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DRIVERS OF CONTINUANCE INTENTION TO USE THE ONLINE LEARNING PLATFORM AFTER THE COVID-19 PANDEMIC

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Abstract

With the start of the COVID-19 pandemic period, the need to continue the educational process imposed the exclusive move to the online environment - a new and insufficiently prepared experience, which generated controversies, but also reflections, and adaptation for teachers, students, decision-makers, and even parents. The major concern of the academic community was related to the quality of the educational process and how the student-centered education paradigm can be introduced in the online environment. The students and teachers of the post-pandemic generation are no longer the same, this period has strongly impacted society, mentalities, and the school's future. Analyzing online education from multiple perspectives, the advantages, and opportunities generated by the integration of ICT in the teaching process are obvious. However, many variables have an impact on the effectiveness of e-learning, and many unanswered questions, yet. This research aims to analyze the key drivers of technology acceptance and the role played by three external variables: content adaptation, facilitating conditions, and ease of access in the context of exclusive online education. For this purpose, an extended technology acceptance model has been conceptualized and tested on a sample of Romanian university students. The results illustrate that content adaptation represents an important predictor of both the perceived ease of use and usefulness. The model explained a lot of variance in the continuance intention which is due to the positive attitude towards using the online learning platform in the future.

Keywords: *distance education, TAM, COVID-19 pandemic, online learning platform, learning motivation*

Introduction

With the new reality imposed by the COVID-19 pandemic, online education has become a viable alternative and an open door to the future, in which school will no longer be just face-to-face, in a traditional format, but will effectively be capitalized by educational platforms, resources, and means of modern technology, to produce creative and innovative learning, to stimulate and maintain students' motivation, interest and desire for knowledge.

Although the implementation of the online teaching-learning process has been achieved with effort, risks and difficulties, in many cases it has also brought satisfaction and success, constituting a bridge over the physical distance between teacher and students and mediating learning. Analyzing several studies from the pre-pandemic period, Nguyen (2015) stated that, if properly designed, online courses can be as effective as traditional ones.

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But the pandemic context, with implicitly imposed strong emotional load and restrictive social measures, with isolation in many situations, unpredictability, and full of anxiety, generated negative effects on education - stress, low interest, lack of motivation, delays, low productivity, and reduced engagement in the online learning process. In this respect, not all students responded positively to the implementation of online learning (Duraku, 2021).

During the COVID-19 pandemic, students' behavior and attitude toward online learning are influenced by many factors, as mentioned by several researchers (Boca, 2021; Um, 2021). However various studies have shown that students have gained knowledge through online education during this period, an appropriate pedagogy and suitable content are important variables of students' learning motivation (Boca, 2021; Hamdan & Amorri, 2022).

A wide range of *course* and *learning management systems* (CMS / LMS) are used in education - platforms that offer synchronous or asynchronous support and include advanced features for facilitating student access to resources and learning materials, mediating collaboration and communication, evaluating and providing feedback, and many other facilities: Moodle, Google Classroom, Edmodo LMS, CANVAS LMS, Schoology, Sakai, EdApp, Thinkific, ZoomLearn, Teachable (https://research.com/software/best-free-learning-management-systems).

Anyway, in the context of the pandemic, the shift to exclusive online education represented a challenge not only for educators but also for researchers interested in explaining the adoption and usage of e-learning systems. In this sense, the *technology acceptance model* (TAM) developed by Davis (1989) stated that the intention to use a given technology is determined by two users' beliefs: the *perceived ease of use* and the *perceived usefulness*. The influence of the two beliefs is mediated by attitude, which has been defined as affective or evaluative feelings about behavior (Azjen, 1991).

This research aimed to analyze the determinants of the acceptance of an online learning platform by university students and the role played by three external variables: content adaptation, facilitating conditions, and ease of access. For this purpose, an extended TAM-based model has been conceptualized and tested on a sample of Romanian university students ($N = 156$).

Background and Conceptualization

Background

TAM considered that the behavioral intention to use a computer system is driven by the attitude towards usage which, in turn, is influenced by two beliefs: perceived ease of use (PE) and perceived usefulness (PU). Extant literature shows a large variety of technology acceptance models as well as a large diversity of conceptualizations as regards the main drivers and their antecedents (Lee et al., 2003; Granik & Marangunic, 2019).

As an example, the study of Pal and Patra (2020) integrated the technology acceptance model with the task-technology fit model (TTF) by conceptualizing TTF as an antecedent of the perceived ease of use and perceived usefulness of online video-based learning. The task-technology fit has been conceptualized as a latent variable with two antecedents: technology characteristics and individual characteristics, the last one having a larger influence on TTF. The influence of TTF on the perceived ease of use was higher than the influence on the perceived usefulness.

The task-technology fit has been also included in a TAM model by Mo et al. (2021). They tested an extended TAM model including three external variables (task-technology fit, instructor attitude, and family support) on a sample of 552 university students. The task technology fit was the only significant antecedent of the perceived usefulness. All external

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variables were significant antecedents of the perceived ease of use. The model explained a 55.9% variance in the continuance intention.

Baber (2021) analyzed the intention to use an online teaching and learning system (Zoom + LMS) during the pandemic. He developed and tested a hierarchical model having three second-order formative constructs that are measuring instructor features (attitude, competency, interaction), student features (motivation, collaboration, and student mindset), and technology acceptance (perceived ease of use and perceived usefulness). The intention to use was mainly influenced by the instructor's characteristics and the student's characteristics. The influence of technology acceptance was smaller. Overall, his model explained 76% variance in the intention to use.

Mailizar et al. (2021) examined the behavioral intention to use e-learning in a university in Indonesia. They conceptualized an extended TAM model featuring two external variables: system quality and e-learning experience. Their results showed that attitude was the only predictor having a crucial influence on the behavioral intention to use. As regards the external variables, only system quality had a significant influence on the perceived ease of use and perceived usefulness. The model explained a 57% variance in the intention to use.

Akuratiya and Meddage (2020) analyzed the IT students' perceptions of online learning in Sri Lanka. They found a high perception of online learning (79%) and a high agreement to integrate online learning in the future. Most of the students found online learning useful (77%), effective (67%), comfortable (53%), and enjoyable (51%). Baczek et al. (2021) reported similar perceptions of medical students in Poland: comfortable (54%), learning at their own pace (64%), access to online material (68%), and enjoyable (73%).

Analyzing the students' acceptance of e-learning in academic studies, by considering a modified TAM model that takes into account the instructor characteristics, computer self-efficacy, course design, perceived usefulness, perceived ease of use, and intention to use, 95 undergraduate students from Malaysia expressed that computer self-efficacy, perceived ease of use, and intention to choose the e-learning format for study, represent crucial factors that affect the students' use of e-learning in higher education (Ibrahim et al., 2017).

Anyway, the development of comprehensive TAMs allows research on e-learning acceptance. A positive example is coming from UAE, where 435 students from 5 universities participated in research that illustrated a significant impact on the perceived ease of use of the e-learning system, influenced by the quality of the system, computer self-efficacy, and computer playfulness. Near the abovementioned variables, the quality of information, perceived enjoyment, and accessibility proved to induce a favorable influence on the perceived ease of use and perceived usefulness of the e-learning system (Salloum et al., 2019).

Research Model and Hypotheses

In this study, an extended TAM is proposed that includes two main beliefs influencing the behavioral intention to use (BI) through the attitude toward use (AT): perceived ease of use (PEU) and perceived usefulness (PU). It has been hypothesized that the perceived ease of use and perceived usefulness are influenced by two external variables: content adaptation (CA) and the ease of access to online activities (EA). The research model is presented in Figure 1.

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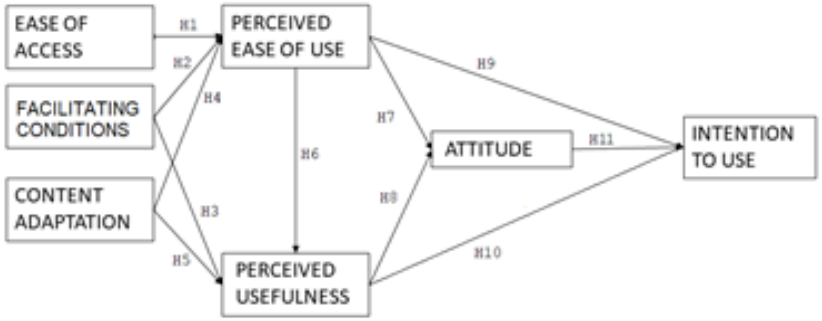
Figure 1
Research Model



The ease of access refers to the new opportunities created by online education: the ubiquitous and fast access to the educational activities and educational resources stored on the platform (Lamanauskas & Makaraskaite-Petkevitciene, 2021; Manea et al., 2021). Therefore, it has been hypothesized that the ease of access is positively influencing the perceived ease of use.

H1 Ease of access has a positive influence on the perceived ease of use (EA→ PEU)

Facilitating conditions refer to the availability of resources, such as computers, Internet access, and the knowledge needed to use the online platform. It is expected that facilitating conditions will positively influence the perceived ease of use and the perceived usefulness (Almayah et al., 2020; Clark et al., 2020)

H2 Facilitating conditions have a positive influence on the perceived ease of use (FC→ PEU)
H3 Facilitating conditions have a positive influence on the perceived usefulness (FC→ PU)

Content adaptation refers to the suitability of the content for online presentation and the suitability of assignments for online learning. On the one hand, suitable content has a positive influence on the perceived ease of use since it minimizes the information density on the screen, makes it easier to read and/or follow, and reduces cognitive load. On another hand, suitable content favors an easier and better understanding of the learning content thus having a positive influence on the perceived usefulness while a lack of content adaptation makes it difficult for students to keep their attention and concentrate on the learning task (Lamanauskas & Makaraskaite-Petkevitciene, 2021).

H4 Content adaptation has a positive influence on the perceived ease of use (CA→ PEU)
H5 Content adaptation has a positive influence on the perceived usefulness (CA→ PU)

Davis (1989) defined the perceived ease of use (PEU) as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989). It is expected that students will find an easy-to-use platform more useful for learning (Lee et al., 2005; Pal & Patra, 2020). It is also expected that the perceived ease of use will make learning more pleasant for students (Lee et al., 2005) and will make them more interested to use the learning platform (Yi & Hwang, 2003).

H6 Perceived ease of use has a positive influence on the perceived usefulness (PEU→ PU)
H7 Perceived ease of use has a positive influence on the attitude toward use (PEU→ AT)
H8 Perceived ease of use has a positive influence on the intention to use (PEU→ BI)

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Perceived usefulness has been defined by Davis as a belief that using a given technology will improve job performance (Davis, 1989). It is supposed that the perceived usefulness will positively influence the attitude toward using the system and the intention to use it (Lee et al., 2005; Lazar et al., 2020; Raza et. al, 2020; Baber, 2021). In turn, a positive attitude will influence the intention to use (Azjen, 1991; Davis, 1989).

H9 Perceived usefulness has a positive influence on attitude (PU → AT)
H10 Perceived usefulness has a positive influence on the intention to use (PU → BI)
H11 Attitude has a positive influence on the intention to use (AT → BI)

Research Methodology

General Background

The students enrolled in the university study programs benefited from the support of *Moodle* as a *course management system* (CMS). In this respect, the platform provided management and contact with all students and offered documentation for each discipline and communication facility at the individual/group level. In addition, the platform offered possibilities for online evaluation and is also interfaced with the *Microsoft Teams* application, which allows student-teacher interaction, online development of courses, seminars, and application classes, as well as organization of face-to-face evaluation (Bîzoi et al., 2017; Santi et al., 2020).

Instrument and Procedure

The instrument designed for evaluation has been developed considering previous research related to online learning during the pandemic (Lamanauskas et al., 2019; Pribeanu et al., 2020), and also by adapting existing scales in the TAM literature (Azjen, 1991; Davis, 1989; Davis et al., 1992; Lee et al., 2005).

The model was tested with Lisrel 9.3 for Windows (Mels, 2006), using the maximum likelihood estimation method. Before model testing, an exploratory factor analysis (maximum likelihood with varimax rotation) has been carried out that revealed several items with poor factor loading. Therefore, these items have been eliminated from the scale. Table 1 presents the constructs and the remaining items.

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Table 1
Measures

EA	**Ease of access**
EA1	I can access the online learning platform anytime from anywhere
EA2	Logging on to the online platform is easy
FC	**Facilitating conditions**
FC1	I have the resources to use the online learning platform
FC2	I have the knowledge to use the online learning platform
CA	**Content adaptation**
CA1	The content is adapted to online presentation
CA2	Students' assignments received are adapted for the online learning platform
PEU	**Perceived ease of use**
PEU1	Using the online learning platform is simple
PEU2	Learning how to use the online learning platform is easy
PEU3	My interaction with the online platform is clear and understandable
PU	**Perceived usefulness**
UU1	Using the online platform will improve my learning performance
UU2	Using the online platform makes it easier for me to study
UU3	Using the online platform makes learning more productive
AT	**Attitude**
AT1	I believe that using the online learning platform is interesting
AT2	I believe that using the online learning platform is pleasant
BI	**Behavioral intention to use**
BI1	I intend to use the online learning platform in the future
BI2	I will use the online learning platform if it is available after the pandemic

Convergent validity has been assessed according to the recommended thresholds from the literature (Fornell, & Larcker, 1981; Hair et al., 2010): loadings magnitude greater than 0.5, composite reliability (CR) greater than 0.70, and average variance extracted (AVE) greater than 0.5. Discriminant validity has been assessed through the squared correlation test (Fornell & Larcker, 1981).

The model fit with the data has been assessed by using the following goodness of fit indices (Hair et al., 2006): chi-square (χ^2), degrees of freedom (*df*), χ^2/df, comparative fit index (CFI), the goodness of fit index (GFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR).

Sample

The data has been collected during the university year 2021-2022. The instrument designed for evaluation purposes has been applied to third-year students enrolled in the psycho-pedagogical study module (initial training for future teachers) at Valahia University in Targoviste, Romania.

A total of 161 undergraduate students answered the questionnaire. The data has been analyzed for incomplete data and 5 cases have been eliminated thus resulting in a working sample of 156 cases (46 men / 110 women). As regards the background, students were coming

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from several faculties, covering on a large scale the palette of Valahia University specializations: education (50), physical education and kineto-therapy (27), music (20), sciences (17), engineering (12), economics (11), theology (10), and other (9).

Research Results

Model Testing Results

The model has been analyzed for unidimensionality, the internal consistency of the scale (Cronbach's alpha), and convergent validity. The descriptive statistics and the standardized factor loadings are presented in Table 2. The mean values for the ease of access and perceived ease of use are high which suggests that university students are familiar with the online learning platform. All item loadings are over 0.70, thus proving unidimensionality.

Table 2
Descriptive and Item Loadings (N=156)

Factor	Item	*M*	*SD*	Loading
EA	EA1	4.38	1.07	.75
	EA2	4.38	0.99	.96
FC	FC1	4.40	1.02	.87
	FC2	4.32	1.04	.98
CA	CA1	3.97	1.08	.84
	CA2	3.97	1.17	.73
PEU	PEU1	4.27	1.03	.94
	PEU2	4.22	1.07	.93
	PEU3	4.17	1.06	.93
PU	PU1	3.64	1.21	.90
	PU2	3.65	1.30	.93
	PU3	3.49	1.30	.92
AT	AT1	3.92	1.12	.93
	AT2	3.76	1.29	.92
BI	BI1	3.60	1.42	.93
	BI2	3.49	1.52	.91

The scale reliability, convergent, and discriminant validity are presented in Table 3. The Cronbach's alpha is varying from .756 to .953, thus showing good reliability of the scales.

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Table 3
Scale Reliability, Convergent, and Discriminant Validity (N=156)

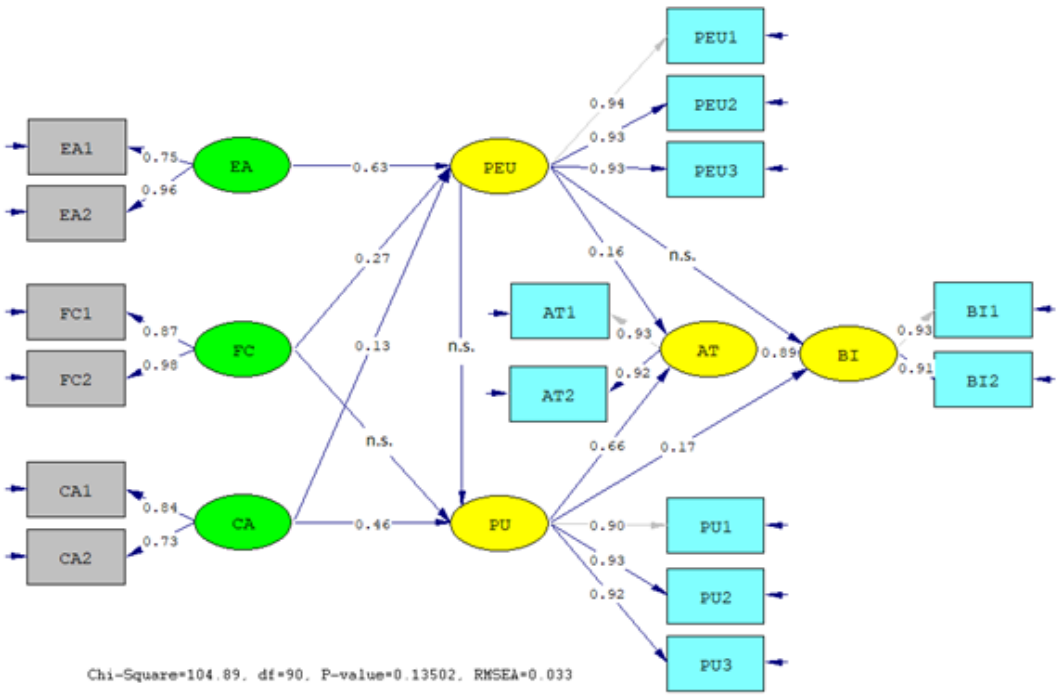
	Alpha	CR	AVE	CA	EA	FC	PEU	PU	AT	BI
CA	0.756	0.757	0.609	**0.782**						
EA	0.836	0.850	0.742	0.346	**0.861**					
FC	0.918	0.953	0.859	0.514	0.623	**0.927**				
PEU	0.952	0.951	0.865	0.483	0.845	0.730	**0.933**			
PU	0.939	0.938	0.834	0.600	0.335	0.477	0.437	**0.913**		
AT	0.943	0.949	0.903	0.455	0.336	0.415	0.456	0.735	**0.950**	
BI	0.916	0.917	0.847	0.351	0.225	0.377	0.360	0.768	0.955	**0.934**

Note: The bold diagonal numbers represent the square root of AVE

The composite reliability (CR) and average variance extracted (AVE) are over the cut-off values of 0.7, respectively 0.5 (Fornell & Larcker, 1981) thus proving the convergent validity. The discriminant validity is acceptable, since (with two small exceptions) the correlation between factors is smaller than the square root of AVE.

The model fit with the data is excellent, as shown by the goodness of fit (GOF) indices: nonsignificant χ^2, df=90, χ^2/df=1.165, CFI=0.994, GFI=0.922, RMSEA=0.032, SRMR=0.0293. The model estimation results are presented in Figure 2.

Figure 2
Model Estimation Results (N = 156)



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The paths from FC to PU, from PEU to PU, and from PEU to BI are not significant so the hypotheses H3, H6, and H9 are not supported. This suggests that the ease of access and ease of use are taken for granted in an online learning context and therefore not relevant for the perceived usefulness. In the same way, it is explained the nonsignificant influence of PEU on the intention to use.

The hypotheses H1, H2, H4, H5, and H7 are supported since the paths from EA to PEU ($\beta = 0.63$, $p < .001$), FC to PEU ($\beta = 0.27$, $p < .001$), CA to PEU ($\beta = 0.50$, $p < .001$), CA to PU ($\beta=0.46$, $p<0.001$), and PEU to AT ($\beta = 0.16$, $p = .018$) are significant. This shows that content adaptation is a relevant variable for both perceived ease of use and perceived usefulness.

PU has a significant positive influence on AT ($\beta = 0.66$, $p < .001$) and BI ($\beta = 0.17$, $p = .010$) so hypotheses H8 and H10 are supported. The influence of AT on BI is also significant ($\beta = 0.89$, $p < .001$) so hypothesis H11 is also supported.

The model explains 79.2% variance in the perceived ease of use (PEU), 39.2% variance in the perceived usefulness (PU), 56.0% in the attitude (AT), and 93.1% variance in the intention to use.

Discussion

This exploratory research contributes with an empirically validated model that explains the contribution of the perceived usefulness and attitude to the acceptance of an online teaching and learning platform by university students during the pandemic. The model explains a lot of variance in the continuance intention towards online learning and brings insights into the role played by the three external variables: Ease of access, facilitating conditions, and content adaptation.

The findings are similar with the results reported by Pal and Patra (2020) and Mo et al. (2021) as regards the contribution of the main predictors of behavioral intention. The content adaptation is quasi-similar to the characteristics of the technology in the model of Pal and Patra (2020). The difference as regards the variance explained by the model in the behavioral intention (much higher in this study) is due to the different contributions of each external variable.

The ease of access had a significant influence on the perceived ease of use and an indirect influence on the attitude and continuance intention. The ease of access, at any time and from anywhere, to educational activities and resources is critical for the success of online learning and has particular importance under the conditions of exclusive online education during the pandemic. Although the facilitating conditions did not have a significant direct influence on the perceived usefulness, they proved to be a significant antecedent of the perceived ease of use.

Content adaptation had a significant influence on both the perceived ease of use and perceived usefulness. Adapting the content to the specifics of delivery in the online environment is an essential condition for the success of the didactic process, unanimously recognized by teachers. According to Debarger et al. (2017), curriculum adaptation involves an intentional effort to bring existing materials into line with new visions by adding, adapting, or transforming materials. Technology-mediated online teaching-learning involves more than transferring content from teacher to students or replicating it as in a face-to-face model, according to recommendations proposed by the *Columbia Center for Teaching and Learning* (https://ctl.columbia.edu/resources-and-technology/teaching-with-technology/teaching-online/adapting-your-course/). Since online learning requires a high degree of independence and the assumption, commitment on the part of the student, the contents must be clear, understandable, attractive, creative, useful, relevant, organized in a logical sequence. Games, ice breakers, digital content (audio, video, images, articles, web links), structured discussions, reflection assignments (https://blog.alo7.com/how-to-adapt-content-for-the-online-classroom/), as well as various educational applications and resources can be used as open sources. Content that makes sense

to the student, that stimulates their interest, becomes content relevant to their cognitive needs and it is perceived as usefulness.

The influence of attitude is very high which is explained by the specific learning conditions during the pandemic. There are several perceived benefits of online learning, such as the commodity of ubiquitous access and learning from home, flexibility in learning, time and money savings (especially for nonresidential students), and safety (Akuratiya & Meddage, 2020; Baczek et al., 2021; Manea et al., 2021). These benefits make students feel comfortable using the online learning platform. Distance education also has disadvantages, such as concentration difficulties, frustration, lack of motivation, and even stress (Gorghiu et al., 2021; Lamanauskas & Makarskaite-Petkeviciene, 2021) which could be compensated if online learning is interesting and pleasant, catch students' attention and keep them engaged with the online courses and seminars. This is consistent with the relatively high perceptions of attitude items (3.92 and 3.76).

The overall perception of the online platform is positive which is explained by the familiarity of students with the LMS which has been currently used before the pandemic for downloading learning content and assignments and uploading homework. It is also explained by the fact that the participants are enrolled in a psycho-pedagogical module which may favor a better understanding of the benefits of online learning.

This study has multiple implications for academic staff, as online teaching-learning will continue post-pandemic, alternating or complementing the traditional format. The analyzed variables show that learning becomes relevant for the student in the online environment when conditions are met such as content adaptation, use of appropriate LMS, and perceived online learning usefulness has a positive impact on learners' attitude toward e-learning (also confirmed by Um, 2021).

Also, considering the online learning situations, the students have more responsibility for achieving academic success than in the context of conventional face-to-face classes. Thus, a proactive, self-managing attitude and behavior in the learning process can stimulate intrinsic motivation for one's training.

The three rejected hypotheses suggest reconsidering the TAM-based conceptualization in future studies. It seems that ease of use is less and less relevant for the intention to use an e-learning platform which explains why several studies did not test a direct path from PEU to BI. On another hand, exploring antecedents of perceived usefulness is a promising research direction.

As this represents an exploratory study, there are several inherent limitations. The first limitation is related to the small number of items of five constructs. In the near future, the scale will be revised accordingly. The second limitation is related to the sample size, which is relatively small. Also, the participants are from only one university. Another limitation is related to the external variables: although the existing research shows a plethora of antecedents of the main drivers of the intention to use, this study included only three. Future work will investigate other external variables that are relevant to the context of use and the purpose of the research.

Conclusions

Understanding the main factors that contribute to the integration of e-learning systems represents a pre-condition for making the best decisions in education. In this respect, the collected results open new perspectives on the factors that can contribute to the achievement of an effective didactic process in the online environment. It is imperative that teachers know and create relevant contexts for students to perform both in the classroom environment, but also online. In an education system that values the paradigm of student-centered education, the concern for optimizing the educational process must be continuous.

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The integration of modern technological means in education, the use of platforms to deliver learning content, and unlimited access in time and space to valuable educational resources, are not the exclusive result of the pandemic. In an academic environment, all of those have existed and worked before. The merit of the pandemic is to open unimaginable opportunities, accelerate transformative processes in education, and open minds and visions.

The high influence of the attitude on the continuance intention shows that university students got used to learning from home and suggests extending the model in future research by including specific antecedents of the main determinants.

Declaration of Interest

The authors declare no competing interest.

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