European Research Studies Journal
Volume XXIII, Special Issue 1, 2020

pp. 848-866

Conditions and Potential for Remote Student Teaching

Submitted 25/07/20, 1st revision 23/08/20, 2nd revision 15/10/20, accepted, 04/11/20

Paweł Modrzyński[1], Małgorzata Zajdel[2],
Małgorzata Michalcewicz-Kaniowska[3]

Abstract:

Purpose: *This article aims to present the potential use and determinants for remote teaching tools in student education. A survey subject is a group of all Jan and Jedrzej Sniadecki UTP University of Science and Technology in Bydgoszcz and a group of all academic teachers.*
Design/Approach/Methodology: *The article presents the results of research conducted among students and employees of the UTP University of Technology and Life Sciences in Bydgoszcz, carried out during the Covid-19 coronavirus pandemic. The presentation of research results was preceded by an analysis of reference books. The method of collecting data from primary sources was an online survey. Because the survey covered the entire surveyed population of UTP students and teaching staff, it was unnecessary to select a sample from the population. This ensured that scientific research is exhaustive. It considers the entire surveyed population, preventing sampling errors, such as lack of full representativeness or random error.*
Findings: *Presented conclusions and summaries are of an applied nature and may form the basis for implementing system solutions for the utilization of remote teaching tools in the student education process.*
Practical Implications: *The research results clearly indicate the enormous potential of these tools in modern education, but it should also be mentioned that the respondent assessment excludes the elimination of traditional teaching classes. The potential of remote learning refers primarily to make the form, accessibility, and methods of selected forms of teaching more attractive. The identified barriers relate to technical conditions (Internet connection parameters) and the nature and nature of activities (e.g., practical exercises, labs) and faculties. Technical barriers outside the competence of the higher education facilities must be addressed systematically, e.g., by offering high-speed mobile internet for students.*
Originality/Value: *The conducted statistical analysis indicates that conducting student and academic staff training in remote learning tool utilization is essential, as it will primarily affect the quality and comfort of work and teaching, but it is also important in the assessment of the use of these instruments, in each of the examined areas.*

Keywords: *Distance learning, student education, IT technologies in the education process.*
JEL codes: *A22, I23*
Paper type: *Research study.*

[1]*Lecturer, University of Science and Technology, Faculty of Management, Poland, pawel.modrzynski@utp.edu.pl.*
[2]*University of Science and Technology, Faculty of Management, Poland, m.zajdel@utp.edu.pl*
[3]*Lecturer, University of Science and Technology, Faculty of Management, Poland, malgorzata.michalcewicz-kaniowska@utp.edu.pl*

1. Introduction

The conclusions presented in the UNESCO report (2015) related to widely understood remote education indicate that it is sometimes the only possibility of raising the level of competence, continuing education, or a chance to get a new, better job for students. The authors of the report indicate that students' decisions related to their selection of, i.e., faculties and forms of education, including remote learning, are varied. In the umbrella document titled: "Lifelong learning for all," prepared by the ministers responsible for education ministries of the OECD countries, the following were noted, i.e., the possibility and necessity of using ICT tools to promote access to all layers and levels of education (OECD, 2016). In Poland, the use of e-learning in didactic education is still in its initial implementation period. According to A. Szewczyk, it may soon become an interesting alternative in conducting classes and improving qualifications (Szewczyk, 2018).

2. Literature Review

For several years, higher education was governed by teaching standards, which defined and imposed a detailed process of creating university offers in Poland. In the international environment, standards were developed over time to change the way higher education facilities design and evaluate education quality. The signature of the Bologna Declaration in 1999 marked the beginning of the process of these changes in higher education for a growing number of countries participating in the Bologna Process (Sursock and Smidt, 2010).

The deployed autonomy of higher education facilities in creating faculties and shaping their curricula is primarily aimed at improving the quality of education. In this area, universities are obliged to introduce and continuously improve internal quality assurance systems supervised by the Rector. In some Polish higher education facilities, we can see the utilization of the complementary education model, which combines the traditional model of education and remote education. Academic e-learning in Poland takes different forms and is used in different areas. It can be considered with various aspects, including its effectiveness in the teaching process, technology as a means of teaching, or the impact on society. In some higher education facilities, there are Academic E-learning Units for e-learning. They are separate within the university structures, implementing, organizing, and coordinating all activities related to e-learning (Malenczyk, Gladysz and Marciniak, 2019).

Reference books in the remote teaching field are not thoroughly recognized and quite rarely undertaken. Many publications are related to its users only when teaching specific subjects and consider only the specification of a particular faculty.

Certainly, some example higher education facilities in the country were already well prepared for remote education before the pandemic outbreak. Thus, the research conducted as early as 2007 at the AGH University of Science and Technology and

the Cracow University of Economics on students' expectations of remote teaching showed several positive opinions of students related to, e.g., freedom of location (56%), organizational effectiveness (54%) understood, e.g., as quick and easy contact with the teacher, availability of teaching materials, freedom of time (49%), attractiveness of the form of conducted classes (22%), as well as increasing the education possibilities for students with disabilities or consulting scientific authorities. Considering their own experience, students emphasized that universities that occupy high positions in the Perspektywy ranking, approx. 80% of students used e-learning during their education as a mandatory or optional form (Kwiecien, Woloszyn, 2007).

However, there is a lack of comprehensive analyses that can provide the basis for comparisons at the national level and offer strategic, unified courses of action to university authorities, which from the financial point of view should be a turning point in higher education, rather than undertaking various, often improper implementations. The research results at the University of Information Technology and Management indicate an increase in the students' satisfaction with the adopted e-learning solutions, both in terms of preparation and distribution of Internet courses offered communication methods with the teacher and other participants. The introduction of e-learning may, according to students taking part in the survey, also influence building a positive image of the university (Betlej, 2009; Khan *et al.*, 2020).

Redlarski and Garnik (2014) researched the practical use of e-learning platforms and their impact on the teaching process's quality in three Polish higher education facilities. For this purpose, the following systems have been assessed: Moodle, ILIAS, EDUX. However, it turned out that the use of the selected educational platform had no direct impact on teaching quality. These studies highlighted the limitations of e-learning system development in Polish higher education facilities as soon as 2014. They also indicated, among other things, the lack of adequate knowledge of the teaching staff, low skill level in creating interactive teaching materials, lack of implemented training policy, motivation policy, and other relevant regulations which can be considered as factors that limit the e-learning system development (Redlarski, Garnik, 2014). Broader coverage of e-learning issues in public higher education facilities was discussed in the A. Pleśniarska study, the results of which indicated the development of a model that adjusts higher education to the needs of the knowledge-based economy with the use of remote teaching (Plesniarska, 2016).

Higher and higher education facilities have been implementing e-learning platforms that support traditional teaching. The Moodle platform is widely used as a tool that helps the blended-learning method. This is related to the development of information technologies and the implementation of educational platforms. The research carried out at the University of Gdansk acts as an indication of higher education in Poland. The study conducted in an attempt to determine the advantages and disadvantages of

the blended-learning method to support traditional lectures and workshops and the subjective student's assessment of its suitability for education has become an important area of knowledge that provide crucial information on future ways of strengthening and developing the functionality of the Moodle e-learning platform (Szadziewska and Kujawski, 2016).

The latest research in 2019, covering a diagnosis of the academic e-learning utilization in Polish public higher education technical facilities compared with the general Polish public higher education facilities, indicates that higher education technical facilities are much more advanced in its everyday use. The advancement state of e-learning implementation is mainly due to conditions, including technological ones, related to the type of a higher education facility. The authors of the research emphasize deficiencies in conducting comprehensive study on the actual state of academic e-learning utilization at the national level (Malenczyk and Gladysz, 2019). The research development on academic e-learning in Poland, both in public and private higher education facilities, covering 139 higher education facilities, presented a high degree of advancement in applying e-learning tools (Malenczyk and Gladysz, 2019).

Due to the coronavirus pandemic, classes at Polish higher education facilities were suspended by the decision of the Minister of Science and Higher Education (MNiSzW) from 12 March to 24 May, and an obligation to teach remotely, if possible, was introduced using distance learning methods and techniques. The country's epidemiological situation showed that the majority of Polish higher education facilities have IT resources necessary to conduct remote teaching, and some of them even offer ready-made solutions in the form of e-learning courses. Taking into account the fact that the majority of Polish higher education facilities is equipped with adequate IT resources and implemented mechanisms of remote teaching, recommendations were prepared related to teaching conducted with distance learning methods and techniques in all faculties and levels of education, in full-time and extramural studies as well as in postgraduate studies. The scope of recommendations included guidelines for the organization of remote learning, assessment, and validation, i.e., recognition of formal remote learning, progressive assessment of remote learning outcomes.

However, many higher education facilities, in the opinion of students, teachers, and management, pointed out several limitations which in the recommendations of the Ministry of Science and Higher Education (MNiSzW) should be taken into consideration in the quality assurance policy, which should also include the use of remote learning methods and techniques and be an integral part of the facility quality assurance system. It is worth noting that according to the Ministry: "…the e-learning policy of higher education facilities may include quality elements, such as institutional support, course development, teaching and learning, course structure, student support, faculty support with compulsory e-learning training for new employees, technological infrastructure, student assessment (student authentication,

work authorization, and exam security) and certification; electronic security measures." (Ministerstwo Nauki i Szkolnictwa Wyższego, 2020).

The activities of higher education facilities in remote teaching, especially at technical and classic-profile universities, were positively evaluated by the Chairman of The Conference of Rectors of Academic Schools in Poland (CRASP) in an interview with the Polish Press Agency in April 2020. He pointed out the short time in which the university staff was motivated to prepare a series of online classes. Among students' opinions directed by the Students' Parliament of the Republic of Poland (PSRP), there were both positive and negative opinions, often depending on the technical capabilities of higher education facilities. In the opinion of the PSRP spokesperson, the quality of classes did not depend on the teachers' age.

Consequently, the high level of traditionally conducted classes often translated into an appropriately high level of remote classes. Students' self-governments were often involved in the process of evaluating remote classes to identify current problems (Zdzieblowski, 2020). In a report prepared by the Independent Students' Association, one in four students stated that the teaching staff did not remotely by applicable requirements. More than 50% of the students indicated that they did not attend some classes, even if possible. Surprisingly, over 68% of the respondents stated e-mail as a tool for conducting remote classes. Respondents also stressed their willingness to participate in training and technical problems and the need to train academic staff, noting the lack of widespread use of systems for remote work (Raport NZS, 2020).

It is worth mentioning that Jakieła and Wójcik (2018) analyzed and criticized the literature related to e-learning systems security policy, which is currently becoming a very topical and demanding subject. The authors formulated a target pattern of higher education facility behavior in system user security and privacy. Unfortunately, this topic becomes more important and binding. Still, this issue will be treated as a minor based on the different degrees of educational platforms' implementation in higher education facilities. The authors underline that the security policy should be developed about the e-learning platform operating at the higher education facilities and be consistent with the security policy of other IT systems with which this particular platform cooperates (Jakieła and Wojcik, 2018). The security of e-learning systems is, therefore, a unique challenge and should require the deployment of appropriate policies and procedures, mainly in the area of higher education IT, especially as online learning poses a severe threat, including all the security risks associated with Internet usage (Bandara, Ioras and Maher 2014; Chen and He, 2013).

3. Materials and Methods and Description of the Dataset

A survey subject is a group of all Jan and Jędrzej Śniadecki UTP University of Science and Technology in Bydgoszcz and a group of all academic teachers. The research tool consisted of two questionnaire forms, including one addressed to

students and the other addressed to academic staff. The survey covered the following thematic areas: (1) technical and location conditions of remote classes, (2) potential determinants of remote learning, and (3) potential opportunities to utilize remote learning. The method of collecting data from primary sources was an online survey. Because the survey covered the entire surveyed population of UTP students and teaching staff, it was unnecessary to select a sample from the population. This ensured that scientific research is exhaustive. It considers the entire surveyed population, preventing sampling errors, such as lack of full representativeness or random error.

The following research hypotheses were put forward in the paper: (1) "The use of modern technologies will make it possible to increase the level of attractiveness, availability and quality of traditional forms of education" and (2) "Lectures, diploma seminars and tutorials are forms of teaching classes offering the greatest potential for remote education." The goal of the research was to verify assumed research hypotheses, specify the factors that determine the teaching process delivered remotely, and examine the potential of this form of education and its use to improve the UTP teaching quality and attractiveness offer1. The specific objective of the research was, among others:

1. To specific factors that determine the teaching process delivered in a remote mode.
2. To examine the potential of this form of education in the remote mode.
3. To define the possibilities of using remote teaching to improve the quality and attractiveness of the teaching offer.

The research attempted to answer the following research questions: (1) How can remote learning be treated – as a complementary or a replacement for traditional education? (2) Can remote learning be implemented at a higher education facility as a standard solution that requires organizational solutions, procedure introduction? and (3) What needs can be identified in the group of employees and students?

4. Empirical Results

The conducted research was part of a broad discussion on the evaluation and development of modern teaching methods and the education process tools. Above all, the conclusions based on the survey allowed to fill the research gap in this area. First of all, previously researched the process of remote education, the conducted literature review results were not carried out under the conditions of total limitation of the traditionally conducted teaching process. For the first time, the Ministry of Science and Higher Education introduced a complete suspension of traditional teaching activities and their implementation to a greater or lesser extent using remote learning techniques, which enabled comprehensive research in this area. Secondly, have not only the determinants of remote education but also the premises and technical elements been verified, such as student's accommodation, housing

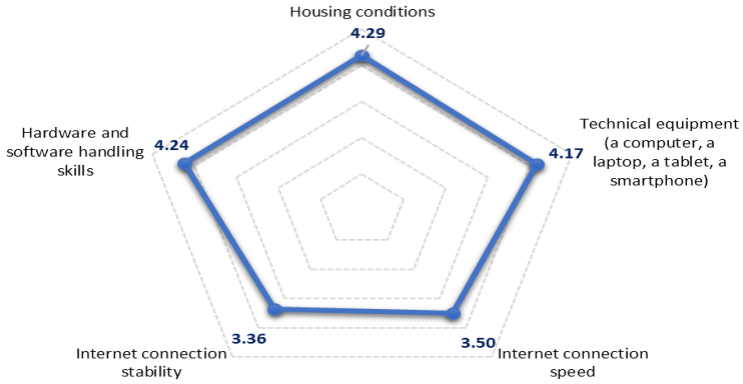
conditions, computer equipment as well as the speed and stability of the Internet connection, which played a vital role in the teaching process and which will significantly influence the subsequent evaluation of the possibility of using this form of education. The research results showed that UTP recruits a large part (42.3% of students) from rural areas, i.e., regions with potentially the lowest level of availability of fast and stable Internet infrastructure. Students use mainly mobile devices: laptops (83.8%) and smartphones (55.1%), which offer an additional advantage – they are equipped with cameras and microphones as standard, which allows for active participation in classes conducted using communication platforms.

The home environment also played a significant role in remote classes' comfort – more than 81% of students used their own rooms, and only more than 16% shared rooms with siblings or other people. In the students' opinion, Internet connection parameters were the biggest problem during remote classes. Interesting differences can be seen in the evaluation of the technical and housing conditions in which remote classes were conducted; the evaluating criterion is the student's place of residence. The greatest differences in the assessment are between students living in the countryside and in the largest cities (over 200,000 inhabitants). Interestingly, while students living in the countryside rate the housing conditions slightly higher, they rate the Internet connection in their homes much lower.

Students' assessment of the Internet connection was also characterized by the highest variability rate (over 39%, the standard deviation of 1.23), indicating high diversity of rural areas in terms of IT infrastructure access. Difficulties in establishing a connection with a remote platform, problems with sound and, more importantly, image transmission, or "hanging up" and slowing down video conferences are the main problems reported by students. Hardware problems, such as with a laptop or a smartphone, can be solved relatively inexpensively. Unfortunately, providing fast and stable internet access in many rural areas is still an important issue that neither the commune nor the telecommunications company operators can solve in a reasonable time. The lack of a stable and fast connection also prevents LTE mobile data transmission in such areas (Figures 1-2).

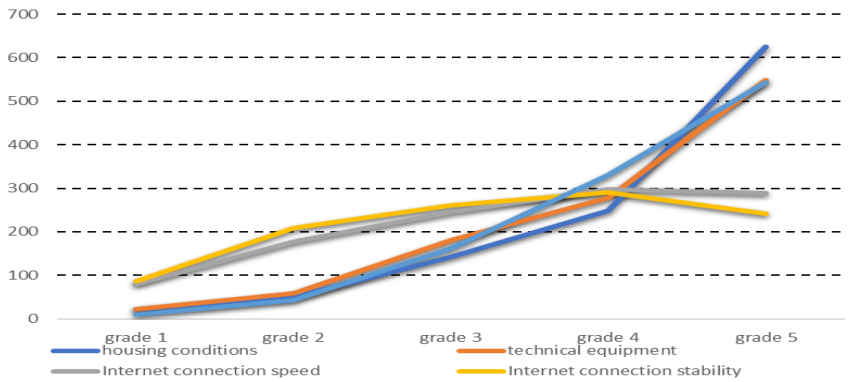
The results confirm the lack of system solutions in terms of utilized tools. During the classes, the students had to use various software and platforms. Depending on the form of conducted classes (lecture, practical exercises, or other forms), the lecturers used several available programs and platforms. The most popular ones were the following: MS Teams and Zoom Meeting as the basic software for remote learning (Figure 3). Moreover, other available and popular software was used in the education process: Google Drive, Discord, Moodle, or even social networking sites: Facebook (including Messenger).

Figure 1. *Average assessment of housing and technical conditions for remote education*



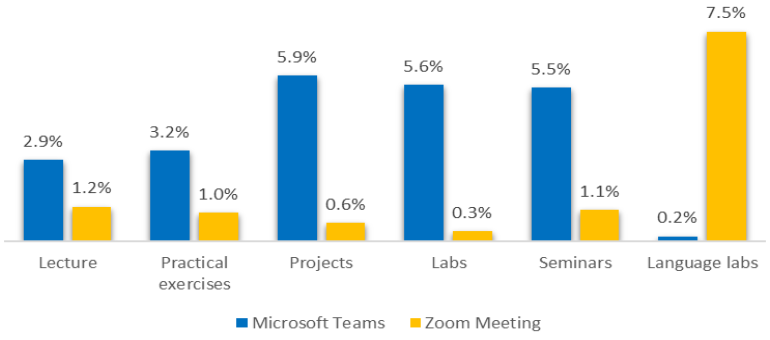
Source: *Own study based on conducted research.*

Figure 2. *Grade distribution of housing and technical conditions for remote education*



Source*: Own study based on conducted research.*

Figure 3. *Basic software used to remotely teach students*

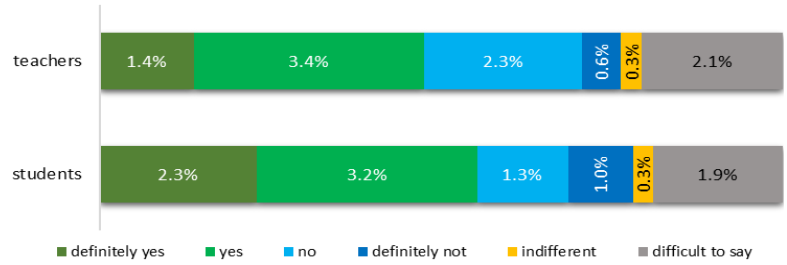


Source*: Own study based on conducted research.*

The assessment of potential determinants of remote learning was preceded with a general question about the perspective of remote learning in seeking alternatives to traditional teaching. It would not be easy to assess remote learning determinants if students did not treat the used remote learning platforms as an interesting option. It's even more difficult as in the current pandemic situation and the temporary limitation of the possibility of conducting business in the standard form, including higher education facilities, remote teaching ceased to be one of the available options. It became the only possible solution where the teaching process can be carried out according to the planned timetable and content schedule.

Obviously, some of the exclusively-practical classes in some faculties and fields of study, even this form of education, were impossible to implement. The research results indicate that the popularity among young people, including students, of modern technologies and social media in everyday life, translates into the acceptance of new communication forms also in the educational process. More than half of the students believe that remote teaching is a good alternative to traditional teaching. Only every fifth student disagrees. It is worth mentioning that this group consists of almost 21% of men and over 17% of women that have not yet formed an opinion on the subject. Only 3% of students claim that the form of conducting classes is indifferent to them. In the group of academic teachers, nearly half of them (47.5%) positively assess this form of education, and 28.7% of the respondents are of the opposite opinion. As in students' cases, there is also a large group of undecided teachers (Figure 4).

Figure 4. *Evaluation of remote teaching as an alternative to traditional teaching by students and academic teachers*

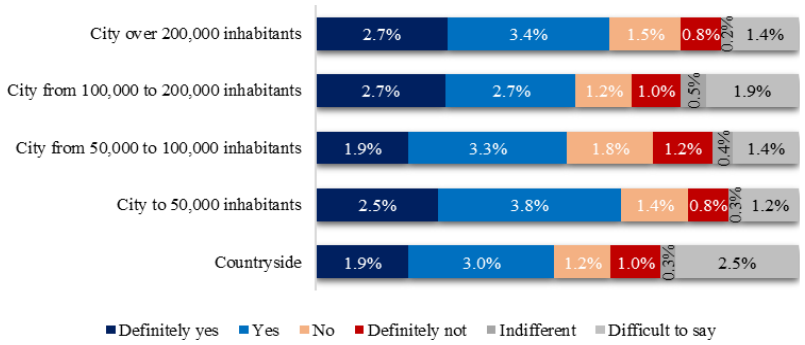


Source*: Own study based on conducted research.*

One of the factors that determine the assessment of remote learning potential as an alternative to traditional teaching by students is the place of residence. The lowest positive mark share (49.3%) for remote learning is among students living in rural areas, but it is worth noting that it is still a good result (Figure 5). The research results indicate a correlation between the assessment of technical conditions and residence and the assessment of remote classes in the researched area. Students who

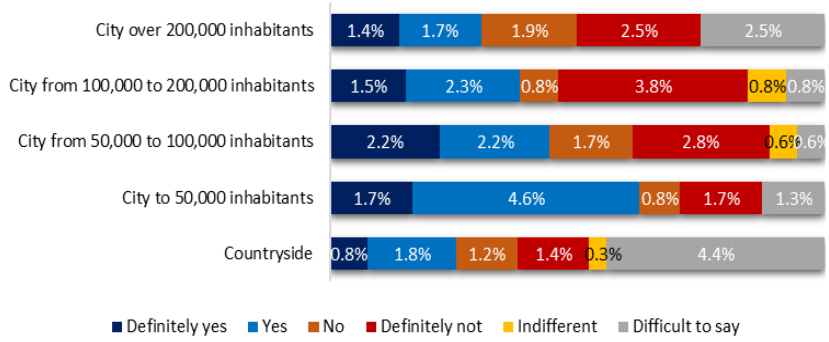
indicated the biggest problems with the Internet connection's stability and speed and who live in the countryside rated remote classes positively only at 24.5% (Figure 6).

Figure 5. *Evaluation of remote teaching as an alternative to traditional teaching by students (place of residence)*



Source*: Own study based on conducted research.*

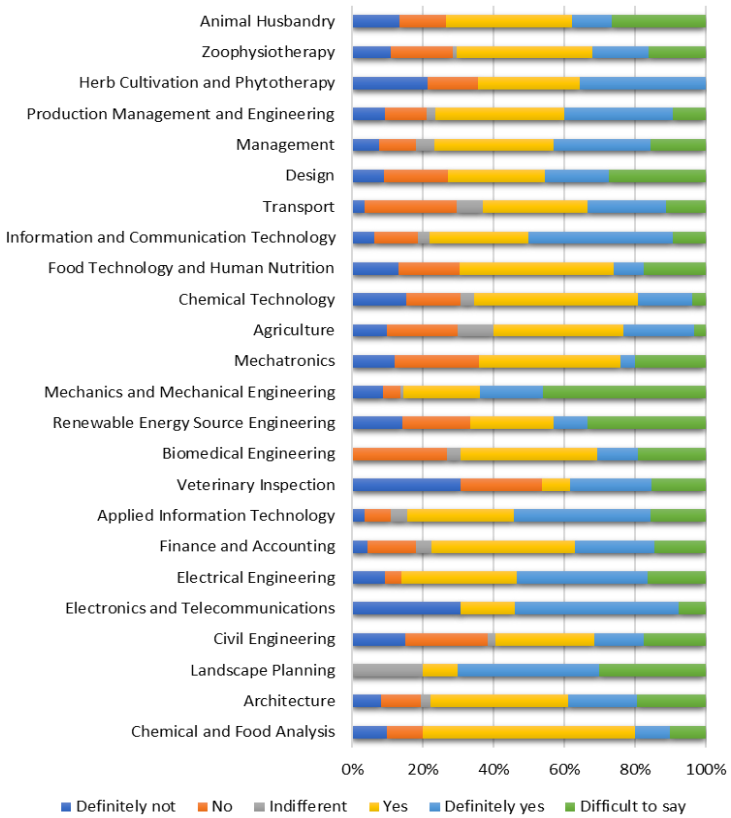
Figure 6. *Evaluation of remote teaching as an alternative to traditional classes by students (place of residence and negative evaluation of the Internet connection – students' grades: 1 & 2)*



Source*: Own study based on conducted research.*

The assessment of the remote learning potential by particular fields of study for students enables the correlations between these variables. In the faculties where teaching requires direct contact between teachers and students, is of a practical and experimental nature, the evaluation of remote education potential is significantly lower, e.g., veterinary inspection, herb cultivation, and phytotherapy, animal husbandry. On the other side of the assessment, there are such fields of study as applied IT, finance and accounting, production management, and engineering (Figure 7).

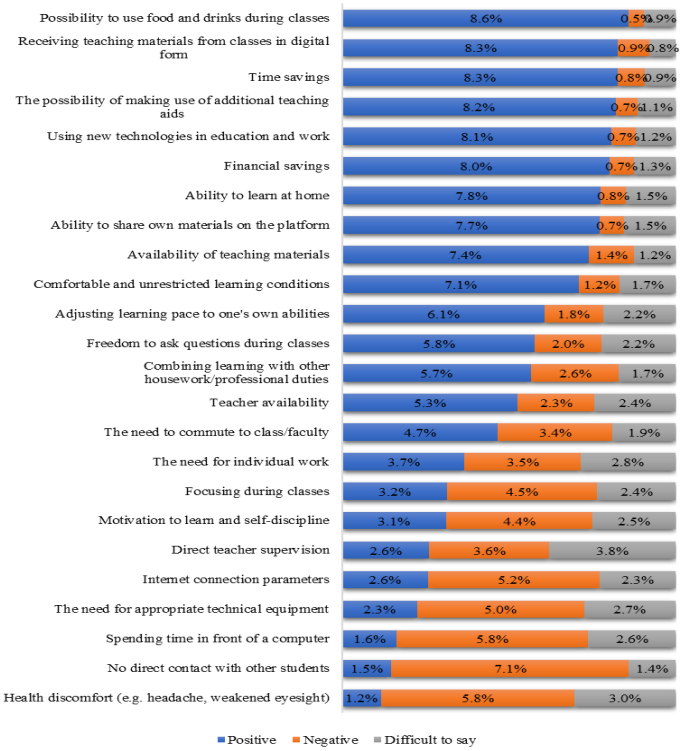
Figure 7. *Evaluation of remote teaching as an alternative to traditional teaching by students in selected fields of study*



Source*: Own study based on conducted research.*

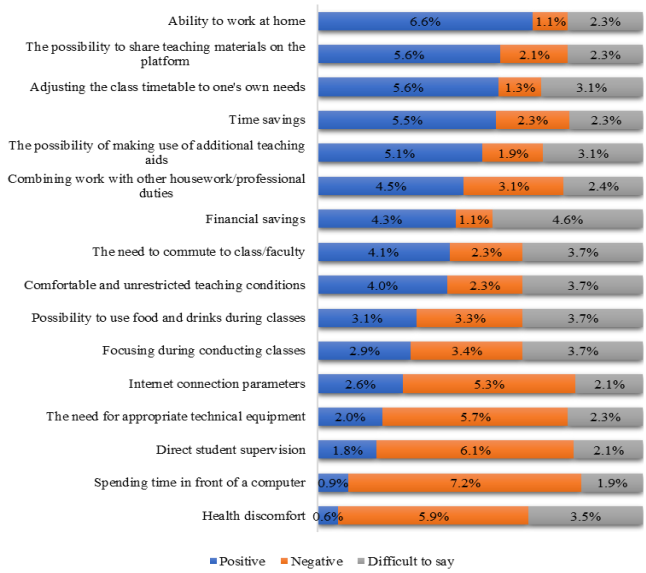
The research results made it possible to verify factors that generally positively impact the evaluation of remote education, both by the academic staff and students. Positive factors that determine the form of education under consideration include the following: (1) the comfort of working at home, (2) time savings, (3) comfortable conditions during teaching sessions, (4) the possibility of using additional teaching aids, (5) defining an individual timetable, as well as (6) the possibility of linking the teaching duties with other professional/home duties. Definitely negative factors for remote teaching – in the opinion of academic teachers – are the need to spend time in front of a computer, which has other negative consequences or limitations, such as, e.g., the need for good computer equipment and a fast Internet connection or health problems resulting from working too long at the computer. The lack of direct supervision of a teacher over the student in case of remote classes is, according to teachers, a significant, negative factor of this form of education (Figures 8-9). For students, this factor was not explicitly defined, and it would be necessary to link the obtained grade with the nature of the classes (e.g., lectures or practical exercises).

Figure 8. *Determinants of remote learning according to students*



Source*: Own study based on conducted research.*

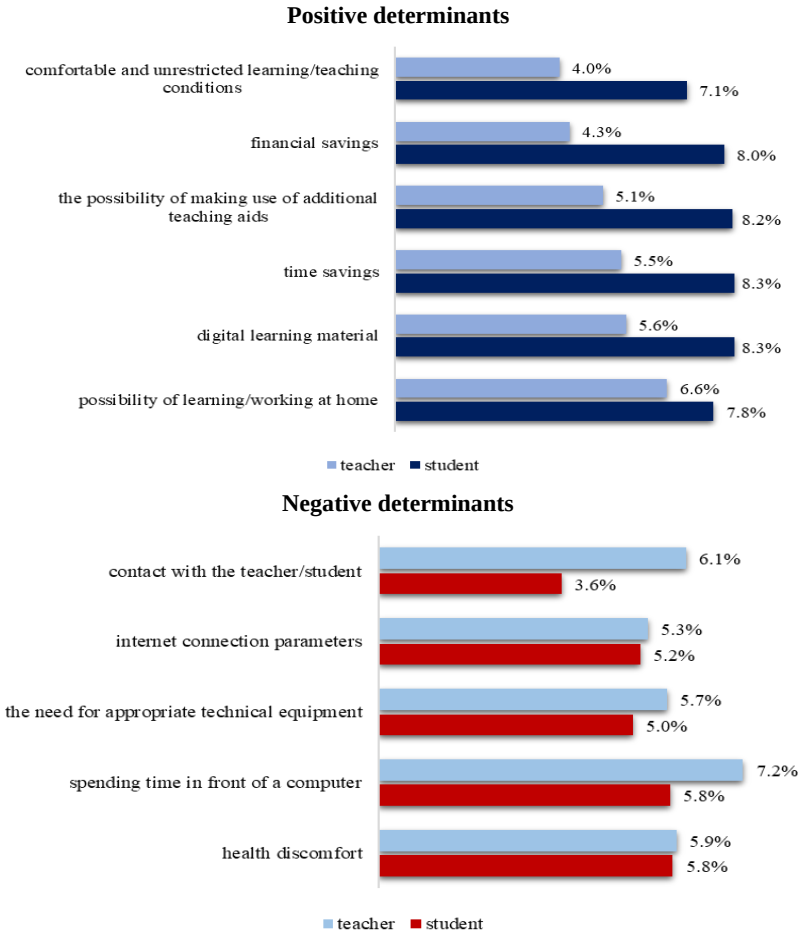
Figurem 9. *Determinants of remote learning according to academic teachers*



Source: *Own study based on conducted research.*

Comparing the assessment of remote education determinants by academic staff and students, we can see some regularities. First of all, both respondent groups made a similar categorization on the positive and negative factors presented. Secondly, in students' opinion, remote learning is rated significantly higher, as indicated by higher positive grades for positive factors and, at the same time, significantly lower grades for negative parameters conditioning the remote learning process (Figure 10).

Figure 10. *Comparison of selected positive and negative determinants of remote teaching in the assessment of teachers and students*



Source*: Own study based on conducted research.*

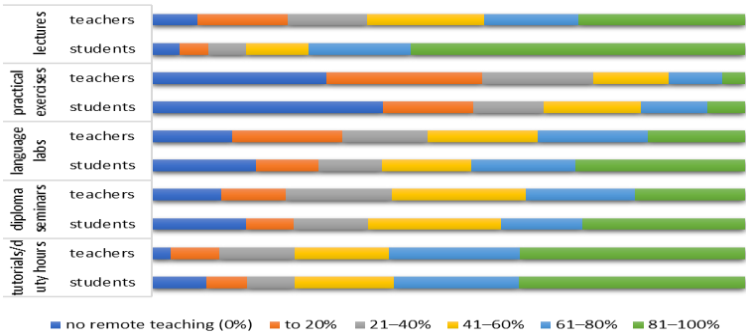
A hypothesis can be put forward that the widespread use of modern technologies, social instant messengers, smartphones, and other mobile devices by young people translates into a positive assessment of their use in the educational process. This hypothesis is confirmed by the correlation between the evaluation of IT tools and their use in educating students by academic staff, where the adopted explanatory

variable will be the respondent age. People over 61 years of age gave the lowest grade for using this form of education. The youngest group of respondents – up to 30 years old – rated remote teaching the highest – almost 90% of positive grades. Since the students indeed notice the possibility of using remote teaching in the current form of classes, it is worth checking which areas of teaching can be included in the future.

The biggest potential in terms of remote teaching usage in the implemented teaching process is related to lectures (as many as 56.3% of students agree only for lectures, and 84.2% agree for more than half of the classes conducted in the remote form), tutorials/duty hours (more than 38% of students agree only for this form of classes, and 59.2% agree for more than half of the classes conducted in the remote form), diploma seminars (more than 27% of students agree only for this form of classes, and 41.1% agree for more than half of the classes conducted in the remote form) and language labs (almost 29% of students agree only for this form of classes, and more than 46% agree for more than half of the classes conducted in the remote form). In the students' opinion, practical exercises and labs should be carried out in the traditional, existing form – 39% of students exclude remote teaching for this form.

The academic staff is much more cautious about remote teaching. Less than 30% of the staff agree with lectures to be conducted exclusively remotely. The same applies to diploma seminars or language labs (approx. 16–19%). There is a high degree of consistency in assessing students and academic staff in the assessment of the scale of remote tutorials and duty hours – the assessments overlap here. What is also interesting, the academic staff does not agree on exclusive remote teaching. For example, nearly 40% of students do not see the possibility of conducting practical exercises remotely. Accordingly, the share of this evaluation in the group of academic teachers is less than 30%. Correlation of these grades, i.e., students and academic teachers, should be used to build the preferred timetable of classes in the future, where traditional classes also include remote classes (Figure 11).

Figure 11. *Preferred share of remote teaching classes in the opinion of academic teachers and students*

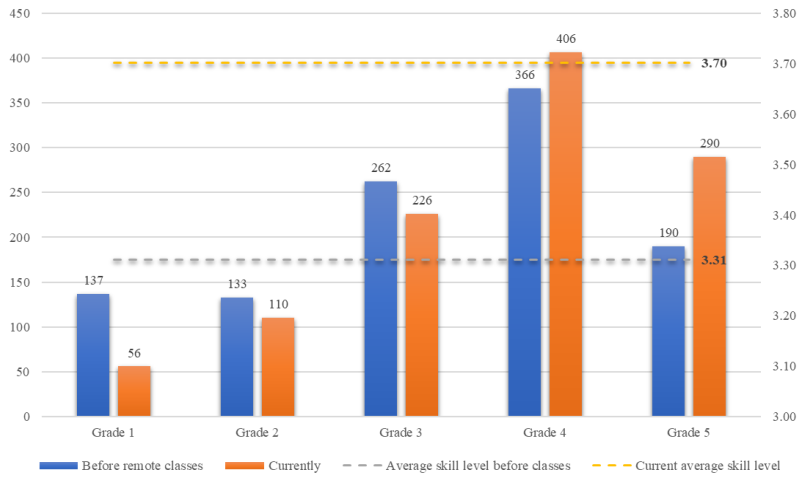


Source*: Own study based on conducted research.*

An important element of a detailed assessment analysis of individual areas of the remote learning usage in the educational process is the students' general attitude to this idea. The result of the research indicates a moderately strong correlation between the evaluation of the remote learning idea among students and the use of this tool as an alternative to traditional teaching – Pearson correlation coefficient is 0.4829. The potential of using remote teaching to enrich the teaching offer of higher education facilities in courses and training is confirmed with these research results. Pearson correlation coefficient indicates a strong correlation (0.5291) between the evaluation of remote education as an alternative to traditional classes and the possibility of conducting additional education (courses and training).

There is a strong correlation between individual evaluations of the usefulness of remote learning tools – the strongest correlation of variables was observed between the evaluation of the use of these tools to conduct additional classes, and the possibility of using them to engage scientists, specialists, practitioners from outside higher education facilities – here the correlation coefficient was as much as 0.7150. Participation in the classes positively impacted students' ability to operate and utilize platforms and other tools used in the remote learning process (Figure 12). The average assessment level of student preparation increased from 3.31 to 3.70. Moreover, the number of students who assessed their skills in the remote tool utilization in the educational process as the lowest significantly decreased (from 137 to 56 respondents who assessed their competence level in the researched area as the lowest).

Figure 12. *Degree of student preparation to participate in remote teaching activities*



Source*: Own study based on conducted research.*

The increase of students' competence level in the tool used for remote learning (i.e., at the moment of research) is also important for the assessment of their potential for use (Pearson's correlation coefficient oscillates from 0.3639 to 0.4685), respectively

to complement, make more attractive and offer an alternative to traditionally conducted classes. A comparison of the students' competence level in remote learning tools before the pandemic indicates no correlation. Pearson correlation coefficient oscillates from 0.0287 to 0.0894 for similar variables.

5. Conclusions

Suspension of traditional classes due to pandemic by The Ministry of Science and Higher Education forced higher education facilities to implement the educational process based on modern communication technologies. For the first time, this created an opportunity for a comprehensive evaluation of their didactic suitability and acceptance, both by students and academic staff. The results of the conducted research clearly indicate the enormous potential of these tools in modern education. Still, it should also be mentioned that the respondent assessment excludes the elimination of traditional teaching classes. The potential of remote learning refers primarily to make the form, accessibility, and methods of selected forms of teaching more attractive.

The identified barriers relate to technical conditions (Internet connection parameters) and the nature and nature of activities (e.g., practical exercises, labs) and faculties. Technical barriers outside the competence of the higher education facilities must be addressed systematically, e.g., by offering high-speed mobile internet for students. The second group of barriers excludes a wider use of remote learning tools at present. Identified problem areas indicate the need for comprehensive ministerial programs, probably funded by the EU, to develop e-learning activities (asynchronous) that would remove the identified barriers as far as possible.

The conducted statistical analysis indicates that conducting student and academic staff training in remote learning tool utilization is essential. It will primarily affect the quality and comfort of work and teaching. Still, it is also important to assess these instruments' use in each of the examined areas.

References:

Alonso, F., López, G., Manrique, D., Viñes, J.M. 2005. An instructional model for web-based e-learning education with a blended learning process approach. British Journal of Educational Technology, 36(2).

Bandara, I., Ioras, F., Maher, I.K. 2014. Cyber Security Concerns in E-learning Education [In:] Proceedings of ICERI2014 Conference. Sewilla.

Betlej, P. 2009. E-learning w organizacji zajęć i opinii studentów – studium przypadku. E-mentor, 1.

Brown, C. 2012. Application of the balanced scorecard in higher education: Opportunities and challenges. Planning for Higher Education, 40(4).

Chen, Y., He, W. 2013. Security Risks and Protection in Online Learning: A Survey. The International Review of Research in Open and Distance Learning, Retrieved from: http://www.irrodl.org/index.php/irrodl/article/view/1632/2712.

Czarnecka, A., Daróczi, M. 2017. E-learning as a method of employees' development and training. [In:] Daróczi M., Robak E., Vinogradov S. (eds.), Management, organizations and society, Agroinform Kiadó, Budapest.

Dabrowski, M. 2011. Zrównoważona karta wyników w e-learningu akademickim, (Balance Scorecard in academic e-learning), E-mentor - bimonthly, Warsaw School of Economics, 1(38).

Domínguez, A., Saenz-De-Navarrete, J., De-Marcos, L., Fernández-Sanz, L., Pagés, C., Martínez-Herráiz, J.J. 2013. Gamifying learning experiences: Practical implications and outcomes. Computers and Education, 63.

Dreveton, B. 2013. The advantages of the balanced scorecard in the public sector: beyond performance measurement. Public Money & Management, 33(2).

Durau-Banaszewska, B., Zajdel, M., Michalcewicz-Kaniowska, M. 2017. The role of teaching improvement programmes for teaching quality in universities in Poland - University of Science and Technology in Bydgoszcz. ICERI 2017, the 10th Annual International conference of education, research and innovation, Seville, 2837-2841.

Guri-Rosenblit, S. 2005. Distance education and e-learning: Not the same thing. Higher Education, 49(4).

Jakieła, J., Wójcik, J. 2018. Przegląd problemów bezpieczeństwa informacji oraz prywatności w akademickim nauczaniu na odległość. Studia Ekonomiczne. Zeszyty Naukowe UE w Katowicach, 355(13).

Johanson, U., Eklöv, G., Holmgren, M., Mårtensson, M. 1998. Human Resource Costing and Accounting versus the Balanced Scorecard: A Literature Survey of Experience with the Concepts. School of Business Stockholm University.

Kaplan, R.S., Norton, D.P. 1996. Using the Balanced Scorecard as a Strategic Management System. Harvard Business Review, January-February.

Karathanos, D., Karathanos, P. 2005. Applying the Balance Scorecard to Education. Journal of Education for Business, 80(4).

Khan, S., Rabbani, R.M., Thalassinos, I.E., Atif, M. 2020. Corona Virus Pandemic Paving Ways to Next Generation of Learning and Teaching: Futuristic Cloud Based Educational Model. Available at SSRN: https://ssrn.com/abstract=3669832.

Klemke-Pitek, M., Zajdel, M., Michalcewicz-Kaniowska, M. 2017. New tools for evaluation of student satisfaction - assuring teaching quality in academic environments case study: University of Technology in Bydgoszcz, Poland. ICERI 2017, Seville, Spain, 7548-7554.

Klemke-Pitek, M., Zajdel, M., Michalcewicz-Kaniowska, M. 2018. Evaluation of students satisfaction -test results - University of Science and Technology, 12th International Technology, Education and Development Conference. Valencia, Spain, IATED 2018, 6644-6650.

Kwiecień, J., Wołoszyn P. 2007. Oczekiwania studentów wobec technik e-learningowych. Automatyka, 11(3).

Latshaw, C.A., Choi, Y. 2002. The balanced scorecard and the accountant as a valued strategic partner. Review of Business, 23(1).

Maleńczyk, I., Gładysz, B. 2019. Wybrane charakterystyki e-learningu w polskich publicznych uczelniach technicznych. Polish Journal of Continuing Education, 4(107), 202-211.

Maleńczyk, I., Gładysz, B., Marciniak, S. 2019. Wybrane aspekty ekonomiki e-learningu. E-mentor, 1(78), 25-78.

Maleńczyk, I., Gładysz, B. 2019. Academic E-learning in Poland Results of a Diagnostic Survey. International Journal of Research in E-learning, 5(1), 35-59.

Michalcewicz-Kaniowska, M., Zajdel, M. 2018. Assessment of educational effects at the level of a secondary school in the students' opinion. ICERI 2018, Seville, Spain. 8437-8443.

Michalcewicz-Kaniowska, M., Zajdel, M. 2017. Student mobility - offering the chance to increase professional competence and acquire new skills results of the study performed at the university of science and technology in Bydgoszcz, Poland. ICERI 2017, Seville, Spain, 2823-2828.

Michalcewicz-Kaniowska, M., Zajdel, M. 2018. Practical education of students in aspect of the economy and the labor market. Valencia, Spain, IATED 2018, 6961-6965.

Ministerstwa Nauki i Szkolnictwa Wyższego. 2020. Rekomendacje Ministerstwa Nauki i Szkolnictwa Wyższego w sprawie kształcenia prowadzonego z wykorzystaniem metod i technik kształcenia na odległość, Retrieved from: https://www.gov.pl/web/nauka/ksztalcenie-zdalne-na-uczelniach.

OECE. 1996. Lifelong Learning for All. Paris, UNESCO Learning, The Treasure Within.

Pleśniarska, A. 2016. Wykorzystanie e-learningu w polskich uniwersytetach w aspekcie rozwoju gospodarki opartej na wiedzy, Toruń.

Poór, J., Szalay, Zs., Pető, I., Sasvári, P., Mester, A., Zsigri, F. 2017. E-learning Magyarország - 2017. Kutatási jelentés, SZIE GTK TTI, Gödöllő.

Raport NZS. Sytuacja studentów w czasie epidemii koronawirusa. Niezależne Zrzeszenie Studentów, Retrieved from: http://nzs.org.pl/wpcontent/uploads/2020/04/NZS_Sytuacja-studentow_wczasie_epidemii_koronawirusa.pdf.

Redlarski, K., Garnik, I. 2014. Zastosowanie systemów e-learningu w szkolnictwie wyższym. [In:] Basińska, B.A., Garnik, I., Zarządzanie informatycznym środowiskiem pracy. Gdańsk, WZiE PG, 77-94.

Sursock, A., Smidt, H. 2010. Trends 2010: A decade of change in European Higher Education. European University Association (EUA), Bruksela.

Szadziewska, A., Kujawski, J. 2016. The usefulness of the blended-learning method in the opinion of full-time students of the Gdansk University. EDULEARN IATED, Barelona, 1792-1801.

Szewczyk, A. 2018. E-learning studentów na przykładzie uczelni wyższych w Szczecinie. Dydaktyka Informatyki, (13), 91-103.

Toader, C., Michalcewicz-Kaniowska, M., Zajdel, M., Ubrežiová, I., Liçaj, B., Deari, H., Irujescu, C. 2018. Aspects concerning the attitude of young people from different European countries as consumers in the field of tourism. Problems of management in contemporary organizations, 75-85.

UNESCO Institute for Lifelong Learning. 2015. Distance education in European higher education – the potential. Retrieved from: https://unesdoc.unesco.org/home.

Yao-Ting, S., Kuo-En, Ch., Tzu-Chien, L. 2016. The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. Computers & Education, 94.

Zajdel, M., Michalcewicz-Kaniowska, M. 2017. Best practices in the PRINCE2 methodology in it project management - study results. ICERI 2017, Seville, Spain, 7544-7547.

Zajdel, M., Michalcewicz-Kaniowska, M. 2017. Internal education quality assurance system – a post-implementation evaluation. Barcelona Spain, 3520-3525.

Zajdel, M., Michalcewicz-Kaniowska, M. 2018. Evaluation of the main library of the university of science and technology within the scope of evaluation of the effectiveness of the use of available electronic and printed resources. ICERI 2018, Seville, Spain, 8444-8448.

Zajdel, M., Michalcewicz-Kaniowska, M., Andruszkiewicz, K., Durau-Banaszewska, B., Klemke-Pitek, M. 2017. Evaluation of student professional training in the student education process. Barcelona, 3506-3512.

Zdziebłowski, Z. 2020. Nauka w Polsce. Retrieved from: https://naukawpolsce.pap.pl/aktualnosci/news%2C82018%2Cnaukowcy-i-studenci-zdalne-nauczanie-na-uczelniach-czesto-sie-sprawdza.html.

Notes: *The survey was conducted electronically with Google tools during the period: 6–15 May 2020. A total of 1,088 students took part in the survey, including 562 women (51.7%) and 526 men (48.3%). The surveyed student group constituted 19.3% of the total number of UTP students. Moreover, a total of 160 academic teachers took part in the survey, which accounts for as much as 30.8% of the total number of UTP research and teaching staff.*