Factors Influencing Satisfaction and Future Intention to Use E-Learning at the University Level

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Abstract

With the growing interest in e-education, particularly in the context of the pandemic, more scientific studies have been undertaken recently to analyze and identify factors influencing e-learning acceptance. Indeed, e-learning acceptance depends on many different factors, but no consensus has been reached on factors that contribute most to the acceptance of e-learning solutions. Consequently, this article ascertains the factors and their relationships behind the satisfaction and the future intention to use e-learning among Polish university students. From among the factors analyzed in the literature, the author examined the relationship between computer self-efficacy (CSE), facilitating conditions (FC), satisfaction (S), and the future intention to use e-learning (FI). Data were gathered using structured questionnaires and computer-assisted web interviewing (CAWI). Students at Bialystok University of Technology (Poland) were sent an electronic link to the questionnaires using the internal e-mail system. A total of 803 forms were returned fully filled out. Aiming to ascertain the extent to which measured variables describe the number of constructs, the author conducted a Confirmatory Factor Analysis (CFA). The Generalized Least Squares (GLS) estimator was used to calculate the values of model parameters.

The results confirmed that higher computer self-efficacy and better facilitation conditions result in greater user satisfaction with e-learning. However, facilitating conditions impact user satisfaction more than computer self-efficacy construct variables. Based on the findings, user satisfaction is a strong antecedent of the future intention to use e-learning.

Keywords: e-learning; consumer satisfaction; future intension to use; computer self-efficacy; university students

Paper type: Research Article

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Introduction

Dynamically developing ICT significantly changed every aspect of social life, including education. E-learning erases time and space limitations, thus allowing one to meet the increasing needs of contemporary education. The outbreak and rapid spread of COVID-19 exacerbated the need to focus on directing human activities towards ICT (Fritsch et al., 2021). In many countries, limitations faced by educational institutions functioned as a motivator in boosting the digitalization of education. Based on (UNESCO, 2020), this decision affected 72.4% of learners in 177 countries. The proper functioning and effectiveness of distance learning is a challenge for educational institutions, which requires more complex and often different measures compared to traditional, stationary education. Despite the effort and commitment of educational institutions to promote new ICTs, the successful implementation of e-learning tools mainly depends on the final users, i.e., their level of acceptance and satisfaction (Arteaga Sánchez, Duarte Hueros, 2010; Recker, 2016).

The recent growing interest in e-education, particularly in the context of the pandemic, is reflected in more studies undertaken to analyze and identify factors determining the adoption of e-learning tools. It seems that one essential element is the identification of critical success factors at all stages of the e-learning technology adoption process (Yi, Hwang, 2003; Emelyanova, Voronina, 2014).

Despite many efforts to promote the use of e-learning technologies, users determine the scope of solutions or their complete rejection (Recker, 2016). Indeed, e-learning acceptance depends on many different factors, but no consensus has been reached on the factors that contribute most to the acceptance of e-learning solutions (Weerathunga et al., 2021). Thus, a study of the factors that motivate and engage the recipients of e-learning solutions remains an area of scientific interest (Jung, Lee, 2018; Emelyanova, Voronina, 2014).

Consequently, this article ascertains the factors and their relationships behind the satisfaction and future intention to use e-learning among Polish university students. From among the factors analyzed in the literature, the author examined the relationship between computer self-efficacy (CSE), facilitating conditions (FC), satisfaction (S), and the future intention to use e-learning (FI).

The studied variables for the model determining the future intention to use e-learning were selected based on a literature review into technology adaptation models used for e-learning. The evaluation focused on the influence of two variables, i.e., facilitating conditions (FC) and computer self-efficacy (CSE), on user satisfaction with e-learning tools and the influence of satisfaction (S) on the future intention to use (FI) e-learning at the university level. The elaborated model allowed the author to consider, on the one hand, the internal factor that reflects user self-efficacy with IT tools and, on the other hand, the external factor of user-support by administration and IT staff.

Literature Review

E-learning (electronic learning) refers to the use of digital tools to support the learning process (OECD, 2020). The adaptation of any new technological solution, including e-learning, is a multifaceted problem that, apart from technological aspects, must also consider economic, social, ethical, or legal factors.

During the pandemic, the usual teaching process, its approaches, tools, and methods for the verification of effects had to change quickly, although many teachers and students were unprepared for such an unexpected situation. E-learning research demand is also driven by the anticipated growth in the global share of this form of studies. Based on global forecasts, the e-learning market will exceed USD 243 billion by 2022 (Duffin, 2020).

The diversity of research on e-learning stems from a wide range of stakeholders involved in the e-learning process that comprises planning, teaching, technology supply, and the improvement of quality and evaluation. The stakeholders include students, employees, teachers, educational and accreditation institutions, educational content providers, responsible ministries, e-learning technology providers, teacher associations, and student organizations.

Research on the application of e-learning technologies is particularly concerned with the perceived benefits for users and providers of educational services (Kimiloglu et al., 2017; Milićević et al., 2021; Mathivanan et al., 2021; OECD, 2020; Al-Azawei et al., 2017; Chen, Tseng, 2012; Ozdamli, Uzunboylu, 2014), the weaknesses of and barriers to e-learning (Olum et al., 2020; Yang et al., 2018; Buckley, 2003), and the analysis of factors determining the wider use and success factors of an e-learning application (Kurfal et al., 2017; Dečman, 2015; Hsiao, Yang, 2011).

E-learning systems also interest researchers in the context of technology acceptance models used to explain elements that determine the current and future extent of use of technological solutions. Such models have also been used for e-learning technologies, e.g., the D&M IS Success Model — DeLone–McLean Information System Success Model, UTAUT — Unified Theory of Acceptance and Use of Technology, and TAM — the Technology Acceptance Model (Weerathunga et al., 2021; Ejdys, 2018). The technology acceptance concept model developed by Fred Davis (Davis, 1985) served as the prototype for all the models.

Dedicated technology acceptance models were also developed considering the specifics of e-learning solutions, e.g., the E-learning Acceptance Model (Islam, Selim, 2006), the user-experience UX-based e-learning acceptance framework (Zardari et al., 2021), or the EESS model — Evaluating E-learning Systems Success

(Al-Fraihat et al., 2020). Based on the original TAM, researchers have expanded their models to include new constructs and examined their interrelationships (Bharadwaj, Deka, 2021). The constructs considered by other authors in e-learning technology acceptance models are shown in Table 1.

In nearly all analyzed e-learning TAMs, their authors considered the constructs included in the original TAM model and its modifications, namely, the perceived ease of use, the perceived usability (functionality), attitudes toward using the technology, behavioral intentions, and the extent of the system's actual use. Many researchers have developed models that include constructs reflecting hedonic characteristics of e-learning tools, such as enjoyment, pleasure, or fun. Other important model elements were constructs expressing characteristics in the field of e-learning, such as self-efficacy, fear, and concerns about computers as well asrequired user effort. In recent studies conducted during the COVID-19 pandemic, new variables have emerged in TAMs, such as the fear of vaccinations and concerns about facilitating the spread of COVID.

The literature review conducted on the application of the UTAUT model for studying the acceptance of e-learning solutions allows us to conclude that most researchers consider six basic constructs in their original models, i.e., the expected performance, the expected effort, social image, support conditions, behavioral intentions, and the system's use. Given the specific areas of interest of a particular researcher, the initial model is modified by including additional constructs. In the era of the pandemic of 2019–2020, an increase in interest can be observed among authors regarding the variables relating to social isolation or fear of contracting COVID-19 on the acceptance of e-learning solutions. Similar to TAMs, UTAUT model variables frequently reflect teacher (instructor) characteristics and the quality of the curriculum content, teaching materials, or the way the classes are conducted.

The variables added to the initial D&M IS Success Model were user experience with the analyzed technology and experience of using the Internet. An interesting new construct added to the D&M IS Success Model refers to learner's character attributes, i.e., student grit, defined as the constancy of interest, persistence, and passion for achieving long-term goals (Aparicio et al., 2017).

Most studies deal with the use of e-learning solutions from the perspective of two user groups — teachers/instructors/trainers of training/courses and the participants in the e-learning process (students, pupils, employees). However, most studies refer to the second group of e-learning system users. Such research aims to establish success factors for the implementation of e-learning technologies; analyze the relationships between the e-learning systems' quality and their use and user satisfaction; measure the effect of individual characteristics and the skills of teachers and students on other elements considered in models addressing the acceptance of e-learning solutions.

The conducted literature studies allowed for distinguishing between two main categories of factors determining the satisfaction with e-learning tools, i.e., internal factors related to individual attributes, such as user competences, skills, motivation, and attitudes, and external factors resulting from general user support and assistance. Computer self-efficacy seems to be the most important among the internal factors, reflecting the user-perceived level to perform a certain task using a computer. According to the literature review, computer self-efficacy and facilitating conditions belong to the most used external variables in TAM applications (Jimenez et al., 2021). Computer self-efficacy reflecting individual characteristics was the most widely employed external factor of technology acceptance models (Salloum et al., 2019; Al-Emran et al., 2018; Abdullah et al., 2016; Williams et al., 2015). Self-efficacy is one of the factors that determine the level of student motivation and commitment towards using e-learning (Baber, 2021). During the COVID-19 pandemic, self-efficiency could play a protective role and may create a more flexible atmosphere that encourages technology acceptance (Al-Maroof et al., 2021). The areas for future research include the need to study the variable "support for e-learning" and its relationship to self-efficacy (Alamri et al., 2020).

The variable "facilitating conditions" is another important external factor, which reflects user satisfaction with the technology/system that the existing organizational and technical infrastructure provides in support of the technology to overcome use-related barriers. The COVID-19 situation forced the Bialystok University of Technology (Poland) to make an urgent transition to remote learning. In the early stages of remote learning, the extent of support from the university was a determining factor for user satisfaction with e-learning.

Research Model and Hypotheses

The literature review resulted in four variables that were included in the proposed model: computer self-efficacy (CSE), facilitating conditions (FC), satisfaction (S), and the future intention to use (FI).

Self-efficacy is the confidence in one's ability to perform certain learning tasks using an e-learning system (Pituch, Lee, 2006) or reflect one's beliefs about one's ability to use computers effectively (Compeau, Higgins, 1995). Otherwise, computer self-efficacy refers to a person's assessment of their capacity to use a PC and the trust in their own ability to handle related challenges (Venkatesh, Davis, 1996).

Facilitating conditions refer to the degree to which the user of the technology/system believes that the existing organizational and technical infrastructure provides

support for the technology to remove its use-related barriers. Otherwise, facilitating conditions concern the technical assistance and available resources and infrastructure that facilitate the use of a technology (Venkatesh et al., 2003).

User satisfaction defines the degree of user contentment with his or her ability to use the system. Sanchez-Franco defined satisfaction as the level of user perception about their necessities, objectives, and expectations related to the system (Sanchez-Franco, 2009).

The future intention to use refers to the predicted decision to use a system in the future in advance of doing so (Petter, McLean, 2009). In the proposed model, the future use of e-learning refers to the planned extended use of e-learning and the encouragement of its use by others.

The object of interest was the relationship between the indicated variables.

Computer self-efficacy vs. satisfaction

Self-efficacy is the ability to use an e-learning system while carrying out specific learning tasks (Pituch, Lee, 2006) or user-perceived trust in their own ability to use a PC effectively (Compeau, Higgins, 1995).. Low self-efficacy levels can result in a user's inability to handle problems, especially when systems are complex, and discourage users from continued use of the device. Many previous studies confirmed that computer self-efficacy significantly affected the student's intention to use an e-learning system (Zardari et al., 2021; Ahmad et al., 2020; Ameen et al., 2019). Based on the findings by Al-Fraihat et al. (2020), computer self-efficacy was one of the primary determinants of student learning satisfaction. Based on the authors, the student experience and grasp of the system and the ability to use it to perform tasks (self-efficacy) can promote positive attitudes toward the e-learning system and overall satisfaction (Al-Fraihat et al., 2020). According to Hsiao and Yang (2011), if e-learning systems are recognized as task-related information systems, self-efficacy is considered to have stronger positive effects on the use (Hsiao, Yang, 2011). Based on Alenezi and Karim (2010), computer self-efficacy can promote a high level of use of an e-learning system among students. An increase in the level of computer self-efficacy leads to the improvement of student acceptance of learning systems (Mouakket, Bettayeb, 2015).

Thus, H1 is formulated as follows:

Hypothesis 1: Computer self-efficacy (CSE) has a positive impact upon satisfaction with e-learning (S)

Facilitating conditions vs. satisfaction

Technology acceptance models refer to this variable differently, but the meaning is the same. The UTAUT model has the variable "support conditions", the D&M IS Success Model uses a service quality variable. Service quality means effective support provided to system users (Wang, Wang, 2009).

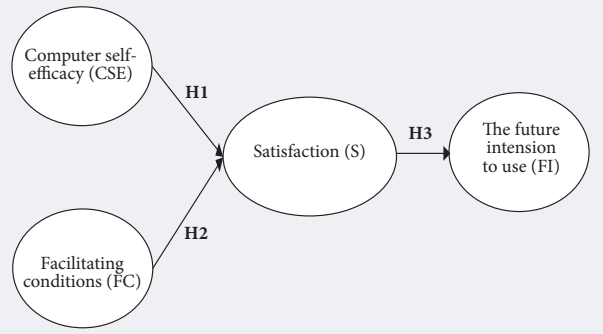
According to Passmore (2000), the satisfaction and progress of students in virtual learning depend on technology and support facilities and infrastructure provided by their institutions (Passmore, 2000). Venkatesh et al. (2003) also argued that the facilitating conditions could reflect user perception and behavior, and the individual use of a system is largely determined by facilitating conditions (Venkatesh et al., 2012; Karaali et al., 2011). Also, Al-Fraihat et al. (2020) confirmed that service quality reflecting facilitating conditions has a significant positive impact on student satisfaction with e-learning tools. Therefore, the following hypothesis was formulated:

Hypothesis 2: Facilitating conditions (FC) have a positive impact upon satisfaction with e-learning (S)

Satisfaction vs. the future intention to use

Technology users can express their level of satisfaction resulting from the quality of information and the system (Gulc, 2020, 2021). User satisfaction with e-learning is often used to measure learners' attitudes (Wu et al., 2010). User satisfaction in the D&M IS Success Model is a key determinant in using technology systems (DeLone, McLean, 2003). Many authors agreed that satisfaction is a key factor for the intention to use e-learning (Aldammagh et al., 2021; Ejdys, Gulc, 2020; Arain et al., 2019; Chang, 2013; Hassanzadeh et al., 2012). Satisfaction as the key antecedent for predicting students' intention to use e-learning is confirmed by Rajeh et al. (2021) and Yekefallah et al. (2021). In the model developed by Kim et al. (2010), measurement variables reflecting user satisfaction were included within the attitude construct (e.g., "All things considered, using the IT system is a pleasant idea, I am satisfied with using the IT system"). The results of the study confirmed that variables related to user satisfaction are

Figure 1. **Theoretical model**



Source: author.

Table 1. **Constructs Included in the e-Learning Technology Acceptance Model – Literature Review**

Authors	Basic model	E-learning tools	Research sample	Country	Theoretical constructs
Arteaga Sánchez, Duarte Hueros, 2010	TAM	Moodle	226	Spain	Perceived usefulness, perceived ease of use, perceived self-efficacy, technical support, attitude, and the use of the system
Al-Maroof et al., 2021	TAM	M-learning	630	United Arab Emirates	Perceived routine use, perceived usefulness, perceived ease of use, perceived enjoyment, the self-efficacy theory, perceived critical mass, fear of vaccination, post-acceptance of the e-learning platform
Weerathunga et al., 2021	TAM	E-learning	1039	Sri Lanka	Subjective norm, relevance, self-efficacy, computer anxiety, experience, perceived usefulness, facilitating the precipitating events of COVID, conditions, perceived ease of use, attitude towards e-learning, behavioral intention to use e-learning, actual use of e-learning
Abdullah at el., 2016	TAM	E-portfolios	242	UK	Perceived usefulness, perceived ease of use, self-efficacy, experience, enjoyment, computer anxiety, subjective norm, behavioral intention to use
Ibrahim et al., 2017	TAM	Blackboard e-learning systems	95	Malaysia	Computer self-efficacy, instructor characteristics, course design, perceived ease of use, perceived usefulness, the future intention to use
Al-Azawei et al., 2017	TAM	Blended e-learning	210	Iraq	Perceived satisfaction, e-learning self-efficacy, learning styles, perceived usefulness, perceived ease of use, intention to use
Cheng, 2019	TAM	WIKI for group work	174	Hong Kong	Subjective norms, self-esteem, perceived behavioral control, perceived ease of use, perceived usefulness, attitude towards using, intention to use behavior
Raza et al., 2021	UTAUT	e-learning	516	Pakistan	Expected performance and effort, social image, facilitating conditions, social isolation (COVID), behavioral intentions, fear of COVID
Mohan et al., 2020	UTAUT	MOOC	412	India	Expected performance and effort, social image, support conditions, hedonic motivation, habits, course content, behavioral intentions
Odegbesan et al., 2019	UTAUT	e-learning	574	Nigeria	Expected performance and effort, social image, support conditions, behavioral intentions, system use, experience
Almaiah, Alyoussef, 2019	UTAUT	e-learning	507	Saudi Arabia	Expected performance and effort, social image, support conditions, behavioral intentions, system use, teacher characteristics, course support tools (chat, multimedia, forums, animations), course evaluation tools, course design (structure, content)
Fianu et al., 2020	UTAUT	MOOC	204	Ghana	Expected performance and effort, social, support conditions, self-efficacy in computer use, quality of the system, quality of teaching
Al-Azawei, 2019	D&M IS	Facebook, Moodle	143	Iraq	Quality of information and system, system use, user satisfaction, impact on users and on the organization, experience with the technology, experience with the Internet
Yakubu, Dasuki, 2018	D&M IS	e-learning CANVAS system	366	Nigeria	Quality of the system, information and services, user satisfaction, behavioral intention to use the system, current level of use of the system
Mohammadi, 2015b	D&M IS	e-learning	420	Iran	Quality of education, services, technical system and content and information, perceived ease of use, perceived functionality, user satisfaction, intention to use, the current scope of use
Al-Fraihat et al., 2020	D&M IS	Moodle	563	Great Britain	Quality of the technical system, information, services, education and support system, quality of participants and teachers, perceived satisfaction, perceived functionality, use of the system, benefits
Aparicio et al., 2017	D&M IS	e-learning	383	Portugal	Quality of information, system and services, user satisfaction levels, system utilization system, impact on the individual, fortitude participants

Source: author.

Table 2. **Summary of the Literature on Variables Included in the Theoretical Model**

Concept (variable)	Literature
Computer Self-Efficacy (CSE)	Arteaga Sánchez, Duarte Hueros, 2010; Agudo-Peregrina et al., 2014; Mohammadi, 2015a; Abdullah et al., 2016; Ibrahim et al., 2017; Al-Azawei et al., 2017; Muyesser Eraslan Yalcin, Birgul Kutlu, 2019
Facilitating conditions (FC)	Mohammadi, 2015a; Asher Irfan Saroia, Shang Gao, 2019; Arteaga Sánchez, Duarte Hueros, 2010; Karaali et al., 2011; Agudo-Peregrina et al., 2014; Dečman, 2015
Satisfaction (S)	Mohammadi, 2015a, 2015b; Abdullah et al., 2016; Salloum et al., 2019
Future intention to use (FI)	Karaali et al., 2011; Ibrahim et al., 2017; Salloum et al., 2019; Venkatesh et al., 2003

Source: author.

statistically significant for the users' future intention to use the system (Kim et al., 2010). This led to hypothesis H3:

Hypothesis 3: *User satisfaction (S) has a positive impact upon the future intention to use e-learning (FI)*

The theoretical model reflecting the links between all the variables is presented in Figure 1, while the summary of the sources that describe each variable is reflected at Table 1.

Research Method

Data

Data were collected using structured questionnaires and computer-assisted web interviewing (CAWI). In February–March 2021, students at Bialystok University of Technology (Poland) were sent an electronic link to the questionnaires using the internal e-mail system. The form was distributed to 5,779 potential respondents. The return rate was 13.9% (803 completed

Table 3. **Constructs and Items — Results of the Confirmatory Factor Analysis**

№	Constructs and items	Standardized regression weights before and after CFA		Variable symbol
		before	after	
	Computer Self-Efficacy (CSE)			
1	I can sort out any problems arising during the use of e-learning tools by myself	0.799		Removed
2	I can use e-learning tools without the support of the third parties	0.841	0.810	CSE1
3	I can use e-learning tools even if I do not have a user guide	0.920	0.959	CSE2
4	I can use e-learning tools even if I have not used them before	0.877	0.878	CSE3
5	I have sufficient technical resources to use e-learning tools	0.668		Removed
	Facilitating conditions (FC)			
6	During the e-learning process, I can rely on technical support from the University	0.843	0.856	FC1
7	During the e-learning process, I can rely on technical support from my colleagues	0.393		Removed
8	In the case of any problems concerning the functioning of e-learning tools, I can count on feedback	0.782	0.808	FC2
9	The University provides professional assistance to users of e-learning tools through clear and understandable user instructions and guides available on the website	0.829	0.834	FC3
	Satisfaction (S)			
10	I enjoy using e-learning tools	0.897	0.895	S1
11	The use of e-learning tools is more satisfying than traditional forms of learning	0.916		Removed
12	The use of e-learning tools makes me more creative	0.889	0.893	S2
13	The use of e-learning tools gives me self-confidence	0.859	0.843	S3
14	The use of e-learning tools gives me the feeling that I am competent and able to perform important activities	0.911	0.896	S4
	Future intention to use (FI)			
15	I intend to use e-learning to a greater extent	0.872	0.888	PI1
16	I intend to encourage others to use e-learning	0.911	0.922	PI2
17	Thanks to e-learning, I am more open to new technological solutions	0.846		Removed
18	I prefer the traditional way of teaching in direct contact with the teacher	0.694		Removed

* Variable removed due to absolute value of covariance for standardized residuals being greater than 2 or regression coefficient less than 0.7

Source: author.

Table 4. **CFA Model Fit Summary**

Indicator	Model fit	
	Before removing reduction	After removing reduction
NPAR	42	31
CMIN Chi-square	586.498	145.044
Degrees of freedom (DF)	129	47
P	0.000	0.000
CMIN/DF	4.546	3.086
RMR	0.305	0.134
GFI	0.919	0.970
AGFI	0.892	0.950
PGFI	0.693	0.584
NFI Delta1	0.601	0.878
RFI rho1	0.527	0.829
IFI Delta2	0.659	0.914
TLI rho2	0.588	0.877
CFI	0.652	0.913
RMSEA	0.066	0.051
LO 90	0.061	0.042
HI 90	0.072	0.061
PCLOSE	0.000	0.414
HOELTER 05	215	354
HOELTER 01	232	401

Source: author.

forms); 463 (42.8%) of respondents were women, and 459 (57.2%) were men.

Measures

Variables included in the theoretical model (computer self-efficacy, facilitating conditions, satisfaction, and the future intention to use) are not directly observable. Therefore, several observable variables were used for their measurement. Based on the literature review, 18 items were initially considered: five items were identified for measuring computer self-efficacy, four — facilitating conditions, five — satisfaction, and four — the future intention to use. A seven-point Likert scale (with 1 as "totally disagree" and 7 — "totally agree") was applied in the measurement of the constructs.

Afterward, the fit of the measured variables with the number of constructs was determined with the help of Confirmatory Factor Analysis (CFA). As it is less sensitive to assumptions concerning normal distribution, the Generalized Least Squares (GLS) estimator was used to determine values of model parameters. Observable variables, for which the value of regression coefficient was lower than 0.7, and absolute values of Standardized Residual Covariances were greater than 2, were removed from the original set (Ejdys, Halicka, 2018). Eventually, 12 items were used for further analysis. The list of variables resulting from the confirmatory factor analysis is presented in Table 2. Table 3 gives the model fit summary.

Cronbach's alpha coefficients were used to verify the consistency of the items in the scale. It is assumed that Cronbach's alpha above 0.7 is acceptable, and less than 0.7 suggests that the item of the scale needs to be revised. For convergence validity, two indicators were used, i.e., Average Variance Extracted (AVE) (Fornell, Larcker, 1981) and Composite Reliability (CR). AVE above 0.5 shows the better capacity of the measurement to indicate characteristics of each model's research variables. CR above 0.7 indicates a higher inherent consistency of the measurement (Hair et al., 2013).

The scale reliability reflected by Cronbach's alpha ranged from 0.873 to 0.934. Composite Reliability (CR) and Average Variance Extracted (AVE) were also higher than expected, which confirmed the convergence validity of scale. Table 4 provides mean, factor loading, Cronbach's alpha, CR, and AVE for the items.

The removal of selected variables improved the fit measures of the CFA model (Table 3). Descriptive statistics, Cronbach's alpha, Average Variance Extracted, and Composite Reliability values are represented in Table 4

Results

The measurement model was evaluated for appropriateness by using the chi-square statistics. The $\chi 2$ value was statistically significant ($\chi 2=136{,}262$, $p<0.001$), indicating a good model fit to the data. Also, ratio chi-square divided by the degrees of freedom ($\chi 2/df$) was used as a measure of model fit, where values of 3 or less indicate a good model fit. Ratio $\chi 2/df$ achieved the value of 2.839, which proved a good model fit as well. Several other disparate indices had been considered to evaluate an overall model fit. The indices adopted to assess the SEM model fit and their desired values are presented in Table 5.

To verify the hypotheses, the author used Generalized Least Squares (GLS) Modeling (GLS-SEM). All tested relationships were found to be statistically significant. Thus, these positive relationships confirmed three hypotheses H1, H2, and H3. The results of the hypotheses' verification and model fit measures are presented in Table 6. Figure 2 presents the individual structural path estimates between constructs and variables.

Results of hypothesis testing using AMOS software are presented in Figure 2.

Discussion

The obtained results allowed for verifying hypotheses H1 and H2 examining the relationship between three variables: computer self-efficacy (CSE), facilitating conditions (FC), and satisfaction (S). The research confirmed the statistically significant role of the computer self-efficacy construct in creating satisfaction with e-learning (H1) and the statistically significant role of the facilitating conditions construct in creating

Table 5. **Descriptive Statistics, Cronbach's Alpha, Average Variance Extracted and Composite Reliability**

Constructs and Items	Mean (M)	Factor Loading	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)
Facilitating conditions (FC)					
FC1	4.56	0.854	0.873	0.872	0.695
FC2	4.88	0.806			
FC3	4.65	0.835			
Computer self-efficacy (CSE)					
CSE 1	6.24	0.809	0.911	0.915	0.782
CSE 2	6.16	0.959			
CSE 3	5.94	0.875			
Satisfaction (S)					
S1	4.32	0.896	0.934	0.933	0.778
S2	3.76	0.893			
S3	3.85	0.842			
S4	3.93	0.896			
Future intention to use (FI)					
FI1	4.55	0.888	0.902	0.901	0.819
FI2	4.00	0.923			

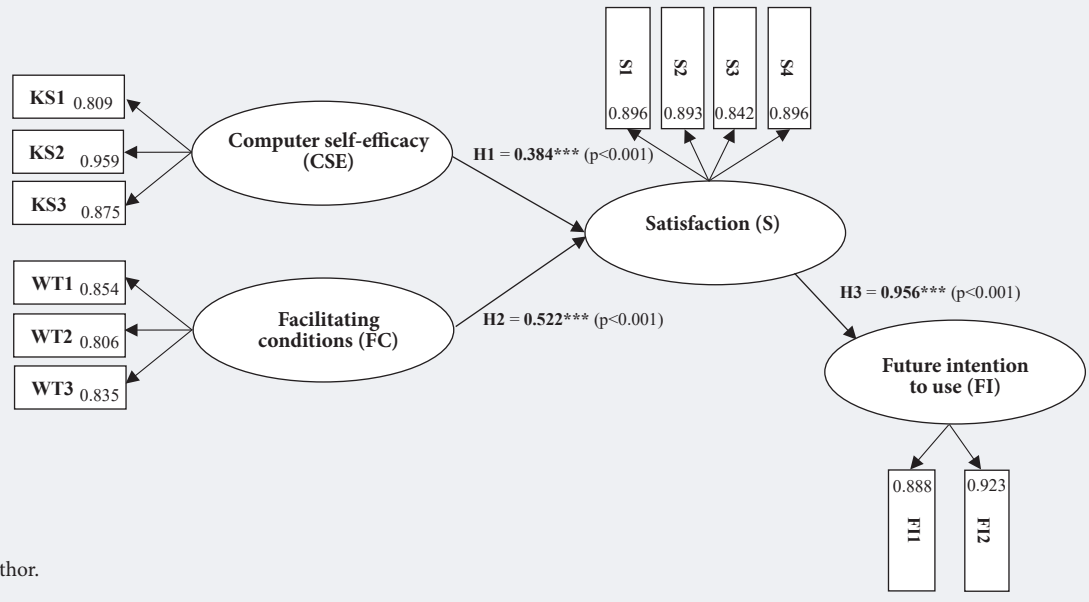
Source: author.

satisfaction (H2). In particular, the effect of facilitating conditions is more profound than that of computer self-efficacy on user satisfaction.

Higher levels of computer self-efficacy result in greater user satisfaction with e-learning. Computer self-efficacy means that users can use tools without external support also if they have never used them before. This is because the respondents belong to the Net Generation, representing young people raised while constantly exposed to computer-based technology.

Particular variables within computer self-efficacy received high scores based on the employed seven-point Likert scale. The average scores for variables were as follows: SCE1 (statement: I can use e-learning tools without the support of the third parties) - 6.24; SCE2 (statement: I can use e-learning tools even if I do not have a user guide) -6.16, and CSE3 (statement: I can use e-learning tools even if I have not used them before) - 5.94. The results confirm that the students feel confident and their digital skills allow them to use new e-learning tools without any problem or additional stress. Previous user experience with digital tools makes them more confident with the new tools, which are very often built on earlier solutions and are often intuitive. Findings regarding the relationship between computer self-efficacy and satisfaction are consistent

Figure 2. **Measurement Model**



Source: author.

Table 6. **Results of the Verification of the Hypotheses**

Hypothesis	Estimate	S.E.	C.R.	P	Test results
Hypothesis (H1). Computer self-efficacy (CSE) has a positive impact upon satisfaction with e-learning (S)	0.384	0.058	6.608	***	Support
Hypothesis (H2). Facilitating conditions (FC) have a positive impact upon the satisfaction with e-learning (S)	0.511	0.051	9.992	***	Support
Hypothesis (H3). User satisfaction (S) has a positive impact upon the future intention to use e-learning (FI)	0.956	0.029	33.153	***	Support

χ^2= 136.262; d.f. = 48; χ^2/d.f. = 2.839; p < 0.005; RMSEA = 0.048; GFI = 0.972; AGFI = 0.954 *** p < 0.001, Hoelter - 384. Adopted level of the statistical significance was 0.001.

Source: author.

with previous studies. Zardari et al. (2021) and Ahmad et al. (2020) proved that computer self-efficacy had a significant effect on students' intention to use the e-learning system. Also, the findings of the study conducted by Al-Fraihat et al. (2020) indicated that computer self-efficacy was one of the primary determinants of student learning satisfaction.

Facilitating conditions (FC) is the second variable determining the level of user satisfaction with e-learning. It concerns the external environment and reflects the conditions created by the university for organizational and technical support. Individual questionnaire statements received lower scores on the used seven-point Likert scale compared to variables of the computer self-efficacy (CSE) construct. The average scores for variables were as follow: FC1 (statement: During the e-learning process, I can rely on technical support from the university) - 4.56, FC2 (statement: In the case of any problems concerning the functioning of e-learning tools, I can count on feedback) -4.88, and FC3 (statement: The university provides professional assistance to users of e-learning tools through clear and understandable user instructions and guides available on the website) - 4.65. Findings regarding the relationship between facilitating conditions and satisfaction were consistent with previous studies. Many authors agreed that technology and support facilities and infrastructure provided by their institutions influenced the satisfaction and progress of students in e-learning (Passmore, 2000; Venkatesh et al., 2003; Venkatesh et al., 2012). Results obtained by Al-Fraihat et al. (2020) confirmed that providing quality services (facilitating conditions) to students may potentially increase their level of satisfaction with an e-learning system. Also, Al-Sabawy et al. (2013) proved that the effect of the system's quality on user satisfaction was significant for students and academic staff.

Analyzing the effect of both variables, i.e., computer self-efficacy (SCE) and facilitating conditions (FC) on the variable "user satisfaction", the standardized regression weight confirms that the facilitating conditions (standardized regression weight - 0.511) have a significantly higher impact than the computer self-efficacy construct variables (standardized regression weight - 0.384) on user satisfaction. This allows for concluding that relatively lower rated variables characterizing facilitating conditions (FC) need further improvement by the university, which will definitely affect the level of user satisfaction.

Results in examining the relationship between satisfaction (S) and the future intention to use e-learning (FI) are consistent with previous studies. The findings regarding the effects of satisfaction on the future intention to use indicated that user satisfaction was a strong predictor of the future intention to use e-learning. According to Zardari et al. (2021), satisfaction significantly influences the intention to use e-learning. Also, research conducted by Alyoussef (2021) confirmed

Table 7. **Model Fit Indices**

Model fit indices	Level of acceptance	Sources
Chi-square/Degrees of freedom (χ2/df)	desire < 3, acceptable < 5	Hwang, Kim, 2007; Choudhury, Karahanna, 2008; Iacobucci, 2010
Comparative fit index (CFI)	0.9, 0.95 desire	Hwang, Kim, 2007; Choudhury, Karahanna, 2008
Root mean square error of approximation (RMSEA)	0.05 (0.08)	Konarski, 2010; Choudhury, Karahanna, 2008
GFI - The goodness-of-fit index	>0.9	Jöreskog, Sörbom, 1979; Hwang, Kim, 2007;
AGFI - The adjusted goodness-of-fit index	>0.9	Jöreskog, Sörbom, 1979; Hwang, Kim, 2007

Source: author.

that student satisfaction had a positive impact on the use of e-learning as a tool ensuring the sustainability of education and the academic performance of students.

Conclusion

This study mostly focused on examining the causal determinants of e-learning user satisfaction and their future intention to use the tool. Considering the literature review results, two constructs determining user satisfaction with e-learning were adopted. One factor was taken from the group related to individual characteristics of users, i.e., computer self-efficacy (CSE), and the other was related to external factors, i.e., facilitating conditions (FC). Thus, the author's intention was to investigate which factors play a more significant role in creating user satisfaction.

All tested relationships were found to be statistically significant. Thus, they confirmed hypotheses H1, H2, and H3. Higher levels of computer self-efficacy and facilitating conditions result in greater user satisfaction with e-learning. But facilitating conditions have a significantly higher impact than the computer self-efficacy variables on user satisfaction.

The conducted research allowed for drawing methodological and practical conclusions. The confirmed reliability of the constructed measurement scales indicates their practical usefulness for future studies of the constructs by other researchers.

The achieved results provide practical implications for e-learning users, namely, in making e-learning tools more effective and widely used. Since the conditions of e-learning support have a significant impact on the level of student satisfaction with e-learning, it is, therefore, necessary to organize appropriately trained personnel available to students who would control the tools and support students during e-learning. Such support should include the provision of tutorials on the use of the tools but also direct contact with students in the case of technical problems. University support should have a positive impact on the students' feelings, satisfying their needs. A student should be treated as any customer, and the university's goal should be to ensure customer satisfaction.

This study provides novel knowledge yet has limitations. The main limitation is the sample, which comprised one university. The study did not include the university teachers and did not research factors influencing their satisfaction and future intention to use e-learning. The number of constructs was limited, aiming to simplify the model and examine relationships between the main factors under the assumption that the other elements determining the acceptance of e-learning technologies were constant. On the other hand, the small number of constructs may restrict the model's application in the future. Yet other limitations are related to the fact that the respondents, while evaluating two factors determining their level of satisfaction with the use of e-learning, gave a higher rating to the factor relating to their characteristics (computer self-efficacy) than an external factor over which they had no influence (facilitating conditions).

The research findings indicate directions for future research. University teachers and ICT staff should be included in studies of factors impacting satisfaction with e-learning systems and the future intention to use.

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