Rocking Up Digital Educational Methodology in Higher Education – Is Education 4.0 Here?

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The COVID-19 pandemic disrupted education and required academics to shift to emergency remote education. The efficiency of the teaching-learning process is determined by several factors in a technologically enhanced learning environment. As part of the improvement of education, educational methodologies and the rate of involvement of digital technology in the "business process" of teaching, the shift was an enforced step in the course of business process redesign (BPR). Technological developments forced pedagogy to change methodologies. The methodological and pedagogical effectiveness and success depend on how academics will apply the best practices and the know-how of emergency remote education and how the capabilities of applications, software and online shared knowledge can be exploited. This paper aims to review the background of educational methodologies and it outlines the pre-COVID-19 practices and strives to survey academics' experiences of emergency remote teaching in higher education. Along with the "time-space-group" three dimensional model of distance learning a slightly modified "time-workload-anxiety" 3D matrix of emergency remote digital education is introduced and considered from the lecturers' perspective.

Keywords: blended learning, digital learning, hybrid learning, narratives, online learning, pandemic

INTRODUCTION

The authors of the article have been working in the education sector as teachers and researchers for over 30 years. We have taught students of different nationalities and ages. The future of higher education, digital education and educational methodology are areas of high importance for all three of us. We are working in the editorial and advisory committees of GiLE Journal of Skills Development (GJSD), a scientific journal published by the GiLE Foundation. Global Institute for Lifelong Empowerment (GiLE) is a Budapest-based foundation that was launched with the primary aim to empower university students, to develop their interpersonal skills such as communication skills, leadership skills and other career skills.

The technological background and opportunities of education changed a lot in the past three decades as well as the social-economic demands imposed on education. We can say that the emphasis on educational methodology and pedagogy shifted and transformed, and new light was thrown upon them. We developed from the use of fountain pen to interactive whiteboard and to even more advanced tools, up to Education 4.0. At least in places where it became possible, as we should not forget that modern technology is not available to everyone in several countries, for which reason we cannot speak about the global transformation of education, however, we cannot deny that in most of the economically developed countries the digital-virtual world is part of everyday life.

Where advanced, state-of-the-art technology was implemented, it became especially obvious that in several areas, even where it had been inconceivable earlier, effective human presence became unnecessary. As for example it happens day by day via various online means of education, or when this becomes the general and only possibility of education due to, let us say, in an emergency (such as the Covid-19 pandemic). This sheds light on the old sensitive subject of the effective role or task of an educator in the 21st century or whether the educator will still have a role at all and if he/she will, how it will be and how it will differ from the old ones, and so on.

The main aim of our research is to investigate the opportunities of higher education - and it reveals a world in transformation in every aspect - from the point of view of education and training as well. Parallel to all this appears the requirement of paying higher attention again to the form of communication, moreover to human communication itself, as an issue of education and training!

As while in the past (but in the present as well) hard skills were deemed the highest value, there is now a growing and urging need for transversal soft skills, for pushing them in the foreground and learning as well as teaching them. So, in addition to professional knowledge the initiation of productive dialogues based on empathy, attention and flexibility, etc. within communities, groups, teams, which is a fundamentally communication issue, can only be accomplished by the high-quality teaching of direct human communication. This, however, requires education exceeding the traditional professional skills, which is in line with the life-long learning model of the era and which is capable of maintaining human ethical values even in an online world.

The pandemic is challenging the education sector. According to the United Nations (2020), around 40 million children worldwide missed learning opportunities and social interaction during the first wave of COVID-19 and the situation is similar in the higher education sector as well where traditional lectures and seminars were replaced by recorded and streamed lectures. Students and teachers all struggled due to the lack of ICT and pedagogical skills needed for teaching online. How have our educator colleagues of different ages and scientific areas working in higher education in Hungary managed in this period of the pandemics? What challenges did they have to face during the Covid-19 lockdown? What are their experiences and what are the yields of the established situation? In our study, we are looking for answers whether there is a need for qualified educators who are ready for a digital-driven world of teaching. Does online emergency remote teaching mean more work for educators? Does Education 4.0 benefit educators at educational institutions because they are able to better serve their students' specific needs?

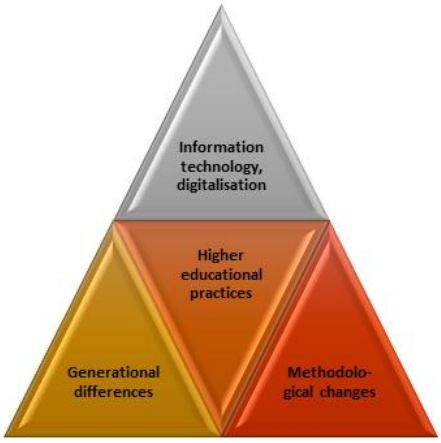
In the current study, we will briefly discuss how higher educational institutions are underway a structural and methodological change and review educators' IT competencies in particular relation to their pedagogical practices. We will give an overview of the results of semi-structured interviews with educators in two universities in Budapest Hungary to look at the changes in the methodology of teaching and to investigate their experience in the first phase of today's revolutionary changes in the delivery of education.

LITERATURE REVIEW

Higher educational institutions are again underway structural and methodological change concerning their educational practices. The pandemic COVID-19 enforces the present changes while these changes are also forced by the different behaviour of the generations entering universities and colleges. The methodological and structural educational changes in higher education are based on three main pillars, namely IT technological development, i.e., digitalization, the methodological challenges and the attitude

and behavioural changes of the generations. The development in IT technology has triggered computer assisted learning and the solid support of digital technologies jointly with the proliferation of the internet made eLearning possible in various forms. The fundamental difference between the digital immigrant and the digital natives also challenges universities to introduce novel methodological approaches in order to maintain their students' attention and by offering high quality education to grab competitive advantage (Fig. 1.).

FIGURE 1
THREE PILLARS OF HIGHER EDUCATIONAL PRACTICES

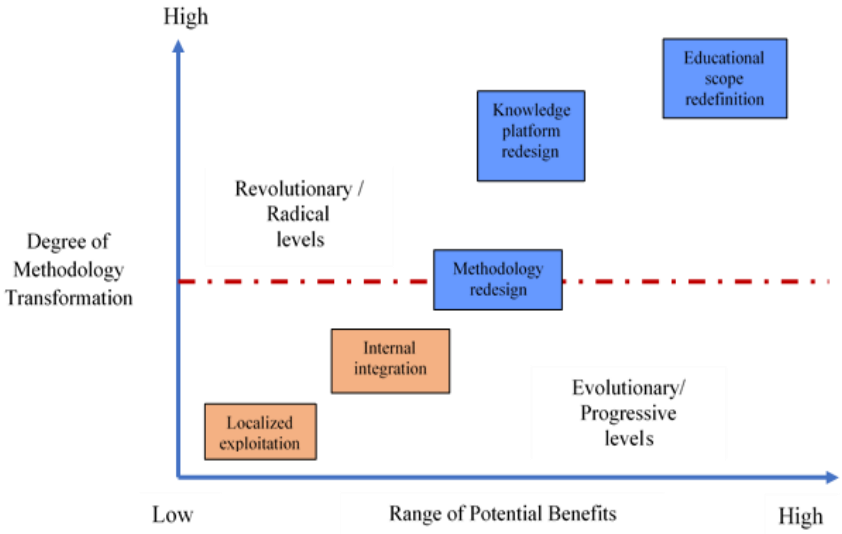


Developed by author

Such a development forces higher education institutions to review staff IT competencies in particular relation to their pedagogical practices. The question is now whether higher education can successfully exploit IT in support of teaching and learning and whether lecturers now naturally consider IT to be a strategic tool embedded within their own teaching practices. The "first wave" of the COVID-19 pandemic forced higher educational institutions at short notice to migrate their education onto digital platforms, thereby highlighting the possibility for higher education to enter a revolutionary phase of development in terms of instructional methodology (Fig. 2.). In this crisis situation, several similarities to the development of business processes were suddenly evident; higher education had been forced to enter into a phase of Educational Methodological Redesign (EMR). The last half a century has proved that technological development, hand-in-hand with changes in society, shifts all kinds of processes in business, education or even health service provision from an incremental, evolutionary phase to a more radical, revolutionary phase (Venkantraman, 1994). Potentially, such a shift was now underway, and not only in Hungary.

The success of IT-enabled education methodological transformation will depend on the well-being of the participants involved being either students or lecturers. This paper focuses on the lecturers' point of view and investigates the experience of lecturers in the first phase of this revolutionary changes in the delivery of education.

FIGURE 2
EDUCATIONAL METHODOLOGY REDESIGN

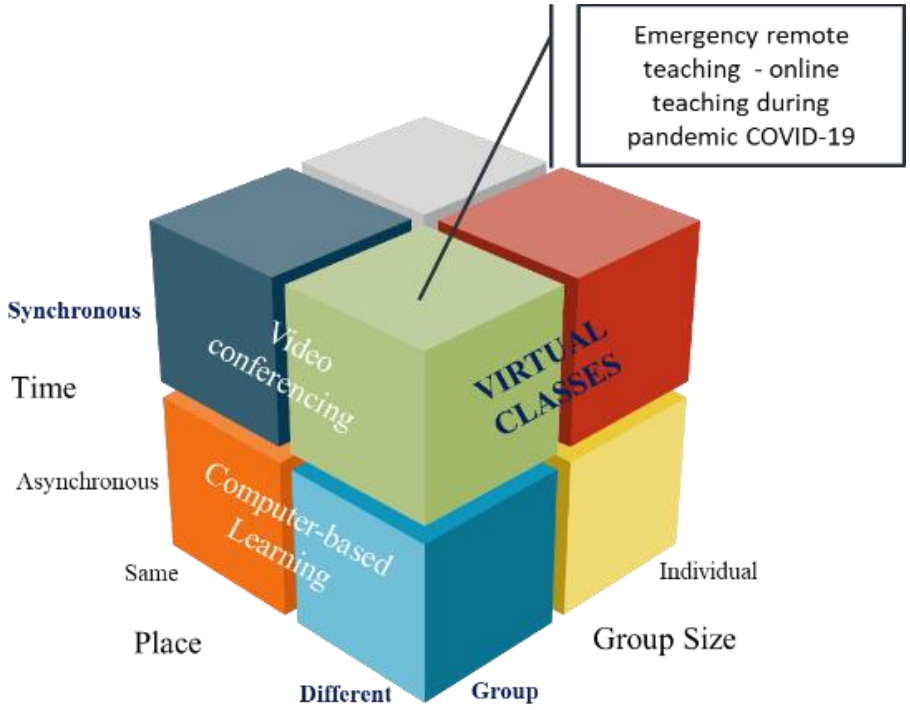


Developed by Author Based on Venkatranam (1994), Ferguson & Wilson (2001)

Ferguson and Wilson (2001) argue that educational institutions have already undergone progressive phases regarding their educational practices and delivery of lectures and seminars. According to them "most of the current efforts to make use of computer and communications technology within education fall within the early and progressive stage of IT implementation". However, due to the development of IT integration in educational technologies, the development of applications and web-based technology, furthermore the emergency remote teaching due to COVID-19 pushed educational practices to the radical/revolutionary phase lately, in which distance learning, online learning both being real-time question the status quo and desires for a reappraisal of digital education. Even such higher educational institutions which were stuck at the progressive /evolutionary level have to open towards the involvement of digital technologies and revise their teaching methodologies. The success or failure of digital education during the pandemic will determine how higher educational teaching practices will be restructured and how digital educational methodologies will be involved and integrated in the delivery of content after the pandemic. The paper focuses on collecting how lecturers experience the transition from the progressive to the radical level, what they could benefit from the process, what fears they have and what traps, challenges they have faced in the course of this sudden and highly intensive change.

"Education is people-centred activity" (Ferguson & Wilson, 2001) and as such, the success of education highly depends not just "on the sensitive implementation of fundamental IT-based change" but on the social well-being, the personal feelings and emotions as well as on the perception of the parties involved in the process of digital learning. The time-space-group model elaborated for distance learning by Miller and Padget (2006) well depicts the development of digital education (Fig. 3). From the asynchronous mode of computer-based learning through synchronous video conferencing higher education has already stepped into the phase of synchronous virtual classes involving a group of students. Online delivery of lectures and seminars has become a regular practice, while the application of methodologies from traditional type of education has raised the question how well higher education is prepared for real-time online teaching.

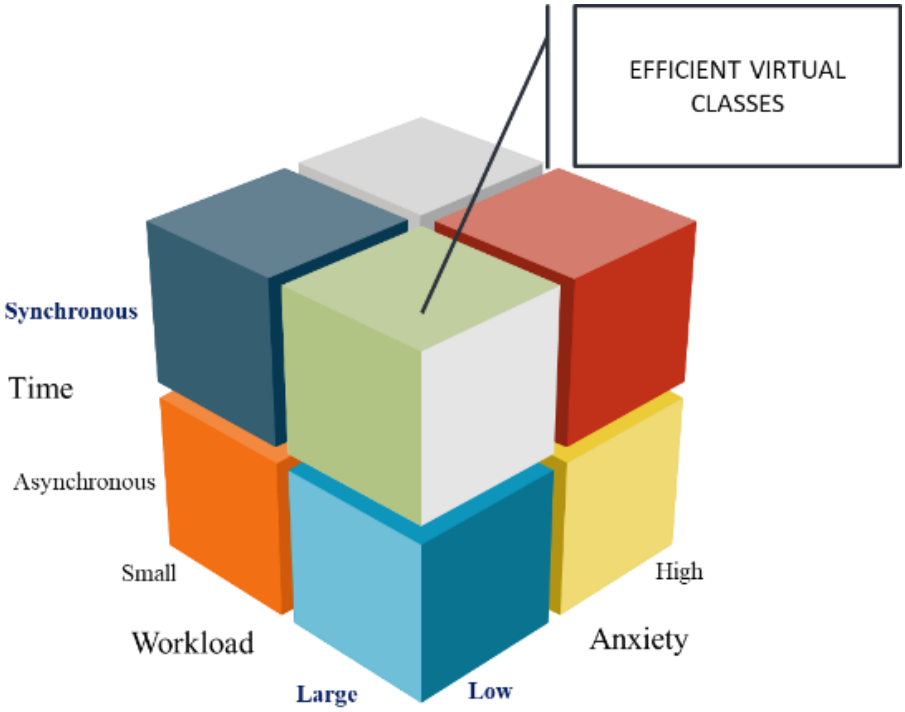
FIGURE 3
THE REVOLUTIONARY PHASE IN HIGHER EDUCATION METHODOLOGY – VIRTUAL CLASSES



Developed by Author Based on Miller and Padget (1998)

Emergency remote teaching placed education to asynchronous, virtual classes where participants are at different places and a group is taught simultaneously. Meanwhile, the other forms of individual learning remained an integral part of the learning process. Beyond the technical constraints and challenges that occurred, lecturers faced methodological challenges at the same time. These challenges range from administration and organization of virtual classes through the questions of interactivity to methodological challenges. Out of the above 3D cube/matrix the cuboid of Virtual classes with a group size is taken out and two extra dimensions – workload and anxiety – are added to it due to the sudden transition to digital education (Fig. 4).

FIGURE 4
THE VIRTUAL CLASS CUBE WITH WORKLOAD AND ANXIETY



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This paper reveals in the findings and results how lecturers at the two universities in Budapest experienced these revolutionary changes and what methodological changes they had to make in order to lead their teaching into success.

RESEARCH METHOD AND DATA COLLECTION

The present study focuses on two higher educational institutions in Budapest, Hungary, namely Budapest Business and School and Óbuda University. In response to a government directive and in response to the early onset of the "first wave" of the Covid-19 pandemic in Hungary, both universities shifted their mode of instructional delivery from the face-to-face traditional approach involving both lectures and seminars to emergency online digital education. The new approach taken involved either synchronous or asynchronous participation on the part of students. The research examines this new "emergency" mode of education from the lecturer's perspective and uses qualitative methodology to explore the lecturer's attitude and behaviour during this period of emergency remote digital education. Semi-structured, or in-depth interviews were conducted by the researchers, five members of the staff at both universities were interviewed. Semi-structured interviews allowed more interviewers to conduct the interviews and made a more open and discursive conversation possible. Using formal guidance, the interviewer followed prescribed guidelines, but was able to pick up on points made and digress from the guidelines when he/she felt it to be appropriate. The interviewers had the chance to interview the lecturers only once, a constraint which further justified the use of the semi-structured interview method (Bernard, 2006). The interviews did not exceed the one-hour time range, which is considered a reasonable maximum length for such interviews (Adams, 2015). Since the interviewers are lecturers at the same institutions, the interviews were preceded by observation and enabling the researchers to collect informal data about digital education. Hence, with the additional help of the interviews they could gain new insights into the topic in question.

The analysis aims to give an insight to the common attitude of lecturers and strives to reveal how higher educational practices can benefit from the affordances of digital and online education revealed by the pandemic situation. The interviewed lecturers work for faculties of Business and Management at the two universities and were selected from different age groups, from 25-30 to over 60, while maintaining a 50-50% balance of male and female staff members. The lecturers come from different professional fields ranging from Economics through Statistics and Mathematics to Informatics. The lecturers have different skills in informatics and in the usage of computer tools, software and applications. Data was collected with the help of semi-structured interviews, and the method of descriptive analysis and the use of a world cloud helped researchers to draw conclusions. The interview questions were designed so as first to give a warm-up question about the participants' general feelings and approach to digital and online education, and then go into detail concerning technical skills, methodological questions, and questions concerning staff isolation and the level of support provided by the university.

FINDINGS AND RESULTS

The interviews were conducted in May-July 2020 when the first wave of COVID-19 ended at the end of the second (Spring) semester of 2019/2020 which means that the lecturers' first experiences and reactions as a short-term response to the disruption caused by the pandemics could be tracked.

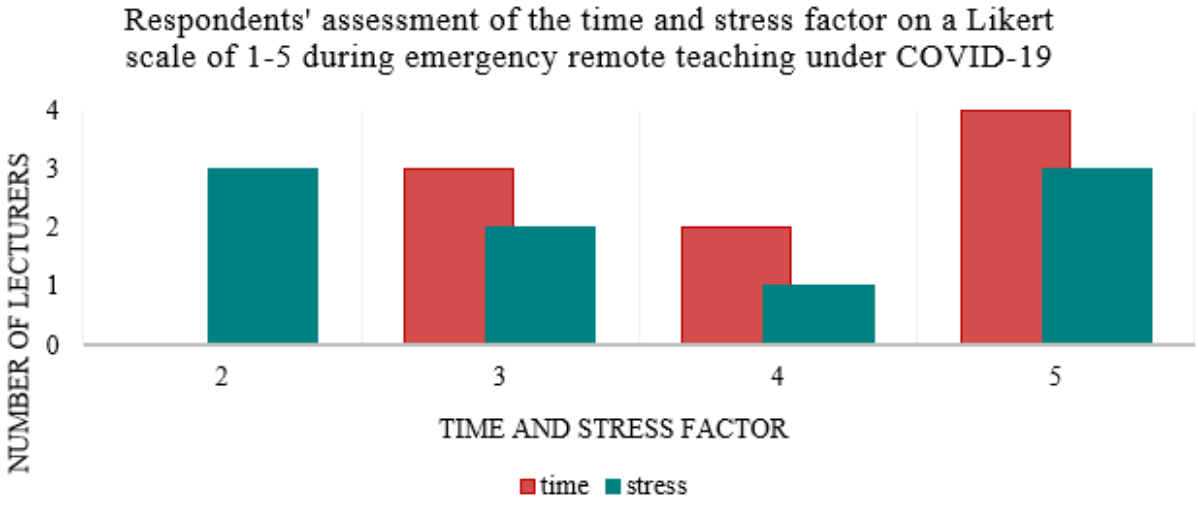
The study began with two open-ended survey questions that asked about the participants' first reaction and first thoughts when emergency remote teaching was introduced in Hungary soon after the outbreak of the coronavirus pandemic. The interview questions asked participants whether they were prepared for the changes and the new methods as well as how time-consuming or stressful the shift was. Some of the questions were designed to find out whether lecturers at the two Hungarian universities were skilled for the new instructional delivery and teaching experience, whether they had experience in using online teaching tools and digital methodologies. Finally, lecturers were asked what they consider beneficial for the future of higher education and what digital methodologies they would incorporate in their teaching tool set when personal fact-to-face education returns.

Lecturers at both universities mainly experienced emergency remote teaching as a negative experience (overall sentiment analysis is negative: 58.1%) while they explored the potential and the positive digital divide in the future of higher education. At the beginning of the shift to emergency remote education, lecturers were "*afraid of the unknown and the uncertain*". Some of them were shocked and were thinking "*for how long it would last*". The lecturers from the age group 60+ thought that "*I will not be able to cope with the situation because I do not have the basic skills, the right knowledge, the technical skills*", or "*I teach in a more ad hoc way, the learning material is always uploaded to the students and seminars depend on actualities. The most difficult for me was to plan and structure each minute in advance.*" All the age groups we studied are "digital newcomers" when it comes to redesigning their online courses. They all had limited access to software and complained about the increased stress and workload since all of them were uncertain about how to choose the right platforms and how to use them.

Participants were asked to rate their input of time and effort and how stressful the shift was for them. They were asked to respond using a 5-point Likert scale ranging from 1 to 5 and measure the input of time, workload, and the stress factor on a scale of 5, where 1 is not at all stressful/time-consuming, 2 is stressful and time-consuming to some extent, 3 is neutral, i.e. there is no significant change in the input of time and effort/there is no change in the amount of stress, 4 is a major increase in the amount of workload/stress, 5 is excessive amount of workload or stress.

As can be seen in Figure 5., no respondents selected 1 (i.e., no stress and having the same workload) and all the lecturers emphasized the increased amount of workload (Fig. 5).

FIGURE 5
RESPONDENTS' ASSESSMENT OF THE TIME AND STRESS FACTOR ON A LIKERT SCALE OF 1-5 DURING EMERGENCY REMOTE TEACHING UNDER COVID-19



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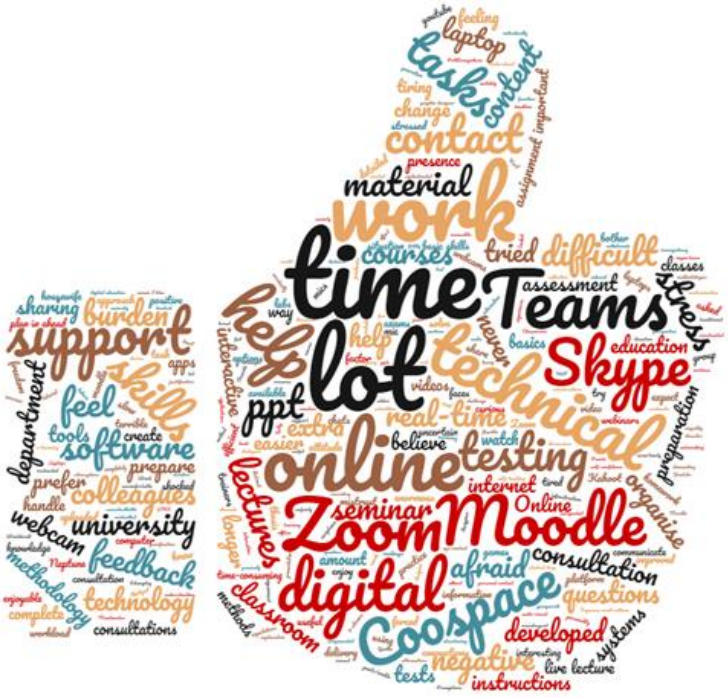
As regards the methodology, it is proved that lecturers at both universities would have required more training courses on teaching methods and wished they had more digital skills for using online teaching tools. Some of the answers that our respondents gave were the following: "*Who was brave enough to experiment, got to know these methods after surviving the first shock*." "*I did not feel really prepared for this and asked my colleagues to give some help*." "*We learnt together and I became a Teams pro at the end*!" Most of the respondents reported that they had looked at online digital teaching as a challenge and tried out tools like Zoom, MS Teams, Skype, Big Blu Button for communication and delivering online classes, and they regularly used the learning management system at their universities (Moodle, Coospace) for assessing assignments, sharing news, have chats in the tool called Forum etc. "*Yes, I started immediately transform the content to make it easy to learn through*." However, some of them felt that "we could not create the atmosphere that I could create in a classroom," and lacked the atmosphere of a class when by walking around help can be given to students, can share attention and can easily create group dynamics. The question has risen "*how can I use the tools in class and how will the class be interesting and efficient*?" Only two of the lecturers mentioned tools with which interactive games and tasks were embedded in the LMS and were used in class (Worldwall, Educaplay, Kahoot, Polleverywhere, Voxvote, Mentimeter, H5P in Moodle), although some have already had experience in digital methodology (had developed e-learning courses earlier).

Lecturers from both universities acknowledged that they have learnt a lot about methodology and got trained and skilled in how to plan and organise online webinars. There were no real differences between the experiences of the lecturers of these two universities. One of the respondents concluded that "*The more time and energy you put into preparation, the easier it is to deliver, more enjoyable for students and teacher!*"

The interviews allowed the researchers to collect a set of relevant words concerning digital education methodologies with a relevance over 0.6, namely students (0.994), a lot of time (0.778), Moodle (.0.705), Zoom (0.680), online testing and online consultation (both having a relevance of 0.644), Skype (0.589) and Big Blue Button (0.579). The analysis shows that the first and most important issue for lecturers is time and the second set of issues is technical concerns. Considering frequency, the words time, team, and problem occurred the most frequently apart from the word student. Keywords in the interviews different from the most relevant words were laptop, webcam, contact time, personal teaching, remote teaching and online seminar that well reflected the technical and the personal side of education.

At both universities lecturers are open to integrating online testing, digital boards, Moodle assignment functions, games, interactive digital tasks in the future and all agree that online consultations, conferencing, or even lecturing in the framework of Erasmus+ staff mobility should be integrated. All of them missed personal contact time with students and face-to-face teaching and as one of them said "*What I feel and I am afraid of is whether I will be needed in the future. I feel that students need my live oral consultation and explanation but sometimes I have the feeling that I record some lectures and I will not be needed any longer. However, I think that not only because of me, but because of the students, they need it*."

FIGURE 6
THE MOST FREQUENTLY USED WORDS IN THE INTERVIEWS



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In summary it can be concluded that the interviewed lecturers found digital education a bit worrying at the beginning because they did not feel confident and did not consider themselves "digital literate" in terms of methodology. They looked at emergency remote teaching as a challenge and trained themselves to cope with the technical and methodological problems or challenges. After the first wave of COVID-19 they would prefer returning to personal face-to-face teaching but keeping the best practices and integrating the newly learnt methodological and soft skills into their teaching to be able to deliver more engaging and relevant classes.

CONCLUSIONS

In summary, this paper argued that the sudden transition from the face-to-face traditional instructional delivery to emergency online digital education raised serious challenges for teachers and professors at higher education institutions across the globe as well as in Budapest Hungary. The shift was an enforced step in the course of business process redesign (BPR) which forced pedagogy to change teaching methodologies.

The research examined the new emergency mode of education from the lecturer's perspective and explored the lecturer's attitude and behavior during the Covid-19 period in Budapest in 2020. The lecturers

or academics that were interviewed at the two Hungarian universities had different skills in the usage of computer tools, software and applications. Their experiences and first reactions to emergency remote teaching were studied and whether the new acquired skills and the capabilities of applications can be exploited in their future teaching practices.

The analysis leads to the following conclusions:

- The sudden transition created severe disruptions. All the interviewed educators agreed that remote teaching was a completely new experience for them, and redesigning their courses was challenging, stressful and time-consuming, especially at the beginning of the pandemics when social distancing measures were imposed by the government.
- Improvising quick and efficient solutions caused many problems for educators. They were not prepared for this task, it added to their workload, and they looked at it as a major challenge and became frustrated.
- All the educators were concerned about the loss of personal contact and interaction with students, the lack of feedback, and they were afraid of alienation. They had concerns about their students' learning process, especially teachers of undergraduate (BSc) students or students who did not have a chance to meet the teacher in the classroom before the lockdown period. Student dropout was a serious concern in many cases.
- Although educators used online tools such as Microsoft Teams or Zoom that offer possibilities for interaction, they did not have enough time to acquire new skills and learn how to use these tools efficiently and interactively. Many of the educators complained about the lack of infrastructure.
- Professors lack methodological training and time to adapt their teaching skills and soft skills.
- Students and educators need more time to learn more about 21st century digital etiquette, for instance, how to use webcams, microphones, how to facilitate discussions, how to manage digital disruptions, etc.
- The shift to online education and the recorded learning material created anxiety and a fear of losing jobs. Several educators hope to go back to the original face-to-face format.

Education 4.0 has apparently arrived. Our far-reaching conclusion is that educators of all age groups who had to migrate the classes to online delivery platforms need to have 21st century transferrable skills. Our data suggest that we still have a long way to go to be able to cope with the current situation and find the opportunities in these challenges.

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