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Personal Predictors of Online Teaching - Experiences of The Teachers in Serbia in The Covid Regime

Danijela Vasilijević[1*], *Žana Bojović*[1], *Marina Semiz*[1], *Danijela Sudzilovski*[1]

[1]Faculty of Education in Užice, University of Kragujevac, Republic of Serbia
e-mail: vasilijevic@pfu.kg.ac.rs, bojovic@pfu.kg.ac.rs, semizmarina@pfu.kg.ac.rs, sudzilovski@pfu.kg.ac.rs

Abstract: The pandemic of the COVID-19 virus initiated a rapid organizational transformation of teaching at all levels of education and its implementation in a virtual environment. In this context, teachers' perceptions of the predictors of online teaching largely determined the quality of its current implementation, but also the character of its further application in the future. Using the survey method, research was carried out with the aim of examining the attitudes of teachers in Serbia about personal predictors of online teaching and their determinants, in the past two school years. Personal predictors of online teaching are operationalized through the cognitive and affective competence of the teachers, as well as through organizational and technical support. Six hundred and seven teachers, who teach in the first three cycles of education, from all districts of the Republic of Serbia, participated in the research. Regarding all personal predictors considered, teachers evaluate cognitive competence as the most important predictor of the implementation of online teaching, then affective competence and finally, organizational and technical support. As the results of the research suggest, a significant influence of the dominant online experience, of the applied online platform, work experience and educational cycle on teachers' perceptions of affective competence as a predictor of online teaching were determined, while the perceptions of organizational and technical support were significantly influenced by the place where the school was located and the applied online platforms. The obtained results may have implications for pedagogical practice and professional development of teachers in terms of consideration and awareness of the role of various personal predictors required for the successful use of modern educational technology.

Keywords: online teaching, Covid-19; cognitive competence, affective competence, organizational and technical support.

Introduction

The pandemic of the COVID-19 virus initiated a rapid organizational transformation of the usual teaching and its implementation in a virtual environment. The forced closure of schools confronted teachers, students and parents with a completely new situation (Huber and Helm, 2020), which required an immediate transition to learning at home. The success and efficiency of external-factors-forced online teaching, largely depended on the technical and technological conditions of the school, the ICT and IPK competencies of teachers, the availability of ICT tools, and the possibility of teacher training in the domain of digital competencies. In most cases, the problem of lack of appropriate technical and pedagogical skills of teachers, key to the integration of teaching in a digital online environment, was identified (Schleicher, 2020). Hence, a need arose to review the roles of teachers and students, by observing the potential of the technological environment for online learning and teaching, both on the scientific- professional and on the application plan (Tsai et al., 2013).

Although digitization as a key issue of modern school was in the scientific and professional focus even before the pandemic of the COVID-19 virus, the transformation of ICT technologies was a surprise (did not live up to expectations) even in some developed countries, such as France and Italy (Fraillon et al., 2019; GEW, 2020). Hence, there was a need to examine competence predictors of online teaching, both in the developed and in the less developed countries of the world.

Generic models of teacher competencies can be viewed through a cognitive and affective motivational context (Blömeke, 2017). When it comes to the cognitive context, starting from Shulman's

*Corresponding author: vasilijevic@pfu.kg.ac.rs

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classification of teacher knowledge (Shulman, 1987), today we distinguish teachers' content knowledge (CK), pedagogical content knowledge (PCK) and general pedagogical knowledge (GPK) (Guerriero, 2017). However, a TPACK-model based on the intersections of their combinations was also developed (Mishra and Koehler, 2006). For example, the intersection of TK with CK and GPK results in technological pedagogical knowledge (TPK), which implies knowledge about technologies for the application in teaching practice, which are not related to a specific subject. So, it is about the general ability to apply technology in different situations of teaching and learning. Technological-pedagogical content knowledge or TPACK arises as a total cross-section of all categories of teacher knowledge (CK, GPK, TK and PCK). Starting from this corpus of professional knowledge, skills and abilities, the teacher can respond to today's challenges, including those caused by the COVID-19 virus. The experiences of teachers in this regard have been the subject of numerous research in the world in the past two years.

A particularly interesting research was conducted in Germany based on a survey of young primary and secondary school teachers of various profiles. The researchers (König, Jäger-Biela and Glutsch, 2020) chose a population of teachers with initial work experience, students who had just graduated - the generation of "digital natives" (Prensky, 2001) considering them relatively competent in using online teaching applications. One part of the research was related to the examination of the contribution of potential factors such as school computer technology, teacher competences in terms of technological-pedagogical knowledge, as well as learning opportunities for teacher education related to digital teaching and learning to the effectiveness of online learning.The information and communication technology (ICT) tools, especially digital competences of teachers, as well as the opportunities for teacher education for learning in the domain of digital competences, shown to be of critical importance for the adaptation of regular teaching in an online environment during school closures due to COVID-19.

Especially valuable is the research related to the pedagogical competences of teachers in the online environment. It has shown how important the creative synthesis of the online technology and pedagogical teaching technology is: without their good integration we cannot talk about the effectiveness of the teaching process. Even before the emergence of the COVID-19 virus pandemic, the necessity of integrating pedagogical principles of teaching and learning and the ICT environment was pointed out (Baker et. al, 2018). In this context, the findings of a German study show that the educators of initial education (teachers) in most cases indicate the importance of topics oriented to information and research, followed by "operation and application", "production and presentation", while "problem solving and modeling" based on on the use of the algorithm, were at the bottom of the list of choices (Jager-Biela, Kaspar and Konig, 2020). This raises the question of their competence.

In the domain of the affective-motivational area, an important predictor of effective online teaching is teachers` self-confidence, which has been shown to be one of the most important constructs of teachers` competence (Lauermann and Konig, 2016). Their readiness and perseverance in facing professional challenges also depends on the degree of self-confidence and trust in their own abilities. Teachers` self-efficacy is a decisive factor in the adaptation of teachers to the new situation caused by the virus (König, Jäger-Biela and Glutsch, 2020). A self-determined teacher strives for competence, for autonomy (which is a consequence of internal motivation) expressed by the need to build emotional relationships with all actors of the educational process (Tan and Hsu, 2017). The similar thing appeares in the findings related to students` learning in the online context, where the importance of self-regulation, motivation and positive dispositions of students for learning is particularly emphasized (Chiu and Hev, 2018). However, when it comes to motivation, there remains a wide field of unexplored possibilities of applying various motivational theories such as self-determination theory (SDT) (Rian and Deci, 2020), expectancy- value theory (Wigfield and Eccles, 2000), achievement goal theory (Senko, Hulleman and Harackiewicz, 2011) and control- value theory (Pekrun et al., 2017) in the field of online education, teaching and learning. The situation caused by the COVID-19 virus significantly contributes to the affirmation of research in this area. For example, a Taiwanese study, based on the application of three theories of motivation, aimed at examining students (before and after the pandemic) in relation to self-regulated learning, showed that the pandemic affected how students valued personal relevance and future expected feedback of online learning adoption; it has been shown that the gap between ideal and actual motivation must be overcome before implementing online learning. However, a research conducted in China, surveying 527 students of the OAS University of Teacher Education, showed that teachers could encourage self-regulated online learning by building a learning community and by designing collaborative learning activities (according to Chiu, Lin, and Lonka, 2021). Also, the nature of incentives, the convenience of learning, the quality of service, usefulness, the ease of use, teacher's attitude towards teaching, application of technology, usage habits, etc., proved to be relevant motivational factors (according to Chiu, Lin, and Lonka, 2021). The association of motivational profiles with online learners' self-regulation, and with affective learning

outcomes, was in the focus of an American study involving 556 online teachers. It was shown that in students with a high profile of motivation, self-regulation between students and content, and between students and teachers, was closely related to their affective learning outcomes, while self-regulation between students and teachers was in correlation with affective learning outcomes only in students with an average and low profile motivation (Cho, Cheon and Lim, 2021).

The experiences of Indonesian primary school teachers during the COVID-19 pandemic have shown that teacher support and motivation are indispensable topics of modern online teaching. In this sense, the establishment of online cooperation between the key bearers of the educational process (teachers, parents, school) is of particular importance for student achievement (Rachmadtullah et al., 2020).

How motivation and stress are closely related is also illustrated by an Italian study based on a survey of 688 teachers of all cycles of education, which showed that the influence of educational technologies negatively correlates with stress and motivation (Toto and Limone, 2021). That was the reason to additionally deal with the subject of teacher stress, as one of the key predictors of the quality of online teaching.

The fact that teaching is at the top of the list of the most stressful professions (Johnson et al., 2005), unfortunately is not denied even in the conditions of the COVID regime. On the contrary, the list of stressors has been significantly expanded. Common stressors, even before the pandemic included: pressure caused by heavy workload, time constraints, unbalanced integration of work and private life, limited autonomy, excessive administrative duties, complicated and strained relationships with colleagues and school management, role conflict/ambiguity, innovation management and changes, emotional exhaustion, fear of losing control over the class, fear of evaluation and low professional self-esteem (Mercer and Gregersen, 2020). That teaching in an online environment did not contribute to the improvement of the situation was supported by numerous contemporary observations. An international online survey of 600 language teachers found that the teachers reported significant level of stress. Positive psychological outcomes (well-being, health, happiness, resilience and professional improvement during trauma) were positively correlated with coping and negatively correlated with avoiding coping. A link was established between confrontational avoidance with negative outcomes (stress, sadness, anger, loneliness). As stress increases, confrontational avoidance also increases, although a confronting approach was used in stress groups (MacIntyre, Gregersen and Mercer, 2020). After the pandemic, the teachers in India also report stress as a result of online teaching, (13% high degree and 66% moderate degree), emotional exhaustion (11% high degree and 25% moderate degree) and a moderate level of depersonalization. Interestingly, almost all surveyed teachers or 99% of them, report a high level of personal achievement (Kumawat, 2020). Surveying online language teachers of various colleges based in the USA, from the aspect of the perceptual value of online language teaching, there were findings indicating that, in terms of adoption, teachers evaluate online teaching positively after the pandemic, although many prefer the hybrid model (Jin, Deifell and Angus, 2021). A group of scientists from Italy surveyed 107 teachers from Lombardy (an area that was among the first in Europe to be particularly affected by COVID-19), with the aim of examining the experience of teachers in online teaching, especially regarding the level of risk factors, protective factors and their impact on satisfaction levels during social distancing caused by the pandemic. It has been shown that stress and depression are the main predictors of the level of satisfaction with online teaching; that facing with, locus of control and self-efficacy are also relevant research factors. In that sense, the authors suggest the necessity of educational support and crisis-psychologically oriented services and assistance with the aim of maintaining psychological well-being (Truzoli, Pirola and Conte, 2021). The importance of the mediating role in terms of professional support in relation to stressors and the resistance mechanism, was also confirmed by a Romanian study based on a survey of 400 Romanian teachers (Obrad, 2020). In case of the absence of professional support and the absence of strengthening the teachers` capacity, their work engagement and performance, and thus the sustainability of the education system as a whole, can be questioned.

Materials and Methods

The changed conditions of life and work in Serbia, caused by the pandemic of the COVID 19 virus, required the Ministry of Education, Science and Technological Development to come up with an operational plan for continuing the work of schools in difficult conditions. To that end, on March 15, 2020, the Government of the Republic of Serbia, in accordance with the Decision on Proclamation of the State of Emergency ("Official Gazette of the RS", No. 29/2020, dated March 15, 2020) and the Decree on Measures During the State of Emergency ("Official Gazette of the RS", No. 31/2020, dated 16/03/2020),

passed the Decision on the Suspension of Teaching in Higher Education Institutions, Secondary and Primary Schools and the Regular Work of Preschool Education Institutions ("Official Gazette of the RS", No. 30/2020 of March 15, 2020). In accordance with the adopted Decisions, the educational and direct teaching work was temporarily suspended in all primary, secondary and higher education institutions, and in order to ensure their realization in the new, changed conditions, remote television teaching was designed and implemented. In cooperation with Radio Television of Serbia, recording and broadcasting of educational content for distance learning was organized through channels RTS 2, RTS 3 and the RTS Planet platform. The broadcasting of educational programs began on March 17, 2020, only two days after the declaration of the state of emergency in Serbia.

However, it soon became clear that it iwas necessary to do an internal systemic institutional implementation of online teaching at all levels of education. In addition to the health situation in the country, region, and municipality where the school was located, the nature and the extent of implementation was also determined by the education cycle. In such chaotic circumstances, often without prior training and preparation, education hastily moved on to different types of internal organization of online classes, which, with the loosening of the measures, would be further realized most often in combination with direct classes.These circumstances, precisely, encouraged us to base the research subject on the examination of personal professional predictors of successful online teaching.

The goal and tasks of the research. The perception of predictors of online teaching largely determines the quality of the actual implementation, and also the character of its operationalization in perspective. With the expectation that the teacher must be open to changes in the educational paradigm, including the goals, forms, contents and methods of teaching and learning (Villegas-Reimers, 2003), we, at the same time, try to find the answers to the question of how teachers manage in the new situation, which is often conditioned by the experience of one's own competence on the cognitive, affective and conative level, but also by the organizational and technical support of the work environment. Therefore, the goal of the research is focused on examining teachers' attitudes about personal predictors of online teaching. The perception of predictors of online teaching of teachers with different "COVID" professional experience, achieved in the past two school years in the Republic of Serbia, was examined. The goal of the research was operationalized through four scientific research tasks related to the examination: a) the perception of teachers' cognitive competence; b) teachers' affective competences; c) organizational and technical support essential for the effective implementation of the online teaching model established in the COVID regime of the organization of educational work; d) the influence of independent variables on the final results of the research.

Sample of the research. The research sample consists of 607 teachers from the Republic of Serbia who teach in the first three cycles of education. The quantitative case study approach was applied, with practical sampling. In order to be more representative, respondents from all districts of the Republic of Serbia were included, i.e. rural, urban and suburban schools, teachers of different ages, work experience, class teachers, but also teachers who teach in higher grades of primary school, secondary school teachers, users of different online platforms of different professional readiness (courses and training) and different organizational online experience (classical teaching, combined model, online teaching).

Table 1
Sample structure

Independent variables	Modalities	f	%
School/ Educational cycle	Lower classes of primary school	204	33.8
	Higher classes of primary school	250	41.4
	Secondary school	150	24.8
School/ locality	Rural	154	25.5
	Suburban	76	12.6
	Urban	374	61.9
Age	up to 30 years.	21	3.5
	from 31 to 40	134	22.2
	from 41 to 50	256	42.4
	over 50	193	32
Work experience	up to 5 years.	48	7.9
	from 6 to 10	69	11.4
	from 11 to 20	213	35.3
	from 21 to 30	181	30
	over 30 years.	93	15.4
Online platform	Google classrooms	411	68
	Teams Microsft	70	11.6
	Moodle	7	1.2
	Social networks	82	13.6
	Other	34	5.7
Online courses/ attendance	Yes	466	77.1
	No	138	22.9
Dominant COVID work experience	Classical teaching	48	8
	Classical teaching dominant		
	Online at times	149	24.7
	Online teaching, at times in combination with classical teaching		
		347	57.5
	Online teaching	71	11.8

Methods, techniques and instruments. A survey research method and two research techniques: survey and scaling were applied. The theoretical-empirical starting points of various studies, as well as the current situation in Serbia, were the basis for designing an online questionnaire, which, in addition to independent variables, considered topics related to teachers' experiences of personal predictors of online teaching, selected in three thematic units: 1) cognitive competencies of teachers; 2) teachers' affective competences 3) organizational and technical support (personal equipment and technical support of students and teachers). The research is an integral part of a more extensive research conducted in 2022 in the Republic of Serbia, which refers to the examination of teachers about the effectiveness of online teaching in the COVID regime.

Data processing and analysis. In order to identify the capabilities of the platforms and reveal the potential relationship between the different research variablesthe the descriptive analysis and quantitative analysis of the responses were applied. The obtained data were analyzed using the IBM SPSS 24.0 software package by calculating the Chi square, the contingency coefficient, and expressing the results as a percentage. Statistical significance was tested at the level of $p<.01$, $p<.05$ and $p <.001$.

Results and Discussions

Teachers' views about cognitive predictors of online teaching in the COVID regime

When it comes to the cognitive competencies of teachers, it is interesting to note that slightly less than four fifths of the respondents or 77.2% report that they attended some of the online courses. However, a serious majority of respondents (95.9%) declare that they are familiar with forms of distance education and that almost all of them, or 99.2%, are familiar with the possibilities of online classes. The percentage of teachers who were somewhat more critical in their assessment of their own ICT competencies in this matter is almost negligible. The distribution of teachers' responses is somewhat different regarding the assessment of PCT competencies. The ability to implement and organize online classes is positively evaluated by nearly two fifths of teachers (32.3% take a mostly positive and 11.1% an extremely positive attitude). Slightly less than two fifths or 36.8% of teachers are undecided on this issue, while one fifth evaluates PCT competencies negatively (2.6% strongly and 17.2% mostly).

It is particularly interesting that, in regard of the assessment of personal achievement and competences related to the adoption of online teaching, we obtained findings almost identical to the findings of the research conducted in India (Kumawat, 2020), and also in the other parts of the world (Jin, Deifell, and Angus, 2021). which points to the fact that teachers perceive their own competence indirectly through additional engagement and dedication to work and work duties. It is possible to interpret the results in the following way - teachers adopted what was expected of them by making maximum efforts in accordance with the sudden COVID situation. However, it is also evident that they are aware of the fact that the use of ICT technology a priori does not guarantee effective online teaching, and that PCT competencies play an important role, especially in the comparative situation of the effectiveness of the teaching process: online - classically organized teaching. The obtained findings of our diagnostic study can be the starting point for further comprehensive research of all the competencies of the TRCK model, and especially the PCT competencies of teachers of all three cycles of education.

Teachers' views on affective predictors of online teaching in the COVID regime

Based on the specific conditions in which online teaching was implemented in the past period, the data on teachers' affective competences were obtained by looking at the self-assessment of motivation, stress and satisfaction - readiness to implement online teaching even after the end of the COVID-19 virus pandemic.

The complexity of motivation of both students and teachers is further deepened in specific circumstances, i.e. when the situation changes for any reason, which results in completely different conditions for work and learning, the way in which the intended teaching content is presented to students and completely changed mutual relationships of the actors of the educational process (Brophy, 2015; Mercer and Gregersen, 2020). It is obvious that the new circumstances also affected the final results of the research in the domain of this research task.

Slightly less than half of the surveyed teachers or 46.5% were not motivated to actively participate in the organization of online classes even after the end of the pandemic (19.1% strongly and 27.4% mostly); one third did not express themselves on this issue (33.2%), while one fifth or 20.3% showed more enthusiasm on this issue.

Statistical significance was also observed showing that there were differences in the answers of teachers with different online experience in the past period in terms of motivation for the implementation of online teaching. It is interesting that teachers who occasionally and sporadically implemented online teaching during the pandemic were the least motivated for its implementation, followed by the teachers who exclusively realised teaching in classic, usual conditions (Table 2).

Table 2

Motivation of teachers for the implementation of online teaching of different online experiences

Online experience	Negative attitude		Undecided attitude		Positive attitude		Total
	f	%	f	%	f	%	f
Most part	42	28.5	15	21.13	14	19.72	71
Occasionally	236	68.4	53	15.36	56	16.24	345
At times	90	62,93	27	18.88	26	18.19	143
Without application	26	54.16	10	20.83	12	25	48
Total:	394	64,91	105	17.3	108	17.79	607

$\chi^2 = 22.435$; df = 12; p = .033

The reasons for such attitudes can be found in the fact that teachers with occasional and sporadic online experience were the most burdened with professional obligations, given that they implemented a mostly combined teaching model.

And the independent variable – the applied online platforms, had an impact on this segment of the research. Teachers who use the Moddle platform (which is the most suitable for online teaching and learning) show the greatest motivation for using online teaching, followed by Teams and Google Classroom users (Table 3).

Table 3

Teachers` motivation for the implementation of online teaching / implemented online platforms

Online platforms	Negative attitude		Undecided attitude		Positive attitude		Total
	f	%	f	%	f	%	f
Google	68	16.47	62	15.01	283	68.52	413
Teams	13	18.31	15	21.13	43	60.56	71
Social networks	11	13.93	22	27.85	46	58.22	79
Moodle	0	0	2	28.57	5	71.43	7
TV platform	7	26.93	5	19.23	14	53.85	26
Other	8	72.72	1	9.09	2	18.18	11
Total:	107	17.62	107	17.63	393	64.74	607

Users of social networks and television programs are the least motivated. There were also those who did not use any platform and they took a dominantly negative attitude on this issue ($\chi^2 = 56{,}317$; df = 24, p = .000). We are talking about teachers employed in rural areas whose work has a primarily individual character. Similar parameters were obtained when it comes to assessing students' motivation for active participation in online classes. Namely, the calculated Chi-square ($\chi^2 = 26.538$; df = 16, $p<.05$) clearly indicates that the difference in the frequency of responses is statistically significant between teachers with different lengths of work experience (Table 4).

Table 4

The views of techers with different work experience on students` motivation for active participation in online classes

Work experence	Negative attitude		Neutral attitude		Positive attitude		Total
	f	%	f	%	f	%	f
Up to 5 yeard	19	3.13	11	1.81	16	2.63	46
From 6 to 10	29	4.78	18	2.96	20	3.29	67
From 11 to 20	106	17.46	78	12.85	32	5.27	216
From 21 to 30	88	14.49	66	10.87	28	4.61	182
Over 30	41	6.75	28	4.61	28	4.61	97
Total:	283	46.62	212	34.92	139	22.9	607

The obtained findings can be interpreted in the context of the teacher's perception of student motivation in the distance teaching education system. Namely, more than two-thirds of teachers or 68.3% assess that students in the online teaching system are not motivated to actively participate in educational work (29.7% significantly and 38.3% mostly), one fifth of teachers or 20.5 % did not define their views, and only a tenth of the respondents or 11.2% positively evaluated the engagement of their students. Also, the assessment of slightly less than half of the teachers or 49.1% (24.8% strongly and 24.3% mainly) is that online teaching did not motivate students to further research and to acquire new knowledge (one third are undecided or 30.4%); one fifth does not agree with the stated statement - 20.5%). The most critical in the assessment are teachers who have 11 to 20 years of work experience, followed by teachers with experience ranging from 21 to 30 years.

The perception of students' stress, caused by the obligations imposed by the organization of online classes, is conditioned by the cycle of education in which teachers implement classes. Everyone generally agrees that online teaching is very stressful for students. Nevertheless, the Chi-square parameters indicate a high statistical significance in terms of the determined difference in the responses of teachers (lower primary school age), teachers of upper grades of primary school and secondary school teachers (Table 5). The obtained Chi-square ($\chi^2 = 21.124$; $df = 6$; $p = .002$) shows that lower primary school teachers more than other respondents predict stress as a negative predictor of the implementation of online classes (51.20%), followed by teachers of upper grades of primary school (43.2%), and finally secondary school teachers (30%).

Table 5

Teachers' views on online teaching as a predictor of student stress

School age	No		Yes		Undecided		Total
	f	%	f	%	f	%	f
Lower classes of primary school	41	19.80	106	51.20	60	28.98	207
Upper classes of primary school	41	19.80	108	43.2	101	40.4	250
Secondary school	37	24.66	45	30	68	45.33	150
Total	119	19.60	259	42.67	229	37.73	607

It is certain that the teacher's perception of student motivation defines attitudes about their own motivation to work in an online environment. Other researchers also observe teaches` dissatisfaction caused by insufficient student interaction (Nambair, 2020) as well as by lack of motivation to cooperate (Nikolić and Milivojević, 2020).

Teaches` stress caused by a different organization of the teaching process produced by the COVID-19 virus pandemic, proved to be an important competence predictor. Only 6.8% of teachers do not report stress as a relevant factor, while slightly under three fifths or 73.1% perceive the organization of online teaching as stressful.

Almost identical results were obtained in the aforementioned study conducted in India (Kumawat, 2020). It is evident that the majority of teachers find it difficult to bear the significant increase in the scope of professional obligations reported by as many as 93.8% of the surveyed teachers. It is no coincidence that the same percentage of teachers report being under stress and strongly agree with the statement related to the increase in professional obligations (73.1%), and that there is an almost identical percentage of respondents who were undecided about stress, and who also mostly report increasing of their professional obligations. These findings are also in agreement with foreign studies (Mercer and Gregersen, 2020). Our research also confirmed that motivation and stress are closely related, and that in this context, the influence of educational technologies is not affirmative (Toto and Limone, 2021).

Considering that stress is one of the key predictors of the level of satisfaction with online teaching (Truzoli, Pirola and Conte, 2021), it is clear that the personal experience of online teaching is crucial for teachers' commitment to its implementation in the future. When it comes to teachers' assessment of the implementation of online teaching in perspective, it is interesting that about half of the teachers show their willingness to organize online teaching even after the end of the measures. A little over one third or 36.75% do not show interest, while 11.3% are undecided on this issue. However, only 20.53% of teachers showed readiness to self-initiatively organize online classes, slightly more are undecided (27.81%), while half of the teachers (51.66%) clearly show that after the end of the COVID measures,

they will apply only classical classes. Although at first glance the findings seem contradictory, it is possible that their attitude towards the inclusion of online classes is conditioned by external factors (if the school management, parents, children... require it). The perspective of distance learning is completely certain and the respondents are fully aware of this fact, but with the view that in extraordinary circumstances online teaching can be an alternative to regular teaching, while in real circumstances it can only serve as an aid in regular teaching (Nikolić and Milojević 2020; Sutiah et al., 2020; Terenko and Ogienko 2020).

Teachers' views on organizational-technological predictors of online teaching in the COVID regime

Personal equipment and technical equipment are an important predictor of effective online teaching. We were interested in the personal, material and technical conditions of online work of teachers and students at home. Slightly less than half of teachers (48.3%) report that they do not have the appropriate equipment for work, slightly less than one third or 29.9% did not say anything about this issue and approximately as many (31.8%) positively evaluate this type of online teaching support.

According to the assessment of city school teachers, two fifths of students (37.6%) have appropriate equipment for online teaching, while the attitude of their colleagues working in suburban and rural schools is somewhat different: about one fifth of students (26.1%) have appropriate equipment.

The non-uniformity of teacher's responses is visible through the indicators of statistical significance of the Chi-square, where high significance is identified at the 0.01 level. The Chi square value ($\chi^2 = 25.995$; df = 8; p = .001) clearly indicates the existence of statistically significant differences in the answers of teachers employed in rural and urban areas (Table 6). On the whole, which was to be expected, teachers employed in city schools are more satisfied with the material and technical conditions of the school; followed by those employed in suburban areas.

Table 6

Teachers' views on the material and technical conditions of students for active participation in online classes

School location	Negative attitude		Undecided attitude		Positive attitude		Total
	f	%	f	%	f	%	f
Rural	78	50.32	47	30.32	30	19.36	155
Suburban	37	45.12	26	31.71	19	23.17	82
Urban	115	31.08	146	39.46	109	29.46	370
Total:	230	37.89	219	36.08	160	26.36	607

We should have in mind the fact that internet signal coverage is not the same in every geographical area, which certainly had an impact on the satisfaction with school equipment for those employed in rural areas. Differentiation of answers also appeared in terms of the material and technical personal equipment of the students, considering the place where the school is located. It was to be expected that the teachers of rural schools rated the material and technical equipment of students for the realization of online classes the worst (50.32%), followed by teachers of suburban schools (45.12%), while the teachers employed in city schools rated somewhat more favourably this significant predictor of effectiveness of online teaching. The findings indicate the necessity of improving the material and technical equipment of school institutions in order to equalize the efficiency and effectiveness of educational systems, regardless of the place where the school is located and the type of school (OECD, 2016, 12).

It was also shown that the teachers who taught mainly through television transmission (RTS2, RTS3, RTS Planeta) rated the material and technical equipment of the students the best, which was to be expected (Table 7). The most skeptical in this regard were teachers whose students worked on the Moodle platform ($\chi^2 = 45{,}851$, df = 24, p = .005).

Table 7
Teachers' views on material and technical equipment of students / applied online platforms

Applied online platforms	I do not agree		Undecided		I agree		Total
	f	%	f	%	f	%	f
Google	149	36.17	165	40.05	98	23.79	412
Teams	26	35.62	19	26.03	28	38.39	73
Social networks	40	59.64	23	29.11	16	20.25	79
Moodle	2	25	3	37.5	3	37.5	8
TV platform	9	37,5	4	16,66	11	45,83	24
Other	5	45,45	4	36,36	2	18,18	11
Total:	231	37,73	218	35,91	158	26,03	607

Given that the technical equipment of key actors is a basic assumption of the effectiveness of online teaching, the obtained findings cannot be considered affirmative. However, it should be kept in mind that the sample of teachers surveyed, is stratified in terms of the implementation of teaching in the first three cycles of education, as well as the experiences related to the application of the hybrid and complete online teaching model. The students of the first cycle were involved in the virtual teaching system for the shortest period of time and compared to others, they used complex platforms for distance learning the least, so it was not even expected that they would have appropriate ICT support. On the other hand, the devastating fact that teachers do not have adequate equipment for work can be partially explained by the fact that a number of teachers used the available material and technical resources of the school.

Conclusions

The general and personal readiness of the key actors of the educational process immediately before the pandemic of the COVID-19 virus largely determined the character and success of online teaching (Bozkurt et al., 2020). Competence predictors of online teaching influenced the speed and degree of adaptation of teachers to external factors caused by the situation. Nevertheless, in addition to different previous experiences, the findings of our research are in agreement with similar foreign studies, which leads to the conclusion that teachers around the world faced similar challenges during the COVID-19 pandemic.

It has been shown that during the virus pandemic, teachers mostly completed some of the online training courses at a distance, that they rate their own knowledge of the forms of distance training very highly, as well as the possibilities of online teaching (the results should be taken with a grain of salt due to potential subjective introspective evaluation). Almost half of the teachers declare that they are not motivated for active participation in online classes, two-thirds rate the students as unmotivated, and one half of the teachers believe that the students are not motivated for additional activities and research. Teachers generally perceive the organization of online classes as stressful, and almost all of them are unanimous in their assessment of the increase in their own professional obligations. The willingness to organize online classes even after the end of the measures (if necessary) was expressed only by about half of the respondents, while a fifth of the teachers opted for self-initiative organization. When it comes to material and technical equipment, it turned out that neither teachers nor students have adequate personal resources.

The general conclusion is that there is a need to encourage the development of teachers' competencies in teaching, especially with regard to the acquisition of PCK competencies, that continuous systemic support and incentives for teachers to create a comfortable environment for efficient work are necessary, that it is necessary to reduce the scope of unnecessary professional obligations of teachers, especially to look at stressors and workload of teachers who work according to the hybrid model, to indicate the role and importance of personal material and technical support for modern teaching. The general statement mentioned, is in accordance with the Action Plan on Digital Education of the European Commission (2018, 5-6), which insists on: 1. better utilisation of digital technology for learning and

teaching, 2. development of digital competencies and skills needed for life and work in the age of digital transformation and 3. providing support to schools in the form of broadband networks and the use of a new tool for self-assessment of the use of technology for teaching and learning (SELFIE).

Personal experience of competences, digital training and material and technical prerequisites are essential assumption for the professional development of teachers. In this context, awareness of the potential risk factors related to the use of modern educational technology is of particular importance for assessing the current situation, and providing systemic support during work with the aim of improving the final performance of teachers in the future. Accordingly, it is necessary to build models of prevention and intervention, which will consequently affect the achievement of students, and thus result in the general satisfaction of all participants in the educational process (Sprenger and Schwaninger, 2021).

Given the fact that our research is an integral part of a larger study that examines the effectiveness of online teaching in the Republic of Serbia in the COVID regime, we were limited in terms of a more comprehensive overview of the indicated research problem. Namely, the obtained research results stimulated our research curiosity and, accordingly, future research should be focused on a more detailed understanding of the role and importance of individual competence personal predictors which are the keys to the successful implementation of online teaching (qualitative longitudinal research based on open-ended questions; experimental development of system support instruments for their improvement, both in the organizational conditions of hybrid and online classes). The connection between personal predictors and modern teaching should be observed in different organizational contexts, which should not be opposed to each other, whereby classically organized teaching remains an irreplaceable organizational form in terms of humanizing relationships and socializing students (König, Wagner and Valtin, 2011).

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Conflict of interests

The authors declare no conflict of interest.

Author Contributions

Conceptualization, D. N. V., Ž. P. B, M. Ž. S. and D. M. S.; Data curation D. N. V., Ž. P. B, M. Ž. S. and D. M. S.; Methodology, D. N. V., Ž. P. B, and D. M. S., Formal analysis, D. N. V., Ž. P. B, and D. M. S.; Project administration, D. N. V. and Ž. P. B.; writing—original draft preparation, D. N. V., Ž. P. B, M. Ž. S. and D. M. S.; writing—review and editing, D. N. V., Ž. P. B, M. Ž. S. and D. M. S. All authors have read and agreed to the published version of the manuscript.

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