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The effectiveness of online learning in the era of the SARS-CoV-2 pandemic on the example of students of Polish universities

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ABSTRACT

This paper aims to present the opinions of Polish university students on the effectiveness of online learning during the SARS-CoV-2 pandemic and forced distance learning. The author conducted an online survey among students of different universities. The questions related to students' attitudes towards online learning and the preparation of universities and academic teachers, considering that all educational material must be covered using online platforms. The author also examined the relationship between the level of education (1st, 2nd, and 3rd-degree studies) and the preferences and problems of students related to e-learning.

Keywords: e-learning, online learning, pandemic, remote learning, SARS-CoV-2, students' opinion, university

1. INTRODUCTION

The development of modern technologies is related to the development of methods and channels of education. In addition to the traditional form of teaching, which takes place at the university and which may or may not use modern technologies in the teaching process, there is also distance learning in the form of e-learning [1]. Classes carried out remotely using the Internet, however, constitute only a small percentage of classes at Polish universities.

The current situation related to the COVID-19 pandemic has forced a rapid transformation of the educational process. Due to the existing threat and the requirement of social distance, the current model of education is insufficient [2]. Universities around the world have been forced to transfer their entire curriculum to the online environment. This means using the e-learning model on an unprecedented scale, which entails many challenges, both for students, universities, and academic teachers alike [3].

According to UNESCO, the closure of universities causes a number of negative consequences that directly translate into students' academic performance and their development opportunities [4]. Therefore, transferring classes to online platforms plays a key role in maintaining communication between students and the university and the proper and undisturbed course of teaching and learning processes, while maintaining safety rules [5]. It is also of great importance whether the university will be able to cope with such an undertaking in terms of technology and staff preparation. However, as shown by Almaiah and Alismaiel [6] and Shawai and Almaiah [7], it is the involvement of students and their willingness to use this type of solution that ultimately determines the effectiveness of e-learning. Although Polish students, just like their foreign peers, generally appreciate the possibilities offered by e-learning [8, 9], carrying out all classes in this form may be met with a negative reaction.

The purpose of this paper is to investigate how students evaluate the effectiveness of a learning process that is entirely implemented through various online platforms. The author constructed preliminary hypotheses to be verified in the research presented in this paper:

- 1) Students feel safer when they can take classes online - regardless of the difficulties associated with it.
- 2) Regardless of the external circumstances, students prefer online learning to classroom learning.
- 3) Universities have successfully managed to transfer classes to the online environment.
- 4) The students' academic performance remained unchanged after the implementation of online learning.

2. PREVIOUS USE OF E-LEARNING IN THE ACADEMIC ENVIRONMENT

E-learning is a modern method of transferring knowledge. For this purpose, it uses information technologies, especially the Internet. There are many definitions of e-learning, but the shortest definition that best describes its nature is "Internet learning" [10]. The common denominator of the various definitions of this concept is the fact that it focuses on activities supporting teaching and the education process with the use of modern technologies [11, 12]. In the literature, there are terms such as distance learning, e-learning, and online learning. They are used interchangeably in this paper, but there are differences between them [13]. Their definitions are presented in **Table 1**.

E-learning as a form of education and additional training is particularly popular in the corporate and academic environments [19]. The corporate environment uses e-learning due to its economic aspect and it is mainly used to improve the training process [20].

The academic environment, on the other hand, uses e-learning to a much wider extent. The purpose of its use is to transfer the educational goals, functions, and materials of a traditional university to an online environment. The important fact is that the transformation of

the form of teaching does not result in the loss or reduction of the scope of the covered material [21]. In this environment, e-learning is implemented in the form of:

- lectures in synchronous mode,
- lectures in asynchronous mode,
- audio lectures posted on open educational platforms,
- educational materials delivered via e-mail,
- virtual consultations,
- discussions on internet forums.

Table 1. Definitions of distance learning, e-learning, and online learning

Term	Definition
Distance learning	The broadest term. Encompasses both e-learning and online learning. It is "an organized instructional program in which teacher and learners are physically separated"
E-learning	"E-learning is the delivery of a learning, training or education program by electronic means"
Online learning	"An approach to learning and teaching process that utilizes acquisition and usage of the knowledge in an educational context by using primarily Internet and communication technologies in collaboration"

Source: [14, p. 210; 15, p. 4; 16; 17, p. 149; 18; p. 864]

Few Polish universities use e-learning as the dominant form of teaching, although there is a growing interest in this concept. Polish universities are opening distance learning centers and adding full online courses to their offer. It is an initiative that is mainly intended for people who want to combine education with work or other studies, who live far from academic centers, people with disabilities, and people who want to learn, but for some reason, the traditional form of learning does not suit them [22].

However, on a larger scale, e-learning is mainly used for teaching individual subjects or as a way of individual training [8]. For this reason, forced by the current epidemiological situation, the transition to this form of teaching in all aspects is a huge challenge for both universities as institutions (in particular in terms of technology and finance), academic teachers, and students.

3. THE BENEFITS AND CHALLENGES OF USING ONLINE LEARNING DURING A PANDEMIC

Like any method of education, e-learning also has advantages and disadvantages. Under normal circumstances, the advantages include [23-25]:

- the possibility of individualized education,
- free choice of place and time of study,
- free choice of place and tools to create courses,
- the forced activity of each participant,
- the use of various methods of transmission and communication,
- saving resources and reducing costs,
- saving time,
- a large selection of study modes, methods, and forms of education,
- easy administration of courses,
- the ability to monitor the progress of students,
- ease of updating courses,
- standardization of the delivered content of the courses,
- automation of the examination process.

The disadvantages of e-learning include [24, 26, 27]:

- high implementation costs related to the purchase of an appropriate platform, IT equipment, etc.,
- in most cases, no direct contact with the teacher,
- the need for the student to be highly motivated and self-disciplined,
- lack of social contacts and integration between course participants,
- problematic effectiveness control,
- the credibility of the examinations checking the knowledge acquired during the course,
- barriers in the form of a lack of IT competences or adequate infrastructure,
- creating materials adapted to e-learning is more time-consuming and labor-intensive than in the case of traditional education.

Furthermore, the current COVID-19 pandemic has revealed the added benefits and challenges of this form of education. Additional benefits include [28]:

- increased safety of students and lecturers due to the lack of the need to be physically present at the university,
- increased sense of security and psychological comfort among students, lecturers, and university employees,
- maintaining the continuity of education despite the closure of universities,
- the ability to maintain contact with lecturers and other students despite the social distancing guidelines.

Additional challenges include, but are not limited to [29, 30]:

- ensuring an effective teaching process by the university, e.g. by appropriately adjusting the e-learning platform to increased user activity,
- provision of appropriate IT infrastructure and software that enables online teaching,
- the need to supplement the regulations related to conducting examination sessions with aspects related to conducting them through online platforms,

- an additional burden on lecturers who have to adapt their teaching methods to the capabilities of the IT infrastructure,
- an additional burden on students who have to adapt to carrying out all their classes online, which may not be the optimal form of learning for them,
- assessment of the actual completion and assimilation of the material by students,
- moving subjects that require a specific environment (laboratory etc.) to the online environment.



Figure 1. Factors influencing the use of e-learning during SARS-CoV-2 pandemic
Source: [4]

It can be seen that the effectiveness and willingness to use e-learning are influenced by many factors. These factors have been divided into different groups by Almaiah, Al-Khasawneh and Althunibat as shown in **Figure 1**.

4. DATA AND RESEARCH METHOD

The survey was conducted in the second and third quarter of 2020 among students of Polish universities. Its aim was to examine students' opinions on the effectiveness and accessibility of remote learning caused by the SARS-CoV-2 pandemic and the suspension of classroom classes. The study was conducted using an online survey that was correctly completed by 734 students. The survey concerned only those classes that can be fully completed remotely, so it did not take into account opinions about practical classes that must be held in a laboratory environment, etc.

The characteristics of the research sample are presented in **Figure 2** and **3**.

The respondents were asked to answer several questions about distance learning. For the questions where it was possible, the relationship between the respondent's answer and their education (1st, 2nd, or 3rd-degree studies) was also examined. Education refers to the degree the respondent is currently working on obtaining. For this purpose, the χ^2 independence test was used. The zero hypothesis (H0) assumes that the respondent's education has no influence on the answer, while the alternative hypothesis (H1) assumes that such a relationship exists. The tests were conducted for the significance level of $\alpha = 0.05$. The aim of the study was to check whether the assessment of individual aspects of e-learning is related to the age of the respondent and their experience in the field of learning at the academic level.

The results of the survey are presented in **Table 2**.

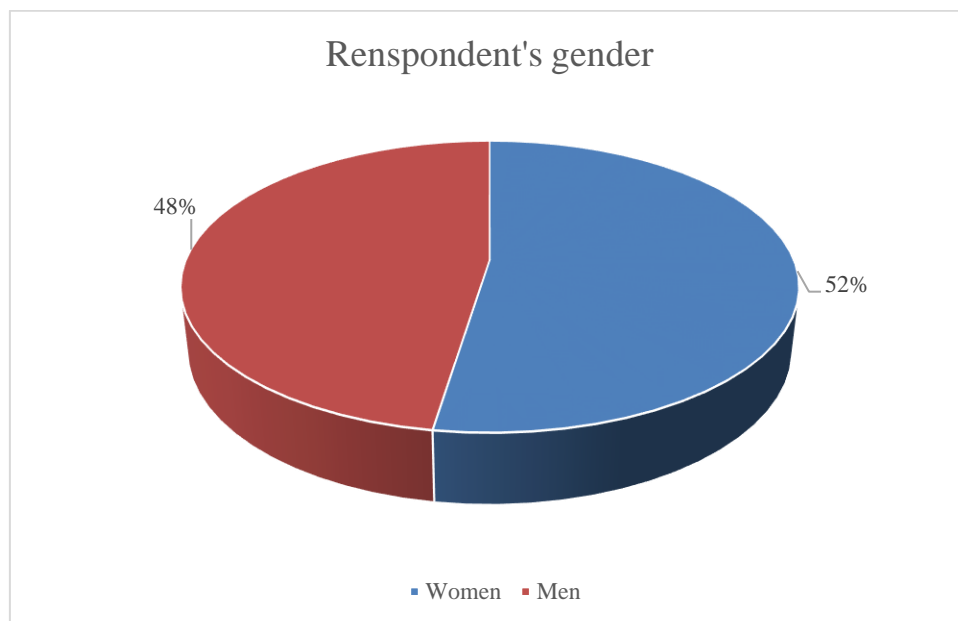


Figure 2. Research sample characteristic - gender

Source: author's own research

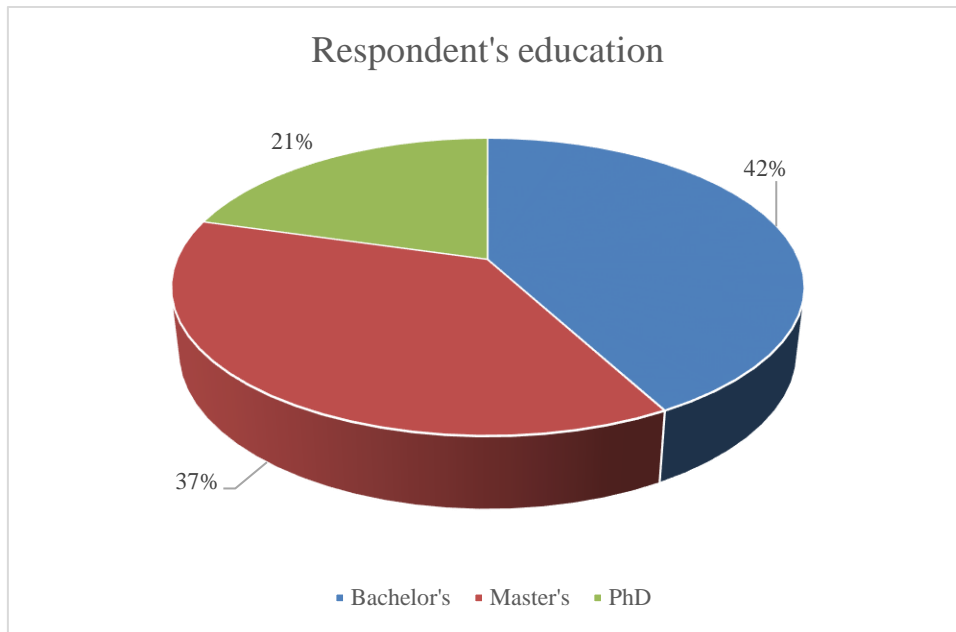


Figure 3. Research sample characteristic - education
Source: author's own research

Table 2. Students' opinions on online learning.

No.	Question	Strongly agree	Agree	Disagree	Strongly disagree
1	Are you generally satisfied with e-learning?	21%	37%	32%	10%
2	I know how to learn from home	27%	31%	36%	6%
3	I like to learn from home	15%	33%	47%	5%
4	I can organize the time for effective learning	35%	29%	34%	2%
5	Distance learning helped me get organized	59%	32%	8%	1%
6	Learning by myself is difficult for me	8%	34%	35%	23%
7	I prefer to study at the university rather than from home	34%	28%	21%	17%

8	I need a tutor to explain things I don't understand	2%	5%	6%	87%
9	I have hardware and software that allow me to use the internet platform without any problems	95%	5%	0%	0%
10	I know how to use the e-learning platform	81%	18%	1%	0%
11	I was able to participate fully in all classes remotely without any technical problems	77%	15%	6%	2%
12	I feel safer being able to learn online than in a classroom	97%	2%	1%	0%
13	E-learning is a good alternative to classroom learning	24%	29%	32%	15%
14	In my opinion, the majority of people have no problem using the e-learning platform	76%	21%	3%	0%
15	Online learning is as effective as traditional classroom learning	19%	26%	37%	18%
16	My university is well prepared technologically to online teaching	41%	37%	13%	9%
17	Lecturers are well prepared to conduct online classes	39%	41%	17%	3%
18	My academic performance is better when I study from home	34%	12%	31%	23%
19	I am motivated to undertake additional research activities when I learn remotely (papers, webinars etc.)	9%	21%	57%	13%

Source: author's own research

5. THE EFFECTIVENESS OF E-LEARNING AS A PRIMARY TEACHING METHOD – RESULTS AND DISCUSSION

Taking into account the results of the conducted research, it can be concluded that there is no clear preference for online learning among students. Approximately half of the respondents know how to and like to learn independently and generally evaluate learning through e-learning as effective. The other half of the respondents is not so positive about e-learning, although the percentage of extreme negative answers is small. Nevertheless, the vast majority of respondents have the ability to effectively organize their time to study and recognize the fact that the necessity to study from home helped them to better organize their time. Students

also see the need to use e-learning in the times of the current pandemic, since as many as 99% of them say that they feel safer being able to attend classes remotely. This proves the hypothesis that students feel safer when they can learn from home. Despite this, under normal conditions, 62% of respondents prefer to study at university rather than online. 54% say that their learning performance is better when the learning process takes place in a classroom. This trend is presented in **Figure 4**. These results also allow to disprove the hypothesis that students prefer online learning to classroom learning.

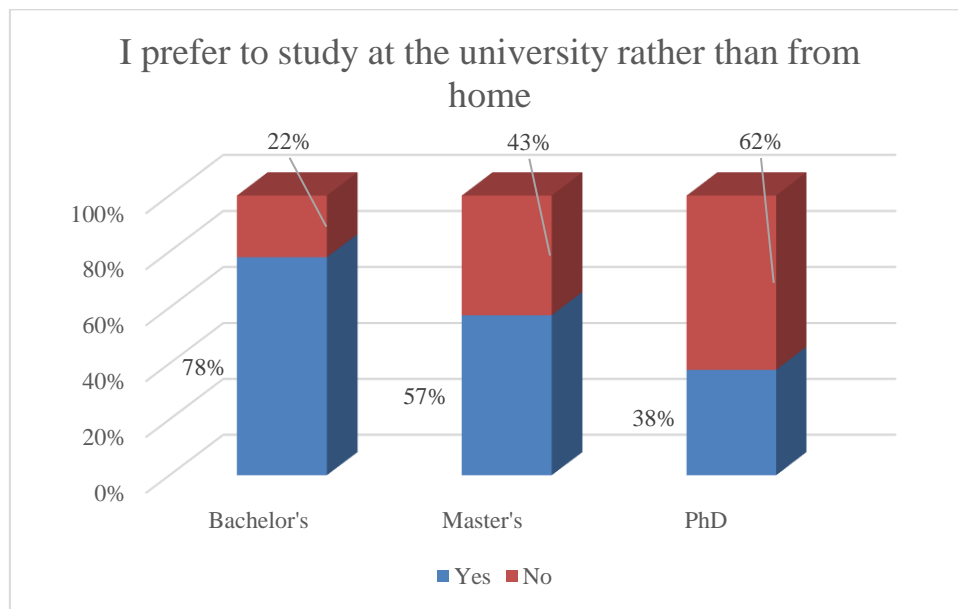


Figure 4. Preference for the place of study of individual groups of respondents
Source: author's own research

Very few students (30%) are motivated to undertake additional research activities, such as conducting their own research or attending additional courses.

All respondents have the appropriate hardware and software to fully participate in online classes. Only 1% of them stated that they do not have all the skills necessary to fully use the tools for online learning. There are a few minor problems with participating in online classes. 8% of respondents were not able to attend all the classes due to technical problems, most often related to poor internet connection and inability to join conference rooms.

55% of respondents believe that traditional learning is more effective than e-learning. In addition, 22% of respondents believe that their university was not technologically prepared for remote learning on such a large scale. Despite this, 80% of students say that the lecturers stood up to the challenge to adapt to the situation and conduct classes in an accessible form. This proves the hypothesis that universities have, in general, successfully managed to transfer classes to the online environment.

The trends revealed in this study are similar to the results obtained by Radha et al. [31]. This means that the opinions of Polish students do not differ significantly from the opinions on online learning from around the world.

The results of the χ^2 independence test are presented in **Table 3**.

Table 3. The results of the χ^2 independence test

Question	χ^2	Hypothesis
1	61,49	H1
2	237,36	H1
3	59,26	H1
4	1,81	H0
5	0,58	H0
6	116,62	H1
7	37,20	H1
8	-	-
9	2,20	H0
10	19,81	H1
11	5,24	H0
12	73,81	H1
13	113,64	H1
14	1,76	H0
15	134,37	H1
16	90,88	H1
17	10,57	H1
18	191,96	H1
19	420,34	H1

Source: author's own research

The χ^2 independence test showed that for most of the questions, the answer depended on whether the respondent was a bachelor's, master's, or doctoral student. Such a relationship was not found only in the case of the following questions:

- I can organize the time for effective learning,
- I know how to use the e-learning platform,
- I feel safer being able to learn online than in a classroom,

- I was able to participate fully in all classes remotely without any technical problems,
- In my opinion, the majority of people have no problem using the e-learning platform.

The general tendency indicates that the longer the “seniority”, the greater the respondent’s satisfaction with the education in the form of online learning. PhD students are most satisfied with it, while undergraduate students are the least satisfied. A similar trend occurs in the assessment of academic performance, with doctoral students finding the greatest improvement in performance, and undergraduate students the least. PhD students are also a group that strongly prefers to study from home rather than at the university. This may be related to additional work or family responsibilities. This trend is presented in **Figure 5**. At the same time, these results allow to disprove the hypothesis that students’ academic performance did not change after transferring classes to the online environment.

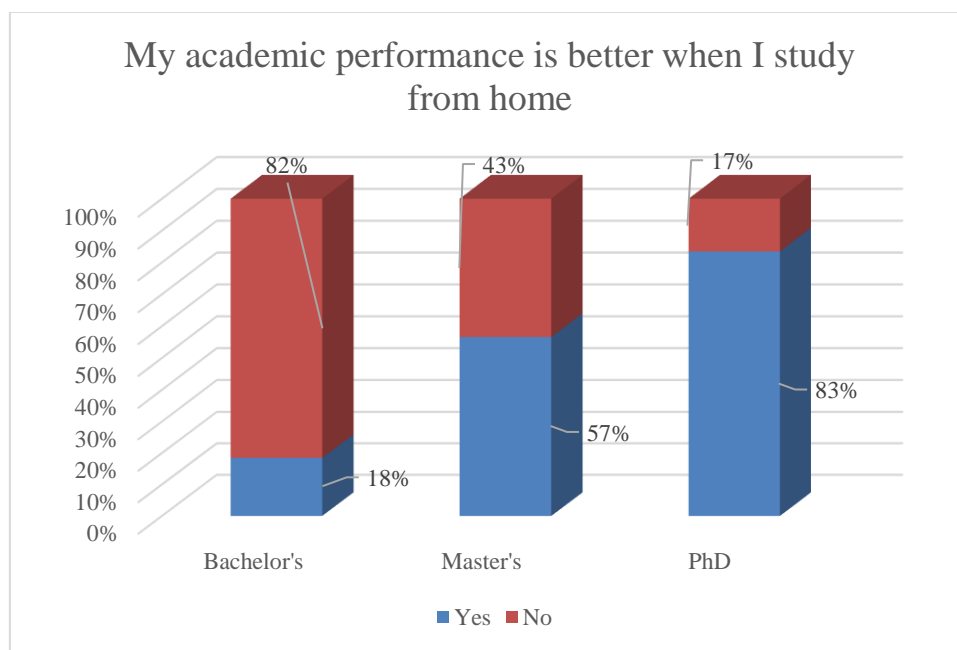


Figure 5. Academic performance of individual groups of respondents
Source: author’s own research

Despite other responsibilities, PhD students are also the dominant group that is motivated to undertake additional academic activities.

Considering the above, it can be concluded that the barriers to the use of online learning are not predominantly technological, but psychological. Students who are just starting their studies in the academic environment have the greatest problem with adapting to the educational requirements in the new form, although they do not report any problems in terms of technological possibilities.

The older and more experienced the student was in academic education, the easier it was for them to adapt to online learning. Certainly, the employment status of students is not without significance, but this paper did not take into account this aspect, as the vast majority of the respondents were employed and combined work and studies.

6. CONCLUSIONS

Summing up, it can be stated that on a national scale remote learning fulfills its task as an alternative to traditional learning. Although students most often prefer to study at the university than at home, they do not report any serious problems with learning the material and participating in classes, although such cases do occur. It is worth taking particular care of new students, who have the greatest problems with adapting to the new mode of teaching, as they find themselves in a doubly new situation - the transition from school to academic learning and then from academic learning to online learning. Particular attention should also be paid to improving the technological preparation of universities for distance learning, as there are signals of problems in this area.

The research also confirmed the hypotheses that the students feel safer when they can take classes online and that the universities managed to successfully transfer classes to the online environment. It also disproved the hypotheses that students prefer online learning and that their academic performance remained unchanged after the implementation of online learning. This shows that while it is possible to transfer the whole teaching and learning process to the online environment, it is only accepted because it is a necessary precaution during a global pandemic. Under normal circumstances, students prefer traditional learning and their performance is usually better while studying in a classroom environment. Therefore, it can be concluded that while the students appreciate the benefits of online learning, they are neither prepared nor willing to fully switch to that form of learning.

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