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Article

Advantages and Disadvantages of E-Learning Innovations during COVID-19 Pandemic in Higher Education in Poland

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Abstract: The paper presents the results of the research on the advantages and disadvantages of innovative e-learning during the COVID-19 pandemic in higher education. In the first stage, an internet questionnaire was used for the study. The research was carried out in Poland on a sample of 621 students. The results allowed the researchers to determine variables that are important for the proper implementation of innovative e-learning, and the emergent perspectives for this form of education after the end of the COVID-19 pandemic. Among the most significant disadvantages, there was a lack of direct contact with colleagues, difficulties with teaching practical subjects, lack of direct contact with the teacher, and too much time spent in front of a computer/telephone or other mobile device. The most important correlations included the following: students satisfied with e-learning assess the advantages highly and the disadvantages lower; all the advantages of innovative e-learning are positively correlated with the student's assessment of the ease of acquiring content in e-learning, and negatively correlated with the student's assessment of the ease of acquiring content in traditional education; the easier the student assimilates innovative e-learning content, the higher the student's evaluation of the advantages of e-learning; students who perceive e-learning content as difficult to absorb have low motivation to learn remotely; the better the student knows information technology, the more highly the student evaluates the advantages of innovative e-learning; the better resources to participate in e-learning activities the student has, the higher the student's evaluation of the advantages of e-learning; the more often innovative e-learning solutions are used in a given university, the better the student assesses the advantages of e-learning.

Keywords: e-learning; COVID-19 pandemic; innovative education; advantages of e-learning; disadvantages of e-learning; open innovation

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1. Introduction

During the COVID-19 pandemic, many universities around the world, including Polish ones, which previously used mainly traditional education [1], were forced to switch to e-learning. This new, innovative solution can be used in many universities to adjust the way of learning to the changing situation. The perception and evaluation of e-learning by students during the pandemic, and the identification of the advantages and disadvantages of this type of education, are interesting and worthy of investigation. It is also important to determine what variables may influence students' perception of particular advantages and disadvantages of e-learning. This knowledge will allow researchers to determine variables that are important for the proper implementation of e-learning, and the understand the perspectives which are posed for this form of education after the end of the COVID-19 pandemic.

Based on the analysis of the literature on the advantages and disadvantages of e-learning [2–4], comparison of traditional and e-learning [5–8], practical e-learning [9], improving quality of teaching [10,11], e-learning innovative tools [12–18] and services usage in e-learning [19,20], we have found the research gap in terms of advantages and disadvantages of innovative e-learning in higher education during the COVID-19 pandemic.

It is worth noting that there has been no research about variables influencing the advantages and disadvantages of innovative e-learning. In the research, the following goals were set:

- G1: To analyze the advantages and disadvantages of innovative e-learning that are the most important from the point of view of university students.
- G2: To analyze the relation between the advantages and disadvantages of innovative e-learning at universities.
- G3: To analyze the relation between the evaluation of advantages and disadvantages of innovative e-learning and the ease of acquiring content in traditional learning and e-learning by students.
- G4: To analyze the relationship between the assessment of the advantages and disadvantages of innovative e-learning, and other investigated variables.

To realize the mentioned goals, the following scientific expectations were formulated:

- E1: The most important advantages of innovative e-learning refer to the reduction in travel time and study expenses.
- E2: Good contact with teachers and the teachers' ability to communicate about the use of remote tools are important variables positively influencing e-learning.
- E3: The easier the student assimilates e-learning content, the higher the student evaluates the advantages of e-learning.
- E4: The better the student knows information technology, the higher the student evaluates the advantages of e-learning.
- E5: The better resources to participate in e-learning activities the student has, the higher the student evaluates the advantages of e-learning.
- E6: The more often innovative e-learning solutions are used in a given university, the better the student assesses the advantages of e-learning.

2. Literature Review

E-learning is a method that has been known and used for many years, long antedating the COVID-19 pandemic [21–24]. The term e-learning has emerged because of the integration of Information and Communication Technology (ICT) in education fields [22]. The development of computer technology has made remote tools and methods more and more popular—this is also the case in education. Despite the fact that educational institutions mostly use traditional methods to provide knowledge to students, it has been predicted that e-learning's popularity will grow [25]. According to Global Market Insight [25], the COVID-19 pandemic has had a positive impact on e-learning industry revenue. Employee safety concerns have encouraged corporations to implement work-from-home practices. The telecommunications and broadband sector has increased accessibility to economical internet connectivity plans. Nearly 4.9 billion individuals use the internet globally, while in 2019 it was 4.1 billion. As the number of internet users increases, more and more people will be able to access e-learning platforms to take courses or complete degrees. In addition to education, the use of remote work methods [26–28] and tools [29–32] is also observed in different work areas. The COVID-19 pandemic had a strong impact on e-learning popularization and the change in the usage of innovative e-learning tools in university education [33]. According to research [33], the percentage of students familiar with the analyzed e-learning tools has increased significantly during the pandemic. There has been a visible rise, especially in the usage of the following tools: MS Teams, Zoom, and Google Classroom. Students have also used e-learning platforms. It is worth noting that e-learning tools were not used on a large scale before the pandemic [34,35].

On the other hand, the younger generation has been raised with the usage of mobile technology and the Internet. Children with smartphones follow YouTube channels, play games, and record and post videos—this is something common these days. Young people's getting used to using mobile devices may make it difficult for them to focus on traditional lectures. Because of this, educators should also strive to use modern technologies and apply them to teaching purposes and involve students in lectures [36,37]. Mobile technologies enhance the e-learning opportunity [38]. Remote education meets the needs of young gener-

ations because, among other reasons, it is based on mobile technologies [39]. E-learning is a great opportunity to better adapt to the expectations of modern students [40]. Furthermore, social media can also be used for education [41]. However, it should be emphasized that e-learning should be accompanied by high standards of quality [42]. The usage of information technologies at universities is very attractive and fruitful; however, it does not always mean that the implementation of e-learning is easy and is done correctly [43]. Additionally, changes in learning can also lead to increased sustainability at universities [44].

The introduction of remote education is not sufficient if it is not followed by good quality content, teaching method, materials, ways of verifying knowledge and skills, and last but not least, competent academics [45]. Bylieva et al. [46] noticed that an important parameter that influences the behavior of students and their educational progress in general is precisely the focus on practice. In Assareh and Bidokht's [47] research, four kinds of e-learning barriers were outlined. They include the following barriers:

- Learners—who can have financial problems, motivation issues, problems with assessment of their progress, isolation from peers' matters, inadequate skills and experience in distance learning, and problems with affection and the social domain;
- Teachers—with barriers such as lack of adequate knowledge about the e-teaching environment, difficulty in the assessment of progress in the different domain;
- Curriculum—ambiguity, quality, resources, teaching process, evaluation;
- School—in this area, there are organizational and structural factors.

Overcoming the groups of barriers mentioned above requires more cooperation from such participants as curriculum developers, teachers, students' parents, social authorities, technology specialists, and also the preparation of virtual and real interaction between students, teachers, and society [47]. According to Becker et al. [48] the critical issue in order to successfully implement e-learning is to ensure that users know about the nature of e-learning and to address concerns about its validity and usefulness. Providing opportunities to actively engage with the material, and potentially with other learners, is also very important. In many cases, it can only be accomplished by implementing a quality learning product that can then be experienced by individual learners. What is more, people responsible for e-learning adoption need to be aware of the fact that organizational issues such as support and time allocation should be part of any strategy to adopt e-learning. Knowing the barriers to the implementation of e-learning will help to successfully overcome them.

Some of the barriers are related to the disadvantages of e-learning. Hence, the identification of disadvantages, but also advantages [49–52], of e-learning is an important issue [53–55]. There is much research on the topic of advantages and disadvantages, to name a few (e.g., [2–6]). Some of the research [9–11] is focused on the challenges and advantages of e-learning. There is also more detailed research which discusses the positive sides of e-learning with the use of WhatsApp [12–14], YouTube [19,20], tablet PCs [17,18], and smartphones [15,16]. Some authors [7,8] compare e- and traditional education in terms of pros and cons. From the university's point of view, e-learning leads to some organizational savings, better use of the infrastructure, and increased flexibility in time [56]. More significantly, this type of learning offers greater opportunities for post-graduate study, and better attendance at classes [57]. On the other hand, e-learning leads to limited interpersonal contacts and isolation from peers, which might have affected the mental well-being of students [58]. It is worth noting that the results of research conducted on smaller research samples differs from each other; namely some results show that e-learning does not necessary cause isolation [59], and some other research pays attention to isolation among teachers [60]. An important issue related to the quality of e-learning is verification of the results, and this topic is broadly described in the literature, including e-cheating and its prevention [61–69]. It is worth emphasizing that both traditional [1] and e-learning [7] have many positive sides and it is difficult to clearly define which of them is unambiguously better.

The possibility exists of using innovative learning solutions based on the use of widespread e-learning in recent years, especially due to the COVID-19 pandemic [70–74].

Using e-learning, we could base our approach upon the traditional innovation approach or use open innovation [75–77]. We can describe open innovation as a combination of external and internal ideas and a path to develop something, especially using new technology [78]. In e-learning, the open innovation approach can base its approach upon mixing external solutions—computer programs, applications, and technical solutions—with the internal experiences from within the organization [79–82]. This approach can lead to an increase in the effectiveness of innovative solutions used in the university's learning. It is especially important to look for experience and expertise outside of the organization, because in the open innovation approach, external experts can create a significant amount of added value. Many e-learning solutions have an open character because we can use them without paying for them if we do not need the full version of the application. Such is the case, for example, with the use of Zoom platform in e-learning [83–88].

Usually, when discussing advantages and disadvantages, the authors refer to the period before the pandemic; however, some research on e-learning during the COVID-19 pandemic has also been published lately. These works usually discuss the process of organization and the application of the e-learning method and tools in the education field [57,89–95]. Some authors [89,90,96,97] noticed that the implementation of remote learning in universities was a great challenge. Universities, even technological ones, did not expect a rapid need to switch to distance learning [98] from traditional learning [1]. Therefore, to continue courses during the so-called waves of the pandemic, education had to face the challenge of preparing and operating educational or videoconferencing platforms, acquiring e-learning skills and knowledge, and overcoming barriers, as well as resistance to the new. One important issue is also the motivation of students to learn online. Authors [99,100] conducted a study identifying factors influencing student motivation in remote learning during the pandemic.

Based on the analysis of research publications, it can be claimed that there is much research on the advantages and disadvantages of e-learning that was done before the pandemic. There is also some research on e-learning during the pandemic. However, there is a lack of papers that discuss and identify advantages and disadvantages of e-learning during the pandemic of COVID-19. We found only two papers that refer to the topic of pros and cons of e-learning during the pandemic. The first one [53], is focused only on advantages. The other one [101] discusses the challenges and opportunities, therefore it can be treated as discussing advantages. However, there are no satisfactory studies on identifying and evaluating advantages and disadvantages by students during the pandemic of COVID-19. Therefore, it was justified to conduct research on this topic.

3. Methodology

The paper presents the results of the research conducted in Poland in December 2021. The participants included a sample of 621 students from Polish universities. An internet—Google—questionnaire was used for the study. Google Forms offers survey administration, which means that in addition to the possibility of creating a form with questions, it allows researchers to automatically collect data and save them to an MS Excel file. We used in our research a non-random process approach to collect our data, but a convenient sample. It was not possible to use a random sample, because we did not have the list of all students. Questionnaires were sent to and posted on Facebook pages of Polish technical universities. In the research, a quantitative data collection method was used. The next stage included the statistical analysis of the collected data. In our data analysis we used the following quantitative technics: standard deviation analysis, histograms analysis, and Spearman's rank correlation.

In the below text and tables, correlations statistically significant at the level of statistical significance $\alpha = 0.05$ are shown in bold and green.

According to the calculator of the minimum research sample, for an unknown population size and the assumed statistical significance $\alpha = 0.05$, the sample is 386 students [102–105].

The number of questionnaires obtained meets the condition of the minimum research sample. A five-point Likert scale was used for all questions in the survey.

The first part of the research referred to the advantages of using e-learning in higher education.

In this case, the following variables were used:

- A1—Saving time;
- A2—Lack of travel necessity;
- A3—Possibility of learning from own home country/city;
- A4—Lower costs;
- A5—Individualization of the learning process;
- A6—Easy access to materials;
- A7—Good contact with the teacher;
- A8—Higher availability of academic teachers;
- A9—Ease of student progress tracking;
- A10—Less mental and physical stress;
- A11—Possibility of interaction (discussion on the forum, sending reactions);
- A12—Convenience;
- A13—Limiting the spread of the SARS-CoV-2 virus.

The second part of the questionnaire contained variables concerning the disadvantages occurring in the case of using e-learning in the university. The following disadvantages were taken into account in the research:

- D1—Lack of direct contact with the teacher;
- D2—Lack of direct contact with colleagues;
- D3—Necessity to purchase e-learning equipment (computer/laptop/smartphone/headphones/microphone etc.);
- D4—Low quality of e-learning materials;
- D5—Difficulties with motivation to learn;
- D6—Discomfort resulting from the use of information technology;
- D7—Poor preparation of academic teachers for e-learning;
- D8—Difficulties with teaching practical subjects;
- D9—Difficulties in accessing traditional academic resources (e.g., libraries, reading rooms);
- D10—Lack of possibility of using other academic activities (e.g., science clubs, sports sections);
- D11—Difficulties with collaborating with colleagues;
- D12—Cyber-threats;
- D13—Risk of being recorded/photographed/"screenshot" etc.;
- D14—Lack of possibility to verify student's knowledge/skills reliably (e.g., due to the ease of cheating during tests via the Internet);
- D15—Lack of/decreased privacy;
- D16—Technical problems on the part of the lecturer;
- D17—Technical problems on the part of the participants;
- D18—Too much time spent in front of a computer/telephone or other mobile device
- D19—Increase in electricity costs;
- D20—Excessive use of own equipment;
- D21—Difficult conditions to use e-learning in the place of residence.

During studying the variables influencing the advantages and disadvantages of e-learning at university, the following variables were taken into account in the survey:

- Students' evaluation of acquiring content in traditional education [1];
- Students' evaluation of acquiring content in e-learning;
- The student's familiarity with information technology;
- Having the proper resources by students to participate in e-learning activities;
- Innovative e-learning solutions used by the university.

The STATISCICA-13.3 software was used to analyze the collected data.

4. Results

In the first stage of the research, the advantages of using innovative e-learning at universities were studied. Table 1 presents the results of the analysis for all variables. They included values of the averages, medians, and standard deviations.

Table 1. The advantages of innovative e-learning in higher education.

Advantage	Average	Median	Standard Deviation
Saving time	4.54	5.00	0.89
Lack of travel necessity	4.82	5.00	0.57
Possibility of learning from own home country/city	4.62	5.00	0.86
Lower costs	4.45	5.00	1.00
Individualization of the learning process	3.39	3.00	1.44
Easy access to materials	4.14	5.00	1.17
Good contact with the teacher	3.06	3.00	1.33
Higher availability of academic teachers	3.25	3.00	1.32
Ease of student progress tracking	3.34	3.00	1.39
Less mental and physical stress	3.89	4.00	1.36
Possibility of interaction (discussion on the forum, sending reactions)	3.18	3.00	1.37
Convenience	4.44	5.00	0.97
Limiting the spread of the SARS-CoV-2 virus	4.37	5.00	1.13

Source: Authors.

As important advantages the students evaluated the following ones (rated over 4.0 out of 5.0, as already stated):

- Lack of travel necessity—4.82;
- Possibility of learning from own home country/city—4.62;
- Saving time—4.54;
- Lower costs—4.45;
- Convenience—4.44;
- Limiting the spread of the SARS-CoV-2 virus—4.37;
- Easy access to materials—4.14.

For all the variables mentioned above, the median value was 5—which is the highest possible level.

It is worth noting that the highest-rated advantages are mostly those related to the convenience of studying and savings—time and money (related to travel to the university). In Poland generally, a substantial portion of the students come from outside of university cities [106,107]. Also, in recent years, we can observe an increasing number of students outside Poland studying in Polish universities [108,109]. This situation can have an impact on problems connected with costs of traveling to and from university and the cost of living in university cities. The use of innovative e-learning significantly reduces the cost of studying and facilitates studying for people from smaller towns, for whom, in the case of traditional education, the costs of travel and accommodation in a large city can be a great obstacle to studying. Ease of access to materials, despite the fact that it is also important, is a factor of less importance compared to the aspects related to saving time and money.

Another very important factor was limiting the spread of the SARS-CoV-2 virus. It is interesting that, although innovative e-learning was introduced in Polish universities due to the pandemic, limiting the spread of the virus was rated only in the sixth place among the examined advantages. It proves that even though the pandemic initiated the widespread use of e-learning at universities, its use made students pay attention to other advantages of this type of learning. The results may suggest that e-learning could also be used after the end of the pandemic. Perhaps it will not be the basic form of teaching for all students, but its advantages may make it an alternative to traditional classes in some fields

of study. Some earlier studies after the time of the pandemic pointed out the advantages of e-learning over traditional learning from the point of view of learners' satisfaction. For example R. Tawafak [110], Alghazo [111], Titthasiri [112] or Hurlbut [113] wrote about it.

The rest of the studied advantages were rated below 4.0. In particular, it is worth noting that the lowest-rated advantage was good contact with the teacher (3.06). This suggests that e-learning does not improve contact with teachers and, thus, traditional learning works better.

We have analyzed histograms for the two highest rated advantages, which are lack of travel necessity and the possibility of learning from own home country/city. They are characterized by asymmetry—skewed—towards upper values in the scale. Most of the surveyed students (556) considered the lack of necessary travel to be a very important advantage of e-learning. Among the respondents, only six people decided that this advantage was not significant (1 or 2 points on the five-point Likert scale). In the case of the possibility of learning from their own home country or city, 493 people assessed this issue as very important (5 points), while 22 people considered it as unimportant (1 or 2 points).

Table 2 presents the results of research on the studied disadvantages of using e-learning. The average, median, and standard deviation values are given for each disadvantage. The research shows that the students did not consider any of the studied disadvantages of e-learning to be very significant;the average never exceeded 4.0, and the median never reached a value of 5.0. It should be noted that significant disadvantages are those whose average value exceeds 3.0, and whose median is 4.0. In this category, there are the following disadvantages: lack of direct contact with colleagues (rate 3.71), difficulties with teaching practical subjects (3.60), lack of direct contact with the teacher (3.41); too much time spent in front of a computer/telephone or other mobile device (rating 3.31).

Table 2. The disadvantages of innovative e-learning in higher education.

Disadvantage	Average	Median	Standard Deviation
Lack of direct contact with the teacher	3.41	4.00	1.43
Lack of direct contact with colleagues	3.71	4.00	1.44
Necessity to purchase e-learning equipment (computer/laptop/smartphone/headphones/microphone etc.)	2.96	3.00	1.42
Low quality of e-learning materials	2.37	2.00	1.24
Difficulties with motivation to learn	3.04	3.00	1.50
Discomfort resulting from the use of information technology	2.08	2.00	1.32
Poor preparation of academic teachers for e-learning	2.64	3.00	1.26
Difficulties with teaching practical subjects	3.60	4.00	1.36
Difficulties in accessing traditional academic resources (e.g., libraries, reading rooms)	2.84	3.00	1.44
Lack of possibility of using other academic activities (e.g., science clubs, sports sections)	2.95	3.00	1.46
Difficulties with collaborating with colleagues	2.75	3.00	1.43
Cyber-threats	2.25	2.00	1.29
Risk of being recorded/photographed/"screenshot" etc.	2.75	3.00	1.42
Lack of possibility to verify student's knowledge/skills reliably (e.g., due to the ease of cheating during tests via the Internet)	2.72	3.00	1.34
Lack of/decreased privacy	2.14	2.00	1.25
Technical problems on the part of the lecturer	3.22	3.00	1.24
Technical problems on the part of the participants	3.14	3.00	1.25
Too much time spent in front of a computer/telephone or other mobile device	3.31	4.00	1.53
Increase in electricity costs	2.72	3.00	1.44
Excessive use of own equipment	2.82	3.00	1.48
Difficult conditions to use e-learning in the place of residence	2.54	2.00	1.46

Source: Authors.

The data analysis shows that the most important drawbacks of e-learning are connected with the reduction of social contacts; first of all, it concerns contacts between students, but also contacts between the student and the lecturer. Human beings are naturally

social beings, and the lack of interpersonal contacts or limiting them to the Internet is not a natural and healthy matter. Many studies have shown the problematic effects of e-learning on social contacts between students and students and teachers. For example, the problem was analyzed by H. Baber [114], Di Pietro at al. [115], and Al Rawashdeh et al. [116]. A long-term reduction of direct social contact is a very important barrier [117,118]. Overcoming this issue largely determines the effectiveness of using e-learning in teaching at the level of higher education.

It should also be noted that not all fields of study are suitable for e-learning in the same way. The respondents indicated that an especially significant problem is the difficulty in teaching practical subjects. While there are no major difficulties in teaching theoretical subjects with the use of e-learning, efficient remote education is hard to realize in the case of practical skills and subjects. Research results suggest that practical courses/subjects should be taught in a traditional way after the end of the COVID-19 pandemic, while e-learning can be used to teach theoretical subjects. This approach can permit universities and students to use the advantages of e-learning, i.e., reducing the costs and time of traveling, as well as offer the study of efficiently practical skills, while at the same time not exposing students to social isolation.

The obtained results support the E1 expectation, which was formulated as follows: the most important advantages of innovative e-learning refer to the reduction in travel time and study expenses.

Subsequently, the disadvantage of e-learning may also be the difficulties with motivation to learn (the average value of 3.04, and the median value of 3.0), and the presence of technical problems on the part of students (the average value 3.14, at the median value of 3.0).

Research has shown that students do not feel discomfort resulting from the use of new technologies (2.08). In addition, the surveyed students did not consider the threats related to cybersecurity (rating 3.25) and the decrease in the level of privacy (rating 2.14) to be significant.

Table 3 contains an analysis of the relationship between the advantages and disadvantages of e-learning perceived by the surveyed students. Spearman's rank correlation coefficient was used to analyze the relationship between the variables. The respective values of the coefficients are presented in Table 3.

When analyzing Table 3, negative correlation coefficients between assessments of advantages and disadvantages by the studied students are observed in most cases. Students who are not satisfied with e-learning evaluate the disadvantages higher and the advantages lower. It is worth noting that the average value of advantages is higher than the average value of disadvantages. It shows that the university students who participated in the survey believe that the advantages of e-learning outweigh its disadvantages.

The analysis of cases for which the correlations have the highest values leads to interesting conclusions—they are statistically significant and exceed 0.4. This kind of situation can be observed for the D5 variable—difficulties with motivation to learn. This variable is negatively correlated at the level below -0.4 with the following variables: A7 (good contact with the teacher), A8 (high availability of academic teachers), A10 (less mental and physical stress), and A11 (possibility of interaction). The conducted research shows that to avoid problems with motivation in e-learning, students should be provided with good-quality contacts with academic teachers, including easy access to them via electronic means and the possibility of interaction with both teachers, and other students. This reduces stress and motivation problems.

Variable D11—difficulties with collaborating with colleagues—is also negatively correlated at a level below -0.4 with several studied advantages. They include the following: A7 (good contact with the teacher), A8 (higher availability of academic teachers), A9 (ease of student progress tracking), A10 (less mental and physical stress), and A11 (possibility of interaction). In this case, a similar phenomenon as for the discussed variable D5 can be observed: good contacts and the possibility of interaction with the teacher and students

"protect" against problems related to the difficulties of cooperation with colleagues from the group.

Table 3. Spearman's rank correlation between variables concerning the advantages and disadvantages of e-learning in universities.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
D1	−0.21	−0.04	−0.11	−0.23	−0.37	−0.29	−0.55	−0.48	−0.46	−0.43	−0.48	−0.33	−0.27
D2	−0.14	0.00	−0.10	−0.17	−0.38	−0.22	−0.46	−0.43	−0.44	−0.37	−0.42	−0.24	−0.21
D3	−0.22	−0.05	−0.08	−0.23	−0.22	−0.23	−0.31	−0.30	−0.27	−0.32	−0.26	−0.29	−0.14
D4	−0.20	−0.08	−0.14	−0.17	−0.26	−0.31	−0.40	−0.38	−0.34	−0.35	−0.36	−0.28	−0.25
D5	−0.25	−0.09	−0.19	−0.25	−0.42	−0.32	−0.50	−0.45	−0.39	−0.46	−0.49	−0.38	−0.30
D6	−0.27	−0.14	−0.20	−0.26	−0.28	−0.32	−0.36	−0.34	−0.30	−0.42	−0.36	−0.36	−0.21
D7	−0.15	−0.06	−0.10	−0.14	−0.21	−0.23	−0.33	−0.34	−0.31	−0.25	−0.28	−0.18	−0.17
D8	−0.16	−0.01	−0.11	−0.21	−0.40	−0.29	−0.51	−0.46	−0.46	−0.41	−0.50	−0.30	−0.28
D9	−0.17	−0.06	−0.07	−0.19	−0.27	−0.33	−0.34	−0.34	−0.32	−0.38	−0.30	−0.28	−0.20
D10	−0.17	−0.06	−0.12	−0.18	−0.29	−0.24	−0.37	−0.35	−0.32	−0.38	−0.36	−0.27	−0.21
D11	−0.27	−0.11	−0.19	−0.25	−0.36	−0.37	−0.50	−0.45	−0.42	−0.48	−0.51	−0.38	−0.29
D12	−0.20	−0.05	−0.04	−0.15	−0.14	−0.18	−0.20	−0.22	−0.19	−0.26	−0.18	−0.22	−0.07
D13	−0.17	−0.06	−0.03	−0.13	−0.15	−0.17	−0.24	−0.21	−0.22	−0.27	−0.20	−0.21	−0.11
D14	−0.20	−0.10	−0.13	−0.23	−0.33	−0.28	−0.44	−0.40	−0.43	−0.40	−0.43	−0.34	−0.25
D15	−0.24	−0.13	−0.16	−0.24	−0.24	−0.26	−0.36	−0.29	−0.28	−0.41	−0.31	−0.32	−0.22
D16	−0.11	0.02	−0.06	−0.09	−0.25	−0.21	−0.39	−0.34	−0.28	−0.25	−0.30	−0.17	−0.15
D17	−0.17	0.00	−0.06	−0.14	−0.24	−0.23	−0.40	−0.35	−0.33	−0.31	−0.34	−0.26	−0.16
D18	−0.20	−0.01	−0.09	−0.21	−0.32	−0.26	−0.42	−0.35	−0.32	−0.42	−0.37	−0.32	−0.22
D19	−0.20	−0.03	−0.10	−0.21	−0.22	−0.18	−0.32	−0.26	−0.22	−0.25	−0.23	−0.23	−0.14
D20	−0.18	−0.02	−0.09	−0.19	−0.24	−0.23	−0.33	−0.29	−0.23	−0.30	−0.25	−0.24	−0.17
D21	−0.22	−0.08	−0.16	−0.28	−0.28	−0.27	−0.40	−0.32	−0.30	−0.41	−0.36	−0.34	−0.22

Source: Authors.

Similar results were obtained for the D1 variable—lack of direct contact with the teacher; D2—lack of direct contact with colleagues; D8—difficulties with teaching practical subjects; and D14—lack of possibility to verify student's knowledge/skills reliably (e.g., due to the ease of cheating during tests via the Internet).

Based on the conducted research, it can be claimed that good contact with academic teachers has a significant impact on reducing the occurrence of e-learning disadvantages. The teachers must be properly prepared to give e-learning classes. In particular, such classes must be easily accessible and enable students to quickly and separately contact their teacher and classmates. Good contact with teachers, as well as their high communication skills with the use of remote tools, can significantly reduce the occurrence of many disadvantages of e-learning. The obtained results support the expectation E2, which was formulated as follows: good contact with teachers and their ability to communicate on the use of remote tools are important variables positively influencing e-learning.

In the next stage of the research, an analysis of the Spearman correlation between the advantages and disadvantages of e-learning and the assessment of the ease of acquiring content during traditional classes and e-learning classes by students were performed. Accordingly, Table 4 presents Sperman's correlations between the advantages of using e-learning and the ease of acquiring content by students in traditional learning and e-learning, and Table 5 shows the results of correlations between the disadvantages of using e-learning and the ease of acquiring content by students in traditional learning and e-learning.

All calculated correlation coefficients are statistically significant at the level of statistical significance $\alpha = 0.05$. Research shows that all the advantages of e-learning are positively correlated with the student's assessment of the ease of acquiring content in e-learning by students, and negatively correlated with the student's assessment of the ease of acquiring content in traditional education. The obtained research results support the expectation E3 formulated as follows: the easier the student assimilates e-learning content, the higher the student evaluates the advantages of e-learning.

Table 4. Sperman's rank correlations between the advantages of using innovative e-learning and the ease of acquiring content by students in traditional learning and e-learning.

Advantage	Ease of Acquiring Content—Traditional Learning	Ease of Acquiring Content—Innovative E-Learning
Saving time	−0.20	0.36
Lack of travel necessity	−0.11	0.24
Possibility of learning from own home country/city	−0.15	0.27
Lower costs	−0.21	0.33
Individualization of the learning process	−0.29	0.47
Easy access to materials	−0.25	0.44
Good contact with the teacher	−0.38	0.56
Higher availability of academic teachers	−0.32	0.52
Ease of student progress tracking	−0.31	0.47
Less mental and physical stress	−0.37	0.51
Possibility of interaction (discussion on the forum, sending reactions)	−0.38	0.52
Convenience	−0.30	0.48
Limiting the spread of the SARS-CoV-2 virus	−0.19	0.42

Source: Authors.

Table 5. Sperman's rank correlations between the disadvantages of using innovative e-learning and the ease of acquiring content by students in traditional learning and e-learning.

Disadvantage	Ease of Acquiring Content—Traditional Learning	Ease of Acquiring Content—Innovative E-Learning
Lack of direct contact with the teacher	0.46	−0.48
Lack of direct contact with colleagues	0.36	−0.44
Necessity to purchase e-learning equipment (computer/laptop/smartphone/headphones/microphone etc.)	0.30	−0.39
Low quality of e-learning materials	0.28	−0.42
Difficulties with motivation to learn	0.37	−0.64
Discomfort resulting from the use of information technology	0.29	−0.47
Poor preparation of academic teachers for e-learning	0.15	−0.31
Difficulties with teaching practical subjects	0.38	−0.49
Difficulties in accessing traditional academic resources (e.g., libraries, reading rooms)	0.31	−0.34
Lack of possibility of using other academic activities (e.g., science clubs, sports sections)	0.32	−0.41
Difficulties with collaborating with colleagues	0.36	−0.50
Cyber-threats	0.31	−0.25
Risk of being recorded/photographed/"screenshot" etc.	0.27	−0.27
Lack of possibility of verifying student's knowledge/skills reliably (e.g., due to the ease of cheating during tests via the Internet)	0.39	−0.43
Lack of/decreased privacy	0.34	−0.41
Technical problems on the part of the lecturer	0.28	−0.32
Technical problems on the part of the participants	0.33	−0.38
Too much time spent in front of a computer/telephone or other mobile device	0.34	−0.45
Increase in electricity costs	0.25	−0.36
Excessive use of own equipment	0.29	−0.38
Difficult conditions for use of e-learning in the place of residence	0.27	−0.44

Source: Authors.

The opposite situation occurs for the disadvantages of e-learning. They are positively correlated with the ease of acquiring the content in traditional learning, and negatively correlated with the ease of acquiring the content in e-learning. On the basis of the results,

we can say that the worse the student assimilates e-learning content, the higher the student evaluates the disadvantages of e-learning.

When analyzing the data on the advantages of e-learning, it can be observed that the highest level of correlation (above 0.5) between the studied advantages and the student's perception of the ease of acquiring e-learning content occurs for the following variables: good contact with the teacher (correlation coefficient at a level of 0.56); possibility of interaction (0.52); higher availability of academic teachers (0.52), and less mental and physical stress (0.51). Again, the importance of the preparation of academic teachers for interpersonal communication with the use of remote tools is observed. The results support the expectation E2—good contact with teachers and their ability to communicate on the use of remote tools are important variables positively influencing e-learning.

In the case of the relationship between the disadvantages of using e-learning in universities and the ease of acquiring traditional and e-content, it can be observed that the highest negative correlation coefficient (−0.64) occurs between the ease of acquiring e-learning content and difficulties in motivation to learn. There are many international research efforts about the advantages and disadvantages of using e-learning in high education. For example, the topic is described V. Arkorful and N. Abaidoo [2], M. Curelary et al. [119] and A. Alsoud and A. Harasis [120]. People who perceive e-learning content as difficult to absorb have low motivation to learn remotely. The problem of importance of motivation in effectiveness of e-learning was analyzed by N. Elayan [121], M. El-Seoud et al. [122] and M. Ja'ashan [123]. The perceived difficulties of the content discourage them from this type of learning and make them not motivated enough. The problems connected with the impact of difficulty of content on e-learning was also analyzed by G. Bora [124] and L. Li and H. Zhang [125]. A similar relationship occurs in the case of cooperation with colleagues within groups. The problems connected with the impact of e-learning on collaboration between students was analyzed by Hurajowa et al. [126].

The last stage of the research considers the relationship between the advantages and disadvantages of e-learning, and variables such as the student's knowledge of information technology, the student's possession of resources necessary for e-learning, and the level of innovation of e-learning solutions used by university at which the given student studies.

The Spearman's rank correlation coefficient was used for the analysis. Table 6 shows the results for the advantages, and Table 7 the disadvantages.

In the case of the advantages of e-learning, the following relationships were observed in the study:

- All studied advantages are positively correlated with students' knowledge of information technology;
- All studied advantages are positively correlated with the student's possession of resources necessary for e-learning,
- All studied advantages are positively correlated with innovation of e-learning solutions used by university in which the given student studies.

The results confirm expectations E4, E5, and E6. The mentioned expectations were formulated as follows: E4—the better the student knows information technology, the higher the student evaluates the advantages of e-learning, E5—the better resources to participate in e-learning activities the student has, the higher the student evaluates the advantages of e-learning, 6—the more often innovative e-learning solutions are used in a given university, the better the student assesses the advantages of e-learning.

In the case of e-learning disadvantages, all correlation coefficients in Table 7 are statistically significant. The results for which statistical significance does not occur are marked with an asterisk.

Table 6. Sperman's rank correlations between the advantages of using e-learning and the student's knowledge of information technology, the student's possession of resources necessary for e-learning, and the innovation of e-learning solutions used by university at which the given student studies.

Advantage	Student's Possession of Resources Necessary for E-Learning	Student's Possession of Resources Necessary for E-Learning	Innovation of E-Learning Solutions Used by University
Saving time	0.18	0.23	0.17
Lack of travel necessity	0.16	0.20	0.12
Possibility of learning from own home country/city	0.15	0.20	0.15
Lower costs	0.16	0.23	0.14
Individualization of the learning process	0.17	0.21	0.27
Easy access to materials	0.17	0.26	0.27
Good contact with the teacher	0.17	0.25	0.28
Higher availability of academic teachers	0.17	0.25	0.27
Ease of student progress tracking	0.18	0.23	0.26
Less mental and physical stress	0.18	0.26	0.29
Possibility of interaction (discussion on the forum, sending reactions)	0.19	0.28	0.28
Convenience	0.18	0.28	0.21
Limiting the spread of the SARS-CoV-2 virus	0.16	0.24	0.24

Source: Authors.

Table 7. Sperman's rank correlations between the disadvantages of using e-learning and student's knowledge of information technology, student's possession of resources necessary for e-learning, and innovation of e-learning solutions used by university in which the given student studies.

Disadvantage	Student's Possession of Resources Necessary for E-Learning	Student's Possession of Resources Necessary for E-Learning	Innovation of E-Learning Solutions Used by University
Lack of direct contact with the teacher	−0.14	−0.18	−0.11
Lack of direct contact with colleagues	−0.12	−0.14	−0.06 *
Necessity to purchase e-learning equipment (computer/laptop/smartphone/headphones/ microphone etc.)	−0.13	−0.23	−0.15
Low quality of e-learning materials	−0.10	−0.23	−0.27
Difficulties with motivation to learn	−0.17	−0.31	−0.24
Discomfort resulting from the use of information technology	−0.29	−0.34	−0.20
Poor preparation of academic teachers for e-learning	−0.01 *	−0.12	−0.37
Difficulties with teaching practical subjects	−0.12	−0.15	−0.18
Difficulties in accessing traditional academic resources (e.g., libraries, reading rooms)	−0.09	−0.17	−0.15
Lack of possibility of using other academic activities (e.g., science clubs, sports sections)	−0.08	−0.14	−0.14
Difficulties with collaborating with colleagues	−0.17	−0.25	−0.21
Cyber-threats	−0.12	−0.21	−0.08
Risk of being recorded/photographed/"screenshot" etc.	−0.12	−0.17	−0.09
Lack of possibility of verifing student's knowledge/skills reliably (e.g., due to the ease of cheating during tests via the Internet)	−0.12	−0.21	−0.19
Lack of/decreased privacy	−0.16	−0.29	−0.18
Technical problems on the part of the lecturer	−0.03 *	−0.15	−0.23
Technical problems on the part of the participants	−0.10	−0.22	−0.21

Table 7. *Cont.*

Disadvantage	Student's Possession of Resources Necessary for E-Learning	Student's Possession of Resources Necessary for E-Learning	Innovation of E-Learning Solutions Used by University
Too much time spent in front of a computer/telephone or other mobile device	−0.16	−0.21	−0.16
Increase in electricity costs	−0.13	−0.23	−0.14
Excessive use of own equipment	−0.16	−0.25	−0.14
Difficult conditions for use of e-learning in the place of residence	−0.14	−0.29	−0.16

Source: Authors.

The following relationships were observed in the research:

- The studied disadvantages (except for two) are negatively correlated with the student's knowledge of information technology;
- All studied disadvantages are negatively correlated with the student's possession of resources necessary for e-learning;
- The studied disadvantages (except for one) are negatively correlated with the innovation of e-learning solutions used by university in which the given student studies.

The results of the research permit the conclusion that Polish university students' knowledge of information technology and possession of resources necessary for e-learning are variables that positively affect the implementation of the e-learning process at a university. Students in Polish universities with the mentioned knowledge and resources assess the advantages of e-learning at a higher level and its disadvantages at a lower level. The efficiency of e-learning in Polish Universities is, to a large extent, conditioned by possession of the proper equipment which is sufficient for the comfortable e-learning and the level of knowledge and skills that allows for trouble-free operation during e-learning.

Another factor that positively influences the evaluation of e-learning by students in Polish universities is the use of innovative e-learning solutions at a given university. When such solutions are used at a given Polish university, students perceive all advantages of e-learning higher and evaluate most of its disadvantages lower.

5. Discussion and Conclusions

Many papers refer to advantages and disadvantages of innovative e-learning, but usually they are theoretical, descriptive, debatable, or review-based [2,4,5,9]—this refers also to the papers from the last two years, for example: [53–55]. In our research, the advantages and disadvantages were evaluated with a questionnaire. The students, as evaluators, were able to show their points of view on the advantages and disadvantages of e-learning. This research has been useful and justified to conduct since it provides measurable and quantitative data. A comparison of our research with the practical research of other authors is presented below.

In our research, the importance of advantages of innovative e-learning was rated higher than the importance of disadvantages. In the literature, there are also some research projects, in which the advantages are placed on the first place. Kaliyaperumal and Raman [49] investigated the satisfaction and sense of comfort with e-learning of nursing students in a Coimbatore college. The sample was 382 students. The students were highly satisfied with various aspects of the lecture, such as the teacher's motivation, the question session at the end of the lecture, and the virtual film about the procedure, according to the results. Students were at ease attending e-learning classes since they are used to using a computer device, according to the findings. At this point, another research limitation can be identified. Our study referred to e-learning in general and was not focused on the given subject of study. Concentrating on the specific subjects, like mathematics, management etc. may bring different results. Other authors—Naveed et al. [50]—emphasize the advantages of e-learning, such as flexibility, no need to travel to school, and low costs. In another re-

search study [51], the following positive aspects of online education were identified among teachers: the ease of teaching online, the flexibility of the work schedule, the adaptability to broad learning styles, the variety of tools available at hand, and the ease in monitoring and documenting teaching activities. The students and parents surveyed identified flexibility in work time, the comfort of working from home, as well as the variety of sources of documentation as the main advantages of the e-learning system. Gherheș et al. [52] also identified the advantages and disadvantages of e-learning. The main three advantages of e-learning, as pointed out by the respondents, were time efficiency, convenience, and accessibility. On the other hand, the respondents believed that lack of interaction was the main drawback of e-learning, supported by those who stated that they missed interacting with their peers. The rest of the important disadvantages were the technical problems encountered during the Internet connection, and lack of practical applications, which could mean a huge problem for students undertaking technical studies.

Our research has shown that in the case of Polish universities, the most important drawback of e-learning in the universities is the reduction of social contacts. This concerns contacts between students in the first place, but also includes contacts between the student and the lecturer. Rutkowska et al. [58] share the same opinion in their research. Isolation from peers and distance learning have significantly limited interpersonal contacts, which might have affected the mental well-being of students. The aim of their study was to investigate the prevalence of depressive symptoms and the level of perceived stress during e-learning among Slovak students and to identify the variables that have the most significant impact on mental health among students. The study included 3051 participants with a mean age of 22.37 years. Almost all study participants were characterized by an increased stress level and 47% of them were depressed. Furthermore, isolation affected women more, especially in terms of social life and economics. Other research has shown similar results [51]. According to them, students' main dissatisfaction is the lack of student/teacher interactions, the lack of socialization with colleagues, and the lower level of quality of teaching.

Ibraheem et al. [59] in their paper described the results of a study using a method similar to the one that we used in our research. The research sample consisted of 199 male and female students from the College of Education for Human Sciences and College of Education for Pure Sciences, University of Basra, for the academic year 2020–2021. The results showed the following: the research sample does not suffer from social isolation; there are no statistically significant differences in social isolation according to the gender variable; there are statistically significant differences in social isolation according to the 'class' variable; there are no statistically significant differences in social isolation according to the field or specialization variable. To the contrary, Parte and Herrador-Alcaide [60] conducted isolation research during the COVID-19 pandemic among teachers. It was concluded that the isolation perception of tutors was not high, while the sense of belonging among the teaching community was high.

Article [57] summarizes the interviews of 15 respondents from Lithuanian higher education institutions and how their informants met changes, opportunities, and identified quality variables addressed to the successful e-learning during a pandemic period. Based on the results of this study, the advantages and disadvantages of e-learning can be identified. The research differs from ours because we utilized questionnaires and they employed interviews as a research method. Using only a questionnaire with closed questions can be assumed to be a research limitation. Extending the survey with, for example, interviews would further increase the quality of the research. The interviews allowed authors the collection of more detailed information and more subjective opinions from specific academics. However, the research was limited as it was carried out on only 15 people, while our research allowed more than 600 respondents to be examined. According to their results, e-learning has been a great opportunity and can bring many advantages. They emphasized flexible schedules and communication, time and cost savings, greater opportunity for post-graduate study, and better attendance at classes. It is worth noting

that the authors found that theoretical lectures can be conducted at a distance, but that the laboratories and exercises should be offline. The interviewers claimed that in active classes there are things that cannot be changed due to the use of e-technology. In our research, the respondents did not consider the disadvantage of "difficulties with teaching practical subjects" to be very significant (average value 3.6, median value 4 out of 5). The reason for this difference in both studies is the respondents: in our research they were students, and in the authors' research they were teachers. It means that teachers see more obstacles in learning practical subjects, whereas students find it easy to prepare and take on. It is because the perspectives of teaching and learning are different. Moreover, the authors also noticed that it is not possible to provide absolutely everything remotely because social skills will be lost. E-learning limits body language as well. For teachers, it is difficult to assess what they actually see on the other side of the screen. To the contrary, Bylieva et al. [46] concluded that an important parameter that influences the behavior of students and their educational progress in general is precisely the focus on practice. Thus, the predominance of the online component in blended learning is appropriate for practical courses. Within the theoretical and general education courses, the predominance of face-to-face learning can positively affect the educational process and results of learning. In this research, the authors have applied Moodle data mining from learning portfolios of 1500 students (N = 1500). Comparative analysis of the courses under review showed significant differences in the behavior of the same students. For the theoretical course, students spent less time than for the practice-oriented one. The progress of the students in the form of points and the demand for non-binding elements of the course differed significantly in favor of the practical course.

The issue of cheating in e-learning is interesting from the research point of view. The disadvantage of "lack of possibility to verify student's knowledge/skills reliably (e.g., due to the ease of cheating during tests via the Internet)" was rated low (average value 2.72, median value 3) by the students. After conducting a literature review, it appeared that there are many papers on e-learning's quality which refer to the e-cheating problem. The authors of other papers usually find e-cheating very easy and common. The authors of [2] claim that since tests for assessments in e-learning are possibly done with the use of a proxy, it is be difficult, if not impossible, to control or regulate bad activities like cheating. According to Jones et al. [61] cheating in e-learning is a major disadvantage and has a high risk of occurrence. The existence of a wealth of information on a wide range of topics helps, and at the same time, tempts. Connors [62] notices that academics who once praised the Internet for giving students more access to information are now worried it is providing students with easy access to pre-written essays. Using the Internet to cheat during online tests also poses the threat of collecting incorrect and unreliable information written by random people [63]. Nowadays, e-cheating is a subject of research; for example, Shoaib and Zahran [64] have concluded that academic misconduct was directly influenced by a rapid transition to e-learning, social culture, and subjective norms, all of which contributed to shifts in ethical perceptions, leading to increased reports of cheating. The study was carried out with ten graduates of the Saudi Arabian English as a Foreign Language program in a higher education institution through in-depth interviews through qualitative interpretative phenomenological analysis. Another research [65], in which 214 participants from different institutes and fields of study from Peter the Great St. Petersburg Polytechnic University took part, revealed that students do not notice any serious forms of deception and they evaluate the motives for cheating quite neutrally, but at the same time demonstrate their propensity and interest in the possibility of cheating. On the other hand, solutions are also sought to the apparent problems of online cheating. Some studies find ways to prevent cheating [66,67], and some work on smart cheating detection [68,69].

Because of the COVID-19 pandemic, universities around the world were forced to switch to e-learning. Innovative e-learning was a great opportunity to continue learning despite the limitations and restrictions related to the occurrence of the SARS-CoV-2 virus. In this paper, a study of the identification and evaluation of advantages and disadvan-

tages of e-learning has been presented. The students considered as the most important the following advantages (average value rated over 4.0): lack of travel necessity (4.82), possibility of learning from own home country/city (4.62), saving time—4.54, lower costs (4.45), convenience (4.44), limiting the spread of the SARS-CoV-2 virus (4.37), easy access to materials (4.14). For all the variables mentioned above, the median value was 5—which is the highest possible level. As the most significant disadvantages, in turn, the students rated lack of direct contact with colleagues (3.71), difficulties with teaching practical subjects (3.60), lack of direct contact with the teacher (3.41), too much time spent in front of a computer/telephone or other mobile device (3.31). For the mentioned variables, the average value exceeded 3.0, and the median was 4.0. It is worth noting that the advantages of e-learning were evaluated as being more important than its disadvantages. It means that, according to the surveyed students, the positive sides of e-learning are much more important than its negatives. The results allow one to draw a conclusion of an overall positive assessment of e-learning used during the COVID-19 pandemic in Poland. The results confirmed that e-learning could also be used after the end of the pandemic. Its advantages may make it an alternative to traditional classes in some fields of study. It is worth noting that although it is not necessary for health safety reasons, some e-learning tools, for example the remote education platform, are used at our university all the time. Also, we should know that e-learning is especially effective when we use a mixed, open innovation approach using both internal and external knowledge.

Other important conclusions from the research include the following:

- Innovative e-learning significantly reduces the cost of studying and facilitates studying for people from smaller towns, for whom the costs of travel and accommodation in a large city can be a great obstacle to studying in the case of traditional education;
- Students satisfied with innovative e-learning assess the advantages highly and the disadvantages lower; on the contrary, students who are not satisfied with e-learning evaluate the disadvantages higher and the advantages lower;
- Limiting the spread of the virus was rated only in the sixth place among the examined advantages. It proves that even though the pandemic initiated the widespread use of e-learning at universities, its use made students pay attention to other advantages of this type of learning;
- Good contact with academic teachers has a significant impact on reducing the occurrence of e-learning disadvantages; the teachers must be properly prepared to give e-learning classes; classes must be easily accessible and enable students to quickly and separately contact the teacher and classmates;
- Good contact with teachers as well as their high communication skills with the use of remote tools can significantly reduce the occurrence of many disadvantages of e-learning;
- All the advantages of e-learning are positively correlated with the student's assessment of the ease of acquiring content in e-learning by students, and negatively correlated with the student's assessment of the ease of acquiring content in traditional education; the easier the student assimilates e-learning content, the higher the student evaluates the advantages of e-learning;
- The disadvantages are positively correlated with the ease of acquiring the content in traditional learning, and negatively correlated with the ease of acquiring the content in e-learning; the worse the student assimilates e-learning content, the higher the student evaluates the disadvantages of e-learning;
- Students who perceive e-learning content as difficult to absorb have low motivation to learn remotely; the perceived difficulties of the content discourage them from this type of learning and make them not motivated enough;
- The better the student knows information technology, the higher the student evaluates the advantages of e-learning;
- The better resources to participate in e-learning activities the student has, the higher the student evaluates the advantages of e-learning;

- The more often innovative e-learning solutions are used in a given university, the better the student assesses the advantages of e-learning.

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Institutional Review Board Statement: According to our University Ethical Statement, following, the following shall be regarded as research requiring a favorable opinion from the Ethic Commission in the case of human research (based on document in polish: https://prawo.polsl.pl/Lists/Monitor/Attachments/7291/M.2021.501.Z.107.pdf): research in which persons with limited capacity to give informed or research on persons whose capacity to give informed or free consent to participate in research and who have a limited ability to refuse research before or during their implementation, in particular: children and adolescents under 12 years of age, persons with intellectual disabilities persons whose consent to participate in the research may not be fully voluntary prisoners, soldiers, police officers, employees of companies (when the survey is conducted at their workplace), persons who agree to participate in the research on the basis of false information about the purpose and course of the research (masking instruction, i.e., deception) or do not know at all that they are subjects (in so-called natural experiments); research in which persons particularly susceptible to psychological trauma and mental health disorders are to participate mental health, in particular: mentally ill persons, victims of disasters, war trauma, etc., patients receiving treatment for psychotic disorders, family members of terminally or chronically ill patients; research involving active interference with human behavior aimed at changing it research involving active intervention in human behavior aimed at changing that behavior without direct intervention in the functioning of the brain, e.g., cognitive training, psychotherapy psychocorrection, etc. (this also applies if the intended intervention is intended to benefit (this also applies when the intended intervention is to benefit the subject (e.g., to improve his/her memory); research concerning controversial issues (e.g., abortion, in vitro fertilization, death penalty) or requiring particular delicacy and caution (e.g., concerning religious beliefs or attitudes towards minority groups) minority groups); research that is prolonged, tiring, physically or mentally exhausting. Our research is not done on people meeting the mentioned condition. Any of the researched people: any of them had limited capacity to be informed, any of them had been susceptible to psychological trauma and mental health disorders, the research did not concern the mentioned-above controversial issues, the research was not prolonged, tiring, physically or mentally exhausting.

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