests (2021) that this happened only because this cluster contains those negotiating chapters that were already opened in the previous accession phase (Financial supervision; Judiciary and fundamental rights; Justice, freedom and security; Public procurement and Statistics). The World Bank report on Serbia (2021) emphasizes that due to generous anti-crisis fiscal support measures intended for enterprises and citizens, the country has experienced a significant increase in its fiscal deficit. This increase in budget deficit was estimated at around 8% of GDP in 2020, while the share of its public debt in GDP was in the same year estimated to reach a level of 58.2%. Serbia is currently burdened by numerous economic, social and political problems. Among its most significant economic problems stand out the insufficiently functioning market economy, necessary public administration reforms, structural weaknesses of its economy, bottlenecks in private sector growth, dominance of public enterprises in some industries, unfinished energy transition and green growth processes, population decline, labor shortages, vulnerability to climate change, etc. In financing its economic development, the country currently relies heavily on foreign direct investments (FDI) and foreign loans.

The aim of this article is to investigate the impact of the transition from classical ex cathedra to electronic teaching on the quality of education and learning achievements in the case of one public owned high school from Serbia. In other words, the intention of the authors of this article is to determine whether the change in the way of teaching and learning due to the Covid-19 coronavirus pandemic could have affected the quality of the educational processes in the country. For the purpose of this research, a study group sample of 100 students of Budget Accounting study course was selected, where a total number of 100 undergraduates studied in accordance with the educational quotas obtained from the RS Ministry of Education, Science and Technological Development.

The next section provides an overview of the literature on the goals, methodology and effects of electronic learning (e-learning). The third section contains a detailed description of the sample and the methodology used, while the fourth section provides results and discussions. Finally, the last section draws a conclusion about the possible impacts of the results of this research on the quality of educational outcomes in the country.

2. Literature review

E-learning is a system of formalized learning that bases on the use of electronic resources, primarily computers, tablets, smartphones and the Internet. In a somewhat broader sense, we can also describe e-learning as a network that enables the transfer of knowledge, skills and experiences to a large number of users, at the same or different times (The Economic Times, 2021). Formalized e-learning is mainly delivered through electronic classroom systems (e-classrooms), while in the physical sense teaching can take place inside and outside the conventional classroom. While this learning system gained its popularity thanks to the rapid technological advances, today many of us consider that schools that do not have distance-learning technologies and that apply traditional *ex cathedra* teaching methods lag far behind those that rely on these modern systems. Kumar Basak, Wotto and Bélanger (2018) assert that E-learning presents an alternative form to traditional teaching, while it can also figure as its complementary form. Some researchers (Chitra & Raj, 2018, pp. 11-12) state a number of benefits of e-learning systems for students such as capability for research, critical thinking, independence, high motivation and commitment to learning, self-responsibility, dissemination of knowledge via the Internet, growth in self-confidence, improved communication among students, independence in work, ease of use and learning, etc. They also cite some of its shortcomings and pitfalls, such as insufficient interaction with professors, reduced social interaction, higher dropout rates, incomplete grades, lack of self-discipline, health problems and inability to access contemporary information and communication technologies (ICTs). Al-Atabi and Al-Noori (2020, p. 10) further emphasize that today's society is witnessing a revolution in education that bases on the influence of electronically interconnected world on individual and group learning outcomes. In the globalized world of new ICTs, media and cultural patterns, the education system itself is facing a challenge to its basic tenets and rules. When it comes to the achievements of e-learning, some researchers (Zare, Sarikhani, Salari & Mansouri, 2016, pp. 31-32) suggest that this type of teaching encourages knowledge, creativity, fluency, originality, flexibility, independence, judgment and self-confidence of students in relation to the traditional *ex cathedra* approach to lectures. Finally, Zaraii-Zavaraki and Rezaei (2011, p. 1) also confirmed these findings, determining that this type of teaching significantly and positively affects the attitudes, motivation and academic results of students.

On the other hand, the professional literature points out some disadvantages of this form of teaching. Of all its perceived technical shortcomings, Gary James (2021) emphasizes in particular limited formatting capacity of teaching content in current browsers, the restriction of instructional methodologies, slower performance of sound, video and graphic presentations, the need for control of and technical support to this process, long and slow time of downloading applications, limited student assessment and feedback, the absence of interactivity, weak multimedia courses, alienation from human contacts, etc. In this context, some other research (Zounek & Sudický, 2013, pp. 59-60) highlights the probability of lacking sufficient skills and knowledge on use of contemporary ICTs; problems with presentation, word-processing, collaboration and other kinds of personal learning purposes tools; a priori negative attitudes towards ICTs which can prevent students from achieving the expected learning results, negative

resentments for students who lack sufficient motivation and the ability to manage workload; treats to learning independence; decreased productivity and worse study results of the students with poor learning habits; a feeling of isolation and abandonment in virtual environment; difficult communication and information overload, etc. as the main problems that this type of teaching is facing with. Nevertheless, O'Donoghue, Singh and Green (2004, p. 63) show that online teaching attracts students and encourages them to learn, increasing their flexibility in terms of study time and location, rising the accessibility of higher education, and thus bringing potential benefits to the workforce and society.

3. Research methodology

Sampling

The aim of this article is to determine the impact of electronic teaching on the quality of the teaching process, i.e. on the educational outcomes on the example of one state owned high school of vocational studies from Belgrade, the capital of Serbia. This school has about 8,000 students and 20 study programs in undergraduate, specialist and master vocational studies. After the outbreak of the Covid-19 coronavirus pandemic, the School reacted very quickly and from the summer semester of the 2019/2020 school year, it switched from traditional to electronic teaching. From that moment, all School's e-classrooms became equipped with the necessary teaching materials, presentations, exam questions and tests for knowledge self-assessment. Unlike the former conventional type of teaching, from the moment the electronic teaching started, lectures were not obligatory. Professors also did not keep records of attending classes, while students mostly attended them from their homes. Despite that, the students continued to take the exams in the classic way, by coming to the School and physically staying in its premises, either electronically or by solving tests. In addition, the School provided its students with a chatbot, i.e. a virtual digital assistant with the aim of providing them with better communication, enabling them time savings, as well as faster and more efficient delivery of teaching services.

The statistical samples of this research consisted of a group of 100 students' grades from the Budget Accounting undergraduate vocational studies, as many as there were a total number of enrolled students in that course. The observed student group had 51% male and 49% female members. In this research, we monitored and compared their grades before and after the transition to e-teaching process. More precisely, for the purpose of this analysis, we collected the grades of these students from the first year of study one-semester course in Accounting, which students took before the outbreak of the Covid-19 crisis, and from the third year of study one-semester course in Management Accounting, which the same group of students took after the coronavirus disease outbreak and the transition to e-learning. Given the fact that these courses belong to the group of methodologically, substantively and didactically related and similar subjects, as well as that they were taught by the same male/female professor, we started from the assumption that the grades from them are most likely mutually compatible and comparable. In order to ensure the anonymity of students, data on their gender and grades based on their index numbers were extracted from the School's electronic database. In this research, the Wilcoxon signed rank test was used to determine the size and statistical significance of the difference between the group medians, before and after the transition to e-learning.

Applied methodology

Wilcoxon signed rank test for paired samples was used in this article to test the hypothesis of the two populations' medians equality, from which the samples were selected. This test is a non-parametric alternative to the Paired samples t-test, which is way it does not require a normal probability distribution as a prerequisite for its

application. In this statistical test, the ranking of absolute differences between data pairs obtained from two samples is first performed, and after that a sign is assigned them based on the higher value from a given data pair. This test essentially calculates the differences between sets of data pairs and analyses these differences in order to determine whether they differ statistically significantly from each other or not. After that, the Wilcoxon signed rank test compares the sums of positive and negative ranks (with + and - signs). In the case of larger samples, i.e. when the number of sample elements is $n > 15$, a normal distribution can be used to perform this test (Mann, 2009, pp. 714-715).

In the Wilcoxon signed rank test for paired samples and in the case of large samples with their elements $n > 15$, the realized value of the z-test statistic is obtained based on the T-test statistic, using the following formula (Mann, 2009, p. 719):

$$z = \frac{T - \mu_T}{\sigma_T} \quad (1)$$

Where

μ_T is the mean of the T statistic's sample distribution, while

σ_T is the standard deviation of the T statistic's sample distribution.

These two indicators are further calculated based on the following formulas:

$$\mu_T = \frac{n(n+1)}{4} \quad (2)$$

$$\sigma_T = \sqrt{\frac{n(n+1)(2n+1)}{24}} \quad (3)$$

In this analysis, the matched pairs' differences are calculated as follows:

$$\text{Matched pairs' differences} = \text{students' grade after the transition to e-teaching} - \text{students' grade before the transition to e-teaching} \quad (4)$$

In this research, the Wilcoxon signed rank test for paired samples was used because the results of the students' grades before and after the transition to e-learning did not show a normal distribution. While before switching to e-learning, the value of skewness was 0.89, and kurtosis was 0.48, after switching to e-learning, skewness amounted to -0.70, while the value of kurtosis was -0.83. In addition, this is an intuitive statistical method, which is adequate for the cases of repeated measurements, while also being simple to apply and interpret.

This article starts from the null hypothesis H_0 that the transition to e-learning did not improve the grades of students, i.e. that the medians of the samples before and after this intervention were equal ($M_A = M_B$). Alternative hypothesis H_1 states that the transition to e-learning affected the growth of students' grades, i.e. that the sample median after this intervention was higher compared to the period before ($M_A < M_B$). Now, the initial and alternative hypotheses can be presented as follows:

$H_0: M_A = M_B$ and

$H_1: M_A < M_B$.

4. Results and discussions

The results of preliminary analysis that included the values of mean, median and mode, as well as of skewness and kurtosis before and after the transition to e-learning are presented in Table 1.

Table 1 Statistical indicators of samples

	Grade before transition to e-learning	Grade after transition to e-learning
Mean	7.21	8.74
Median	7.00	9.00
Mode	7	10
Skewness	0.89	-0.70
Kurtosis	0.48	-0.83

Source: Authors' calculation

The Table 1 clearly indicates that the mean of the sample grades in the meantime increased from $\mu_A = 7.21$ to $\mu_B = 8.74$, while the mode after this intervention was Mode = 10, indicating that most students from the group received the highest grades after switching to e-learning. The applied Wilcoxon signed rank test revealed a statistically significant increase in students' grades after the transition to online learning, $z = -7.24$, $p = \text{Sig} < 0.001$, with a large difference in grades, i.e. with a large effect size ($r = 0.51$). The median scores of the observed students' grades increased from $Md = 7.00$ before to $Md = 9.00$ after the transition to online learning. Based on all the above, it can be concluded that the null hypothesis H_0 can be rejected, while the alternative hypothesis H_1 that the transition to e-learning affected the growth of students' grades, and thus the growth of the sample median after this intervention cannot be rejected.

Observed by genders, the values of the mean, median and mode of male students' grades also showed their increase due to this intervention (Table 2), while the application of Wilcoxon signed rank test revealed a statistically significant increase in their grades after the transition to e-learning, $z = -5.24$, $p = \text{Sig} < 0.001$, with a large difference in grades, i.e. with a large effect size ($r_m = 0.52$). The median of grades of the observed male students increased considerably from $Md_m = 7.00$ to $Md_m = 9.00$ after switching to e-learning, while it is noticed that most male students received the highest grade of 10 ($Mode_m = 10$) after this intervention. On the other hand, the indicators of the mean, median and mode of female students' grades also experienced their growth (Table 2), while the use of the same test also showed a statistically significant increase in their grades after this intervention, $z = -5.05$, $p = \text{Sig} < 0.001$, also with a large effect size ($r_f = 0.51$) (Pallant, 2010, p. 232). The median of grades of the observed female students also increased considerably from $Md_f = 7.00$ to $Md_f = 10.00$, while most female students also received the highest grade of 10 ($Mode_f = 10$). At the very end, it seems that female students achieved slightly better educational outcomes than the male ones, because the mean of their grades after the transition to e-learning was higher ($Mean_f = 8.82$ in relation to $Mean_m = 8.67$). At the same time, the median of their grades $Md_f = 10.00$ was also higher than the corresponding median of male students' grades $Md_m = 9.00$.

Table 2 Male and female students` grades statistical indicators

	Grade before transition to e-learning	Grade after transition to e-learning
Mean of male students` grades	7.20	8.67
Median of male students` grades	7.00	9.00
Mode of male students` grades	7	10
Mean of female students` grades	7.22	8.82
Median of female students` grades	7.00	10.00
Mode of female students` grades	7	10

Source: Authors` calculation

Potential limitations of this research relate to the fact that it is very possible that, under the initial shock, impressions and influence of the coronavirus Covid-19 pandemic, the professor was subjective, biased and lenient towards her/his students in their evaluation and after switching to electronic teaching. There is also a possibility that the professor restored to reducing the volume of teaching material in accordance with the recommendation of RS Ministry of Education, Science and Technological Development on reducing the teaching materials. The Ministry also provided informal guidance to education staff on not lowering the examination criteria. It is also possible that the students really liked this form of teaching, and learning, as well as they dedicated more time to their obligations and learning activities because they were not obliged to attend classes physically. One of the surveys conducted in Serbia, organized by the Serbian Centre for International Public Policy, indicates that, after the initial shock, 65% of surveyed students stated that they maintained continuity of lectures, exercises and learning during this health crisis. On the other hand, Serbian news agency Fonet (2021) states that when asked whether professors changed their criteria during the pandemic, 52.2% of surveyed students gave a negative answer. In any case, we should be very careful in interpreting the results of this analysis given the fact that the evaluation of these students was conducted in completely unusual circumstances, caused by initial shock and fear of a coronavirus Covid-19 pandemic.

Thousands of conducted studies deal with this issue today, pointing out contradictory results, facing various biases and not giving strong conclusions about the real results of e-learning activities. In addition to the already mentioned studies (Chitra & Raj, 2018, Zare, Sarikhani, Salari & Mansouri, 2016 and Zaraii-Zavaraki & Rezaei, 2011) which indicate the positive impact of e-learning on many abilities, activities, achievements and educational outcomes of students, there are quite opposite conclusions. The results of this research do not fit in well with the findings of Coman, Țiru, Meseșan-Schmitz, Stanciu and Bularca (2020, p. 14) who point at the fact that some higher education institutions from Romania were not well prepared exclusively for this type of teaching, thus making the benefits of online learning identified in other research diminishing. In this study, the main problems and obstacles of e-teaching highlighted issues such as teachers' lack of technical skills, inadequate style of teaching in online environment, difficult assimilation and processing of information by students, lower value of e-teaching, lack of students` self-confidence and courage in expressing their views, etc.

All these factors could have an unfavorable impact on their educational outcomes. Another similar study (Mohammad, 2012, p. 229) also points to the possible obstacles that online teaching brings to educational outcomes. This research specifically states the insufficient focus of teachers on technical capacities and online materials and activities, insufficient understanding of the way students perceive their e-learning environment, insufficient online tools to achieve effective learning outcomes, etc. in the form of the main problems in implementing electronic teaching. However, there are quite the opposite views (O'Donoghue, Singh & Green, 2004, p. 72) that indicate some social advantages of online learning, such as increased flexibility and accessibility of knowledge, the growth of shy and anxious students' self-confidence, increased independence in learning, the permanent availability of technology and multimedia, development of new skills, etc.

Previous experiences in conducting online teaching in Serbia also unequivocally indicate a number of advantages of this type of teaching activities. Matijasevic, Caric and Skoric (2021, pp. 166-168) highlight that they include participation in e-teaching and e-learning activities in a high-quality way, 24-hour access to teaching content, synchronized communication, intensive interaction between teachers and students, didactic value of online tools, Internet as an additional base of knowledge sources and development of digital skills. Therefore, the positive impact of contemporary information and communication technologies on the educational system, as well as on educational methods, approaches and outcomes comes to the fore. In principle, the penetration of ICTs in the field of education has had a positive impact not only on the technical aspects of teaching, but also on the ways of teaching and acquiring knowledge by students. All this unequivocally indicates the need to conduct further studies that would more specifically address the impact of online teaching on the quality of learning processes in higher education institutions in order to help decision makers in creating and implementing future directions of education policy.

5. Concluding remarks

The Covid-19 coronavirus pandemic outbreak has undoubtedly brought new challenges to Serbian economic and educational system. The current health crisis has greatly changed the context of education, work, entrepreneurship, gatherings, behavior and overall life, posing new challenges to the whole world. The aim of this paper was to determine whether the transition to electronic teaching had a statistically significant impact on the quality of teaching processes and students' educational outcomes in the case of one economic profile higher school from Belgrade. In this analysis, it was concluded that e-learning has most likely notably and statistically significantly improved the quality of learning, grades and educational achievements of the observed students. This type of teaching most likely motivated them to better and more productive learning, increasing their flexibility, creativity, openness to change, adaptability, critical thinking, independence, responsibility, and self-confidence. In the absence of direct communication and direct contact with students, on-line teaching and distance learning have most likely changed the role of teachers and professors themselves, who have also experienced increased flexibility, self-direction and control over the teaching process, challenges of conceptualization and adequate delivery of knowledge and teaching content, as well as improved communication and collaboration with their students. They also realized the importance of positive feedback, as well as better interaction results in their lines of communication with students. In any case, the World Bank Group (2020, p. 1) asserts that the current pandemic has led many contemporary countries to make their education systems more effective, inclusive and resilient, as well as to improve their digital skills and probably educational outcomes of participants in online teaching and learning activities.

References

- Al-Atabi, A. J., Al-Noori, B. S. M. (2020), E-Learning In Teaching, A Term Paper, Bagdad.
- Borio, C. (2020), The Covid-19 economic crisis: dangerously unique, available at <https://www.bis.org/speeches/sp200722.htm>.
- Chitra, P. A., Raj, A. M. (2018), E-Learning, *Journal of Applied and Advanced Research*, 3(S1):11, May 2018, 11-13, DOI: 10.21839/jaar.2018.v3iS1.158.
- Coman, C., Țiru, L. G., Meseșan-Schmitz, L., Stanciu, C., Bularca, M. C. (2020), Online Teaching and Learning in Higher Education during the Coronavirus Pandemic: Students' Perspective, *Sustainability* 2020, 12, 10367, 1-24, doi:10.3390/su122410367.
- European Western Balkans (2021), Srbija juce nije otvorila klaster 1 u pregovorima sa EU, *EWB*, June 23, 2021, available at <https://europeanwesternbalkans.rs/srbija-juce-nije-otvorila-klaster-1-u-pregovorima-sa-eu-izjave-premijerke-i-ministarke-neprecizne/>.
- Fonet (2021), Oko polovine studenata smatra da su predavanja na fakultetima bolja nego onlajn, *Danas*, April 4, 2021, available at <https://www.danas.rs/drustvo/oko-polovine-studenata-smatra-da-su-predavanja-na-fakultetima-bolja-nego-onlajn/>.
- James, G. (2021), Advantages and disadvantages of online learning, *Allen Communication*, available at <https://www.leerbeleving.nl/wbts/1/addis.pdf>.
- Johns Hopkins Medicine (2021), What is Coronavirus?, May 19, 2021, available at <https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus>.
- Kumar Basak, S., Wotto, M., Bélanger, P. (2018), E-learning, M-learning and D-learning: Conceptual definition and comparative analysis, *E-Learning and Digital Media*, Vol. 15(4), 2018, 191-216, <https://doi.org/10.1177%2F2042753018785180>.
- Lopez-Leon, S., Wegman-Ostrosky, T., Perelman, C., Sepulveda, R., Rebolledo, P. A., Cuapio, A., Villapol, S. (2021), More than 50 long-term effects of COVID-19: a systematic review and meta-analysis, *Scientific Reports*, (2021)11:16144, <https://doi.org/10.1038/s41598-021-95565-8>.
- Mann, P. S. (2010), *Uvod u statistiku*, (sesto izdanje), Beograd, Izdavački centar Ekonomskog fakulteta u Beogradu.
- Matijasevic, J., Caric, M., Skoric, S. (2021), Online nastava u visokom obrazovanju – prednosti, nedostaci i izazovi, XVII Skup Trendovi razvoja: On-line nastava na univerzitetima, Novi Sad, February 15-18, 2021, 165-168.
- Mohammad, M. (2012), The Impact of e-Learning and e-Teaching, *World Academy of Science, Engineering and Technology International Journal of Educational and Pedagogical Sciences*, 6 (2), 229-234.
- Nielsen (2020), The Nielsen Total Audience Report: Special Work from Home Edition, August 2020, Root, The Nielsen Company, Root, Switzerland.
- O'Donoghue, J., Singh, G., Green, C. (2004), A comparison of the advantages and disadvantages of IT based education and the implications upon students, *Interactive Educational Multimedia*, Number 9, November 2004, 63-76.
- Pallant, Julie. (2010), *SPSS Survival Manual*, (fourth edition), Crows Nest, Allen&Unwin.
- Republički zavod za statistiku (RS Bureau of Statistics). (2021), Trziste rada, available at <https://www.stat.gov.rs/oblasti/trziste-rada/>.
- Statista (2021), Global gross domestic product (GDP) at current prices from 1985 to 2026, available at <https://www.statista.com/statistics/268750/global-gross-domestic-product-gdp/>.

- Szmigiera, M. (2021), Impact of the coronavirus pandemic on the global economy - Statistics & Facts, Statista, September 15, 2021, available at <https://www.statista.com/topics/6139/covid-19-impact-on-the-global-economy/>.
- Teodorovicz, T., Sadun, R., Kun, A. L., Shaer, O. (2021), Working from Home during COVID19: Evidence from Time-Use Studies, Working Paper 21-094, Boston, Business School.
- The Conference Board (2021), Global Economic Outlook, September 2021, available at <https://conference-board.org/topics/global-economic-outlook>.
- The Economic Times. (2021), Definition of 'E-learning', English Edition, October 1, 2021, available at <https://economictimes.indiatimes.com/definition/e-learning>.
- The World Bank (2021), The World Bank in Serbia, April 7, 2021, available at <https://www.worldbank.org/en/country/serbia/overview>.
- Turin Rahman, K., Uddin Arif, Z. (2020), Working from Home during the COVID-19 Pandemic: Satisfaction, Challenges, and Productivity of Employees, *International Journal of Trade and Commerce*, July-December 2020, Volume 9, No. 2, 282-294.
- World Bank Group (2020), Ekonomski i socijalni uticaj Covid-19 – obrazovanje, Redovni ekonomski izvestaj za Zapadni Balkan, 2020, no. 17, Washington, D.C, WBG.
- World Development Indicators Database (2021), Serbia – Country Profile, data set, available at https://databank.worldbank.org/views/reports/reportwidget.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zm=n&country=SRB.
- Wu, Y. C., Chen, C. S., Chan, Y. J. (2020), The outbreak of COVID-19: An overview, *Journal of the Chinese Medical Association*, March 2020, Volume 83, Issue 3, 217-220, doi: 10.1097/JCMA.0000000000000270.
- Zaraii-Zavaraki, E., Rezaei, E. (2011), The Impact of Using E-portfolio on Attitude, Motivation and Academic Achievement of Students In Khajeh Nasiriddin Toosi University's E- Learning Center, *Quarterly of Educational Measurement*, Volume 2, Issue 5, Winter 2011, 1-36.
- Zare, M., Sarikhani, R., Salari, M., Mansouri, V. (2016), The Impact of E-Learning on University Students' Academic Achievement and Creativity, *Journal of Technical Education and Training*, Vol. 8, No. 1, 25-33.
- Zounek, J., Sudický, P. (2013), Heads in the Cloud: Pros and Cons of Online Learning, International Conference DisCo 2013: New technologies and media literacy education, June 2013, Center for Higher Education Studies and West Bohemia University, Prague, 58-63.