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Barriers During Distance Learning in a Pandemic Time from the Aspect of Serbian Secondary School Students[2]

***Abstract**: During the pandemic caused by the COVID-19 virus, the whole world faced numerous issues in regard to an urgent response that was needed in all areas of society. Education is one of the fields that has faced the biggest changes as well as problems caused by the transfer of learning from the real world to the virtual environment. The aim of this research is to examine the barriers that students encountered during the implementation of distance learning. The research was conducted on a sample of 424 high school students using an especially designed instrument that included 40 potential barriers. By using factor analysis, the barriers in distance learning were identified and grouped into nine dominant factors: socio-emotional, content-related, communication and support, technical skills, assessment, technical conditions, administrative, organizational, and cheating on tests. The ranking of the selected factors showed that in our sample the most common barriers were cheating on tests and assessment, while technical skills were the least common barrier. The obtained results point to significant pedagogical implications in the field of didactic-methodological education and teacher professional development, but also to the need to empower them to engage in cooperative and team work.*

***Keywords**: distance education, online learning, COVID-19 pandemic, factor analysis*

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Introduction

With the accelerating development of technology and the Internet, their application in education is becoming more and more prominent and the possibility of implementing various types of distance learning is increasing. Distance education refers to educational processes in which participants do not directly interact with one another (Nadrljanski, Nadrljanski, & Soleša, 2008), and it is a significant component of the contemporary educational system. The approach to the educational process today has undergone a substantial transformation, especially in light of the phenomenon of technological globalization of modern society and the opportunities and trends it brings with it. An important factor determining this is electronic learning, which is defined as learning based on modern technology and the utilization of computer networks (Zhang, Zhao, Zhou, & Nunamaker, 2004). The more recent method of electronic learning that stands out is mobile learning. One of the most important forms of electronic learning in the modern period is mobile learning owing to its accessibility, representation, and performance, which all set it apart. The essential characteristics of mobile learning such as spontaneity, informality, and personalisation (Alhassan, 2016; Miangah & Nezarat, 2012) contribute to its unique efficiency and efficacy in modern education.

Distance learning is the broadest concept and process due to the specifics of the learning context, the breadth and diversity of learning approaches, and the means of information distribution (Cherian & Williams, 2008). Distance learning includes a variety of electronic and mobile learning methods and can occur both synchronously and asynchronously. Asynchronous learning is distinguished from synchronous learning by the absence of simultaneous communication between participants, while synchronous learning is characterized by two-way communication between participants that occurs in real time (Egan & Akdere, 2004). When it comes to education, asynchronous learning is most frequently accomplished via sending materials and assignments via email, network postings, educational platforms, etc.

Distance learning now serves as a significant resource in the fields of adult education, formal and non-formal education, language learning (Miangah & Nezarat, 2012), professional development in organizations (Welsh, Wanberg, Brown, & Simmering, 2003), as well as higher education thanks to the capabilities provided by various types and modalities of distance learning. At universities, e-learning is used as a supplement to regular classes, students use this type of learning to find scientific articles, meet their pre-exam requirements, or communicate with professors (Alhassan, 2016). E-mail communication is recognized as the most common form of communication with a mentor while writing the undergraduate and master's thesis (Jovanović & Vukić, 2020). As for the regular primary and secondary education, this type of learning was not widely used, only in specific circumstances or for certain groups of students who were not able to attend regular classes.

During 2020, in the conditions of the global pandemic when the whole world was facing the COVID-19 virus, all spheres of society faced challenges, education included. Face-to-face learning was identified as a specific threat to every community, and the urgent introduction of e-learning was proposed as a security measure to protect the community. Accepting these circumstances in education is associated with the Securitization theory, which assumes an effective implementation of education as well as normalization after the pandemic (Murphy, 2020). Asynchronous learning is another type of education that can be used during the pandemic and it allows for the simplest adaptation of teachers who are used to teaching in real time. Asynchronous learning provides teachers with flexibility in preparing learning materials and students with an opportunity to align school requirements with other obligations. Teachers do not have to post materials at a fixed time and students can use the materials ac-

cording to their schedule (Daniel, 2020). Research was conducted in Georgia on the ability of the education system to use different variants of e-learning, such as Meet, Zoom, Microsoft Teams, TV teaching. A case study was conducted in a private school with 950 students where e-learning was implemented via the Meet platform and the data showed that this type of learning was successful and enabled an unhindered and smooth transition of education from real world to virtual environment (Basilaia & Kvavadze, 2020). A study analyzing the application of distance learning during the first days of the pandemic, on a sample of students on a campus in Indonesia, found that different forms of e-learning were used, but that learning was most effective via WhatsApp, where students and teachers shared presentations, audio and video materials, as well as documents (Wargadinata et al., 2020).

By the decision of the Government of the Republic of Serbia[3] from 15/03/2020, on the suspending classes, all education activities, at all levels of education, have been transferred to the online environment and the entire learning process was realized via distance learning until the end of the 2019/2020 school year. These circumstances have led to an increased interest of the professional and general public about the possibilities and problems that accompany this type of learning. Although distance learning is not a novelty in our field, the specific circumstances left all participants in the learning process insufficiently prepared to carry out such a radical change.

We have decided to dedicate this paper to the study of the barriers that students faced during the implementation of distance learning.

3 Odluka o obustavi izvođenja nastave u visokoškolskim ustanovama, srednjim i osnovnim školama i redovnog rada ustanova predškolskog vaspitanja i obrazovanja (2020). *Službeni glasnik Republike Srbije*, br. 30. [Decree on Prohibiting On-Site Teaching at Institutions of Higher Education, Primary and Secondary Schools (2020). The Official Gazette of the Republic of Serbia, No. 30]

Barriers during the implementation of distance learning

There are many benefits and motivating elements of distance learning, but there are also obstacles and implementation issues. The effectiveness and quality of its implementation are greatly influenced by the barriers, or obstacles, that come with it. Its identification and systematic study serve as a solid foundation for minimizing the potential risks they may pose and creating the ideal environment for an effective distant learning. The demographic of students and adults who participated in some sort of online instruction is the focus of the studies on the obstacles of distance learning that are currently available. The following barriers can be identified as significant when analyzing the findings of these studies from the perspective of the topic of our work: resistance to change, uncertainty regarding the use of technology, inadequate familiarity with the potential of distance learning (Maquire, 2005), organizational changes, social interaction, a lack of technical skills, evaluation, administrative and legal issues (Berge & Muilenburg, 2003), to name a few. Teachers and other professionals must possess a solid understanding of this subject and focus their efforts on removing the obstacles and preventing overlap in the real-world situations. In this regard, pedagogical, didactic, and methodological actions ought to be based on expert knowledge and continuous growth of different types and forms of distance learning that prevail in the current educational settings. Given the significance of asynchronous learning in achieving the objectives of online education (Daniel, 2020), as well as the fact that Google Classrooms and email communication are the most popular forms of asynchronous learning in higher education, it is important to highlight the risks they entail.

A lack of immediate feedback, feelings of uncertainty and anxiety, insufficient informational value of messages and announcements, a lack of individualization, and risks associated with the conno-

tative and denotative meaning of written communaction are a few drawbacks of this type of learning, according to Zhang et al. (2004). The problems that were discovered when looking at the teaching process suggest that synchronous and asynchronous approaches to distance learning should be combined. Problems with strictly using asynchronous learning include failure to adhere to the class schedule, overloading students with information, and inconsistency among teachers who work with the same class of pupils. The results from the research performed during the pandemic (Chen, Kaczmarek, & Ohyama, 2020), which demonstrate that asynchronous learning models should be improved and made more interactive in order to lessen fatigue and boost student involvement, are also in support of this. This ensures that students' knowledge and abilities are of a greater quality.

The barriers that have been found can be conditionally divided into three categories: psychological, social, and technical when viewed from the perspective of learning via mobile phones. Among the psychological effects, anxiety caused by the numerous messages they receive each day, unnatural interaction, and a preference for using mobile phones for leisure activities predominate (Alhassan, 2016); a reduced intellectual mobility of students and changeable attention are other psychological effects. The most prominent social barriers are associated with: reduced direct communication and socialization of students, negative social attitudes toward the use of mobile devices for learning and their perception of these tools as disruptive devices for playing games and chatting with friends (Mehdipour & Zerehkafi, 2013). In the category of technological obstacles, there are issues with phone battery life and storing excessively big files (Al-Said, 2015), Internet accessibility in underdeveloped areas (Adnan & Anwar, 2020), as well as device-specific hardware and software.

There are four main categories of barriers to distance learning in the school setting: those related to students, teachers, curriculum, and school organization. According to the topic of the study, for the purposes of our paper we identify the following barriers as being specific to students: low motivation to learn, poor assessment of progress, isolation from peers, insufficient skills for distance learning, and a preference for social interaction (Assareh & Hosseini Bidokht, 2010); administrative issues, academic skills, technical skills, payment and Internet access, technical issues (Muilenburg & Berge, 2005); stress among students and the worry of failing a school year (Hasan & Bao, 2020), as well as other emotional barriers. In addition to the previously mentioned barriers, it is important to draw attention to the obstacles such as the accessibility of technology, knowledge of how to use it effectively in education, material costs, wasteful use of time, absence of prompt assistance and support in completing educational tasks, and others. The focus of our paper is on the investigation of this significant topic, keeping in mind the unique characteristics of the high school education and teaching as well as the insufficiency of the research on the barriers to distance learning at this level of education.

Methodology

The starting point of this research is the introduction of distance learning as the only possible way to conduct the learning process and the problems faced by all participants in the education process. The aim of this research was to identify the barriers in distance learning from students' perspective. The research is based on three research tasks:

1. Identify the barriers that students encountered during the implementation of distance learning and their frequency;
2. Analyze the attitudes of students about the identified barriers in relation to the type of distance learning;
3. Analyze students' attitudes about the identified barriers in relation to gender, age of students, and achieved academic success.

Sample. The research was conducted on a sample of 424 high school students from the territory of the Southeast Serbia in May and July 2020. The available statistical data on the student population indicate that in 2020 there were 249,855 high school students in the territory of the Republic of Serbia, while in the territory of the Southeast Serbia the number of high school students was 120,010 (Republički zavod za statistiku [National Agency for Statistics], 2020). The sample of our research consisted of 424 students, which indicates that the criterion of 95% reliability of the sample was achieved. In relation to the research variables, the sample includes 108 male and 316 female participants; 199 participants were between 14 and 16 years of age and 225 respondents were between 16 and 18 years of age. From the aspect of academic success, the sample structure shows that the largest number of our participants had the highest academic achievement (336), followed by a very good achievement (78), while those with good and lower academic achievement were the fewest. In relation to the way of conducting distance learning, the largest number of participants used a mobile phone (387), followed by Google classroom (30), and the least represented learning type was via email and Meet or Zoom application.

Instrument and Procedures. The instrument was designed based on the studied literature and the obstacles identified in the previous studies (Assareh & Hosseini Bidokht, 2010; Berge et al., 2002; Muilenburg & Berge, 2001, 2005). The instrument was used for the purpose of a broader study that involved a more thorough study of distance learning on a sample of teachers and students. In a sample of teachers, a scale with some modifications showed high reliability (Jovanović & Dimitrijević, 2021). In our sample the Cronbach's alpha value was 0.916, which indicates that the assessment scale in this study is reliable for use. The instrument named *Barriers during distance learning – students (BTND-U),* consists of two parts: four questions relating to the demographic characteristics of the research sample (such as gender, age) and a Likert-type assessment scale comprising 40 items that include different barriers. On the Likert scale, students were asked to choose the answer on a scale from 1 (*I totally disagree*) to 5 (*I totally agree*).

The research was conducted via Google questionnaire, distributed through mediation of teachers who passed the questionnaire on to students, therefore, the participants had enough time to fill it out. Participation in the research was voluntary and anonymous, which contributes to the relevance of the obtained data.

Data Analysis. In accordance with the nature of the used instrument and in order to identify the barriers that students encountered in distance learning, we decided to apply factor analysis. The justification for applying factor analysis to our data is shown by the results of the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test (Table 1). The value of the KMO test was .901, and the Bartlett's test showed statistical significance (p = .00), which, based on the defined border values (Kaiser, 1974), confirms that the application of the factor analysis is justified.

By using factor analysis, nine factors were identified, which were further analyzed using parametric tests (t-test and ANOVA test). The statistical analysis of the data was performed in the SPSS.20 program.

Table 1. KMO and Bartlett's Test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.901**
Bartlett's Test of Sphericity	Approx. Chi-Square	6209.883
	df	780
	Sig.	**.000**

Results

Factor analysis was performed by applying principal component analysis with Varimax factor rotation in order to determine the basic data structure. The results singled out nine factors shown in Table 2, which were named according to the individual barriers that they contain: 1) socio-emotional barriers consisting of items related to excessive pressure, feelings of anxiety, confusion and overload with learning material, confusion due to too much information, lack of support and cooperation; 2) content-related barriers which include items such as superficial and disorganized knowledge, inadequate subjects for this type of learning, distracted attention of students, insufficient understanding of the content, student motivation, false information; 3) communication and support including claims such as: inadequate communication, disrespect for teachers and agreements, lack of peer support and stress due to parental control; 4) technical skills include fear of new technologies and inadequate teaching conditions for teachers; 5) assessment is a factor that includes items such as the fact that students have access to books and learning materials during assessment, they get better grades than in regular classes, there is an assessment of effort and not acquired knowledge; 6) technical conditions such as inadequate devices and Internet problems; 7) administrative problems that include frequent completion of surveys and excessive control by the school administration; 8) organizational problems such as time constraints, spending time typing messages, inability of distance learning to compensate for learning conditions in classrooms; 9) students cheating on tests.

Factor analysis identified nine factors that describe more than 50% of the total cumulative variance. In order to determine the frequency of the barriers that students encountered during distance learning, we ranked the identified factors by the arithmetic mean considering the number of the barriers included in each factor.

Table 2. Isolated factors with cumulative percentage of variance.

Factors	Initial value			Extraction Sums of Squared Loadings			Rotated factor loading		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Socio-emotional barriers	9.975	24.937	24.937	9.975	24.937	24.937	4.874	12.185	12.185
Content-related barriers	2.919	7.296	32.233	2.919	7.296	32.233	4.436	11.090	23.275
Communication and support	2.035	5.087	37.321	2.035	5.087	37.321	3.219	8.046	31.321
Technical skills	1.882	4.706	42.026	1.882	4.706	42.026	2.100	5.251	36.572
Assessment	1.745	4.363	46.389	1.745	4.363	46.389	1.946	4.865	41.437
Technical conditions	1.387	3.468	49.858	1.387	3.468	49.858	1.914	4.785	46.222
Administrative issues	1.197	2.992	52.849	1.197	2.992	52.849	1.732	4.330	50.552
Organizational issues	1.054	2.636	55.485	1.054	2.636	55.485	1.622	4.054	54.606
Cheating on tests	1.038	2.596	58.081	1.038	2.596	58.081	1.390	3.475	58.081

*Extraction Method: Principal Component Analysis

Table 3. Priority of students'barriers to distance learning.

Rang	Barriers factors	**M**	**Sd**
1.	Cheating on tests	3.72	1.92
2.	Assessment	3.69	0.90
3.	Administrative barriers	3.44	0.99
4.	Organizational barriers	3.43	1.07
5.	Content-related barriers	3.42	0.86
6.	Socio-emotional barriers	3.27	0.84
7.	Technical conditions	3.24	1.04
8.	Communication and support	2.06	0.81
9.	Technical skills	2.00	1.06

Table 3 shows that cheating on tests stands out as the most common barrier, followed by assessment, administrative, organizational, and content-related barriers. Communication and support, as well as technical skills, were singled out as the least prevalent barriers. The obtained data indicate that high school students realistically assess the circumstances in which they found themselves; the fact that they highlighted assessment as the most frequent barrier indicates that they are aware of the qualitative differences in the acquired knowledge and inconsistency between the grades received and the acquired knowledge. On the other hand, the least represented barriers indicate that mutual communication and support was not an aggravating factor in this period as well as technical skills. It is important to note the characteristics of our sample, that is, a high representation of learning via mobile phone, and we were guided by the assumption that the majority of students had the technical skills to use it, therefore, the data obtained are not surprising.

In order to determine whether the identified barriers differ in relation to the dominant way of conducting distance learning, ANOVA test was performed for each of the isolated factors. The obtained data showed a statistically significant difference only for the administrative issues factor. Students whose distance learning relied on mobile phones encountered fewer administrative problems, such as frequent encounters with various surveys and a strong control by the school administration, compared to students who used Google classroom or Meet / Zoom application.

Table 4. ANOVA test of differences in students' barriers in relation to distance learning method and achieved academic success.

Factors	Variables		M	Sd	F test	df	p
Administrative issues	Distance learning method	mobile (Viber app)	3.66	0.90	8.80	3	**.000**
		e-mail	3.66	0.60			
		google classroom	3.87	0.91			
		Meet, Zoom	5.00	0.00			
Communication and support	Academic success	excellent	1.94	0.70	18.64	3	**.000**
		Very good	2.42	0.98			
		good	3.25	1.14			
		sufficient/insufficient	4.00	0.23			

Table 5. Difference in established barriers in relation to participants' gender.

Barriers	Gender	N	M	Sd	t-test	df	p
Communication and support	Male	108	2.35	0.88	4.36	422	**.000**
	Female	316	1.96	0.77			
Technical skills	Male	108	1.81	1.04	-2.07	422	**.039**
	Female	316	2.06	1.06			
Assessment	Male	108	3.53	0.84	-2.06	422	**.040**
	Female	316	3.74	0.91			
Technical conditions	Male	108	3.01	1.08	-2.55	422	**.011**
	Female	316	3.30	1.01			

In terms of identifying the differences in students' perceived barriers in relation to their academic achievement during distance learning, the obtained data showed a statistically significant difference within the communication and support factor (Table 4). The data indicate that barriers were least pronounced in students with the highest academic achievement, and most common in students with lower/the lowest academic achievement. This data is not surprising, bearing in mind that the students with poorer academic performance are usually more likely to encounter problems related to communication and support in regular classes as well. However, it was expected that the content-related barriers and assessment would stand out as more prevalent among students with lower/the lowest academic achievement, which did not prove to be the statistically significant data.

The results of the statistical analysis that took into account the participants' gender showed a statistically significant difference in four factors - communication and support, assessment, technical skills, and technical conditions. Within the communication and support factor, based on the Mean and Standard deviation values shown in Table 5, we can see that the barriers from this group are more pronounced in male students. This data is not surprising, bearing in mind that this factor consists of the barriers such as inadequate communication, disrespect of teachers, inconvenience due to an increased parental control, which in practice is more common among male students. On the other hand, the barriers within the factors of assessment, technical skills and technical conditions are statistically significantly more frequent among female students.

By analyzing student barriers in relation to participants' age, a statistically significant difference was found in two factors - socio-emotional barriers ($p = .024$) and content-related barriers ($p = .039$). Based on the Mean and Standard deviation values (Table 6), we can see that the barriers within both factors are more frequent in older participants - 16 to 18 years of age, compared to participants of age 14 to 16. The data obtained were expected, bearing in mind that the participants from the older group attend the third and fourth grades of high school when they are introduced to several professional subjects and are about to finish high school and these circumstances of distance learning affected them differently compared to the first- and second- graders who are just getting to know each other and have more general school subjects.

Table 6. Difference in established barriers in relation to participants' age.

Factor	Age	N	M	Sd	t-test	df	p
Socio-emotional	14-16	199	3.17	.83	-2.27	422	**.024**
	16-18	225	3.35	.83			
Content-related	14-16	199	3.35	.82	-2.07	422	**.039**
	16-18	225	3.50	.90			

Discussion

By applying the factor analysis in order to group and reduce the primary list of 40 potential barriers, nine factors were identified: 1) socio-emotional, 2) content-related, 3) communication and support, 4) technical skills, 5) assessment, 6) technical conditions, 7) administrative, 8) organizational, 9) cheating on tests. Similar results were found in a study conducted on a sample of students where eight factors were identified: administrative problems, social interaction, academic skills, technical skills, time and support to learn, payment and Internet access, technical problems (Muilenburg & Berge, 2005). It is interesting that technical skills and technical problems stood out as a separate factor, which corresponds to the results of our research.

This data can be associated with the results of the studies which used a similar methodology and identified the following ten factors-barriers sorted by frequency: compensation and time, organizational changes, lack of technical skills, expertise and support, evaluation, supporting students, social interaction, administrative issues, legal issues, technology vulnerability (Berge & Muilenburg, 2003). There was also a difference found in the perceived barriers in relation to the type of job that adults do, so it was confirmed that higher education employees had a high ranking within the compensation and time factor, and a low ranking within the organizational factor, while primary education employees had a high ranking within three factors - organizational, administrative, and supporting students (Berge et al., 2002). In relation to the results of our research, we see that the isolated factors are similar to the studies mentioned, except for the content-related barriers and student cheating on tests as factors that are characteristic of younger students and are not expected to stand out in the adult sample. The isolation of the socio-emotional barriers as a separate factor can be connected to the results of another research (Hasan & Bao, 2020) which confirmed in a sample of students that e-learning leads to emotional problems such as stress and fear of failing the academic year.

The ranking based on the frequency of the isolated factors proved that cheating on tests is the most frequent barrier to distance learning. This result can be partly explained by the fact that our sample included students who are at such an age when they focus on achievement, since it allows them to go to the next grade, while at higher levels of educational achievement it is more often perceived as a result/achievement in mastering competencies necessary for future vocation. Moreover, assessment, administrative, organizational and content-related barriers were singled out as the most frequent ones. Similar data are indicated by the research conducted on a sample of university students in the same time period where it was confirmed that students prefer classroom (face to face) learning to online teaching, and claimed that problems associated with online learning are insufficient quality, lack of structure, problem in clarification of content, technical problems, lack of motivation (Nambiar, 2020). Also, students' passivity, detached communication, increased stress, and problems in performing practical tasks were identified as disadvantages (Marković et al., 2021).

By taking into account the difference in the age of the research participants, it was expected that the younger participants would highlight the quality of teaching as a more frequent barrier to mastering the learning content successfully. Our sample showed that the barriers within the communication and support factors were ranked low in terms of frequency, which indicates that students cooperated and helped each other, which means that cooperation can be used as a potential that can alleviate or neutralize other barriers in the future. Technical skills proved to be the least represented barrier, which was expected given the age of our participants and the presence of modern technologies in their daily lives, which in a way made it easier for them to adapt to distance learning.

Before a more detailed analysis of the isolated factors was conducted, it was necessary to look at the characteristics of the sample in relation to the research variables. In regards to the type of distance teaching, it is important to point out that our respondents opted for the most frequent type of distance teaching. The data showed that the majority of the participants participated in distance learning via mobile phone, followed by Google classroom, email, and the Meet and Zoom application. Similar results were obtained in another research conducted during the pandemic (Wargadinata et al., 2020) where it was found that the most common form of distance learning was via mobile phone (WhatsApp group), followed by e-learning, Zoom, and Google classroom. In addition to the frequency of this type of learning, the same study confirmed the success of using WhatsApp application in teaching, which allows us to compare this data with our data, since our study found that the most common form of distance learning was via mobile phone (Viber group) and that the majority of our participants achieved the highest grades during distance learning. Viber group and WhatsApp group are applications that are often used in everyday communication because they provide many opportunities to share different materials. It can therefore be concluded that all the possibilities of the Viber group were used in learning and that mobile phone served as a means of easy communication and transfer of necessary information and files, which can be related to the results of a research (Chen et al., 2020) that showed that students believed that the best effects of distance learning are achieved by combining synchronous and asynchronous learning.

By observing the characteristics of our sample, the data obtained can be observed in relation to the results of other studies that studied the barriers to mobile learning (m-learning) which were as follows: impracticality, unnatural interaction between teachers and students, anxiety about too many messages received, too much information they receive during the day (Alhassan, 2016); technical barriers such as battery life and device memory problems (Al-Said, 2015). Comparing these results with our research, we identified similar data because socio-emotional barriers, communication, and support were singled out as factors, in addition to two factors that focused on technical problems, which indicates the importance of this type of the problem.

The data obtained were further analyzed in relation to the manner of conducting distance learning. The results showed a significant difference only within the administrative problems factor, where students who used Google classroom and Zoom/Meet applications more often filled out various surveys and were excessively controlled by school administration, which they perceived as a barrier. Our assumption was that the barriers will be more pronounced in asynchronous learning, while they will be least pronounced in synchronous learning (meet, zoom applications) due to its similarity to real-life learning. We can explain the results by the structure of the sample itself, because the majority of our participants learned via a Viber group. This can also be a starting point for a more extensive research that would include primary school students and university students, which would include other types of distance learning. With regard to students' academic achievement during distance learning, it was confirmed that all barriers were more prevalent in students with a lower academic achievement compared to students with the highest academic scores, which is statistically significant for the communication and support factors. Although most of our participants had the highest academic achievement, it is expected that students who achieved less will more often perceive barriers during distance learning.

By analysing the isolated factors in relation to the participants' gender, it was found that male participants more frequently highlighted the barriers grouped within the communication and support factors, while the barriers within the assessment factor, technical skills and technical conditions were more frequent in female participants. As for the

participants' age, it was found that socio-emotional barriers and content-related barriers were statistically significantly more common in older participants (16-18 years of age) compared to younger participants (14-16 years of age). Similar data were indicated by another research (Muilenburg & Berge, 2005, p. 39) where it was confirmed that men more often singled out administrative barriers and barriers related to time spent and support compared to female participants. The same research obtained different data compared to our results regarding the age of the participants - it was found that in older respondents, the barriers such as social interaction, motivation to learn, time spent and support, administrative problems tend to decrease. This difference in data can be explained by the structure of the sample, since in our study the older group of the participants included students who were between 16 and 18 years of age, while the other study was conducted on a sample of adults where the youngest group of participants was between 18 and 24 years of age. Taking into account the difference in the sample structure, the results can be compared because the barriers such as social interaction and motivation to learn (in our research these were socio-emotional and content barriers) were identified in a similar age group of participants.

Conclusion

The research focused on high school education in Serbia during distance learning and singled out nine groups of barriers. The most frequent barriers were cheating on tests, assessment, administrative, organizational and content-related barriers, which indicates that high school students are critical of distance learning, pointing to significant problems such as: characteristics of individual subjects, inability to do exercises and practical work in a virtual environment, wasting time on technical-organizational aspects, insufficient focus on acquired knowledge, etc. The research also found that learning via mobile phone (Viber group) is the most common type of distance learning, which contributes to a better understanding of the obtained data and indicates that the identified frequency of barriers was caused by learning via mobile phone. When drawing conclusions, we must not lose sight of the research period, as well as the fact that the transition to online learning was unprepared and sudden, which justifies the frequency of these barriers in the sample of high school students.

Although the researchers are becoming increasingly interested in dealing with distance learning issues during the Covid-19 pandemic, when this paper was written there were still no published papers on this topic in our region, which once again confirms the importance of this research. It is important to note that although our research results identify different barriers, the common barriers are assessment, organizational, and content-related barriers, which indicates the importance of qualitative changes in the organization of learning in order to overcome them. However, the fact that socio-emotional barriers and communication and support barriers were isolated as factors, indicates that even in a pandemic, students' emotions should be addressed, empowered and supported, while positive communication and social interaction in a virtual environment should be encouraged in order to avoid emotional problems. The main pedagogical implication is surely the need to systematically approach the didactic-methodological education and professional development of teachers, which would improve the quality of distance teaching in those aspects that the most frequent barriers are related to. In addition to improving the competencies in these areas, it is necessary to empower teachers to share their experience and share examples of good practice through cooperative and teamwork, networking, assistance, and support.

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БАРИЈЕРЕ ТОКОМ РЕАЛИЗОВАЊА НАСТАВЕ НА ДАЉИНУ У ПЕРИОДУ ПАНДЕМИЈЕ ВИРУСА КОРОНА СА АСПЕКТА СРЕДЊОШКОЛАЦА У СРБИЈИ

Током 2020. године, у условима глобалне пандемије, када се цео свет суочио са вирусом корона, све области друштва, укључујући и образовање, суочиле су се са изазовом. Како је учење лицем у лице идентификовано као посебна претња заједници, е-учење је хитно уведено у образовни процес. Одлуком Владе Републике Србије[4] о обустави реализовања наставе од 15. 3. 2020. године све образовне активности на свим нивоима образовања пребачене су у онлајн-окружење и цео процес наставе се реализује путем наставе на даљину до краја школске 2019/2020. Иако настава на даљину није новина у нашој области, специфичне околности учиниле су све учеснике у процесу наставе недовољно припремљеним за овако радикалну промену. Одлучили смо да овај рад посветимо проучавању баријера са којима су се ученици суочавали током реализације наставе на даљину.

Циљ овог истраживања је идентификовати баријере током реализовања наставе на даљину из перспективе ученика. Истраживање је спроведено у мају и јуну месецу 2020. године на узорку од 424 ученика средњих школа са територије југоисточне Србије. У односу на варијабле истраживања, узорак је обухватио 108 мушких и 316 женских учесника; 199 учесника између 14 и 16 година и 225 испитаника између 16 и 18 година. Са аспекта академског успеха, структуру узорка чинио је највећи број испитаника са одличним успехом (336), док је најмање оних са добрим и довољним/недовољним постигнућем. У односу на начин извођења учења на даљину, највећи број испитаника користио је мобилни телефон (387), затим Гугл учионицу (30), а најмање заступљен вид учења био је путем мејла и Мит или Зум апликације. Коришћени инструмент је скала процене Ликертовог типа коју чини 40 ајтема, који обухватају различите баријере. У складу са природом инструмента, анализа добијених података је реализована коришћењем мултиваријантне статистике.

Баријере у настави на даљину током пандемије су идентификоване у оквиру девет група. Најучесталије баријере везују се за варање на тестовима, оцењивање, административне, организационе и садржајне препреке, што указује да средњошколци имају критички однос према проблемима наставе на даљину. Статистички значајне разлике потврђене су у оквиру фактора комуникација и подршка ($p<.001$) и академски успех. Подаци указују да су баријере најмање изражене код ученика са одличним успехом, а најчешће код ученика са довољним/недовољним успехом. Такође, социоемоционалне и садржајне баријере биле су значајно учесталије код старијих испитаника у односу на групу млађих испитаника.

4 *Одлука о обустави извођења наставе у високошколским установама, средњим и основним школама и редовног рада установа предшколског васпитања и образовања* (2020). Службени гласник Републике Србије, бр. 30.

Имплликације за праксу:

- *Неопходност системског уређења питања дидактичко-методичког усавршавања наставника у области компетенција за реализовањем наставе на даљину.*
- *Школски саветодавни рад треба да буде усмерен ка оснаживању ученика и наставника за примену различитих методичких поступака који би створили позитивну комуникацију и социјалну интеракцију и спречили емоционалне проблеме ученика.*
- *Организовати ситуације хоризонталног учења у којима би наставници унапредили вештине наставе на даљину кроз размену искустава, сарадњу и тимски рад.*

Кључне речи: *настава на даљину, електронско учење, пандемија вируса корона, факторска анализа*