The Sustainability of E-learning of the University Education System Generated by the COVID-19 Epidemic

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Abstract

The health crisis caused by Covid-19 has affected the whole world, even the university environment. With the advent of this virus, universities were closed as a measure to prevent and combat these health epidemics, so these measures had a significant impact on the teaching / learning environment in the university environment. Thus, this paper analysed how teachers adapt to the e-learning system before and during the pandemic. The authors start from the description of the importance of sustainability for universities in general and in particular in such a period of health crisis and, moreover, the importance and role of e-learning during the period of health crisis. The authors provide a description of teachers' perceptions of e-learning based on descriptive statistics and will conduct an empirical study in future research to develop these results. The results show that the e-learning system was indispensable during the pandemic, although the classroom teacher cannot be replaced by such a system. The novelty brought by the article is the analysis of the perception of teachers from Romanian university's regarding the acceptance of technology. This research also faces a few theoretical, practical and managerial limitations on the number of respondents, the synthetic way of analysis, and the evolution over time of the results, and the perception of the usefulness and acceptance of the e-learning system.

Keywords

Sustainability; e-learning; Covid-19; technology; usefulness.

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Introduction

As institutions of education, research, and services, universities are key players in the sustainable development of society and the economy. This requires an analysis of the institutional anchoring of sustainable development and how universities meet these expectations, i.e., in what aspects relevant to sustainability a university acts in a future-oriented manner and where optimization is needed. At sustainability same time, the analysis allows universities to position their sustainability efforts in comparison with other players in the university field. Based on the analysis of university sustainability, an exchange between universities and shared learning is allowed. Higher education has undergone radical changes in many nations since the 1990s, when reforms inspired by the new public administration required the development of university management techniques.

The European Commission has expressed its desire to modernize universities since 2006, at the same time the European Commission has established that modernization is considered - if universities want to contribute to the EU's goal of becoming a global, knowledge-based economic area - to be of importance. fundamental. European universities have enormous potential, which unfortunately remains largely untapped due to rigid structures and various disabilities. Unleashing the vast pool of knowledge, talent, and

energy requires immediate, profound, and coordinated changes: from the way systems are governed and managed to the way universities are run (European Commission, 2006). University sustainability must be the active participation of all higher education institutions in the development of environmental protection policies. The sustainable university is the one that, in addition to the governmental involvement, contributes to the protection of the environment by adapting the curriculum to the ecological needs and by the progress of the scientific knowledge, as a result of the didactic and research activities (Ng,2020). A university that wants to be sustainable must have the capacity to make its programs more flexible according to the evolution of the labour market, especially by adapting to the economic activities that take place in the main recruitment pool, by giving increased interest to the specialized practice, respectively, the consistency of the implementation of these programs (Schunk et al, 2014). The competencies of the teachers, respectively, their level of training, the active presence in the specialized fields at national and international level, the development of an external collaboration network of the educational institution, as well as the organization of highly prestigious academic events, are an important indicator of sustainable development for higher education institutions.

1. Literature review

Today's students are tomorrow's decision makers. To succeed in social transformation in terms of sustainability, students need to be trained in sustainability and sustainable management, because they, as multipliers, are implementing sustainability in practice now and later. Pure knowledge transfer is just one aspect. Through a close link between theory and practice, students should develop their own skills that can be applied in later activities in business or science practice (Förster, Zimmermann and Mader, 2019). E-learning and blended learning are important elements of contemporary university teaching. The study models offered are as diverse as the students. With the help of innovative teaching concepts, students' individual learning styles can be approached, and on the other hand we can discuss the different learning materials. Universities around the world are supporting students and faculty in creating and using digital courses, especially during this pandemic. For example, the MOODLE learning platform allows working in virtual learning environments and the use of a wide range of activities and work materials (Zhang, et al., 2020; Ng, 2020). The end of e-learning development has not yet been reached, not only for organizational and motivational reasons, but also because technical developments and policies set new goals, namely the comprehensive digitization of studies and teaching. Such far-reaching requirements are not only problematic for data security reasons, but also in terms of good teaching, many questions remain unanswered. The aim should be to use digital elements in teaching in a meaningful, integrated, and measured way and to ensure that participants have control over their data. Other objectives appear in terms of the use of e-learning, as can be seen from the various initiatives, especially of the states and, to a lesser extent, of the government. In addition, the level of development in universities, in universities and in the comparison of subjects is very different. If everyone involved is interested and financial resources are available, there are attractive and extensive e-learning elements that are used in teaching; otherwise, they are missing. The spread of MOOCs has also given a new impetus to online learning (López Meneses, Vázquez Cano and Mac Fadden, 2020).

2. Research methodology

For the quantitative study, we developed a questionnaire based on the literature and then sent it to teachers to obtain an x-ray of the status and challenges they face in the full adoption of e-learning in higher education. Specifically, the questions are about perceived usefulness and perceived ease of use. The first section deals with the personal information of faculty members that reflects their field and experience. The second section focuses on the level of use of e-learning. Data were collected using a survey, which was conducted using the computer-assisted web interview technique CAWI (Vehovar and Manfreda, 2008; Sowa, et al., 2015; Taniguchi et al., 2019; Ejdys, 2021). A link to the electronic questionnaires was distributed to the individual teachers of the Romanian universities through the university's e-mail system. These were distributed between January and February 2022. In total, 267 completed questionnaires were received, of which 24 that were incomplete were removed, so we analysed 243 questionnaires.

3. Research framework and results

The term e-learning has its origins in the 1980s, following the introduction of the first computer-assisted jobs, which led to the replacement of handheld computers and typewriters with computers, so to speak. Employees have been trained in new software applications (e.g., operating system, text program, and databases) through traditional employee training courses and, and this was new - through small learning

programs that have been installed on workstation computers. Work by program providers. These tools were originally simple didactic texts, which were processed in the following years using graphics and animations.

The characteristics of the sample are presented in Table 1, which shows that 13.9% of those sampled were in the category of assistants, 41.15% Readers, 30.86% Lecturers and 13.99% teachers, which indicates a distribution between the four categories. We also note that over 66% of respondents have over 15 years of experience in teaching. All 243 respondents are in a public or private university.

Table no. 1. Sample characteristics

		No. Answer	Percentage
Category of teachers			
	Assistant	34	13.99%
	Lecturer	100	41.15%
	Assistant Professor	75	30.86%
	Professor	34	13.99%
Total		243	100%
Age group			
	21-30 years	25	10.29%
	31-40 years	48	19.75%
	41-50 years	85	34.98%
	51-60 years	66	27.16%
	Over 60 years	19	7.82%
Total		243	100%
Work years			
	1-5 years	36	14.81%
	5-10 years	17	7.00%
	10-15 years	28	11.52%
	15-25 years	88	36.21%
	over 25 years	74	30.45%
Total		243	100%
University type			
	Public	224	92.18%
	Private	19	7.82%
Total		243	100%

Below we present the results obtained on the 12 elements and the 36 related items in order to have an x-ray on the perception of teachers regarding the acceptance and use of the e-learning system.

Ability to use

The use of skills and abilities acquired by individual teachers specifically at the university is an important process when we discuss the ability to teach and learn in an online e-learning environment (Chien, 2012; Schunk, Meece and Pintrich, 2014). In addition to the ability to successfully implement professional knowledge, personal mastery also includes coping. The conditions of departure of the teachers were and are heterogeneous. Acquiring technical and teaching skills at the same time has been a challenge for many teachers, but it is necessary due to the complexity and multifaceted nature of e-learning. In addition, technical difficulties and malfunctions are to be expected at any time with e-learning sequences, which abruptly disrupt the coherent process and consume valuable learning time. We notice from our results an increasing trend regarding the agreement expressed by the teachers regarding the technical resources, the digital skills held, and the easy access to the e-learning system (Figure no. 1.).

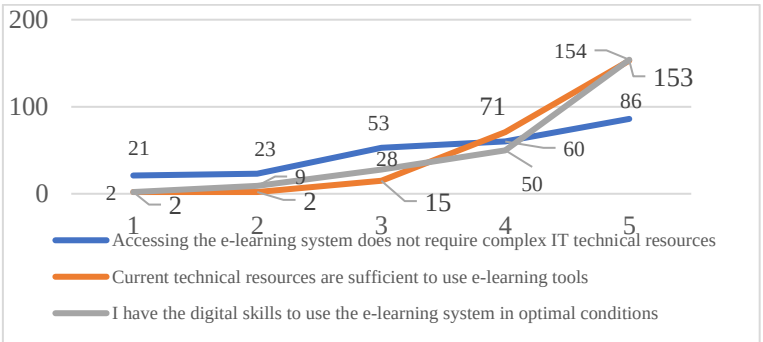

Figure no. 1. Ability to use e-learning platforms

However, in terms of general teaching and methodological skills, the teachers themselves could not see any increase. The knowledge gained in the e-learning approach has been changed and deepened, especially between specialist colleagues and teachers. The transfer of knowledge also led to a coordination of the content of teaching between colleagues.

Course content and design

During the preparation of courses and seminars, on the one hand, it is analysed which forms of learning are suitable for transmitting and consolidating the content of teaching and ensuring the learning outcome and, on the other hand, which e-technology is suitable for each teacher (Junus, et al., 2015).We note the rather divided opinions of teachers regarding the acquisition of practical skills based on the use of the e-learning system; a number of 63 teachers expressed their total agreement, 54 are neutral, and 30 express a total disagreement. Also, regarding the objective evaluation of the students, the opinions are divided between neutral, partial agreement, and total agreement, at the same time a percentage of 25% does not agree or only to a small extent with these aspects. On the contrary, we note that the majority of teachers, almost 97%, consider that the courses supported through the e-learning system are clearly designed and structured. As we have already mentioned, the presentation of the content is gaining more and more space and importance. This form of learning also seems to have an impact on comprehension, as students are required to work on the content themselves. The use of e-learning opens up new opportunities for motivation, especially for students who find it difficult to access learning content through conventional instruction.

Instructor contribution

On the one hand, it is about trying innovative forms of teaching and learning. In this sense, the use of new technologies contributes to the professionalization of teaching, so we consider it an enrichment for teaching in terms of method and teaching (Harandi, 2015). The importance of e-learning in universities is great, but attention is paid to the fact that the focus on technology should not overshadow other areas of university interest. The computer should be perceived as a tool and not as an object of focus, which is why e-learning is considered an additional component in the design of courses and seminars. The learning platform as a communication medium is able to contribute to the formation of networks and facilitate teamwork through effective communication. It becomes clear that the self-taught lecturer is the most important factor in learning success. If, in addition, the material is presented in a lively and fun way and is discussed in class, which the reader should encourage, then two other important factors for productive learning are met. We note that the teachers consider that they are ready for the e-learning system; respectively, the organization they belong to provides them with the necessary resources to access the e-learning system.

Previous experience in e-learning

Teachers who have little previous experience with new electronic technologies have reported more often that they have had initial difficulties, that they are overwhelmed and stressed, and that they are particularly reluctant to engage in new media (Lee and Lehto, 2013; Hrtoňova, et al.2015). The results show that only half of the teaching cards used the e-learning system before the pandemic, but many more used online communications software (Table no. 2.).

Table no. 2. Distribution of previous experience in E-learning

	1	2	3	4	5
I have used e-learning platforms in the past	57	39	41	45	61
Accessibility to technical resources needed for the e-learning process was also used before the COVID pandemic 19	34	39	66	41	63
I have had experience using online communication software even before the COVID 19 pandemic.	28	28	40	46	101

Notes: *1 Total disagreement; 2 partial disagreements; 3 neutral opinion; 4 partial agreement; 5 total agreement

The quality of the e-learning system

The competence of fashionable word media, which has only become the subject of educational policy debates with the new media, marks the new quality of information processing and knowledge production (Fathema, Shannon and Ross, 2015). Teachers and students alike face the challenge of rethinking these processes and critically evaluating their practical implementation. We note that most teaching cards over 123 consider that the use of e-learning systems is accessible and ensures data security, but expects a prompt and daily update from universities, i.e., a more proactive involvement from the university.

Quality also means creating the opportunity to improve and the desire to develop. The quality of the e-learning system in universities is also reflected to some extent in the desire and ability to learn. The use of multimedia elements in university teaching is not intended to replace face-to-face teaching, but rather to enrich it and improve the quality of long-term teaching.

Perceived utility

When a person decides whether the newly introduced information system is useful (perceived usefulness), the quality of the results plays a crucial role (Scherer, Siddiq and Tondeur, 2019). The perceived usefulness of the information system also depends on the results produced by the information system, whether they reflect the user's expectations. The introduction of digitized teaching is greatly facilitated by students who are themselves convinced of the benefits. Previous studies show that perceived benefits and perceived ease of use have a significant impact on the acceptance of e-learning. Thus, our results confirm this primarily through the flexibility offered by the e-learning system with a total of 98 responses. However, a large part of the teachers consider that the use of e-learning tools does not ensure an improvement of the results, respectively, the teaching / academic performance cannot be increased.

Perceived ease of use

Ease of use also plays an important role in accepting the e-learning offer (Binyamin, Rutter and Smith, 2019). Specifically, it must include the following aspects: the highest quality, attractive design, well-thought-out user guide, methodology and teaching, consideration of different media skills and personalities, adapted usage habits, and how to provide the learning offer (Figure no.2.).

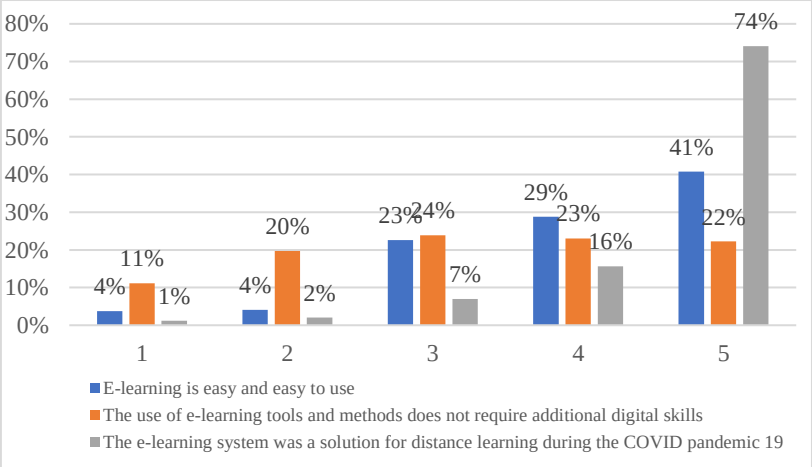

Figure no. 2. The ease of use of E-learning platforms

Attitude towards use

It becomes clear that competencies can only be specifically defined if there is a university-specific target framework that names the scenarios that are intended to be implemented (Hussein, 2017). How can these skills be developed within the university? More and more forms of on-the-job or integrated learning are being proposed, as well as learning based on informal communication and exchanges on social networks, while ensuring that they go beyond simple on-the-job learning. Universities should apply measures to develop skills on a broad basis and not focus on training courses that do not achieve sufficient sustainability and effectiveness on a broad basis. At the same time, measures need to be incorporated into explicitly developed ideas about what teaching guidelines a university (or faculty) would like to base its courses on and what role media use should play here. More than 60% of teachers consider that e-learning was a good alternative during the pandemic and was a good idea to continue the teaching / learning activity, but only 33% consider it is an attractive form of teaching.

Satisfaction and personal development

The specific benefits of using e-learning could not always be implemented to the full satisfaction of teachers (Weng and Tsai, 2015). It is often pointed out that the purpose of using the platform has not always been seen as appropriate and in some cases has been rejected (Table no.3.).

Table no. 3. Personal developments and satisfaction with the use of e-learning

	1	2	3	4	5
I prefer to use the e-learning system more than the traditional education system	23%	16%	26%	14%	22%
E-learning tools give me the opportunity to be more creative	7%	13%	20%	28%	32%
E-learning gives me the opportunity to have a flexible schedule	10%	13%	17%	22%	38%

Notes: *1 Total disagreement; 2 partial disagreements; 3 neutral opinion; 4 partial agreement; 5 total agreement

Behavioral intent to use

In principle, e-learning is appropriate if well-founded theoretical knowledge is to be transmitted, with a large proportion of text, video content, or sound sequences (Chow, et al., 2012). This requires a longer duration of attention. Mobile learning, on the other hand, is particularly suitable for consolidating what has been learned using small bits of learning. The use of e-learning in the classroom is closely related to the issue of added value. Depending on the technical possibilities, this can be seen in what the new media can do more. A total of 226 teachers stated that they use e-learning platforms in all activities and that they use them every day, but only 160 of the teachers used this system before the pandemic.

Actual use

The use of e-learning in the classroom is closely linked to the issue of added value (Almaiah, Al-Khasawneh and Althunibat, 2020). Depending on the technical possibilities, this can be seen in what the new media can do more (Figure no.3.)

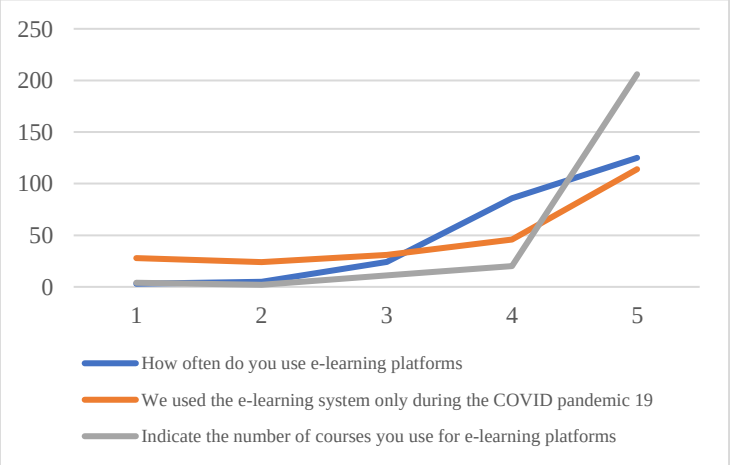

Figure no. 3. Actual use of e-learning platforms

Academic performance

In the discussion of higher education, e-learning is regularly seen as an engine of change in higher education. The chances of e-learning are aimed at "better" teaching: teaching that relies more on student activities - rather than teaching - that encourages self-directed and cooperative learning, focusing on case studies, materials, complex issues, or work. on projects and promotes interuniversity cooperation in teaching - and internationally (Al-Maroof and Al-Emran, 2018). Teachers are a key factor when we think about university performance and sustainability; they can be seen as promoters, depending on whether e-learning is used successfully in a long-term university: teachers, their competence, and motivation play a role. key role in promoting e-learning and establishing an innovative teaching and learning culture. Skills development is increasingly recognized as an essential condition for the sustainable anchoring of new forms of learning and media in the university. It initially refers to teachers' knowledge, skills, and attitudes towards the development, introduction, and use of innovative forms of e-learning in teaching. In addition, skills development also includes an institutional level; it also affects the ability of an organization to provide certain quality services. For this reason, increased efforts can be seen in many universities to motivate teachers to innovate in e-learning and to reorganize or set up processes and structures of support facilities to build this competence at the individual and organizational level. Computer skills are only a small part of "e-learning skills" (Table no.4.).

Table no. 4. Influence factors on academic performance

	1	2	3	4	5
E-learning systems effectively enable teacher-student interaction	19	25	55	63	81
The e-learning system has contributed to the significant increase in assessment grades	20	18	75	67	63
The e-learning system contributes to the development of ICT skills among both teachers and students	6	7	31	80	119

Notes: *1 Total disagreement; 2 partial disagreements; 3 neutral opinion; 4 partial agreement; 5 total agreement

Conclusions

In short, sustainable development at universities and technical colleges is becoming increasingly important. However, in peer review, it has become clear that the implementation of sustainable measures and concepts is only in its infancy in many institutions, with the exception of pioneer universities. The detailed analysis of your company, stakeholders, and comparison group is an important first step in formulating goals for your university and towards the goal of a comprehensive sustainability strategy.

E-learning as a new learning concept seems very tempting at first glance: it opens up the possibility of learning and continuing education according to individual needs when and where we want. The computer and the Internet connected to it are now an indispensable part of our lives, which is why a combination of learning and electronic media is a good idea.

As technology advances at a rapid pace, further progress will be made in the field of e-learning, but it is important to remember that e-learning also has limitations. On the one hand, an e-learning environment according to its didactic concept and certainly not only according to its technical feasibility, which depends on the creators of the respective programs. In addition, the learner is still usually the same person as in classical learning methods. Where there is a lack of motivation, interest, or desire to make an effort, e-learning will not be able to work wonders. In addition, the constant flexibility and availability of learning programs tempt people to put in additional learning effort and possibly overwhelm them. In short, e-learning cannot replace teachers. In particular, the concepts of blended learning seem to make more sense than pure e-learning. Social contact between learners is important, and it should take place primarily interpersonal in direct interaction and only additionally through forums, etc. E-learning offers many possibilities, but the use and success of learning depend primarily on the respective teachers and learners, while a learning program can only have a sustaining effect.

What implications can be derived from this research for future research? First of all, this paper represents a first careful examination of the subject of accepting e-learning in Romanian universities. Therefore, the article should be understood as a starting point for future research. The acceptance investigation of e-learning must also be studied from an empirical perspective with respect to the acceptance of new technologies. This analysis is future research that we want to do based on the information collected and why no study can be extended to the student's perspective on the e-learning system. As a result, the purpose of further investigations is to perform a more detailed analysis of the different types of e-learning used.

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