

Survey of students' opinions on the effectiveness of e-learning and distance learning during a pandemic

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Abstract

The article analyzes the opinion of students in two high schools in the town of Yambol, Bulgaria, in connection with the effectiveness of distance learning during the second school year of the 2019/2020. In conducting the survey, gender and the school in which the students are educated were taken into account. The questions from the survey are related to the successful acquisition of knowledge, the independent work of the students, the influence of their social contacts, as well as the time for self-preparation. The obtained results confirm and supplement those from the available literature. Methods and tools for detailed analysis of student performance using e-learning and distance learning methods are proposed.

Keywords: education, students acceptance, information-technology, service quality, distance learning, data analysis

1 Introduction

In a complex epidemiological situation in 2020, distance learning has been imposed in a number of countries (Gómez-García et al., 2020; Liu, 2020). Bulgaria is no exception during the Covid-19 pandemic, where remote sensing methods have been used as the main way to present teaching material. Teaching is carried out synchronously and asynchronously with the help of online platforms, means of Internet communication with shared chats, audio virtual conference rooms, electronic textbooks and others (Shivacheva & Nedeva, 2016).

After numerous tests by teachers of open applications for online learning with a wide range and strong user base, the most used during the pandemic in Bulgarian schools are Microsoft Teams and Zoom (Digital, 2020). Although Microsoft's application is more labor-intensive, it is most used due to support from the Ministry of Education and Science (MES) in Bulgaria (MES, 2020). The platform is implemented by the Ministry of Education and Science to the users in edu.mon.bg, as the student accounts are connected to the teachers' accounts automatically.

The specifics of the application of distance learning in the Balkan countries are summarized (Gábor & Péter (2015). According to the authors, the use of such teaching methods in the specified geographical region, for the study period until 2015, has gone through stages of complete rejection, until acceptance as an additional and in some cases as a basic form of preparation.

In Bulgaria, the use of electronic and distance forms of teaching provokes wide discussion (Shivacheva et al., 2016; Stoykova et al., 2016). The main advantages are possible savings, active participation of students, who are often absent from the classrooms, and last but not least, the opportunity for training to take place wherever there is an Internet connection. For their part, skeptics of online forms of teaching have no less arguments. They point to the need for technical availability and literacy, the emergence of problems with students' vision due to prolonged staring at monitors, social isolation and the need for continuous parental control during training.

In order to receive feedback from students on the effectiveness of distance learning during the Covid-19 pandemic, schools in Bulgaria are initiating anonymous online surveys in their school community.

An online survey (Tonchev, 2020) shows that 38% of respondents indicated that distance learning in 2020 was ineffective and should not be conducted in the next school year. On the other hand, 28% of the respondents indicate that the distance form is suitable as a supplementary, but not as a basic form of education.

Another survey conducted in the city of Sofia, Bulgaria (ELS, 2020) shows that over 50% of the surveyed students believe that the problem with distance learning is the lack of social contacts. The same percentage of participants answered that they needed more time for self-preparation due to the larger volume of homework.

Opposite results were obtained in a survey in the city of Vratsa, Bulgaria. Only 15% of respondents (Vratsa, 2020) indicated that it took them longer than usual to prepare on their own.

In addition to schools in major cities, surveys have been conducted by companies offering online supplementary education for students as a service. According to the surveyed survey in the distance form of education the time for independent work of students increases by 22% (Namama, 2020).

The results of the research, reflected in the presented review of the available literature, show that the assessment of students for the use of e-learning and distance learning is not unambiguous. This necessitates more research in this regard. The survey surveys in schools were conducted mainly in the big cities of Bulgaria, while in the smaller ones there are none. Another disadvantage of the presented is that they are mainly expressed as a percentage of the total number of respondents. It is necessary to propose a methodology for relatively more accurate analysis, using a statistical calculator.

Such studies conducted in the town of Yambol, Bulgaria are few and concern schools offering primary education. No surveys have been conducted on the opinion of upper secondary students.

The aim of the present work is to make a survey and comparative analysis of the effectiveness of e-learning and distance learning in a pandemic.

2 Material and methods

The survey was conducted in two of the most elite high schools in the city of Yambol, Bulgaria: Profiled High School "Atanas Radev" (PHS); Natural and Mathematical High School "Vasil Levski" (NMHS).

The answers to the questions in the survey are 98 students from 11th grade, from all 11 grades. The survey was conducted immediately after the end of the school year.

Based on a study of literature sources, questions were selected for a survey, in connection with e-learning and distance learning. After consultation with an expert, questions were selected that are suitable for obtaining informative data on students' opinions.

The students surveyed would not like to answer too many questions, but are willing to fill out a short questionnaire with a small number of questions after a kind request. For this reason, the developed survey contains a small number of accurate, easy and clear questions.

Table 1 shows the selected questions that are included in the survey.

Table 1. Survey questions and possible answers

№	Question	Possible answers
Q1	Your gender?	Male; Female
Q2	High school where you study?	Name of high school
Q3	Do you think that with e-distance learning, the acquisition of knowledge is more successful for you?	Yes; No
Q4	Do you think that the independent development of topics (presentations) helps to better acquisition of knowledge?	Yes; No
Q5	Do you think that the lack of direct social contact and	Yes; No

	communication in the school environment leads to poorer learning of the material?	
Q6	Do you think that e-distance learning requires more time for self-preparation than the present form of learning?	Yes; No

The survey was prepared and conducted with the help of Google Forms (Google Inc.). This online tool was chosen because it is convenient to use and fill out questionnaires on mobile phones, which are preferred by students to work in the Internet environment.

Google Forms also offers a summary graph, as well as a download of the answers received in the form of a spreadsheet. In this table are available the individual answers of each of the respondents, which makes them suitable for processing with the methods used in the present work for data processing and analysis. The questions are arranged one below the other and the possible answers are marked with a "checkbox" element.

Data were processed at significance level $\alpha = 0.05$, using the chi-square analysis method (χ^2) in the software product Statistica 12 (Stat Soft Inc.). "Chi-square" is a non-parametric method for testing hypotheses, which hides its main advantage, namely that it does not require knowledge of the law of stochastic distribution. The method is based on the comparison of two distributions, one empirical and the other theoretical. From the comparison of the indicated distributions a criterion is drawn up with the help of which the existence of a presumed connection between the studied factors is checked.

3 Results and discussion

It was checked whether there is a statistically significant relationship between gender and the high school where students study, and the answers to the question: do you think that with e-distance learning, the acquisition of knowledge is more successful for you (Q3)? From this analysis it was found that there were almost equal numbers between men and women who gave a positive answer and with about twice the predominance of women gave a negative answer to question Q3.

The hypothesis for connection between the gender factor of the student and the factor whether with the e-distance learning, the acquisition of knowledge is more successful for the students is tested.

The χ^2 analysis of the respective answers shows that the level of significance $p=0,093>0,05$, which means that the factor does not affect the response or there is no statistically significant relationship between gender and the given answer to question Q3. From these analyzes it was found that no statistically significant dependence on the gender of the students and their opinion on this issue was found.

An analysis was made of the relationship between questions Q2 and Q3. It was found that there is a strong predominance of those who gave a positive answer to the question to students from NMHS, and the majority of students from PHS gave a negative answer to question Q3.

The hypothesis for connection between the student's school factor and the factor was made, whether with the e-distance learning, the acquisition of knowledge is more successful for the students?

The χ^2 analysis of the respective answers shows that the level of significance $p=0,0001<0,05$, which means that the factor affects the response or there is a statistically significant relationship between the high school and the given answer to the question whether the electronic distance learning, the acquisition of knowledge is more successful for students. From this analysis a statistically significant dependence on the NMHS where the student studies and their opinion on this issue was established. In PHS students strongly believe that with e-distance learning, the acquisition of knowledge is more unsuccessful for them.

An analysis was made of the relationship between questions Q1 and Q4. Women who gave answers have an almost double advantage, but this is due to the larger number of participants in the survey.

The hypothesis of a connection between the gender factor of the student and the factor is tested. Do you think that the independent development of topics (presentations) helps for the better assimilation of knowledge?

The chi-square analysis of the respective answers shows that the level of significance $p=0,43>0,05$, which means that the factor does not affect the response or there is no statistically significant relationship between gender and the answer to the question whether self-development of topics (presentations), helps to better acquisition of knowledge. It was found that there is no statistically significant dependence on the gender and response factors – the independent development of topics (presentations) helps to better acquisition of knowledge.

An analysis was made of the relationship between questions Q2 and Q4. There was a slight difference in the answers of the students depending on the school in which they study, as for the first a slight advantage have the students in NMHS, and for the second from PHS.

The χ^2 analysis confirms that there is no statistically significant relationship between the school factor and the factor – the independent development of topics (presentations), helps to better assimilate knowledge, $p=0,52>0,05$.

From the analysis it was found that there is no statistically significant dependence on the school factor and the response – the independent development of topics (presentations) helps to better assimilate of knowledge.

An analysis of question Q5 was made. It was found that 75,5% of students believe that the lack of direct social contact and communication in the school environment leads to poorer learning, and the remaining 24,5% that it is more successful.

It was checked whether there is a statistically significant relationship between gender and the high school where students study, and the answers given to this question (Q1 and Q5). Figure 1 shows a diagram of the impact of these issues.

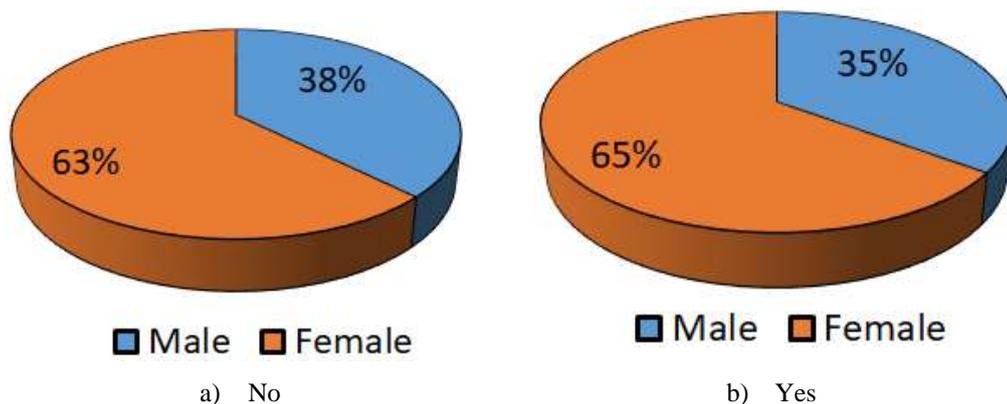


Figure 1. Categorized diagram of influence of questions Q1 and Q5, according to gender

The performed χ^2 analysis confirms that there is no statistically significant relationship between gender and that the lack of direct social contact and communication in the school environment leads to poorer learning of the learning material, $p=0,83>0,05$. It was found that there is no statistically significant dependence on the gender factor and the response that the lack of direct social contact and communication in the school environment leads to poorer learning of the material.

An analysis was made of the relationship between questions Q2 and Q5. There is a significant difference in the answers of the students depending on the school in which they study, as for the first significant advantage have the students in NMHS, and for the second insignificant – PHS. Figure 2 shows a diagram of the impact of these issues.

The performed χ^2 analysis confirms that there is a statistically significant relationship between the school and that the lack of direct social contact and communication in the school environment leads to poorer learning of the learning material, $p=0,03<0,05$. There is a statistically significant dependence on the school factor and the response that the lack of direct social contact and communication in the school environment leads to poorer learning of the material. NMHS students do not believe that the lack of direct social contact and communication in the school environment leads to poorer learning of the material, while PHS students believe the opposite.

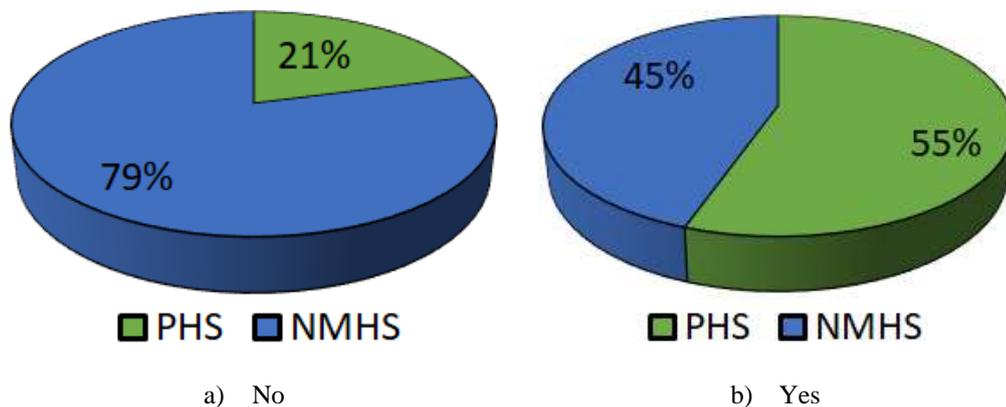


Figure 2. Categorized diagram of influence of questions Q1 and Q5, according to high school

An analysis of question Q6 was made. It was found that 56,1% of students believe that e-distance learning requires more time for self-preparation than the present form of learning, and 43,9% do not think so. There is a difference in students' responses depending on gender, we will check how statistically significant it is. Table 2 shows the empirical and theoretical frequencies of the answers to question Q6, depending on the gender of the respondents.

Table 2. Empirical and theoretical frequencies of answers of Q6, according to gender

Frequencies Answer Gender	Empirical frequencies			Theoretical frequencies		
	No	Yes	Total	No	Yes	Total
Male	19	16	35	15	20	35
Female	24	39	63	28	35	63
All groups	43	55	98	43	55	98

An analysis was made of the relationship between questions Q2 and Q6. The χ^2 analysis confirms that there is no statistically significant relationship between the student's gender and that e-distance learning requires more time for self-preparation than the present form of learning, $p=0,12>0,05$. There is no statistically significant dependence on the gender factor and the response that e-distance learning requires more time for self-preparation than the present form of learning.

Table 3 shows the empirical and theoretical frequencies of the answers to question Q6, depending on the school in which the respondents study.

The χ^2 analysis confirms that there is no statistically significant relationship between the school in which the student studies and that e-distance learning requires more time for self-preparation than the present form of learning, $p=0,08>0,05$. There is no statistically significant dependence on the factor the school in which the student studies and responds that e-distance learning requires more time for self-preparation than the present form of learning.

Table 3. Empirical and theoretical frequencies of answers of Q6, according to High school

Frequencies	Empirical frequencies			Theoretical frequencies		
Answer High school	No	Yes	Total	No	Yes	Total
PHS	16	30	46	20	26	46
NMHS	27	25	52	23	29	52
All groups	43	55	98	43	55	98

The results obtained in this paper confirm and supplement those of other surveys related to the effectiveness of e-learning and distance learning in Bulgaria in a pandemic. The lack of social contacts of children is defined as a shortcoming mentioned in the available literature (over 70% of the respondents) (Kandeva, 2020). This is confirmed and supplemented by the results obtained in the present study, which found that this lack of social contact has a statistically significant difference in the assimilation of learning material by students. A survey similar to the one presented in this paper was conducted at a high school in Sofia, Bulgaria (ELS, 2020). The results are convenient for comparison between those obtained in a larger city and those presented here for the city of Yambol. According to the results of the survey in the city of Sofia, 56% of the surveyed students point out as a disadvantage the lack of social contacts in the distance form of education. The time for independent work is increasing by 32% of the respondents. Also, 54% believe that the volume of homework has increased. These results are confirmed and supplemented in the present work, a statistically significant difference was found between the different schools and there is an increase in the time for self-preparation of students.

4 Conclusion

In the present work, a survey and comparative analysis is made to assess the effectiveness of e-learning and distance learning in a pandemic. Methods and tools have been proposed that can be used to improve the analysis of survey data in schools. From the analyzes it was found that the gender factor does not have a statistically significant impact on the successful acquisition of knowledge, increasing the time for self-preparation and social contacts in e-learning and distance learning. It was found that in the analysis of the factor educational institution, there is a statistically significant difference in these factors.

The results obtained in the present work confirm and supplement those of the available literature. There is a statistically significant difference between the different schools and there is an increase in the time for self-preparation of students using e-learning and distance learning.

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