E-Learning Platforms in Teaching Process – Demographic Factors Influencing Teachers' and Students' Attitudes

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Abstract

E-learning is learning using information and communication technologies. One of the possible applications is the use of e-learning platforms in the teaching process, which enables numerous ways of presenting teaching content and provides new opportunities for expanding knowledge through teaching without space and time limitations. The research aims to examine and determine the teachers' and students' attitudes toward the use of e-learning platforms in the teaching process, as well as to determine whether demographic factors including age, gender and work position influence their attitudes. In the research conducted in elementary schools in Vojvodina, a survey method was used and an anonymous questionnaire was filled out by 100 teachers and subject teachers, as well as a questionnaire filled out by 103 students from 1st to 8th grade. The research results indicate a generally positive teachers' and students' attitude towards e-learning. The examinees

acknowledge its application as an opportunity to present teaching materials in a more modern and interesting way and to enable teaching that leads to the recognition of students' personal affinities and improvement of their abilities in different domains. Based on the research results, it can be concluded that e-learning provides numerous opportunities for improving the teaching process. Thus, the existence of positive attitudes should be used to create systematic and planned e-learning. On the other hand, it is necessary to additionally encourage those who do not have positive attitudes to understand the importance and possibilities of implementing e-learning platforms, which can be achieved through professional development and lifelong learning.
Keywords: distance learning, e-learning, information and communication technologies, learning management systems, on-line learning

Introduction

Modern technologies that have become an integral part of everyday life play an important role in the world that surrounds us. Nowadays, the rapid scientific and technological development enables artificial intelligence methods to be used in many scientific disciplines, among other things, for the development and improvement of speech technologies that enable communication between humans and computers through speech (Sovilj-Nikić et al., 2014; Sovilj-Nikić et al., 2018; Sovilj-Nikić et al., 2019). New technologies, including information and communication technologies (ICT), inevitably appear in all segments of modern society as well as education.

Electronic learning (e-learning) means learning by using information and communication technologies. The contemporary level of development provides almost unlimited possibilities for their application in education. One of the possible applications of ICT is the use of e-learning platforms in the teaching process. It enables numerous ways of presenting teaching content and provides new opportunities for expanding knowledge through teaching without space and time limitations. E-learning is a way of learning which implies that teaching material is delivered to students using electronic technologies (Khan, 2004). Electronic learning can complement traditional learning. In that case, this learning model represents a combination of traditional teaching and teaching using ICT, and that is a hybrid learning model. On the other hand, electronic learning can be realised as an independent form of learning, and that is distance learning or online learning. There are two models of distance e-learning: the asynchronous and the synchronous model. Asynchronous learning enables independent learning adapted to the individual needs of students in

accordance with the tempo and learning style of each individual. The teaching process works by the teacher placing the teaching content on the appropriate platforms. Teaching material can include audio and video presentations. In this learning model, multimedia content is always available to the student, and communication between the student and the teacher takes place via e-mail, forums or some other communication tool. The student and the teacher do not have to be online at the same time. Unlike the asynchronous model, the synchronous learning model involves learning in real time. In this form of learning there is immediate communication. The direct interaction between teacher and student allows immediate feedback. All participants participate in classes at the same time regardless of their physical location. This type of teaching is implemented using tools for online communication such as audio and video conferences.

In addition to enabling interactive learning adapted to the individual needs of students, electronic learning has a number of other advantages. Research has shown that e-learning is the best alternative in situations where access to education is limited (Kisanga & Ireson, 2016). This advantage proved to be effective during the COVID-19 pandemic when it was the only way to maintain the continuity of the teaching process. Zrim Martinjak (2023) conducted research aiming to identify predictors of student satisfaction with distance learning during the COVID-19 pandemic in order to improve it and offer insights into programme implementation and students' needs according to the students' individual characteristics. These findings indicate that student satisfaction is statistically significantly predicted by both study and other individual characteristics and circumstances faced by students. Bakr and Zidin (2023) state that e-learning is characterised by flexibility and time efficiency because it allows students to access teaching materials when it suits them best. This strengthens their autonomy and engagement (Riberić, 2018). Furthermore, e-learning encourages students to learn by themselves, which is necessary for the development of critical thinking and problem-solving skills (Bakar & Zidin, 2023). Svalina (2022) points out that teachers believe that the harnessing of ICT can bring new opportunities for organising teaching and learning, open unlimited opportunities that did not exist before, and increase the quality of teaching materials and the availability of education. In addition to the mentioned advantages, the findings of previous research also indicate the challenges that e-learning brings. The biggest challenges associated with e-learning are finding an adequate place for learning, infrastructure and technical equipment that require certain financial resources, maintaining contact and agreements between teachers and students, more time-consuming preparation of teaching materials, assessment methods, insufficient digital competence of teachers, lack of direct supervision and face-to-face interaction that can lead to loss of motivation

(Nouraey & Al-Badi, 2023). Therefore, the successful implementation of e-learning systems in the management of knowledge and educational needs requires the identification of technical, technological, cultural and other challenges of e-learning. Overcoming these challenges requires the creation of technological infrastructure and the adoption of standards, as well as the harnessing of previous experiences of other countries with a long tradition in the application of e-learning (Shahomoradi et al., 2018).

The Technology Acceptance Model (TAM) explains user acceptance of technology and indicates that user intention to use technology depends on three factors: perceived usefulness, perceived simplicity of use, and attitude towards harnessing. Perceived usefulness and perceived simplicity of use influence the user's attitude towards the harnessing of technology (Davis, 1989). Therefore, teachers' attitudes towards e-learning and the use of e-learning platforms are crucial for its successful integration into the educational system, as indicated by the research findings (Karimi, 2023). Having in mind that e-learning implies interaction and two-way communication between teachers and students, students' attitudes towards e-learning and the use of e-learning platforms in the teaching process are also extremely important for successful implementation. Therefore, this research aims to examine and determine the teachers' and students' attitudes towards e-learning and the use of e-learning platforms in the teaching process, as well as to determine whether demographic factors, including age, gender and work position in school influence their attitudes.

Research material and method

The research in this paper was carried out in elementary schools in the territory of Vojvodina, which is an autonomous region within the Republic of Serbia. In the research, a survey method and anonymous questionnaire were used. The anonymous questionnaire was filled out by 100 teachers and subject teachers. The first part of the questionnaire contains demographic questions related to the age, gender and work position of teachers in school. The second part of the questionnaire is shown in Table 1. The questionnaire for students was filled out by 103 students from 1st to 8th grade. The first part of the questionnaire contains demographic questions related to the age and gender of students. Table 2 shows the second part of the questionnaire. Before the research, parents and students were informed about the aim of the research and that the results would be used exclusively for scientific purposes. After that, they gave their verbal consent for the students to participate in the research. The general research hypothesis is that students and teachers have a mostly positive attitude to-

wards e-learning and the use of e-learning platforms in the teaching process. Specific hypotheses relate to examining the influence of demographic factors on teachers' and students' attitudes towards e-learning and the use of e-learning platforms in the teaching process. These hypotheses are listed below.

H1: The age of teachers does not influence their attitudes towards e-learning and the use of e-learning platforms in the teaching process.
H2: The work position in school does not influence teachers' attitudes towards e-learning and the use of e-learning platforms in the teaching process.
H3: The age of students does not influence their attitudes towards e-learning and the use of e-learning platforms in the teaching process.
H4: The gender of students does not influence their attitudes towards e-learning and the use of e-learning platforms in the teaching process.

The t-test of independent samples was applied to test the specific research hypotheses. The statistical t-test was performed using the SPSS software package.

Table 1. Questionnaire for teachers

Statement
E-learning is more interesting; the material is remembered faster and is more long-lasting.
E-learning enables greater success; the student is more motivated for this type of learning.
Preparing lessons using e-learning platforms takes more time than traditional teaching.
Complete individualisation of students and progress at their own tempo is achieved.
A lot of textual and audiovisual information
Better communication with students is achieved through e-learning platforms .

Table 2. Questionnaire for students

Question
Are you more motivated to learn when using e-platforms?
Do you achieve better communication with teachers through e-learning platforms?
Does the electronic form of learning allow you to progress at your own tempo?
In e-learning, does the teacher pay attention to each student according to their needs?
After learning via e-learning platforms, are you able to apply the material you learned?

The first part of the questionnaire contains demographic questions related to age, gender and work position in school. The research sample consisted of 100 teachers, where 88 (88%) were female and 12 (12%) were male. The largest part of the sample are teachers between the ages of 41 and 60 (64%). The smallest number of examinees is under 30 years old. The largest number of examinees (57%) are employed in upper grades of elementary school as subject teachers, while 35% of them work in lower grades as teachers. The smallest part of the sample (8%) are examinees who are engaged in all grades of elementary school.

In the sample that consisted of students, 60 (58.3%) were female and 43 (41.7%) were male. In the structure of the sample with regard to the class that the examinees attended at the time of the research, more than two-thirds of students (68%) attend higher grades.

Results and discussion

In the second part of the questionnaire, there are questions which enable the determination of the teachers' attitudes towards e-learning and the use of e-learning platforms in the teaching process. The research results show that as many as 99% of examinees believe that the computer can be a useful tool in the lessons' preparation and teaching. This is significant information, given that the examinees were of different genders and ages and that they work with students of different ages. Despite the demographic differences, almost all of them believe that computers are useful in the lessons' preparation and teaching. The largest percentage of examinees (69%) believe that students are most engaged when the blended teaching model is applied, while the smallest percentage (4%) believes that students are most engaged when using the electronic teaching model. Almost a third of teachers believe that student engagement is highest in traditional teaching. Although the following question is not directly aimed at examining teachers' attitudes towards e-learning and the harnessing of e-learning platforms in the teaching process, it is extremely important to examine whether the school where they work has the necessary equipment for the implementation of e-learning. Almost all examinees (97%) stated that the school where they work has all the necessary equipment and provided conditions for working on a computer and using e-learning platforms. A third of examinees stated that they did not use e-learning before the COVID-19 pandemic, another third stated that they used it more than 10 times during the semester, while also one third used e-learning 3-10 times during the semester.

Table 3 shows the frequency of examinees' level of agreement with certain statements, on the basis of which it is possible to determine teachers' attitudes towards

e-learning and the harnessing of e-learning platforms in the teaching process. A modified Likert-type scale was used to assess the level of agreement. Based on the results shown in Table 1, it can be concluded that the teachers partially or completely agree that the harnessing of e-learning makes teaching more interesting, that the material is remembered faster and that the knowledge is more long-term. A significant percentage of examinees (53%) partially or completely agree with the statement that e-learning enables greater success because the student is more motivated for this form of learning. It is important to point out that almost a quarter (23%) of examinees have an ambivalent attitude towards this statement. The time needed to prepare lessons using e-learning platforms should be mentioned as the negative characteristic of e-learning from the teacher's point of view. Namely, as many as 61% of examinees mostly or completely agree with the statement that for this form of teaching they need significantly more time to prepare than for traditional teaching. Also, as a potential drawback of e-learning, the impossibility of achieving adequate communication with students should be mentioned, having in mind that as many as 44% of examinees state that they completely or mostly disagree with the statement that through platforms they achieve better communication with students. As the greatest

Table 3. Teachers' attitudes towards e-learning

	Completely disagree	Mostly disagree	I do not know	Mostly agree	Completely agree
E-learning is more interesting; the material is remembered faster and is more long-lasting.	5%	20%	16%	32%	27%
E-learning enables greater success; the student is more motivated for this type of learning.	6%	18%	23%	38%	15%
Preparing lessons using e-learning platforms takes more time than traditional teaching.	7%	19%	13%	25%	36%
Complete individualisation of students and progress at their own tempo is achieved.	8%	17%	22%	36%	17%
A lot of textual and audiovisual information	2%	3%	12%	29%	54%
Better communication with students is achieved through e-learning platforms.	17%	27%	16%	27%	13%

advantage of e-learning, the largest number of examinees (83%) states a lot of textual and audio-visual information.

Based on the research findings, it can be concluded that the teachers who were the research sample have a mostly positive attitude towards e-learning and the use of e-learning platforms in the teaching process, thus confirming the general research hypothesis.

In order to determine whether demographic factors influence teachers' attitudes towards e-learning and the use of e-learning platforms in the teaching process, appropriate specific hypotheses were set, and the t-test of independent samples was applied to test the research hypotheses. The statistical t-test was performed using the SPSS software package. Below are the research hypotheses.

H1: There are no statistically significant differences in teachers' attitudes towards e-learning and the use of e-learning in the teaching process depending on the age of the examinees.

H2: There are no statistically significant differences in the attitudes of teachers towards e-learning and the use of e-learning in the teaching process depending on the age of the students they work with.

In the case of examining the influence of the age of the examinees on their attitudes towards e-learning and the use of e-learning in the teaching process, the independent variable age of the examinees was divided into two age categories. The first category consisted of examinees up to 40 years old. In the second category, there are examinees aged 41-60 years. The dependent variable in the analysis was the summation score on the questionnaire, which examined examinees' attitudes towards e-learning and the use of e-learning in the teaching process. The results of the analysis are presented in Table 4.

Table 4. Dependence of attitudes on teacher's age

Age		Mean	Std. deviation	t	p
up to	40	31.75	9.69	-.54	.2
	40-61	32.82	7.00		

Based on the obtained results, it can be concluded that there are no statistically significant differences in teachers' attitudes towards e-learning and the use of e-learning in the teaching process depending on the age of the examinees, thus confirming hypothesis H1.

In the case of examining the influence of the workplace in the school, that is, the age of the students they work with, on their attitudes towards e-learning and the use of e-learning in the teaching process, the independent variable, the age of the students, was divided into two categories. The first category consisted of examinees who work with lower-grade students and work as teachers in school. In the second category there are examinees who work with students of higher grades and work as subject teachers in school. The dependent variable in the analysis was the summation score on the questionnaire that examined the examinees' attitudes towards e-learning and the use of e-learning in the teaching process. The results of the analysis are presented in Table 5.

Table 5. Dependence of attitudes on work position

Work position	Mean	Std. deviation	t	p
teacher	34.85	7.12	2.26	.42
subject teacher	31.01	8.32		

Based on the obtained results, it can be concluded that there are no statistically significant differences in teachers' attitudes towards e-learning and the use of e-learning in the teaching process depending on the workplace in the school. Therefore, the research hypothesis H2 is accepted.

In the second part of the questionnaire for students, there are questions which allow the determination of students' attitudes towards e-learning and the use of e-learning platforms in the teaching process. The results of the research show that students, as well as teachers, believe that the computer can be a useful tool in teaching. However, it should be noted that the largest percentage (87.4%) of students agree with the above, but a significantly larger number of students (12.6%) than teachers do not agree with it.

Table 6 shows the frequency of students' answers to questions that are directly aimed at examining their attitudes towards e-learning and the use of e-learning platforms in the teaching process. Approximately half of the examinees agree that they are more motivated to learn when using e-learning platforms, that they do their homework more successfully, that they achieve better grades by using platforms for checking knowledge, that the electronic teaching model allows them to progress at their own tempo, and that within e-learning the teacher devotes herself/himself to each student according to her/his needs. On the other side, the other half of the examinees disagree with these statements. Furthermore, as an interesting data point,

it should be mentioned that 65% of examinees believe that through e-learning platforms they do not achieve better communication with teachers, which is in correlation with the attitudes of teachers.

In order to determine whether demographic factors affect students' attitudes towards e-learning and the use of e-learning platforms in the teaching process, appropriate hypotheses were set, and the t-test of independent samples was applied to test the research hypotheses. The statistical t-test was performed using the SPSS software package. Below are the research hypotheses.

H3: There are no statistically significant differences in students' attitudes towards e-learning and the use of e-learning in the teaching process depending on the age of the examinees.

H4: There are no statistically significant differences in students' attitudes towards e-learning and the use of e-learning in the teaching process depending on the gender of the examinees.

Table 6. Students' attitudes towards e-learning

	Yes	No
Are you more motivated to learn when using e-platforms?	48.5%	51.5%
Do you achieve better communication with teachers through e-learning platforms?	35%	65%
Does the electronic form of learning allow you to progress at your own tempo?	50.5%	49.5%
In e-learning, does the teacher pay attention to each student according to their needs?	52.4%	47.6%
After learning via e-learning platforms, are you able to apply the material you learned?	64.1%	35.9%

In the case of examining the influence of the examinees' age on their attitudes towards e-learning and the use of e-learning in the teaching process, the independent variable, the age of the examinees, was divided into two categories. The first category consisted of students from the lower grades of elementary school. In the second category there are students who attend higher grades of elementary school. The dependent variable in the analysis was the summation score on the questionnaire that examined students' attitudes towards e-learning and the use of e-learning in the teaching process. The results of the analysis are shown in Table 7.

Table 7. Dependence of attitudes on a student's age

Grade	Mean	Std. deviation	t	p
1st – 4th	14.06	2.69	-2.68	.09
5th – 8th	12.47	2.85		

The obtained results indicate that there are no statistically significant differences in students' attitudes towards e-learning and the use of e-learning in the teaching process depending on the age of the examinees, thus confirming hypothesis H3.

In the case of examining the influence of the gender of the students on their attitudes towards e-learning and the use of e-learning in the teaching process, the independent variable, the gender of the students, was divided into two categories. The first category consisted of girls, and the second category consisted of boys. The dependent variable in the analysis was the summation score on the questionnaire that examined students' attitudes towards e-learning and the use of e-learning in the teaching process. The results of the analysis are presented in Table 8.

Table 8. Dependence of attitudes on a student's gender

Gender	Mean	Std. deviation	t	p
female	13.01	3.04	.14	.04
male	12.93	2.68		

Based on the obtained results, it can be concluded that there are statistically significant differences in students' attitudes towards e-learning and the use of e-learning in the teaching process depending on the gender of the students. The research results indicate that girls who participated in this research have statistically significantly more positive attitudes towards e-learning and the use of e-learning platforms in the teaching process compared to boys. The research results indicate that the arithmetic mean of the answers for girls is 13.01, while the arithmetic mean for boys is 12.93. Therefore, the research hypothesis H4 is rejected.

The findings of this research are in accordance with the findings of other similar research conducted in the Republic of Serbia. The findings of the research (Milenković et al., 2022), whose aim was to determine the similarities and differences between the attitudes of mathematics teachers and students of higher grades of elementary school about distance learning, indicate that students and teachers believe

that distance mathematics teaching is effective. In the research (Županec, 2023), which deals with determining the effectiveness of teaching biology realised using computers, 70% of examinees completely or partially disagree with the statement that teaching can be effectively carried out without the use of computers. In the research within this paper, even 99% of teachers believe that the computer can be a useful tool for teaching. The research findings in this paper show that two-thirds of students and almost half of teachers believe that using e-learning platforms does not achieve better mutual communication. Similarly, according to the findings of one study (Jovanović & Dimitrijević, 2023), communication between students and teachers represents one of the biggest challenges of distance learning. According to research (Neralić, 2023), the majority of students believe that teaching at school is of better quality compared to distance learning. They point out, as the most important reasons, easier monitoring of classes, better explained material that they understand better, better communication, and the possibility of easier memorisation and learning during school classes.

The research results in this paper indicate that there are no statistically significant differences in teachers' attitudes towards e-learning and the use of e-learning platforms in the teaching process depending on the age of the examinees. Similar findings were obtained in the research (Vrkić Dimić & Vidov, 2019) of teachers' attitudes about the use of computers in the teaching of nature and society. The results of this paper also showed that the workplace in the school does not affect the attitudes; that is, there are no statistically significant differences in the attitudes between teachers and subject teachers towards e-learning and the harnessing of e-learning platforms in the teaching process. Furthermore, no statistically significant differences were found in the attitudes between students of lower and upper grades of elementary school towards e-learning and the harnessing of e-learning platforms in the teaching process. When determining differences in attitudes depending on the gender of students, obtained results indicate that girls have statistically significantly more positive attitudes towards e-learning than boys. Similar findings were obtained in a study (Komnenić & Milanović, 2021) whose goal was to examine the attitudes of elementary school students about the quality of distance learning during the COVID-19 pandemic. Boys stated the shortening of lessons as one of the advantages of such a form of teaching, while girls emphasized the quality and interest of distance learning.

The obtained results show guidelines and implications applicable in practice. The existence of positive attitudes of both students and teachers towards electronic learning should be used for the purpose of a systemic and plan-driven e-learning system and the use of digital platforms in the teaching process. Furthermore, it is neces-

sary to encourage teachers who do not have positive attitudes towards e-learning to understand the importance of this concept, as well as the most adequate techniques to apply it in their practice. This is closely related to the topic of lifelong learning and professional development of employees in schools. Having in mind that girls have more positive attitudes towards e-learning than boys, it is possible to include them in activities aimed at increasing boys' motivation for active involvement in the electronic learning process.

Conclusion

The research results show that the attitude of teachers and students towards e-learning and the use of e-learning platforms is mostly positive. Almost all examinees believe that the computer is a useful tool for preparing lessons and teaching. Most teachers realise e-learning and the use of e-learning platforms are an opportunity to create multimedia teaching material. This kind of material is more interesting for students, increases their motivation and encourages creativity as well as enabling recognition of students' personal affinities and progress at their own tempo. The majority of students agree with this viewpoint. On the other hand, the majority of teachers and students believe that the negative characteristic of e-learning is mutual communication, which they believe is no better than in traditional teaching.

The findings of the research show that the teachers' age and the age of the students they work with do not affect the teachers' attitudes towards e-learning and the use of e-learning platforms, as well as the age of the students on their attitudes. However, research has demonstrated that students' gender significantly impacts their attitudes towards e-learning and the use of e-learning platforms in the teaching process.

The research results obtained in this paper can serve as a basis for future research, which would include a larger research sample in the territory of Vojvodina. The relatively small sample in this research represents a certain limitation because the findings refer only to the school where the research was conducted. Realisation of the research on the territory of the entire Vojvodina would enable the generalisation of the obtained research findings.

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Platforme za e-učenje u nastavnom procesu – demografski čimbenici koji utječu na stavove učitelja i učenika

Sažetak

E-učenje predstavlja oblik učenja uz primjenu informacijsko-komunikacijskih tehnologija. Jedna od mogućih primjena odnosi se na korištenje platformi za e-učenje u nastavnom procesu, što omogućuje različite načine prezentacije nastavnih sadržaja te otvara nove mogućnosti za proširivanje znanja kroz nastavu bez prostornih i vremenskih ograničenja. Cilj istraživanja bio je ispitati i utvrditi stavove učitelja i učenika o uporabi platformi za e-učenje u nastavnom procesu te ispitati utječu li demografski čimbenici, poput dobi, spola i radnog statusa, na njihove stavove. U istraživanju provedenom u osnovnim školama u Vojvodini primijenjena je metoda anketiranja. Anonimni upitnik ispunilo je 100 učitelja i nastavnika predmetne nastave te 103 učenika od 1. do 8. razreda. Rezultati istraživanja upućuju na pretežno pozitivne stavove učitelja i učenika prema e-učenju. Ispitanici njegovu primjenu prepoznaju kao mogućnost suvremenijeg i zanimljivijeg prikazivanja nastavnih sadržaja te kao način ostvarivanja nastave koja omogućuje prepoznavanje osobnih sklonosti učenika i razvoj njihovih sposobnosti u različitim područjima. Na temelju dobivenih rezultata može se zaključiti da e-učenje pruža brojne mogućnosti za unapređenje nastavnog procesa. Stoga bi postojeće pozitivne stavove trebalo iskoristiti za sustavno i plansko uvođenje e-učenja. S druge strane, potrebno je dodatno potaknuti one koji nemaju pozitivne stavove kako bi prepoznali važnost i mogućnosti primjene platformi za e-učenje, što se može ostvariti stručnim usavršavanjem i cjeloživotnim obrazovanjem.

Ključne riječi: e-učenje; informacijsko-komunikacijske tehnologije; obrazovanje na daljinu; *online* učenje; sustavi za upravljanje učenjem