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Digitalization impact on higher education – potential and risks

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***Abstract*—The topis of education is often superseded by business, mainly because business is associated with rapid technological advancement and often brings lucrative profits. Perhaps this is why significant paradigm changes in the education field take place only during crises or exceptional situations that force a change of the current approach. So it was this time, that the pandemic of covid- 19 revealed how much education systems are not enough adapted to the technologically changing world. The main goal of the article is to present a general overview of the process of digitalization in the higher education field. The introduction part highlights the importance of today's education. The second part of the article describes the characteristic of digitalization in the context of education. The third section indicates the potential and risks of digitalization. The next part of the article points out the use of digitalization in the didactic process.**

I. Introduction

UNIVERSITIES, like businesses, are subject to constant pressure from the environment and are forced to take up challenges dictated by the changes taking place in the environment and actions that will ensure that their existence will not be endangered. Currently, the key challenges include such support for knowledge management/knowledge management within universities, thanks to which universities will be perceived as attractive for both candidates for studies (in the era of globalization of candidates increasingly often coming from all over the world) and organizations that will employ graduates such universities. On the other hand, universities should provide the best possible working conditions for their staff, including research, teaching, and administration staff. In this article, the attention will be focused primarily on the changes that have occurred and are taking place in relation to didactic processes, which consist in the virtualization and digitization of education processes.

Teaching processes are at the same time one of the key areas of university functioning and a critical element of the university's knowledge management system based on knowledge sharing.

The aim of the article will be an attempt to assess the current situation of higher education in the field of digitization and virtualization of processes, and above all a discussion of the purposefulness, potential and benefits of such changes, as well as the risks and pitfalls that may not be perceived in the light of contemporary trends and sometimes too thoughtless focusing on technological aspects / IT tools. This article will cover a critical analysis of the phenomenon of digitization of higher education institutions as a process that is undoubtedly necessary to meet the expectations of stakeholders (employees, students, business, etc.) and at the same time difficult to define measurable benefits.

The following research methods were used in the article: literature review, observations, and own experiences as well as interviews with randomly selected employees and students at Wroclaw University of Economics and Business. The interviews were conducted in the period February-May 2022, in the period after the pandemic, when the classes were already conducted in the stationary version.

II. Characteristic of digitalization

Digitalization is the process of converting information such as texts, pictures, or sounds into a digital format, that can be processed by a computer. In addition, digitalization means improving an organization's core business operations to satisfy customer requirements efficiently by the use of data and technology. In the education industry, the target customers can be students, teachers, staff, and alumni, and digitalizing the education sector can bring benefits to both students and faculty.

Digital transformation in education comprehends, among the many, the following tools and resources:

- AI Chatbots: A chatbot is a computer program that simulates human conversation through voice commands or text chats or both. Chatbot, short for chatterbot, is an artificial intelligence (AI) feature that can be embedded and used through any major messaging application.
- Adaptive Learning: is a technique for providing personalized learning, which aims to provide

efficient, effective, and customized learning paths to engage each student.

- Smart Classroom is an EdTech-upgraded classroom that enhances the teaching and learning process for both the teachers and the students by inculcating audio, video, animations, images, multimedia, etc. This increases the engagement factor and leads to better-performing students.
- Remote Proctoring: allows students to take an assessment at a remote location while ensuring the integrity of the exam. These systems require students to confirm their identity, and, during the exam, the system monitors students through video, looking for behavior that could indicate cheating.
- Video conferencing for online studies: Telecommunication in the form of a videoconference.
- AR/VR for a better learning experience: Augmented reality (AR) adds digital elements to a live view often by using the camera on a smartphone.

Digitization in recent years has been increasingly evolving and having an increasing impact on society, work, school, and people's lives. Furthermore, the Covid-19 pandemic has undoubtedly accelerated some of the digitization processes, with the aim of moving the economy, education, jobs, and relationships between people forward. In some nations, like Italy, there has been a lockdown, during which, without digital means, many activities both work and school would have been interrupted. Here smart working and distance learning has certainly played a key role. This has involved a reorganization of activities, such as the purchase of the computer and additional training on the use of the devices. With regard to the development of digitization in education in particular, several tools and resources, in general, have been employed, to enhance the student experience in particular. Among them we find some communication technology platforms, such as Zoom Video Communications, Google Meet, Microsoft Teams, and Skype, which allow, through video calls, to hold online classes, create virtual rooms, use support chats, and many other features. On these platforms and others, such as Classroom, there are additional possibilities of using, for instance, sharing of teaching materials, the electronic register, which also allows a direct link between teachers and students' families, and the possibility for students to register for admission or to exams via the app, the recording of progress of students during their course of studies. In addition, there are many other tools that provide a wide array of online learning options, such as web pages or YouTube channels with interesting points and explanatory videos or examples. Other useful tools, mainly in university settings, are digital libraries, i.e., archives, in which students can share their projects and work that can be viewed by all those enrolled in the same school. Of course, the use of this tool must be controlled so as to avoid any form of plagiarism. With this, students are motivated and challenged to be active and interact with each other constructively.

All of this has occurred starting with students in school and university, with online classes, some live, some deferred, with teachers and professors implementing new teaching techniques, sometimes more interactive. There is the possibility to create quizzes or online games for reviewing a given topic, for the benefit of students, and to help teachers with possible modifications of teaching intervention. Among these is Kahoot, an application that allows the creation of ad hoc quizzes with questions and answers of various kinds in a simple and effective way to make the lesson interactive and engaging.

Advantages

Digitalization brought some positive aspects, such as increased productivity and efficiency, especially from the economic point of view: fewer expenses, and less "wasted" time. In addition, people became more proficient in the use of electronic tools, with advantages also for their future, had the ability to find material online with considerable ease and to communicate despite distance and other problems, including indisposition at the health level. Another advantage of digital tools is their environmentally sustainable aspect. For example, the use of e-books, tablets, or laptops saves large amounts of paper and the ability to have it with you at all times.

Disadvantages

In addition to the many positive aspects of digitization, there are also some disadvantages. Among these, we find the difficulty of teachers and professors in keeping students' attention and respect alive, who certainly have more sources of distraction at home. Students have missed almost two years of "regular" school, in the classroom, with their peers and friends, so in many cases, their health and psyche have been negatively affected. This type of teaching also created financial difficulties in some families who did not have the ability to purchase a laptop. Furthermore, these means and resources, sometimes, can be used in the wrong way, for instance when students, find material easily, just "copy and paste" what they found online, without filtering the seriousness of the sources and without putting their creativity into it, thus leading them to a loss of reading and writing skills and critical sense. The worst thing they can do is verified when they take advantage of the situation, certainly in the wrong way, and, for example, in the case of an online test, have an outside person take it.

So, as mentioned earlier, the pandemic brought the above-listed positive and negative aspects. Since there was a certain urgency in finding adequate and suitable solutions for the period, some disadvantages and damages were inevitable. With prior experience, over time, by implementing new strategies, the problems related to digitization that occurred during the pandemic can be avoided or reduced, enhancing the positive aspects and advantages it brings.

III. POTENTIAL AND RISK OF DIGITIZATION OF DIDACTIC PROCESSES

The topic of teaching virtualization is not new, although during and after the COVID-19 pandemic, activities related to the implementation of diverse types of strategies and projects to virtualize university operations have certainly gained in importance and speed. Some aspects related to virtualization/digitization in education are highlighted by, among others: P. Petrov, M. Radev, G. Dimitrov [Petrov et al., 2022], M. Cuypers [Cuypers 2012], T. Pfeffer [Pfeffer, 2003] or K. Prosyukova, F. Shigapova [Prosyukova & Shigapova, 2020].

The issues gained importance with the emergence of the pandemic and the need for a rapid transition to distance learning. It also turned out that such a need for a moment gave an impulse for a very quick adaptation of employees and students to the new, remote form of work/teaching and learning and the university authorities were considering the next steps towards virtualization and digitization not only of teaching but also other areas of university functioning. There is an ongoing discussion involving the authorities of many universities in Poland on the digitization of Polish universities, both in the context of developing the educational offer and scientific and research cooperation and in relation to the marketing and recruitment strategies of Polish universities [Tytuła, 2020]. Also, foreign universities have been observing this phenomenon for years, examining the possibilities and introducing changes aimed at the best adjustment of the educational offer to the market expectations. At the same time, the limitations and weaknesses of changes consisting in digitization and virtualization of "teaching services" are also noticed. For example M. Cuypers, who analysed a potential relation between the emphasis on virtual web-based processes in an institution of higher education and the paradigm of internationalization comparing three German universities, a campus-based university, a mostly paper-based distance-learning university and a fully virtual distance-learning university in terms of their services and procedures, states that “campus-based university has advantages for the sociocultural and political rationales of internationalization due to the emphasis on face-to-face communication and on-campus services, while the virtual university succeeds for the educational and economical rationales of internationalization because of the more wide-spread influence of web services and timeless availability of content” [Cuypers, 2012].

As described in the earlier publication of the authors [Binsztok in. 2022] the last two decades have been a time when information and communication technologies have an increasingly greater and greater impact on all sectors of the economy, including the higher education sector, which, like business, is beginning to undergo gradual digital transformation. The environment expects universities, on the one hand, to conduct teaching processes in a way that will prepare students for the challenges of the modern world, and on the other - to create knowledge corresponding to contemporary social requirements and phenomena. Current students and applicants for studies economic studies are mostly people with developed digital skills, expecting modern forms and channels of interaction with lecturers or, more broadly, university employees.

Increasingly, applicants for studies are people from different countries, who expect certain standards in terms of education programs and tools used at universities. This is certainly the reason it is worth taking care of the quality of education and looking for ways of acquiring, codifying, and disseminating knowledge as well as conducting research at the highest scientific level. Well-selected and implemented solutions based on the latest ICT technologies and processes of digitization of knowledge processes appear here as a potential help in the pursuit of maximizing the level of organizational (domain) knowledge of universities.

However, implementing technological tools at universities is a major challenge and requires a systemic approach. Universities that consciously approach digital transformation must consider many factors, including increasing the digital competencies of all university employees, including academics (teachers, and scientists), using tools to support and develop didactic innovations, as well as conducting scientific activities or building relationships with students and graduates through new communication channels.

The following barriers/obstacles to the transition to modern forms of education on the part of universities can be noticed (own study based on [Binsztok i in., 2022]):

- low digital competencies of teachers resulting from poorly conducted campaigns promoting modern teaching tools,
- lack of motivation to use such tools,
- lack of or too limited training,
- lack of time to participate in trainings due to excess duties (didactic work plus scientific work; often the need to work over a working age),
- insufficient infrastructure,
- fear of excessive "bureaucracy" in the teaching process,
- academic teachers' fear and reluctance to limit the freedom in the selection of means and methods of working with students,
- employees’ fear of excessive control by the employer,
- employees’ fear of interference with privacy,
- the need to employ auxiliary / technical staff who would support educators in using specific tools, and thus - additional costs of introducing such a change.

On the part of students, such barriers may be:

- lack of motivation,
- lack of involvement in classes,
- students often hidden behind cameras do not actually participate in classes, although in the application they are shown as "active",

- limiting the time for discussions / brainstorming,
- limiting situations requiring critical thinking, looking for arguments for and against,
- limiting creativity by performing prepared / standardized tasks / simulations, etc.,
- overabundance of tools with which they come into contact during a brief period of study, e.g., in fields more closely related to IT,
- insufficient infrastructure (no laboratories) that would allow improving the ability to use specific tools (e.g., simulations) outside of class hours.

Students already, as promoters of bachelor's and master's theses have noticed, have problems with both verbal and written communication. It is exceedingly difficult to prepare a written expression that is longer than 1-2 pages. It seems that the short messages and commands used in communication with devices have impoverished the language of young people, so from this point of view, limiting "normal" interpersonal contacts in favour of virtual ones seems to be risky. At this point, it is also worth paying attention to health problems resulting from the lifestyle to which the ubiquitous technology and related "customs" accustom us. More people notice distinct types of back pain, problems with eyesight, hearing (people using headphones) or even mental problems resulting from the lack or insufficient number of contacts with another person or, for example, not keeping up with the news / not coping with a brief time of many new skills and knowledge.

Nevertheless, the digital transformation of higher education seems to be an irreversible process expected by all stakeholders of institutions making up this sector. The authorities of higher education institutions should determine to what extent their institutions can consider digital solutions to adapt to the changing nature of the sector “Education.” The activities supporting the transition of digital transformation processes by universities in Poland include (own elaboration based on [Mazurek, 2019]):

- supporting universities in increasing digital competencies, centralizing information systems, and making decisions based on the most accurate data sets and database analytics,
- supporting scientists, teachers, and university administration employees in rapid, even radical improvement of their digital competencies,
- preparing qualified managerial staff who, understanding contemporary changes, will be able to prepare universities for the challenges of digital transformation,
- changing the work culture at universities - from functional hierarchies and a "silo" approach to multi-task teams working on a project basis,
- increasing digital and analytical competencies of the administrative apparatus, as well as educators and scientists,
- a conscious approach to data collected at the university, including IT systems,
- continuous improvement of communication and research on the needs / motivation and commitment of employees and students,
- changes in the methods of education, the use of interactive tools, and alternative ways of working with the student.

Research, administrative, and especially teaching staff of universities should be ready to adopt new digital solutions and ensure the appropriate use of technology in everyday work being aware that it is currently one of the keyways to increase the attractiveness of studying and improving positioning on the international science market.

Employees should be provided with time and properly prepared for changes related to digitization / virtualization. It is very important to ensure a sense of security through effective communication at various stages of change.

It seems that the maximum degree of digitization is justified in extreme conditions, such as e.g., war or pandemic, while under normal/everyday conditions, the decision on the degree and areas of digitization of a particular university should be made after thorough analysis and considering many factors, both financial, organizational, and social, which include:

- financial opportunities related to the acquisition and maintenance of appropriate infrastructure and technical support,
- organizational possibilities (also the time horizon needed to implement changes (preparation of infrastructure, conducting the necessary training, preparation of new curricula and syllabuses considering new forms of conducting classes / selected classes),
- the specificity of the university,
- specificity of fields of study / specialization - different fields of study may have different needs in the digitization of didactic processes (e.g., classes in medical, chemical, etc. seem to be the least susceptible to digitization),
- expectations and concerns of both candidates for studies and the staff themselves,
- possible negative psychological impact - breaking ties or preventing the creation of ties between various participants of processes carried out at the university; in extreme cases - depression or other mental problems related to not finding oneself in new work / study conditions.

Also, too much offer for teachers and students who cannot (within a limited time) effectively use modern ICT tools in education, may constitute another challenge for universities.

IV. The use of Digitization in Didactic Processes

The progressive digitization in society, the dynamically changing market of educational needs with new priorities in

the global educational market, and the development of the knowledge-based economy are the processes that determine a new approach to the learner in the broadly understood educational process. Nowadays, the digitization of education is not only an idea or a challenge but a necessity.

The ever-increasing use of the latest technologies in education is mainly explained by the new opportunities have been created and are still creating. The use of ICT in teaching processes intensifies and accelerates the process of absorption and assimilation of knowledge, and thus increases the effectiveness of teaching. Moreover, their use has a positive effect on the creation and development of key competencies that are often missing by university graduates, such as analytical and critical thinking, problem-solving, or the ability to cooperate and share knowledge [8]. The technologies used, imposing specific forms of organization of information transfer, also bring about cultural changes, change the scope of knowledge transfer, re-evaluating the view of the education process, and at the same time making it more attractive.

Many discussions on changes in the way of teaching come down to answering the question: Will ICT replace the traditional teaching model? Today it can only be said that the changes to come will undoubtedly result in the inclusion of new learning and teaching paradigms. The initiative to create new solutions will be transferred to the learners themselves, stimulating their motivation and activation. These activities will contribute to the development of learning, but only if the creativity of teachers, high-quality digital resources and educational applications are combined [9]. Such a compilation (along with the didactic process carried out) will allow to find a common space for communication, understanding, education and knowledge creation and its implementation in your own development area.

Modern technologies not only support the didactic process but also change the way universities operate. The use of modern ICT tools in the process of educating students undoubtedly determines not only a change in its quality but also an increase in the competitiveness of universities.

When deciding to start studying at a university, future students pay special attention to the way classes are conducted. Traditional forms of knowledge transfer are becoming schematic and increasingly unattractive. Therefore, it is important to constantly modify the teaching process at universities. Only interesting forms of knowledge transfer have a significant impact on the mental functions of the listener, significantly affect his interest and, above all, the development of competencies. The use of modern ITC tools in teaching students particularly relates to the development of competencies [10]:

- cognitive:
  - digital and analytical competencies related to thecreation/usee of information, media, technological efficiency,
  - communication skills, the ability to solve problems independently, inventive thinking, creativity,
- action-oriented:
  - independence, flexibility, time management skills,
  - productivity and use of digital resources,
- social:
  - cooperation involving interaction based on cooperation, emotional management,
  - teamwork.

The use of this type of solutions in teaching students helps to get to know reality more thoroughly, transform it rationally and stimulate students' creative activity. Summing up it should also be noted that the progressive digitization of education, especially during and after the COVID-19 pandemic, causes an increasing revival of educational communities around universities and their tasks. One of the reasons is the significant increase in competition among providers of digital teaching systems, programs, and tools.

V. Conclusion

The authors wanted, by presenting both the potential and barriers related to the digitization of universities, to contribute to the discussion whether digitization of universities is a necessity /future of universities. Recognizing the digitization of higher education as an inevitable direction of change, they tried to emphasize in which areas and under what conditions it should be implemented to negatively affect the entities participating in it (primarily staff and students) as little as possible.

Educational processes, the manifestation of which are, inter alia, classes with students are difficult to standardize in hundred percent, hence they are problematic and demanding to digitize. Their nature, however, does not exclude partial digitization to achieve the benefits described in this article.

In addition to indicating the potential and unquestionable benefits of developing virtualization and digitalization of higher education, the article also pointed a few important obstacles and doubts that universities must consider not to lose confidence and at the same time to keep up with the dynamically changing needs of the environment / market. These are both individual barriers (related to the attitude / motivation of staff and students to use different ICT tools and platforms and being literally "connected" to a large virtual system of the university with all its repercussions), and organizational, financial and technological ones, related to the need to properly plan this type of changes (e.g., creating appropriate infrastructure, providing technical support, and preparation and planning of information campaigns and trainings in various groups of interested parties).

However, it should be remembered that the teacher-student relationship plays a key role in the teaching process. One can try to dehumanize it, but before that happens, the question should be asked - if and who wants it. Hence, according to the authors, it is worth investigating the motives for taking actions related to the virtualization and digitization of universities; ask questions for whom and for what purpose it will be used; or the thesis that it is impossible to avoid the process of digitization of didactics is not only a justification for the pursuit of total control over what is happening in the classroom without leaving any

margin for spontaneity, creativity, and sometimes creative improvisation adapted to the needs of the moment - overestimating codification to the detriment for interpersonal relationships and face to face communication. Prof. T. Pietrzykowski very aptly sums up the discussion on the digitization of universities: „The future is not a virtual university, that is, an excellent university such as Cambridge or Harvard, which attracts people to several years of online studies. This path will not work, because such education has one fundamental drawback: it does not equip students with the social competencies that are so needed today. That is why let us digitize universities, but with a view to complementary online contact education" [Tytuła 2020].

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