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EDUCATION IN TIME OF PANDEMIC CRISIS – CASE STUDY

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Purpose: The crisis caused by the Covid-19 pandemic has seriously impacted the way we work, learn and behave in everyday life. We were forced to work from home, i.e. work remotely, and learn using methods that were rarely or even not used until the pandemic. Switching from classes at the university with direct contact with the teacher to online classes had advantages, but also some disadvantages. Some universities already had some experience in conducting online classes and knew how to use them for various types of studies. Other universities took advantage of the platforms offered by international organizations, prepared new forms of education and adapted the program to their technical capabilities. New forms of education turned out to be a big challenge for both students and professors. The aim of the study was to compare the methods of distance education used both in universities with extensive experience and in universities where distance learning, at least due to applicable legal regulations, was less popular.
Design/methodology/approach: The article analyzes the distance learning methods used by universities. The results of interviews conducted with students, teachers and the authors' personal experiences are described.
Findings: We have discovered that students have no problems using online education techniques and highly value the opportunity to use materials prepared by lecturers and made available on remote education platforms. Moreover, they derive satisfaction from the opportunity to learn independently and search for materials on the Internet. One of the main conclusions was that the future seems to belong to a blended learning system, combining physical and online learning.
Originality/value: The value is the originality based on the interviews and post COVID point of view.

Keywords: pandemic crisis, online education, case study.

Category of the paper: Case study, Viewpoint.

1. Introduction

As the modern world is becoming more and more connected, there appear a lot of various global threats. The COVID-19 pandemic did not stop at national borders. It affected many people regardless of nationality, education level, income, or gender. Education was no exception. This crisis exposed many shortcomings and inequities in education systems, for example, the limited access to broadband connections and hardware needed to provide online Education, the lack of supportive environments necessary to focus on learning, and the mismatch between resources and needs.

According to research by UNESCO (UNESCO, 2020), out of 38 OECD countries and eight partner countries covered by the Education at a Glance 2020 Program, the People's Republic of China was the first to close schools in response to the COVID-19 pandemic. By the end of March 2020, educational institutions were closed in all 46 Education at a Glance 2020 Program countries: 41 countries closed schools nationwide, and five countries (Australia, Iceland, the Russian Federation, Sweden, and the United States) closed schools sub-nationally or locally (Figure 1). However, not all countries affected by the pandemic implemented this imposed educational innovation. For example, primary schools in Iceland remained open because school children's classes consisted of less than 20 pupils. Most primary and lower secondary schools in Sweden have remained open, while upper secondary schools have mainly switched to distance learning since mid-March 2020. In Poland, schools were closed for 43 weeks.

The COVID-19 pandemic also severely impacted higher Education as universities closed their headquarters and countries closed their borders. Although higher education institutions quite quickly replaced face-to-face lectures with online learning, it was not easy to conduct some classes in the form of exercises or laboratories that required access to specific resources that, for various reasons, students could not afford. Significantly, this crisis has raised questions about the value offered by university education, which includes establishing social relationships apart from the educational content.

In the long run, the COVID-19 pandemic and its results observed in Education will have economic consequences. Using historical growth regressions, it has been estimated that the loss of continuous learning can lead to a loss of skills, and people's skills are related to their productivity. The long-term economic impact of this loss, which equals one-third of a year of schooling, has been estimated for the current group of students. According to the study's authors, the gross domestic product (GDP) may be lower by 1.5% on average by the end of the century. For example, in the United States, the loss of 1.5% of future GDP would correspond to a total economic loss of $15.3 trillion (Hanushek et al., 2020).

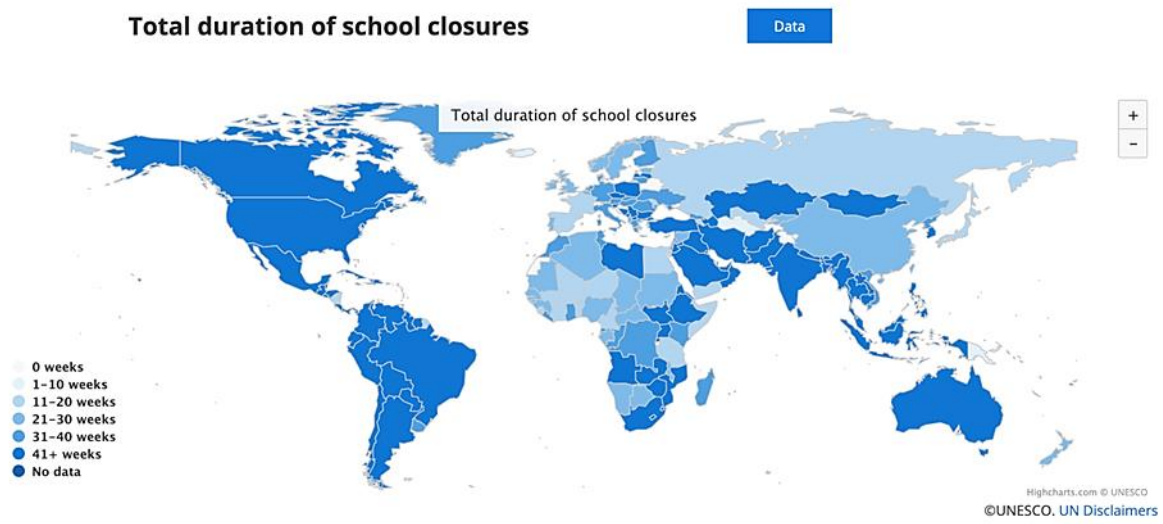

Figure 1. Total duration of school closures.

Source: https://webarchive.unesco.org/web/20220629024039/https://en.unesco.org/covid19/educationresponse/, 26.06.2023.

Numerous countries applied various tools to replace face-to-face Education, including instructional packages (textbooks, worksheets, and printouts), radio education, educational television, and online instructional resources. Countries tended to implement several tools to reach as many students as possible. The most famous device used in distance education was connected to Internet educational platforms (Schleicher et al., 2020). These Online platforms were used in almost all OECD and partner countries. Online learning tools included educational content, formalized curricula, or real-time teacher-led lessons via virtual meeting platforms. Thanks to this opportunity, students could acquire knowledge at their own pace and at any time convenient. In France, the already existing distance learning program "Ma classe à la Maison" was made available to all primary and secondary school students (Ministère de l'Éducation Nationale et de la Jeunesse, 2020). In Estonia, cooperation with private services allowed students to access rich educational content free of charge during school closures. Greece enabled real-time virtual classes with other online learning tools (Ministry of Education and Religious Affairs, 2020; Schleicher et al., 2020). In Poland, various Internet platforms were used to conduct online courses in real-time, as well as tools facilitating remote access to educational materials and platforms enabling knowledge verification. The article contains introduction and related works, case study, discussion and conclusions part.

2. Related works

The crisis caused by the COVID-19 pandemic has disrupted existence around the world, hence many researchers have studied its impact on various areas of life. Henry A. Giroux (Giroux, 2021) describes how the Covid-19 crisis affected politics, especially taking into account the events in the USA during this period. Already in 2017, the title of the 2017 Mathematics Education and Society conference was: "Mathematics and life in times of crisis". Conference participants predicted social and climate crises.

Now we know that these problems can also be caused by a pandemic (Ezeibe et al., 2020; Banerjee, 2020). Rittel and Webber (Rittel et al., 1973) formulated a theory of problems that natural scientists and social planners deal with, they proposed the concept of a "bad problem" to describe problems that are inevitable, serious human problems that cannot be avoided. In 1992, the concept of the "risk society" (Beck, 1992) was developed and the theory of changing the risk to which man is exposed in connection with possible crises, ranging from natural disasters to man-made disasters, was created.

Many researchers describe problems in Education in different countries of the world and ways to solve them (Gonçalves, 2020; Tejedor, 2020; Bozkurt, 2020). They also point to the negative assessment of students of the transition to virtual learning systems, because it is associated with an increase in teaching load. E-learning has contributed to the negative impact of remote learning on the lives of students and teachers, and the Covid-19 crisis has highlighted the gaps in basic digital skills among young students.

Information and its analysis is the basic assumption for creating science and Education. Science and Education are at the forefront of changes that will extend to other areas of life, so they must be the first to overcome the difficulties of adapting to change. The most important is the incorporation and establishment of rules for using artificial intelligence in science and Education. After being solved, the indicated challenges and problems will introduce a modern look at both processes and stabilize work in this area until the next innovation that will revolutionize the approach (Fazgalić, 2022; Usiuds 2023a, 2023b, 2023c, 2023d; Van Dis et al., 2023; Banasik, Kempa, 2023).

3. Approaches presented by different universities – case study

The pandemic has caused changes in the education process. All educational community members had to cope with distance learning methods. The universities' authorities need to cope with pandemic changes. That cause the development of distance learning procedures. The analyzed approaches are based on AGH University of Science and Technology (AGH),

and Massachusetts University of Technology (MIT), and Silesian University of Technology (SUT).

3.1. AGH University of Science and Technology

During the period of total or partial closure of university premises, the universities were organizing the educational process in various ways. At the AGH University of Science and Technology in Cracow, the e-Learning Center made a major contribution to supporting higher Education during the COVID-19 pandemic. The rules for organizing and conducting the remote Education were defined by the University Rector's Regulations No 17/2019 of May 15, 2019 and 52/2021 of September 10, 2021. The regulations consisted of the condition that academic teachers had to complete the training in the scope of e-learning basics and the ability to use the University's e-learning platform (UPEL) provided by the university e-Learning Center (CeL). Completion of this training was confirmed by the University certificate issued by CeL. The regulations also defined detailed rules for organizing and conducting classes with the implementation of distance learning requirements, methods and techniques as well as e-learning tools.

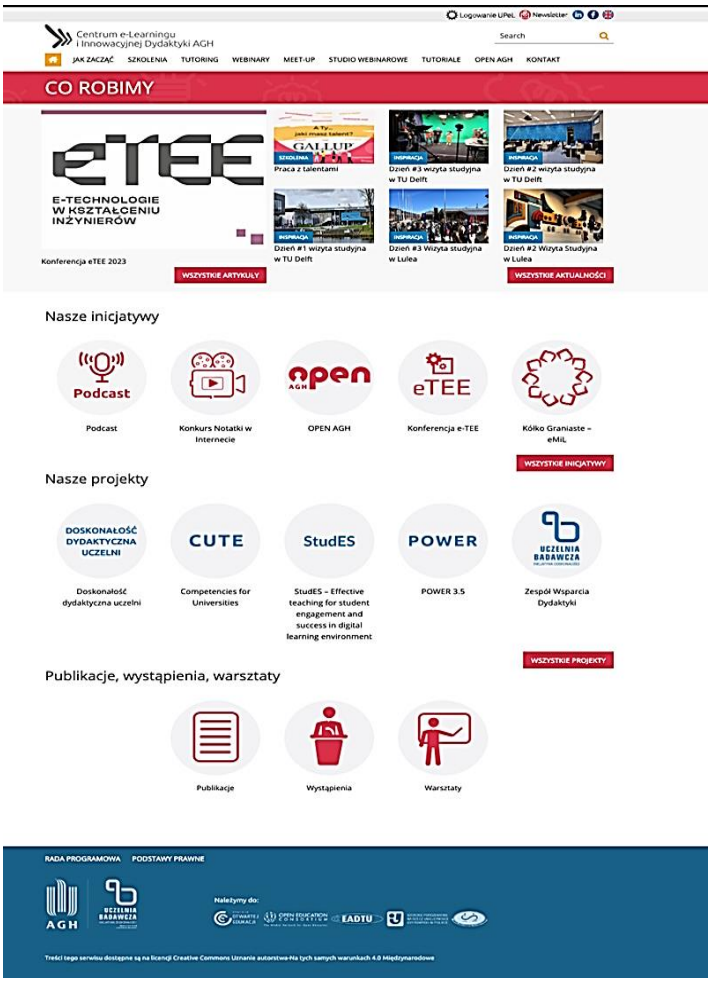

Figure 2. Website of the AGH e-learning Center.

Source: www.ce..agh.edu.pl, 3.07.2023.

Specific principles for organizing and verifying the learning outcomes defined in the study programs, in particular credits, exams, and diploma exams, as well as the rules of remote learning supervision, the rules for registering or recording the remote classes or lectures with the application of electronic means of communication provided by participants or academic teachers, were also included in the Rector's regulations.

Up till now, the AGH e-Learning Center has been offering technical and didactic support. It suggests the lecturer's numerous pieces of training and webinars. The UPEL platform gives many opportunities to activate students. It streamlines the process of collecting final theses or carrying out online tests. It is integrated with the Virtual University.

In the opinion of the University students, the method of classes or lecture organization, which was adopted at the University during the remote learning period, enabled, to a large extent, the implementation of the didactic process. With the consent of the lecturer, remote lectures were recorded. It facilitated the acquisition of knowledge provided to students. Online classes did not cause many problems. However, laboratories, during which it was required to use specialized equipment available only in university laboratories, were carried out in a rather specific way. The teacher running the laboratory classes was recording a given experiment. Then, the recording was made available to students along with the relevant measurement results, based on which the students were supposed to prepare the final experiment report.

Of course, this form of presenting knowledge, initiated by specific circumstances, cannot replace the students' opportunity to work in a special laboratory environment and obtain the experiment results independently. However, in the student's opinion, the adopted forms of conducting classes were a sufficient replacement for classroom classes during COVID-19-related restrictions.

3.2. Massachusetts University of Technology (MIT)

MIT OpenCourseWare (OCW) is a free, publicly accessible, openly licensed digital collection of high-quality teaching and learning materials presented in an easily accessible format. Browse through, download, and use materials from over 2500 MIT on-campus courses and supplemental resources, all available under a Creative Commons license for open sharing. That is the free online alternative for students not involved in the process of studies at MIT.

MIT also has the proper course available only for registered people in its faculties. All classes are made similarly:

- Materials containing lecture highlights,
- Exercises or lab descriptions,
- Theoretical requirements for the exercises and labs.

That approach seems to be adequate for online learning. Of course, the online materials were accompanied by online lectures for all classes. In modern times, the lectures are in hybrid mode.

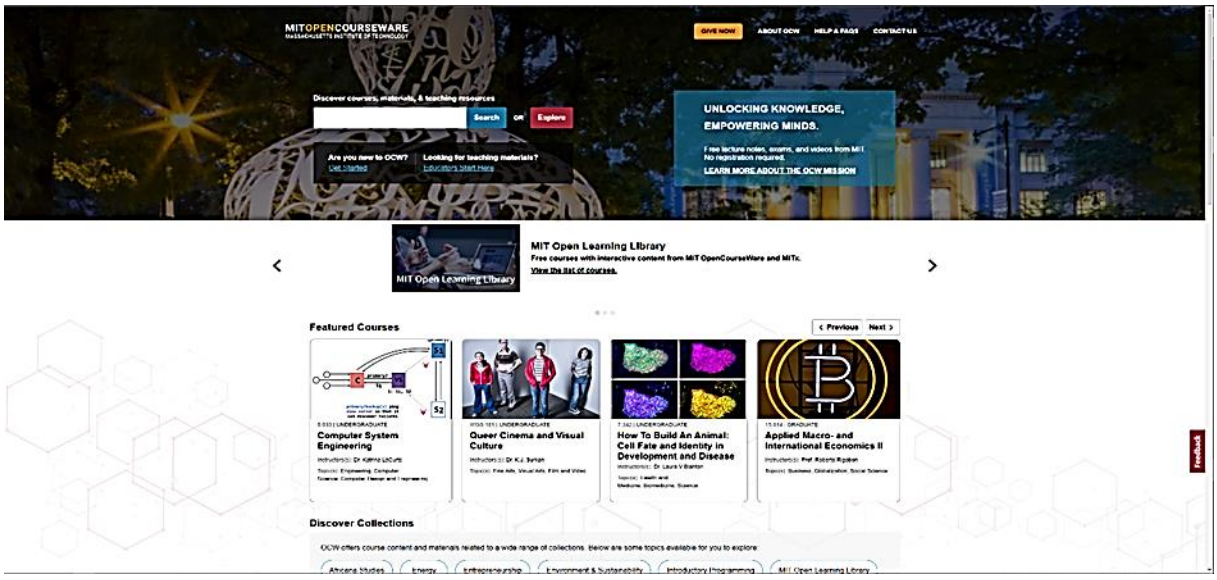

Figure 3. Website of the MIT Opern Courseware.

Source: https://ocw.mit.edu/, 29.08.2023.

3.3. Silesian University of Technology (SUT)

The rules for organizing and conducting remote Education were defined by the University Rector's Regulations No. 200/2020, which allow lecturers to make their classes online. The possibility of online learning was prepared for all kinds of classes: lectures, exercises, and laboratories.

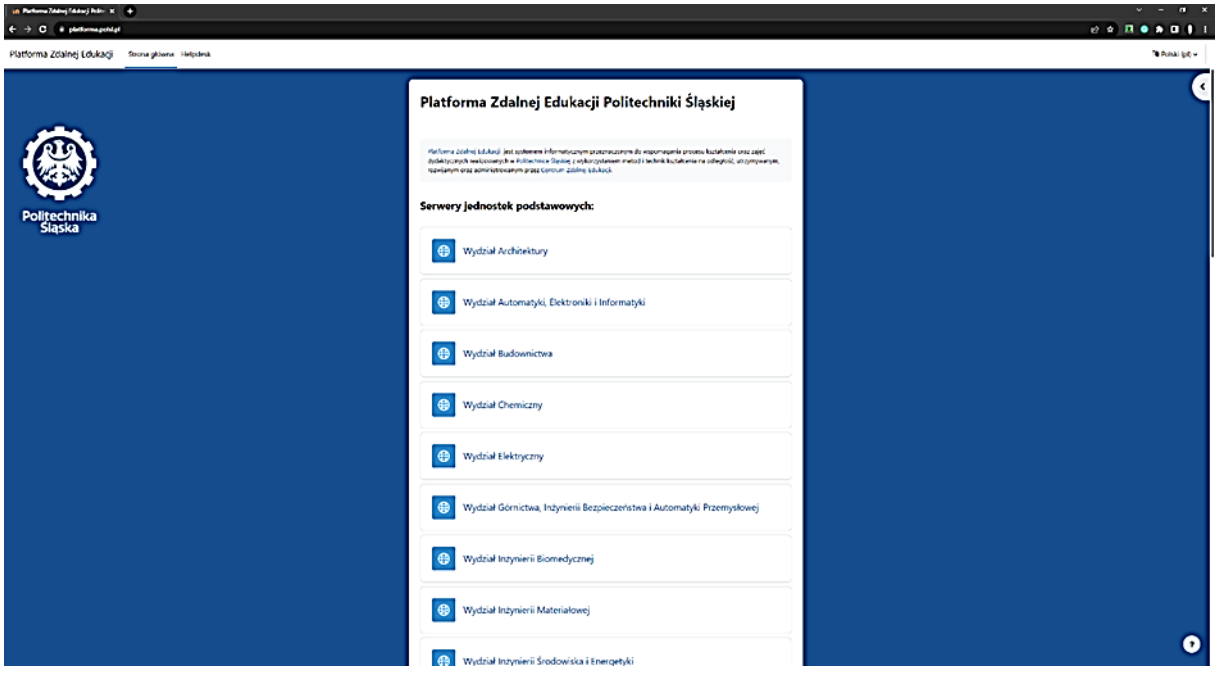

Figure 4. Website of the SUT e-learning platform.

Source: https://platforma.polsl.pl/, 29.08.2023.

The regulations also proposed tools for online teaching. The selected tools were communication tools and e-learning platform for online materials. Also, the synchronic form of classes was an option for lecturers; the other possibility was asynchronous (recorded) lectures and other courses in a synchronic way.

The regulations also proposed a way of confirming students; identity for credits and exams and presented a way of proceeding with those critical parts of the learning process.

4. Discussion

The pandemic has increased efforts to develop distance learning and e-learning methods. The prepared materials were made to help students cope with all subjects., The necessity forced a change of attitude towards the methods mentioned above. Both sides – students and lecturers- had to change the reality of the learning process with no personal contact.

The learning process was focused on achieving goals, but in the pandemic years, goals were to be completed by students on their own. The course materials had to be prepared more precisely and have some theoretical background to help students solve the problems.

The worst part for students and lecturers was not having personal contact, which caused some mental problems during classes. The issues were also a part of evaluating the students in their houses. In those cases, personal contact was necessary before the pandemic years.

The newly recorded material for students was a good part of the learning process, but nowadays, they are indicating eye-to-eye lectures as a better way for their Education. Also, the new artificial intelligence tools for the learning process should be considered as a step toward the change in the educational path.

In the case of SUT, students also demand more mathematical classes during their Education. That shows the approach for the required knowledge. On the other hand, some students prefer to have as many online classes as possible, especially on maters' degrees. From the authors' point of view, that approach is unsuitable for the final results of studies.

The discussion was based on interviews with students of different years of studies on the Faculty of Applied Mathematics in SUT.

5. Conclusions

The text also allows the use of endnotes[1], which should be developed in the **Footnotes** section. It should only contain information that significantly affects the understanding of the issues discussed in the paragraph, and which could distract the reader if placed in the text.

The appropriate approach for the learning process is needed. All available possibilities for providing knowledge should be used during the educational process. The scope should be the best possible way of teaching for our students.

The newest methods should be implemented in the learning process, including tools for learning and methods for applying Artificial Intelligence.

Currently, when it is possible to learn in direct contact with the lecturer, students point out that some methods developed during distance learning still can be used. Students really appreciate the materials prepared by teachers and available online, especially the ability to re-listen to a lecture that was recorded and made available to students, and the ability to consult projects without having to come to the university. The materials available online help in better mastering the subject of classes. Moreover, students use online sources related to the subject matter to a greater extent than before the Covid-19 pandemic. Interestingly, they want to do so. It can be observed that this forced online learning has taught students to study independently.

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