

# Exploring E-Learning Success during the COVID-19 Pandemic: Indonesia Empirical Study

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## Abstract

*This study examines whether and how student feedback and experience in using E-Learning affect mediator variables such as perceived ease of use and learning outcomes in the field of education. It also examines how mediators should influence the success of E-Learning. Seven hundred and thirty-four students were recruited for the survey, and the Structural Equation Model (SEM) was used to test the research hypothesis. Empirical results show that student feedback on using E-Learning has a significant and positive effect on perceived ease of use and learning outcomes, further affecting the success of E-Learning use. Furthermore, the mediator variables Perceived ease of use and Learning outcomes have partial mediators between feedback, student experience, and successful use of E-Learning. In this study, participants with higher levels of feedback and experience were more aware of online learning performance. The E-Learning process also strengthens the relationship between students and teachers. Research results from students feedback and experience in using E-Learning can provide important information for the existence and success of learning in the future.*

**Key words:** student feedback; student experience; perceived ease of use; learning outcomes, successful use of E-Learning.

## Introduction

The impact of the COVID-19 pandemic added quite a lot of complexity to various activities, one of which was the learning process. Staff, teachers, students, and parents

have faced administrative transitions and online learning. Meanwhile, the educational environment was experiencing obstacles, such as adaptation to digitalization and new conditions that make teachers and students use technology in learning, such as online classes, seminars, meetings, exams, and various school activities (Nikou & Maslow, 2021). The transformation in online learning is not entirely new among education stakeholders; it is just that the current conditions force teachers and students to use online learning fully. However, COVID-19 made online learning inevitable (Al Soub et al., 2021; Ho Thao, 2021; Mujiono & Herawati, 2021; Radha et al., 2020).

The COVID-19 disaster forced all teaching and learning activities to face a sudden transition to the context of online learning. In Vietnam, India, Malaysia, Jordan, Thailand, Jordan, Brazil, Saudi Arabia, Russia, and Ghana, higher education institutions (HEIs) stopped traditional face-to-face learning and adopted and implemented E-Learning as a learning tool, so that schools would continue not only their work (Abbad, 2021; Almaiah et al., 2020; Budu et al., 2018; Cidral et al., 2018; Eze et al., 2018; Meriem & Youssef, 2020; Radha et al., 2020; Samsudeen & Mohamed, 2019; Siron et al., 2020; Vanitha & Alathur, 2021) and learning process, but almost all academic activities, such as providing services to students, teachers, parents, and staff. Like other countries, almost all schools in Indonesia have taken steps in transforming the learning process from traditional/face-to-face to online learning (such as submitting assignments online, consulting with teachers online, doing presentations online, and doing individual assignments from home).

Students' educational concerns must be further improved, considering that their conditions must remain stable for them to participate in learning during the COVID-19 pandemic. Situational pressures among students need to be determined, especially in E-Learning, such as sharing psychological experiences, challenges, and learning outcomes. Numerous authors (Cao et al., 2020; Cohen, 2021; Junaidi et al., 2020; Kinash, 2020; Shearer et al., 2019; Yassin et al., 2021) revealed that online learning continues to grow and has a positive effect on the ease of learning in schools, so it is utilized by teachers and students to learn outside the classroom. When the situation does not allow for face-to-face learning, teachers and students agree to do online learning with different platform choices. However, previous research encountered some limitations, such as being more focused on the advantages of online learning media, including the ease of learning, the provision of learning materials, teacher attitudes toward using online learning media, and hybrid learning. Some authors (Capraro & Baucum, 2021; Hainey & Baxter, 2022; Vu Tien Duc et al., 2022) recommended in their studies that future researchers investigate experiences (such as students' habits and feelings) and students' success in using online learning, especially in some instances such as the COVID-19 pandemic. It could help achieve a holistic view of the correlation between the previously mentioned variables and provide relevant insights to teachers and governments. It could also help examine the online learning carried out during the COVID-19 pandemic more comprehensively.

The students' responses to the use of E-Learning in school would impact the condition of education in the future. Therefore, comprehensive research was needed, aiming to address the issue of readiness in E-Learning, not only in current conditions, but also in future conditions (assessing student responses, experiences, and results obtained during the use of E-Learning). Based on these objectives, the present study attempted to answer the following research questions:

- 1) Does student feedback affect E-Learning ease of use and learning outcomes?
- 2) Does student experience affect E-Learning ease of use and learning outcomes?
- 3) Do the ease of use of E-Learning and student learning outcomes have a positive effect on the successful use of E-Learning?

To answer these questions, this study examined student feedback and students' experiences (e.g., ease of use of E-Learning and student learning outcomes) by involving the successful use of E-Learning as a mediator. Furthermore, this research could make some theoretical and practical contributions. First of all, this study linked students' experiences in E-Learning to the learning context. Secondly, previous research examined the correlation between the use of emergency E-Learning, adoption, and integration of technology in the teaching and learning process (Murphy, 2020; Patra et al., 2021). It could help academics and governments better understand students' conditions (feedback, experience, convenience, and success of students) in using online learning. So, the present study results would determine the future learning.

## **Literature review**

### ***E-learning and student feedback***

Today, E-learning or online learning is famous in supporting the learning process across cultures and regions worldwide; one example of it is the Learning Management System (LMS), which was employed to empower teachers and students in the learning process during the COVID-19 pandemic (Amar & Eleyan, 2022; Meriem & Youssef, 2020; Ulker & Yilmaz, 2016; Bervell & Umar, 2017). The desire of teachers and students to share knowledge and complete the learning process affects the acceptance of E-Learning. Even the quality of the LMS being offered can influence the confidence of teachers and students to continue to use E-Learning in the learning process. Some studies (e.g. by Ashrafi et al., 2020; Fahadi & Khan, 2022; Goh & Yang, 2021) show that students gave positive feedback on the use of LMS (such as enjoyment, benefits, and subjective norms affecting the continued intention to use the LMS). The feedback, such as students' satisfaction and pleasure in using E-Learning, indicated that students' intentions to learn online paid off in the early and later stages. In addition, feedback such as perceived ease of use was a determinant of the viability of E-Learning among students.

Studies investigating the use of LMS have often been conducted, a frequent topic being the adoption of E-Learning learning in schools and universities. As far as researchers knew, relatively few studies on student feedback on E-Learning concepts investigated

the acceptance, enjoyment, and sustainability of LMS offered by teachers to students in each different subject. Student feedback would provide input on the feasibility of the previously used LMS. Both negative feedback (laziness or lack of intention due to the encountered difficulties) and positive feedback (pleasure and intention in using E-Learning) would have an impact on the success of the learning process and the use of LMS in the future (Ghazal et al., 2018). Thus, investigating students' knowledge of E-Learning during the COVID-19 pandemic would affect learning outcomes and the sustainable use of E-Learning.

### ***Student experience***

The student experience is a personal process of acquiring knowledge through online learning, such as technological facilities in the learning process (Aparico et al., 2016). Based on student experience in using E-Learning, researchers evaluated students' satisfaction (happy, difficult, easy, and inhibited). The student experience can be used to determine whether the LMS system is successful or not in the learning process. In addition, self-study experience also contributes to measuring success in exploring the mechanisms (Kim et al., 2022). E-Learning has been trusted as a knowledge dissemination system, which can also be evaluated for its service quality through features such as usage, user satisfaction, and benefits (DeLone & McLean, 2003). To be more convincing, it is a must for every platform, such as an LMS, to be known for its success based on user experience. Therefore, student experience in E-Learning is a key factor in determining their success or failure, such as their cognitive and emotional responses to educational services in the form of E-Learning (Hero & Lindfors, 2019).

Every online learning platform, such as E-Learning, has created a secure students' personal experience with key education objectives in various fields (Lemon & Verhoef, 2016). The experience can be seen in the interactions made by students, such as their experiences using various online learning media. It can further be used to assess students' self-study habits. It is indeed not easy to do, but many sources of experience can be used as conclusions to determine the success of each online media used, which even matches their expectations (Thompson & Kolsky, 2004).

### ***Ease of use of the E-learning system***

E-Learning has been widely known for a long time. Even before the outbreak of COVID-19, it had been implemented in various fields, such as education, social services, health, and government. E-Learning training has been introduced and taught in every institution in need. The use of online media is worth trying, considering that it has low variable costs, lots of flexible learning content, that it is free from temporal constraints, and is cost-effective (Hsin & Lin, 2018; Slechtova et al., 2015). Some students have shown their interest in using E-Learning as a primary medium for learning. In addition to gaining knowledge, students feel that the presence of LMS/E-Learning helps them learn independently. Almost all students feel the ease and advantages

of E-Learning. Nevertheless, several students in remote villages do not have a stable Internet connection, so they prefer to use traditional learning methods.

Students with information and technology support certainly experience multiple conveniences. They can access various learning materials (texts, images, sounds, videos, and many more). They can also do it anywhere and at any time, as long as they have a stable Internet connection. In addition, teachers also found it convenient to be able to interact rapidly with students, in terms of the ease of asking about students' conditions, assignments, and materials. The interaction among students can also occur more quickly. Additionally, teachers and students can engage in self-learning and control the prescribed learning process (Lee, 2006; Trombley & Lee, 2002; Zhang & Zhou, 2003). The organized learning process might provide benefits for teachers. However, concerning student satisfaction, it certainly needs a closer investigation by correlating students' habits in using E-Learning/LMS. McManus (2000) concludes that learners' personalities, materials structure, and teaching strategies each influence the way students organize their learning behavior, so each student has a different opinion about the convenience they receive.

### ***Learning outcomes and successful use of E-learning***

One way to determine the success or failure of learning is by looking at student learning outcomes. Learning outcomes cannot be measured by one factor alone, such as student learning experience. However, learning outcomes are indeed supported by several factors, such as self-motivation, learning style, facilities, interactions, and feedback (Eom et al., 2006; Suti & Sari, 2021). Previous studies have also investigated potential predictors of E-Learning success (Arbaugh et al., 2009), which include factors influencing learning outcomes, student satisfaction, and successful use of E-Learning in the context of asynchronous online learning (Peltier et al., 2007; Marks et al., 2005; Eom et al., 2006). All previous studies empirically examined the determinants of student satisfaction and learning outcomes in online education at school or university. Marks et al. (2005) found that teacher-student interaction was the most important determinant, twice as important as student-student interaction. In addition, some student-content interactions were significantly correlated with perceived learning; they had a significant impact on learning outcomes and the success of all learning media being used.

## **Hypotheses development**

### ***Student feedback, perceived ease of use and learning outcomes***

Student feedback on the use of E-Learning aspects influences the existence of learning media, learning effectiveness, ease of learning, and learning outcomes. The dimension of student feedback on the use of learning media has a prominent role. Students provide positive feedback on the use of E-Learning, which includes enjoyment, benefits, and subjective norms (Ashrafi et al., 2020 & Arbaugh et al., 2009). This is related to students'

interest in and intention of using E-Learning, which affects learning outcomes and perceived ease of use (Ghazal et al., 2018 & Capraro & Baucum, 2021). It has also become an educational goal to improve student learning outcomes as well as comfort in learning. Positive student feedback will have an impact on the effective continuity of the teaching and learning process (such as ease of communication between teachers and students, as well as students with other students). Students with positive feedback will always find it easy to pursue tasks or interactions with teachers through E-Learning. The concept of positive student feedback, includes the acceptance, enjoyment, and sustainability of learning media, as well as the ease of use. Some authors (Marks et al., 2005; Murphy, 2020) conclude that feedback, ease of use, and learning outcomes have a strong correlation with each other and are indispensable. Previous studies concluded that student feedback has affected the ease of use of E-Learning and improved the learning outcomes (Goh & Yang, 2021; Ashrafi et al., 2020; Meriem & Youssef, 2020; Bervell & Umar, 2017). Therefore, this study proposes the following hypothesis:

H1 Student feedback has a positive effect on perceived ease of use and learning outcomes.

### ***Student experience, perceived ease of use and learning outcomes***

Student experience while using E-Learning is measured by the ease of use and student learning outcomes. Student experience affiliation refers to the students' experience of acquiring knowledge through online media (such as happy, difficult, and easy). Student experience can determine the successful use of E-Learning and the effective learning process (Kim et al., 2022 & Aparico et al., 2016). From interacting, students obtain personal experiences. It is also correlated to personal motivation to accept or decline an opportunity to adopt online learning (Vu et al., 2022). However, experiences also have a positive effect on student psychology and enhance their motivation to apply technology during learning process (Ülker, D., & Yilmaz, 2016; Yassin et al., 2021). Experiences might also refer to how an individual sees the value objects, such as concern during the learning process. Besides, experiences have also influenced the students' perceived ease of use and learning outcomes (Radha et al., 2020; Shearer et al., 2019). Hence, this study proposes the following hypothesis:

H2 Student experience has a positive effect on perceived ease of use and learning outcomes.

### ***Students' perceived ease of use and successful use of E-learning***

Ease of use of E-Learning is an important aspect in measuring the success of E-Learning process by students. This will be an important assessment in measuring the existence of more dynamic learning media (Trombley & Lee, 2002). With such ease of use, students can access a variety of learning materials (texts, images, and sounds, and they can do so anywhere and at any time). Ease will have a positive impact on the successful use of E-Learning (Zhang & Zhou, 2003), because teacher and student interactions in the teaching and learning process are effective (such as teachers easily



setting assignments, checking assignments, and assessing student learning outcomes), and because interaction between students occurs faster. Thus, the ease of use of E-Learning can be used as a basis and strategy in determining learning success and the successful application of E-Learning learning media. Students also have positive attitudes in positive circumstances based on their beliefs. Furthermore, preliminary studies reported that students' perceived ease of use plays a crucial role in their successful use of E-Learning (Ho Thao et al., 2021). The previous consideration led to the proposed hypothesis:

H3 Students' perceived ease of use has a positive effect on successful use of E-Learning.

### ***Student outcomes and successful use of E-learning***

Student outcomes play an important role in determining educational goals, one of which is improving student learning outcomes. In addition, student outcomes have an important role to play in illustrating the relationship with successful use of E-Learning (Hero & Lindfors, 2019; Nikou & Maslow, 2021). If students succeed in the use of E-Learning, it will have a positive impact on the future learning outcomes and also on the successful use of E-Learning in the future, so its existence will be of great importance in advancing education. But if student learning outcomes decrease, it will affect the success of using E-Learning, especially during the COVID-19 pandemic (such as failures in learning outcomes and failures in the use of E-Learning). This study considers the role of learning outcomes mediation when examining the relationship with successful use of E-Learning. Understanding the role effects of this mediation improves the quality of inference, facilitates increased successful use of E-Learning, and offers a substantial contribution to the study. Students' commitment to learning outcomes is highly correlated with their performance and it influences further decision making (Hsin & Lin, 2018; Kim et al., 2022; Meriem & Youssef, 2020). The preliminary study found a strong association between feedback, student experience, and learning outcomes, which influenced the successful use of E-Learning (Hainey & Baxter, 2022; Hsin & Lin, 2018; Jena, 2020). Hence, this study proposes the following hypothesis:

H4 Learning outcomes have a positive effect on the successful use of E-Learning.

## **Methodology**

### ***Questionnaire design, pretest, pilot study and data analysis***

The items used to measure each construct are presented in the Appendix. A five-point Likert scale anchored between 1 ("strongly disagree") and 5 ("strongly agree") was used for all scale items. A recent study examined the causal relationship among variables that observed and validated structural relations based on the theory examined (Byrne, 2016). Another recent study applied high reliability and validity measurement items to enhance the students' understanding and maintain bias issues (Podsakoff et al., 2003). The respondents were university students in Indonesia. The hypothesis testing was carried out by applying the structural equation model (SEM) by using AMOS

and SPSS 22 software versions. After that, descriptive statistics was applied to examine the frequency distribution of samples. Furthermore, Pearson correlation test was used to examine the relationship between predictors (e.g., student feedback and students' experiences) and criterion variables (e.g., successful use of E-learning) important for adopting E-learning, and it was followed by standard method variance (CMV) to prevent detection bias in later stages. Lastly, this study used the Hayes (2018) bootstrapping process to examine the mediating and indirect impact of mediator variables.

### Sample and data collection

Indonesian students were asked to fill out an online survey. This online survey was conducted using Google Forms in the period from April 1 to May 30, 2022. The sample was taken from convenience sampling at random involving 747 students in Indonesia. However, 734 samples were valid, and this represents a completion rate of 98.25 %. Table 1 shows the demographics of the respondents. Indonesia was selected for the data. This study validates the relationship between perceived ease of use, learning outcomes, and successful use of E-Learning.

### Measures

The items used in the measurement are presented in the Appendix. They include student feedback (adapted from Ho Thao et al., 2020; Jiang et al., 2010), student experience (adapted from Ho Thao, 2020; Kim Sodam, 2022), perceived E-learning ease of use (adapted from Ho Thao, 2020; Patra, 2021), learning outcomes (Patra, 2021), and successful use of E-Learning (adapted from Ho Thao, 2020; Patra, 2021).

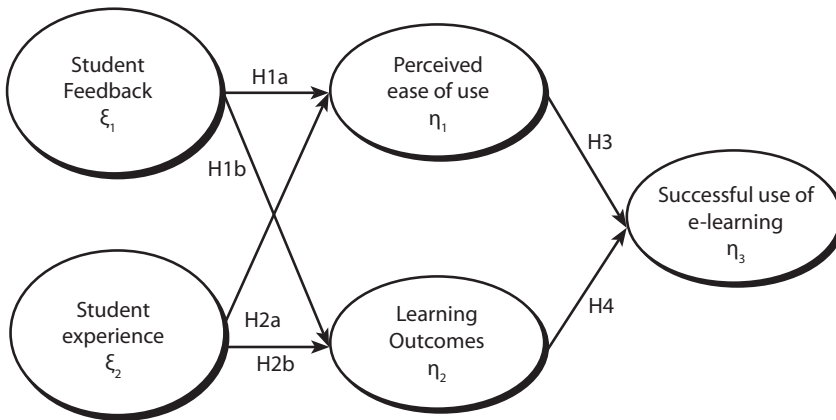


Figure 1 Proposed research model

## Results

### The pilot study and descriptive statistic

The pilot study was adopted to ascertain the validity of the content and identity of the respondents. Moreover, the reliability of the measurement items was assessed



using Cronbach alpha (Hair Jr et al., 2019). The mean differences are stated in terms of standard deviations. Therefore, an effect size greater than 5 shows that the mean difference is one half of the standard deviation. The mean score for the dependent variable (successful use of E-Learning) is above 3.00, while the standard deviation is above 0.70. This means that, on average, student feedback, student experience, perceived ease of use, learning outcomes, and successful using of E-Learning have a strong correlation (Table 2). The sample involved 747 students. However, 734 repondents were selected (98.25 %) (see Table 1).

Table 1  
*Respondent demographics*

Demographic Items	Frequency	Percentage (%)
Gender		
Male	317	43.2
Female	417	56.8
Age		
Under 21 years old	199	27.1
21-25 years old	320	43.6
26-30 years old	215	29.3
Time range use E-learning		
0-1 year	132	18.0
2-3 years	161	21.9
> 3 years	441	60.1

### **Pearson correlation**

The pilot study was adopted to ascertain the validity of the content and identity of the respondents. Moreover, the reliability of the measurement items was assessed using Cronbach alpha (Hair Jr et al., 2019). Mean differences are stated in terms of standard deviations. Therefore, an effect size greater than 3 shows that the mean difference is one half of the standard deviation. The mean score for all is above 5.00, while standard deviation is below 1.00. This means that all variables which were observed have a strong correlation (Table 2).

Table 2  
*Correlation matrix for measurement scales*

Constructs	Mean	SD	SF	SE	PE	LO	SU
SF	3.40	0.70	0.747				
SE	3.32	0.74	0.567**	0.741			
PE	3.27	0.80	0.476**	0.581**	0.748		
LO	3.42	0.81	0.538**	0.629**	0.496**	0.766	
SU	3.44	0.80	0.511**	0.539**	0.483**	0.694**	0.757

Note: SF: Student feedback, SE: Student experience, PE: Perceived ease of use, LO: Learning outcomes, SU: Successful use of E-Learning SD: Standard Deviation  
Diagonal elements are the square roots of the AVE for each construct  
Pearson correlations are shown below the diagonal  
Significant at \*:  $p < 0.05$ , \*\*:  $p < 0.01$ , \*\*\*:  $p < 0.001$

### Measurement result

The SEM was used to test the proposed model and the research hypothesis. A two-stage approach (Byrne, 2016; Hair Jr et al., 2018) was used in this study. First, the measurement model was probably based on the confirmatory factor analysis (CFA) to examine the reliabilities and validities of the research constructs. The structural model was used to test the strength and direction of the proposed relationships among the constructs. The CFA results of the remaining 24 items showed the data had a good fit (see Appendix).

Table 3  
Measurement results

Constructs	MLE estimates factor loading/ measurement error		Squared multiple correlation (SMC)	Composite reliability (CR)	Average of variance extracted (AVE)	Cronbach's $\alpha$
Student Feedback				0,887	0.568	0.866
		0.742	0.449	0.551		
SF2	0.778	0.395	0.605			
SF3	0.731	0.466	0.534			
SF4	0.699	0.511	0.489			
SF5	0.845	0.286	0.714			
SF6	0.716	0.487	0.513			
Student Experience				0.816	0.526	0.905
SE1	0.719	0.483	0.517			
SE2	0.677	0.542	0.458			
SE3	0.746	0.443	0.557			
SE4	0.756	0.428	0.572			
SE5	0.860	0.860	0.860			
Perceived Ease of use				0.863	0.614	0.873
PE1	0.885	0.217	0.783			
PE2	0.708	0.499	0.501			
PE3	0.747	0.442	0.558			
PE4	0.783	0.387	0.613			

Constructs	MLE estimates factor loading/ measurement error		Squared multiple correlation (SMC)	Composite reliability (CR)	Average of variance extracted (AVE)	Cronbach's $\alpha$
Learning Outcomes				0.873	0.581	0.847
LO1	0.699	0.511	0.489			
LO2	0.677	0.542	0.458			
LO3	0.716	0.487	0.513			
LO4	0.825	0.319	0.681			
LO5	0.875	0.234	0.766			
Successful Use of E-Learning				0.848	0.583	0.849
SU1	0.729	0.469	0.531			
SU2	0.848	0.281	0.719			
SU3	0.751	0.436	0.564			
SU4	0.719	0.483	0.517			

Fit statistics (N = 734)

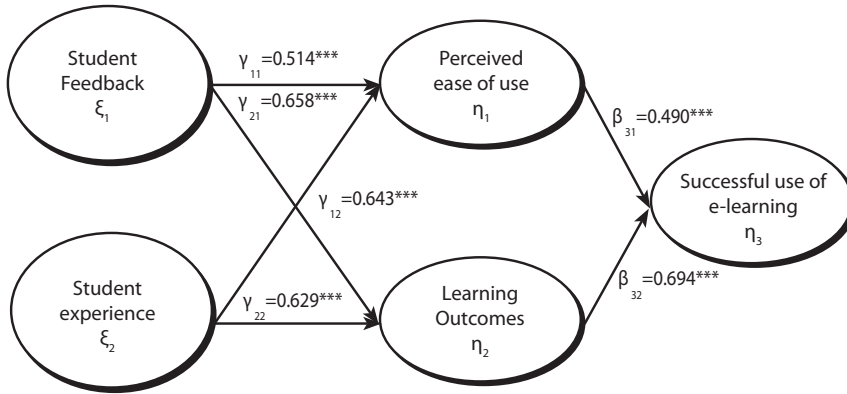
$\chi^2/df = 3.568$ , Goodness-of-Fit Index (GFI) = 0.916, Nonnormed fit index (NFI) = 0.924, Comparative Fit Index (CFI) = 0.938, Incremental fit index (IFI) = 0.938, and Root Mean Square Error of Approximation (RMSEA) = 0.059

### Structural model

The model fit for the data was adequate. The summary in Table 4 shows a positive and significant relationship between student feedback and perceived ease of use (0.514;  $p < 0.001$ ) and learning outcomes (0.658;  $p < 0.001$ ), thereby supporting H1 and H2. Similarly, H3 and H4 are supported, which means a positive relationship was found between student experience and perceived ease of use (0.643;  $p < 0.001$ ) and learning outcomes (0.629;  $p < 0.001$ ). Furthermore, perceived ease of use and learning outcomes also have positive effects on the success of E-Learning (0.490;  $p < 0.001$ ; 0.694;  $p < 0.001$ ). Hence, H5 and H6 are supported in this study. Figure 2 shows the structural model adopted in this study.

Table 4  
Proposed model results

Hypotheses	Symbol		Path	Coefficients	Test results
H1	$\gamma_{11}$	Student Feedback	→ Perceived ease of use	0.514***	Supported
H2	$\gamma_{21}$	Student Feedback	→ Learning Outcome	0.658***	Supported
H3	$\gamma_{31}$	Student Experience	→ Perceived ease of use	0.643***	Supported
H4	$\beta_{41}$	Student Experience	→ Learning Outcome	0.629***	Supported
H5	$\beta_{42}$	Perceived ease of use	→ Success E-Learning	0.490***	Supported
H6	$\beta_{43}$	Learning Outcomes	→ Success E-Learning	0.694***	Supported



Note: Significant at \*:  $p < 0.05$ , \*\*\*:  $p < 0.01$ , \*\*\*\*:  $p < 0.001$

Figure 2. Structural result analysis

### Mediating effect

This study adopted the procedure recommended by Hayes (2018) to validate mediator variables (e.g., perceived ease of use and learning outcomes). Table 5 shows the mediation analysis illustrating that the 95 % CIs of all tested indirect effects and partial roles did not include zero. It concluded that student feedback and student experience have a significant indirect effect on students’ E-Learning performance with and without mediator variables (e.g., perceived ease of use and learning outcomes).

Table 5  
Mediation effects

IV	M	DV	IV->DV (c)	IV->M (a)	IV+M->DV		Bootstrapping 95 % CI		
					IV (c')	M(b)	Percentile method	Bias-corrected	
SF	PE	SU	0.700***	0.584***	0.564***	0.230***	[0.492, 0.637]	[0.635, 0.763]	
			Standard Error	0.032	0.036	0.037	0.032		
SF	LO	SU	0.700***	0.758***	0.326***	0.492***	[0.251, 0.635]	[0.400, 0.763]	
			Standard Error	0.032	0.032	0.038	0.033		
SE	PE	SU	0.576***	0.693***	0.407***	0.242***	[0.324, 0.490]	[0.510, 0.640]	
			Standard Error	0.032	0.030	0.042	0.040		
SE	LO	SU	0.576***	0.687***	0.180***	0.574***	[0.110, 0.251]	[0.510, 0.640]	
			Standard Error	0.032	0.031	0.036	0.033		

Note: SF: Student feedback, SE: Student experience, PE: Perceived ease of use, LO: Learning outcomes, SU: Success of E-Learning

Significant at \*:  $p < 0.05$ , \*\*:  $p < 0.01$ , \*\*\*:  $p < 0.001$

## **Discussion**

### ***Key findings***

This study uncovers the specific factors determining student feedback and experience. This is important and relevant for the education sector. Both of these predictor variables play an essential role in their perceived use and learning performance. It means that the Student feedback dimension, including the online learning system toward attractive learning environment, the content and quality of the course online learning during the COVID-19 pandemic have a strong correlation to the learning process and performance. These have a positive and significant effect on communication and interaction patterns among students. It also has a positive effect on enhancing student psychology toward the provided valuable education materials. Furthermore, students' personal experiences also play an important role in predicting their perceived ease of use of E-Learning, such as online learning system useful and comfortable to support the learning process and improve learning performance and effectiveness. In addition, students will use E-learning because this platform supports their activities. Besides influencing students' perceptions of the ease of use of E-Learning and their outcomes, student outcomes have similarly influenced the learning outcomes through support for completing online learning activities, communication with their teachers and peers, obtaining good references, and enhancing their productivity. This result confirms preliminary studies (e.g., Ashrafi et al., 2020; Baxter & Hainey, 2022; Cohen, 2021; Eom & Ashill, 2016), which state that the frequency of E-Learning process has a positive and significant effect on students' real experiences and suggestions. Hence, this can positively affect students' ethical E-Learning processes. Recent studies have shown that education and technology have been a global issue, hence enlightening students and stakeholders to enhance education infrastructure and the learning process.

As mediator variables, perceived use and learning outcomes have a crucial role in mediating the relationship between student feedback and experience and the success of their use of E-Learning. It means that the online learning system, the content of the courses, and the quality of the E-Learning process all play an essential role in predicting students' activities during the learning process. It also mediates their communication and interaction, both offline and online and makes it easier to apply it. It might also facilitate the successful use of E-learning with regard to teaching and learning activities in the online environment during the COVID-19 pandemic and also support online learning system autonomy and flexibility. This result follows prior studies which have revealed that perceived use and learning performance have a positive and significant effect on the E-Learning process (Baucum & Capraro, 2021; Cao et al., 2020; Nikou & Maslov, 2021; Patra et al., 2021).

### ***Theoretical Implications***

The current study contributes to several aspects of the literature. Firstly, by providing better knowledge about the use of E-Learning during the COVID-19 pandemic (for

example, student feedback and student experience), about the successful use of E-Learning mediated by perceived ease of use, and learning outcomes. This process shows a strong correlation between student feedback, student experience, perceived ease of use and learning outcomes. It has a positive effect on the successful use of E-Learning and the learning process during the COVID-19 pandemic using E-Learning. Secondly, it was reported that perceived ease of use and learning outcomes played a mediating role in the relationship between student feedback, student experience and successful use of E-Learning. Although previous research revealed that student feedback has a positive effect on the successful use of E-Learning, some aspects have been studied separately and not completely. The role of the mediator variable for the successful use of student E-Learning is much bigger than before after successfully developing perceived ease of use and learning outcomes. This shows the importance of knowing student feedback and experiences in using E-Learning, as it can be used as a reference in the world of education as a learning medium in the future. Finally, this study strengthens the SIT proposal that is used to predict the factors (for example, student feedback, student experience, and successful use of E-Learning) that affect student learning success.

### ***Managerial implications***

The current studies suggest that academics and governments should better understand students' conditions (feedback, experience, comfort, and student success) when using online learning. The results of current studies will determine future learning. In the educational context, the results of this study allow for the analysis of several examples, such as feedback and experiences felt by students that are in line with learning objectives (such as satisfaction, comfort, and successful use of E-Learning in the learning process). The ease which students feel and the learning outcomes have allowed students to successfully use E-learning, especially during COVID-19. Not only did they manage to use E-Learning successfully, but they also gained a pleasant experience, thus positively impacting the learning outcomes.

This finding offers several managerial implications. Success in E-Learning and student learning makes it easier to use E-Learning and results in better learning outcomes. The government must implement online learning media, both under normal circumstances and under emergency circumstances, such as COVID-19. Online learning media have an important role in successful learning, considering that almost all students spend their time on mobile phone screens. This has a strong correlation with students' habits of using online media and their perceived comfort. The role of perceived ease of use and learning outcomes as mediators between student feedback, experiences, and successful use of E-Learning shows that students will find it easier to use E-Learning in the learning process so that learning outcomes will increase. In addition, students get a more enjoyable experience and positive feedback. In other words, positive feedback and experiences (such as ease of use of E-Learning, fast response, and convenience) will make students more interested in using E-Learning in the learning process (such

as teacher and student interaction, looking for references, sending assignments, etc.), the teaching-learning process, exchanging opinions, and all learning activities.

These results suggest that positive feedback and student experience should be maintained. In particular, student learning outcomes are influenced by the pleasant experience of using E-Learning and the perceived ease of use. Therefore, the curriculum that has been created needs to apply online learning media for all kinds of learning under any conditions. The school environment that has implemented the curriculum must ensure that students can understand and have knowledge of online learning media. On the other hand, students must slowly apply online learning to all learning at school and at home (to do homework). Likewise, students who feel bored or less interested in using online learning media can try other online learning media. This decision tends to cause serious problems, causing them to experience a burden in learning. In this case, education is expected to play an important role by providing various facilities and clearly stating the curriculum. The role of the Minister of National Education and his staff, including teachers and parents, is to control students' activities when using online learning media. This is very important in order to fix educational problems, such as students' understanding of the use of E-Learning, especially in emergency situations. In addition, comprehensive methods and easy-to-understand mechanisms are important factors to increase the success of using E-Learning. Students are in a *happy* condition and provide positive feedback on the use of online learning media.

### ***Limitations and future research directions***

There are some limitations to this study. First of all, this research was conducted in the field of education and online learning media during the COVID-19 pandemic; therefore, the result should not be generalized. Future studies will need to include different beliefs, larger sample sizes, other regions, and geographic regions to encourage better conclusions. Secondly, it uses only two mediators: perceived ease of use and learning outcomes. Future research needs to add mediators from different angles and examine online learning issues. In addition, it is necessary to ensure that students are able to use E-Learning, in a happy, easy environment and achieve improved learning outcomes. Finally, although most of the hypotheses proposed in this study have been supported, they are limited to student feedback, student experience, perceived ease of use, learning outcomes, successful use of E-Learning, and interest in preliminary studies.

### **Conclusion**

Education and experience can build a cultural and psychological construct that needs to be explored more frequently by studies on education. This is because education requires a combination of specific skills to acquire information and help the development of technology. Hence, this study provides one of the first investigations into the correlation between student experience and perceived education infrastructure use. Therefore, the government and practitioners must collaborate across the region



to educate students on shaping quality. This is because the learning process requires the combination of specific skills, knowledge (e.g., communication and interaction), and technology development to seek credible information and learning materials such as references. Hence, this study provides one of the first investigations into student feedback and experience as predictors of perceived ease of use and learning outcomes. These have a different role to influence students' attitude and behavior in response to the limitations of the learning process during the COVID-19 pandemic. The study shows that the participants with a higher level of feedback and experiences are more aware of the need to seek valuable information and knowledge. The E-Learning process also possibly makes it easier for students to seek information and knowledge with different purposes and in different ways. If information seekers can participate in virtual communities more comprehensively and in a specific context, they will feel the effect of quality factors on communication and interaction. Consequently, they will become confident information seekers, who will pave the way for the ultimate success of virtual learning (e.g., E-Learning).

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## **Appendix**

### **Student feedback** (Ho Thao, N.T. et al., 2020; Jiang et al., 2010)

- 1 The online learning system provides an attractive learning environment.
- 2 The current content of the course is redesigned to fit online learning during the COVID-19 pandemic.
- 3 Using the online learning system during the COVID-19 pandemic is a good idea.
- 4 I think that I should study online during the COVID-19 pandemic.
- 5 The instruction delivery of content in the online course during the COVID-19 pandemic is easily understandable.
- 6 Taking the course in the E-Learning system is valuable to me.

### **Student experience** (Ho Thao, N.T. et al., 2020; Kim Sodam et al., 2022)

- 1 I find the online learning system useful and comfortable in my learning during the COVID-19 pandemic.
- 2 Using the online learning system improves my learning performance during the COVID-19 pandemic.
- 3 Using the online learning system promotes my learning effectiveness during the COVID-19 pandemic.
- 4 The E-learning system is well-organized, and I can find what I need easily.
- 5 Overall, I like using the online learning system during the COVID-19 pandemic.

### **E-learning ease of use** (Ho Thao, N.T. et al., 2020; Patra, S.K. et al., 2021)

- 1 The communicational tools in the online learning system are effective.
- 2 E-learning is easier to use than direct/offline learning.
- 3 Interacting with the online learning system does not require a lot of my mental effort.
- 4 E-learning helps to access materials at any time and any place.

### **Learning outcomes** (Ho Thao, N.T. et al., 2020; Patra, S.K. et al. 2021)

- 1 I could complete my learning activities via an online learning system if I had seen someone else using it before trying it myself.
- 2 The online learning system enables interactive communication between the lecturer and learners.
- 3 E-learning makes it easier for me to find references and homework.
- 4 As long as I use E-learning, my learning outcomes are getting better.
- 5 E-learning increases productivity, namely learning outcomes.

### **Successful use of E-learning** (Ho Thao, N.T. et al., 2020; Patra, S.K. et al., 2021)

- 1 The related teaching and learning activities in the online course during the COVID-19 pandemic are suitable and appropriate.
- 2 Using the online learning system gives me greater autonomy and flexibility over learning during the COVID-19 pandemic.
- 3 I am able to put the right kind of effort into the use of an E-learning system.
- 4 All learning is easy to complete using E-learning.

# Analiza uspješnosti e-učenja tijekom pandemije bolesti COVID-19: empirijsko istraživanje u Indoneziji

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## Sažetak

*U ovome istraživanju ispituje se utječu li, i u kolikoj mjeri, povratne informacije studenata i njihova iskustva u korištenju e-učenja na medijatorske varijable poput percipirane lakoće korištenja i ishoda učenja u području obrazovanja. Također se ispituje kako bi medijatorske varijable trebale utjecati na uspješnost e-učenja. U istraživanju je sudjelovalo 734 studenata, a za testiranje hipoteza istraživanja korišten je model strukturne jednadžbe. Empirijski rezultati pokazuju da povratne informacije studenata o korištenju e-učenja imaju značajan i pozitivan utjecaj na percipiranu lakoću korištenja i ishode učenja, što dalje utječe na uspješnost primjene e-učenja. Nadalje, percipirana lakoća korištenja i ishodi učenja kao medijatorske varijable djelomično posreduju između povratnih informacija, iskustava studenata te uspješnoga korištenja e-učenja. U ovome istraživanju, sudionici čije su povratne informacije i iskustva bila bolja, ujedno su pokazali i veću osvještenost o pitanju uspješnosti online učenja. Proces e-učenja također jača i odnos između studenata i profesora. Rezultati istraživanja koji su dobiveni pomoću povratnih informacija i iskustava studenata u e-učenju mogu pružiti važne podatke za njegovu daljnju primjenu i uspjeh učenja u budućnosti.*

**Ključne riječi:** *ishodi učenja; iskustva studenata; percipirana lakoća korištenja; povratne informacije studenata; uspješno korištenje e-učenja.*

## Uvod

Pandemija koju je uzrokovao COVID-19 rezultirala je dodatnim komplikacijama u različitim aktivnostima, a posebno u procesu učenja. Osoblje zaposleno u obrazovnim ustanovama, nastavnici, studenti i roditelji morali su se suočiti s administrativnim promjenama i *online* učenjem. U međuvremenu su se pojavile brojne poteškoće u obrazovnom okružju, npr. prilagodba digitalizaciji i novim uvjetima rada u kojima nastavnici i studenti u procesu učenja koriste tehnologiju (*online* nastava, seminari, sastanci, ispiti i različite školske aktivnosti) (Nikou i Maslow, 2021). Transformacija u *online* učenju nije potpuno strana sudionicima obrazovnoga procesa. Trenutačni uvjeti



prisiljavaju nastavnike i studente da u potpunosti koriste *online* učenje, a COVID-19 učinio ga je neizbježnim (Al Soub i sur., 2021; Ho Thao, 2021; Mujiono i Herawati, 2021; Radha i sur., 2020).

COVID-19 bio je katastrofa koja dovela do toga da su sve aktivnosti poučavanja i učenja odjednom morale biti prebačene u kontekst *online* učenja. U Vijetnamu, Indiji, Maleziji, Jordanu, Tajlandu, Jordanu, Brazilu, Saudijskoj Arabiji, Rusiji i Gani, visokoškolske ustanove prestale su izvoditi nastavu na tradicionalan način, licem u lice te su se prebacile na e-učenje, kako bi škole mogle ne samo nastaviti svoj rad (Abbad, 2021; Almaiah i sur., 2020; Budu i sur., 2018; Cidral i sur., 2018; Eze i sur., 2018; Meriem i Youssef, 2020; Radha i sur., 2020; Samsudeen i Mohamed, 2019; Siron i sur., 2020; Vanitha i Alathur, 2021) i proces učenja, nego provoditi skoro sve druge akademske aktivnosti, poput pružanja usluga studentima, nastavnicima, roditeljima i osoblju. Kao i u drugim državama, gotovo sve škole u Indoneziji poduzele su mjere kako bi proces učenja prebacile s tradicionalnoga oblika, licem u lice, na *online* učenje (uključujući predavanje zadataka *online*, *online* konzultacije s nastavnicima, držanje prezentacija u *online* obliku te odrađivanje različitih zadataka od kuće).

Potrebno je raditi na poboljšanju uvjeta za obrazovanje studenata jer bi oni trebali imati stabilne uvjete za sudjelovanje u procesu učenja tijekom pandemije bolesti COVID-19. Trebalo bi kroz razgovore o psihološkom stanju, izazovima i ishodima učenja utvrditi koliki pritisak cjelokupna situacija, a posebno e-učenje, stvara studentima. Brojni su autori (Cao i sur., 2020; Cohen, 2021; Junaidi i sur., 2020; Kinash, 2020; Shearer i sur., 2019; Yassin i sur., 2021) utvrdili da se *online* učenje širi i razvija te da ima pozitivan učinak na lakoću učenja u školama. Stoga ga i nastavnici i studenti koriste i u procesu učenja izvan učionice. Kada situacija ne dozvoljava učenje licem u lice, nastavnici i studenti dogovaraju se za *online* oblik učenja, s različitim izborom platformi. Međutim, ranija istraživanja naišla su na neka ograničenja, kao što je fokusiranost na prednosti medija za *online* učenje, uključujući lakoću učenja, dostupnost materijala za učenje, stavove nastavnika prema medijima za *online* učenje te hibridno učenje. Neki su autori (Capraro i Baucum, 2021; Hainey i Baxter, 2022; Vu Tien Duc i sur., 2022) u svojim radovima naveli da bi u budućim istraživanjima trebalo analizirati iskustva (npr. navike i osjećaje studenata) i uspjeh studenata u korištenju *online* učenja, posebno u uvjetima kao što je pandemija bolesti COVID-19. To bi pomoglo izraditi holistički pregled korelacije između ranije spomenutih varijabli i pružiti uvid u situaciju nastavnicima i nadležnim tijelima. Također od velike pomoći bila bi daljnja analiza načina na koji se *online* učenje provodi tijekom pandemije bolesti COVID-19.

Odgovori studenata na pitanja o upotrebi e-učenja u školama mogli bi utjecati na stanje u domeni obrazovanja u budućnosti. Stoga je bilo potrebno provesti opsežno istraživanje o spremnosti za e-učenje, ne samo u trenutačnim uvjetima, nego i u budućnosti (procjena odgovora studenata, njihovih iskustava te rezultata dobivenih tijekom provedbe e-učenja). Na temelju tih ciljeva, u ovome radu pokušava se odgovoriti na sljedeća pitanja istraživanja:

- 1) Utječu li povratne informacije studenata na e-učenje, lakoću korištenja i ishode učenja?
- 2) Utječu li iskustva studenata na e-učenje, lakoću korištenja i ishode učenja?
- 3) Imaju li lakoća korištenja e-učenja i ishodi učenja koje studenti postižu pozitivan utjecaj na uspješno korištenje e-učenja?

Kako bi se odgovorilo na ova pitanja, u radu su analizirane povratne informacije studenata i iskustva studenata (npr. lakoća korištenja e-učenja i ishodi učenja studenata) tako što je uspješno korištenje e-učenja uzeto kao medijator. Nadalje, ovo istraživanje moglo bi donijeti neke teorijske i praktične rezultate. Kao prvo, ono povezuje iskustva studenata u e-učenju s kontekstom učenja. Nadalje, prethodna su se istraživanja bavila ispitivanjem korelacije između upotrebe e-učenja u izvanrednim okolnostima, kao i prihvaćanjem i integracijom tehnologije u proces učenja i poučavanja (Murphy, 2020; Patra i sur., 2021). To bi moglo pomoći akademskoj zajednici i vladajućim strukturama bolje razumjeti uvjete u kojima studenti koriste *online* učenje (povratne informacije, iskustva, praktičnost i uspjeh). Stoga bi rezultati ovoga istraživanja mogli odrediti način učenja u budućnosti.

## Pregled literature

### *E-učenje i povratne informacije studenata*

U današnje vrijeme, e-učenje ili *online* učenje jako je poznato jer pomaže u procesu učenja u raznim kulturama i regijama širom svijeta. Jedan od primjera je sustav za upravljanje učenjem (LMS), koji se koristi za osnaživanje nastavnika i studenata u procesu učenja tijekom pandemije (Amar i Eleyan, 2022; Meriem i Youssef, 2020; Ulker i Yilmaz, 2016; Bervell i Umar, 2017). Želja nastavnika i studenata da podijele znanja i privedu proces učenja kraju utječe na prihvaćenost e-učenja. Čak i sama kvaliteta sustava za upravljanje učenjem može utjecati na samopouzdanje nastavnika i studenata da nastave koristiti e-učenje u procesu učenja. Neke su studije (npr. Ashrafi i sur., 2020; Fahadi i Khan, 2022; Goh i Yang, 2021) pokazale da studenti daju pozitivne povratne informacije o upotrebi sustava za upravljanje učenjem (uživanje u radu, korisnost, subjektivni standardi koji utječu na daljnju namjeru korištenja sustava za upravljanje učenjem). Povratne informacije studenata, kao što je njihovo zadovoljstvo i uživanje u e-učenju, pokazale su da se njihova namjera da uče u *online* obliku isplatila i u ranijim i u kasnijim fazama. K tomu, povratne informacije, npr. o percipiranoj lakoći korištenja, bile su determinanta ostvarivosti e-učenja kod studenata.

Studije koje se bave analizom upotrebe sustava za upravljanje učenjem često se provode, a jedna je od čestih tema upotreba e-učenja u školama i na sveučilištima. Koliko je autorima poznato, jako se malo studija o povratnim informacijama studenata o konceptima e-učenja bavilo analizom prihvaćanja, uživanja u te održivosti sustava za upravljanje učenjem koje su nastavnici u različitim predmetnim područjima ponudili studentima. Povratne informacije studenata mogle bi dati važne podatke o mogućnostima ranije korištenih sustava za upravljanje učenjem. Negativne povratne informacije

(lijenost ili odsutnost namjere da ih se koristi zbog teškoća na koje su naišli), kao i one pozitivne (zadovoljstvo i namjera korištenja e-učenja), mogle bi utjecati na uspješnost procesa učenja i upotrebu sustava za upravljanje učenjem u budućnosti (Ghazal i sur., 2018). Stoga bi analiza znanja koje studenti imaju o e-učenju tijekom pandemije bolesti COVID-19 mogla utjecati na ishode učenja i održivu upotrebu e-učenja.

### **Iskustva studenata**

Iskustva studenata su osobni proces stjecanja znanja kroz *online* učenje, a to uključuje i tehnološke aspekte u procesu učenja (Aparico i sur., 2016). Na temelju iskustava studenata u korištenju e-učenja autori su procijenili njihovo zadovoljstvo (opcije: sretno, teško, lagano i sputano). Pomoću iskustava studenata moglo bi se odrediti je li sustav za upravljanje učenjem uspješan u procesu učenja ili nije. Osim toga, iskustvo koje su u samostalnom učenju studenti stekli također daje svoj doprinos mjerenju uspješnosti e-učenja (Kim i sur., 2022). E-učenje smatra se sustavom diseminacije znanja, a može se procijeniti i s obzirom na kvalitetu usluge kroz karakteristike kao što su uporaba, zadovoljstvo korisnika i dobiti (DeLone i McLean, 2003). Uspjeh svake platforme i sustava za upravljanje učenjem morao bi se mjeriti na temelju korisničkoga iskustva. Zato su iskustva studenata u e-učenju ključni faktor u određivanju njegova uspjeha ili neuspjeha, a uključuju kognitive i emocionalne reakcije na obrazovne usluge u obliku e-učenja (Hero i Lindfors, 2019).

Svaka platforma za *online* učenje izgradila je osobno iskustvo svakoga studenta s ključnim obrazovnim ciljevima u različitim područjima (Lemon i Verhoef, 2016). To se iskustvo može vidjeti u interakcijama studenata, uključujući njihova iskustva u korištenju različitih medija za *online* učenje, a može se dalje koristiti za procjenu navika studenata u samostalnom učenju. To nije lako postići, ali pomoću mnogih izvora iskustava može se odrediti uspjeh svakog korištenoga medija za *online* učenje, što čak i odgovara očekivanjima studenata (Thompson i Kolsky, 2004).

### **Lakoća korištenja sustava za e-učenje**

E-učenje jako je poznato već dugo vremena. Čak i prije nego je nastupila pandemija bolesti COVID-19, ono se provodilo u različitim područjima, poput obrazovanja, javnih usluga, zdravstva te u upravljačkim strukturama. Edukacija za e-učenje provedena je u svakoj instituciji gdje je to bilo potrebno. Svakako bi trebalo isprobati *online* medije za učenje, s obzirom na to da imaju niske varijabilne troškove, puno fleksibilnih obrazovnih sadržaja, da nemaju vremenskih ograničenja i da su isplativi (Hsin i Lin, 2018; Slechtova i sur., 2015). Neki su studenti pokazali interes za e-učenje kao primarni medij učenja. Osim što im pomaže u stjecanju znanja, e-učenje im pomaže i u samostalnom učenju. Gotovo svi studenti osjećaju lakoću korištenja i prednosti e-učenja. Ipak, nekoliko studenata koji žive u udaljenim selima nema stabilnu internetsku vezu pa zato preferiraju tradicionalne metode učenja.

Studenti koji imaju informatičku i tehničku podršku uistinu osjećaju višestruke prednosti e-učenja. Mogu pristupiti različitim obrazovnim materijalima (tekstovima,

slikama, audiozapisima, videozapisima itd.) u bilo koje vrijeme i na bilo kojem mjestu, sve dok imaju internetsku vezu. K tomu, nastavnici isto smatraju da je brza interakcija sa studentima praktična jer im olakšava postavljanje pitanja o uvjetima rada, zadacima i materijalima. Inerakcija između studenata također je vrlo brza. Uz to, nastavnici i studenti mogu samostalno učiti i kontrolirati propisani proces učenja (Lee, 2006; Trombley i Lee, 2002; Zhang i Zhou, 2003). Organizirani proces učenja mogao bi donijeti mnoge dobrobiti nastavnicima. Međutim, što se tiče zadovoljstva studenata, njega je zasigurno potrebno detaljnije ispitati u korelaciji s njihovim navikama u korištenju e-učenja/sustava za upravljanje učenjem. McManus (2000) je došao do zaključka da osobnosti studenata, struktura nastavnih materijala te strategije poučavanja utječu na način na koji oni općenito organiziraju svoje ponašanje pri učenju te da svaki student ima drugačije mišljenje o prednostima takvoga učenja.

### ***Ishodi učenja i uspješna upotreba e-učenja***

Jedan od načina da se odredi uspjeh ili neuspjeh učenja jest analiza ishoda učenja koje su studenti ostvarili. Ishode učenja ne može izmjeriti samo jedan faktor, poput iskustva učenja, nego se mjere pomoću nekoliko faktora – samomotivacije, stila učenja, mogućnosti, interakcije i povratnih informacija (Eom i sur., 2006; Suti i Sari, 2021). U prethodno provedenim istraživanjima također su analizirani potencijalni prediktori uspjeha e-učenja (Arbaugh i sur., 2009), koji uključuju faktore s utjecajem na ishode učenja, zadovoljstvo studenata i uspješno korištenje e-učenja u kontekstu asinhronoga *online* učenja (Peltier i sur., 2007; Marks i sur., 2005; Eom i sur., 2006). Sva su prethodna istraživanja empirijski ispitivala zadovoljstvo studenata i ishode učenja u *online* obrazovanju u školi ili na sveučilištu, kao determinante. Marks i sur. (2005) uočili su da je interakcija između nastavnika i studenata najvažnija determinanta. Ona je dvostruko važnija od međusobne interakcije između studenata. K tomu, neke su interakcije između studenata i obrazovnih sadržaja bile u značajnoj korelaciji s percipiranim učenjem. One su imale značajan utjecaj na ishode učenja i uspješnost svih korištenih medija za učenje.

## **Razvoj hipoteza**

### ***Povratne informacije studenata, percipirana lakoća korištenja i ishodi učenja***

Povratne informacije studenata o aspektima e-učenja utječu na odabir medija za učenje, učinkovitost učenja, lakoću učenja i ishode učenja. Dimenzija Povratne informacije studenata o korištenju medija za učenje ima istaknutu ulogu. Studenti daju pozitivne povratne informacije o e-učenju, uključujući užitek u tom procesu, dobrobiti te subjektivne standarde (Ashrafi i sur., 2020 i Arbaugh i sur., 2009), što je povezano s interesom studenata za i namjerom korištenja e-učenja i utječe na ishode učenja i percipiranu lakoću korištenja (Ghazal i sur., 2018 i Capraro i Baucum, 2021). Jedan od obrazovnih ciljeva svakako je i poboljšanje ostvarenih ishoda učenja studenata i

zadovoljstva u učenju. Pozitivne povratne informacije studenata utječu na učinkovit nastavak procesa poučavanja i učenja (npr. na laganu komunikaciju između studenata i nastavnika i međusobnu komunikaciju između studenata). Studentima čije su povratne informacije pozitivne uvijek će biti lako odraditi zadatke ili komunicirati s nastavnicima tijekom e-učenja. Sam pojam povratne informacije upućuje na prihvaćenost, užitak korištenja i održivost medija za učenje, a uključuje i lakoću korištenja. Neki autori (Marks i sur., 2005; Murphy, 2020) smatraju da povratne informacije, lakoća korištenja i ishodi učenja imaju jaku međusobnu korelaciju i da su od iznimne važnosti. Zaključak je ranije provedenih istraživanja da povratne informacije studenata utječu na lakoću korištenja e-učenja i da poboljšavaju ishode učenja (Goh i Yang, 2021; Ashrafi i sur., 2020; Meriem i Youssef, 2020; Bervell i Umar, 2017). Stoga se u ovome istraživanju predlaže sljedeća hipoteza:

H1 – Povratne informacije studenata imaju pozitivan utjecaj na percipiranu lakoću korištenja i ishode učenja.

### ***Iskustva studenata, percipirana lakoća korištenja i ishodi učenja***

Iskustva studenata tijekom e-učenja mjere se pomoću lakoće korištenja i ishoda učenja. Povezivanje iskustava studenata odnosi se na njihova iskustva u usvajanju znanja kroz *online* medije (opcije: sretno, teško, lagano). Iskustva studenata mogu odrediti uspješnu upotrebu e-učenja i učinkovit proces učenja (Kim i sur., 2022 i Aparico i sur., 2016). Tijekom interakcije studenti stvaraju osobna iskustva koja se povezuju i s osobnom motivacijom za prihvaćanje ili odbijanje prilike za *online* učenje (Vu i sur., 2022). Međutim, iskustva imaju i pozitivan utjecaj na psihološki aspekt kod studenata i povećavaju njihovu motivaciju za primjenu tehnologije u procesu učenja (Ülker, D. i Yılmaz, 2016; Yassin i sur., 2021). Iskustva se mogu odnositi i na to kako pojedinac doživljava određene vrijednosti, poput zanimanja za proces učenja. Osim toga, iskustva utječu na način na koji studenti percipiraju lakoću korištenja i ishode učenja (Radha i sur., 2020; Shearer i sur., 2019). Stoga se u ovome istraživanju predlaže sljedeća hipoteza:

H2 – Iskustva studenata imaju pozitivan utjecaj na percipiranu lakoću korištenja i ishode učenja.

### ***Percepcije studenata o lakoći korištenja i uspješnom korištenju e-učenja***

Lakoća korištenja e-učenja važan je aspekt u mjerenju uspješnosti procesa e-učenja kod studenata. Ona je važna i kod procjene dinamičnijih medija za učenje (Trombley i Lee, 2002). Lakoća korištenja znači da studenti mogu pristupiti raznovrsnim obrazovnim materijalima (tekstovima, slikama i audiozapisima, bilo gdje i u bilo koje vrijeme). Ona ima i pozitivan utjecaj na uspješnost korištenja e-učenja (Zhang i Zhou, 2003) jer su interakcije između nastavnika i studenata u procesu poučavanja i učenja učinkovite (nastavnici lako postavljaju i pregledavaju zadatke te ocjenjuju postignute ishode

učenja), a interakcija između studenata je isto brža. Zato lakoća korištenja e-učenja može poslužiti kao osnova i strategija za određivanje uspješnosti učenja i uspješnosti primjene medija za učenje tijekom e-učenja. Studenti također imaju pozitivne stavove u pozitivnim okolnostima koji se temelje na njihovim uvjerenjima. Nadalje, preliminarne studije pokazuju da način na koji studenti percipiraju lakoću korištenja ima važnu ulogu u uspješnoj upotrebi e-učenja (Ho Thao i sur., 2021). Prethodno navedeno dovelo je do stvaranja sljedeće hipoteze:

H3 – Način na koji studenti percipiraju lakoću korištenja ima pozitivan utjecaj na uspješnu upotrebu e-učenja.

### ***Ishodi učenja koje su studenti ostvarili i uspješna upotreba e-učenja***

Ishodi učenja koje su studenti ostvarili imaju važnu ulogu u određivanju obrazovnih ciljeva, jedan od kojih je i poboljšanje ostvarenih ishoda učenja. Uz to, ishodi učenja koje su studenti ostvarili usko su povezani s uspješnim korištenjem e-učenja (Hero i Lindfors, 2019; Nikou i Maslow, 2021). Uspješno korištenje e-učenja pozitivno će utjecati na ishode učenja i općenito na uspješnost e-učenja u budućnosti pa će imati i veliku važnost za napredak obrazovnoga procesa. No, ako se ostvarenost obrazovnih ishoda smanji, to će se odraziti na uspješno korištenje e-učenja, posebno tijekom pandemije bolesti COVID-19 (npr. neuspjeh u ostvarenju ishoda učenja i neuspjeh u korištenju e-učenja). Ovo istraživanje razmatra ulogu medijacije ishoda učenja pri ispitivanju njihove povezanosti s uspješnim korištenjem e-učenja. Razumijevanje važnosti ove medijacije vodi k boljoj kvaliteti inferencije, omogućava veću uspješnost u korištenju e-učenja te daje znatan doprinos ovome istraživanju. Predanost studenata ostvarivanju ishoda učenja usko je povezana s njihovim rezultatima i utječe na kasnije donošenje odluka (Hsin i Lin, 2018; Kim i sur., 2022; Meriem i Youssef, 2020). U jednoj je preliminarnoj studiji uočena jaka veza između iskustava studenata i ishoda učenja, što je utjecalo na uspješno korištenje e-učenja (Hainey i Baxter, 2022; Hsin i Lin, 2018; Jena, 2020). Stoga se u ovome istraživanju predlaže sljedeća hipoteza:

H4 – Ishodi učenja imaju pozitivan utjecaj na uspješno korištenje e-učenja.

## **Metodologija**

### ***Izrada ankete, pretest, pokusna istraživanja i analiza podataka***

Tvrdnje koje su korištene za mjerenje svakoga konstrukta prikazane su u Dodatku. Likertova skala od pet stupnjeva kretala se rasponu od 1 („uopće se ne slažem“) do 5 („u potpunosti se slažem“), a korištena je za sve tvrdnje u skali. U ovome je istraživanju analizirana kauzalna veza između varijabli pomoću kojih su se promatrala i potvrdile strukturne veze na temelju analizirane teorije (Byrne, 2016). U sličnome istraživanju korištene su tvrdnje koje su se mogle jako pouzdano i valjano izmjeriti, kako bi se povećalo razumijevanje kod studenata i smanjila odstupanja (Podsakoff i sur., 2003). Uzorak ispitanika sačinjavali su studenti iz Indonezije. Testiranje hipoteza provedeno



je pomoću primjene modela stukturane jednadžbe i računalnih programa AMOS i SPSS 22. Nakon toga, za analizu frekvencije distribucije uzoraka korištena je deskriptivna statistika. Nadalje, proveden je Pearsonov test korelacije kako bi se ispitala veza između prediktora (npr. povratne informacije studenata i njihovih iskustava) i kriterijskih varijabli (npr. uspješnoga korištenja e-učenja) koje su važne za provedbu e-učenja, a nakon toga provedena je standardna metoda varijance kako bi se u kasnijim fazama spriječila pristranost otkrivanja. Na kraju, za ispitivanje medijacijskoga i indirektnoga utjecaja medijatorskih varijabli korišten je Hayesov *bootstrap* proces.

### **Uzorak i prikupljanje podataka**

Studenti u Indoneziji popunili su *online* anketu u obliku Google Formsa u periodu između 1. travnja i 30. svibnja 2022. godine. Uzorak je odabran pomoću nasumičnoga prigodnog uzorkovanja od ukupno 747 studenata u Indoneziji. Međutim, 734 odgovora bilo je valjano, što čini stopu odgovora od 98,25 %. U Tablici 1 prikazani su demografski podatci ispitanika. Zbog tih je podataka odabrana Indonezija. Istraživanje potvrđuje vezu između percipirane lakoće korištenja, ishoda učenja i uspješnoga korištenja e-učenja.

### **Mjerenja**

Tvrđnje korištene u mjernom instrumentu prikazane su u Dodatku. Obuhvaćaju povratne informacije studenata (prilagođeno iz: Ho Thao i sur., 2020; Jiang i sur., 2010), iskustva studenata (prilagođeno iz: Ho Thao, 2020; Kim Sodam, 2022) percipiranu lakoću korištenja e-učenja (prilagođeno iz: Ho Thao, 2020; Patra, 2021), ishode učenja (Patra, 2021) te uspješno korištenje e-učenja (prilagođeno iz: Ho Thao, 2020; Patra, 2021).

*Slika 1*

## **Rezultati**

### **Pokusno istraživanje i deskriptivna statistika**

Pokusno istraživanje provedeno je s ciljem utvrđivanja valjanosti sadržaja i identiteta ispitanika. Pouzdanost tvrdnji izmjerena je pomoću Cronbachove alfe (Hair Jr i sur., 2019). Srednje razlike prikazane su s obzirom na standardne devijacije. Dakle, veličina učinka veća od 5 pokazuje da je srednja razlika ujedno jedna polovina vrijednosti standardne devijacije. Srednji rezultat dobiven za zavisnu varijablu (uspješno korištenje e-učenja) je iznad 3,00, dok je standardna devijacija iznad 0,70. To znači da, u prosjeku, povratne informacije studenata, iskustva studenata, percipirana lakoća korištenja, ishodi učenja i uspješno korištenje e-učenja imaju jaku korelaciju (Tablica 2). Uzorak se sastojao od 747 studenata. Međutim, odabrano je 734 ispitanika (98,25 %) (vidi Tablicu 1).

Tablica 1

### **Pearsonov koeficijent korelacije**

Pokusno istraživanje provedeno je s ciljem utvrđivanja valjanosti sadržaja i identiteta ispitanika. Pouzdanost tvrdnji izmjerena je pomoću Cronbachove alfe (Hair Jr i sur.,



2019). Srednje razlike prikazane su s obzirom na standardne devijacije. Dakle, veličina učinka veća od 3 pokazuje da je srednja razlika ujedno i jedna polovina vrijednosti standardne devijacije. Srednji rezultat dobiven za sve je iznad 5,00, dok je standardna devijacija ispod 1,00. To znači da sve promatrane varijable imaju jaku korelaciju (Tablica 2).

Tablica 2

### **Rezultat mjerenja**

Model strukturne jednadžbe korišten je za testiranje predloženoga modela i postavljenih hipoteza. Korišten je pristup koji se sastoji od dvije faze (Byrne, 2016; Hair Jr i sur., 2018). Prvo, model korišten za mjerenje temelji se na konfirmatornoj faktorskoj analizi, a pomoću njega mjerile su se pouzdanost i valjanost konstrukata. Strukturni model korišten je za testiranje jačine i smjera predloženih veza između konstrukata. Rezultati konfirmatorne faktorske analize za preostale 24 tvrdnje pokazali su da podatci imaju dobru prikladnost (vidi Dodatak).

### **Strukturni model**

Prikladnost modela za navedene podatke bila je odgovarajuća. Sažetak u Tablici 4 pokazuje pozitivnu i značajnu vezu između povratne informacije studenata i percipirane lakoće korištenja (0,514;  $p < 0,001$ ) i ishoda učenja (0,658;  $p < 0,001$ ) te tako potvrđuje H1 i H2. Slično tome, potvrđene su i H3 i H4, što znači da je utvrđena pozitivna veza između iskustava studenata i percipirane lakoće korištenja (0,643;  $p < 0,001$ ) i ishoda učenja (0,629;  $p < 0,001$ ). Nadalje, percipirana lakoća korištenja i ishodi učenja također imaju pozitivan utjecaj na uspješnost e-učenja (0,490;  $p < 0,001$ ; 0,694;  $p < 0,001$ ). Stoga su u ovome istraživanju potvrđene i H5 i H6. Na Slici 2 može se vidjeti korišteni strukturni model.

Tablica 4

Slika 2

### **Medijatorski učinak**

U ovome je istraživanju za potvrđivanje medijatorskih varijabli (npr. percipiranu lakoću korištenja i ishode učenja) korišten postupak koji je predložio Hayes (2018). Tablica 5 prikazuje medijatorsku analizu prema kojoj 95 % CI vrijednosti od svih testiranih indirektnih učinaka i djelomičnih uloga nije sadržavalo vrijednost nula. Zaključak je da povratne informacije studenata i iskustva studenata imaju značajan indirektni utjecaj na rezultate studenata u e-učenju s i bez medijatorskih varijabli (npr. percipirana lakoća korištenja i ishodi učenja).

Tablica 5

## Rasprava

### Ključni rezultati

Ovo istraživanje otkriva specifične faktore koji određuju povratne informacije studenata i njihova iskustva, što je jako važno za sektor obrazovanja. Obje ove prediktorske varijable imaju iznimno važnu ulogu u percipiranom korištenju i rezultatima učenja. To znači da dimenzija Povratne informacije studenata, uključujući i sustav za *online* učenje koji stvara privlačno okruženje za učenje, sadržaj i kvalitetu učenja u sklopu *online* kolegija tijekom pandemije bolesti COVID-19, ima jaku korelaciju s procesom i rezultatima učenja. Povratne informacije imaju pozitivan i značajan utjecaj na komunikaciju i obrasce interakcije između studenata te pozitivan utjecaj na jačanje psihološkoga aspekta kod studenata s obzirom na dostupne i relevantne obrazovne materijale. Štoviše, osobna iskustva studenata imaju važnu ulogu u predviđanju njihove percipirane lakoće korištenja sustava za e-učenje, kao što je sustav za *online* učenje koji je dovoljno koristan i praktičan da bi podržavao proces učenja i poboljšao rezultat i učinkovitost učenja. Osim toga, studenti će koristiti e-učenje zato što platforma podržava provedbu njihovih aktivnosti. Uz to što utječu na percepcije studenata o lakoći korištenja e-učenja i na ishode, ishodi učenja koje studenti ostvaruju također utječu na ishode učenja kroz podršku izvršavanju svih *online* aktivnosti, komunikaciju s nastavnicima i kolegama, pronalaženje odgovarajućih referenci i povećanu produktivnost. Ovaj rezultat potvrđuje rezultate preliminarnih studija (npr. Ashrafi i sur., 2020; Baxter i Hainey, 2022; Cohen, 2021; Eom i Ashill, 2016), u kojima se navodi da frekvencija procesa e-učenja ima pozitivan i značajan utjecaj na stvarna iskustva studenata i njihove prijedloge. Stoga to može pozitivno utjecati na etičan proces e-učenja kod studenata. Novija istraživanja pokazuju da su obrazovanje i tehnologija globalno zanimljive teme pa studentima i ostalim dionicima daju ideje o tome kako mogu poboljšati infrastrukturu obrazovanja i proces učenja.

Kao medijatorske varijable, percipirana lakoća korištenja i ishodi učenja imaju ključnu ulogu u medijaciji veze između povratne informacije studenata i njihovih iskustava i njihova načina korištenja e-učenja. To znači da sustav *online* učenja, sadržaj kolegija i kvaliteta procesa e-učenja igraju važnu ulogu u predviđanju aktivnosti studenata tijekom procesa učenja. On također posreduje i njihovu komunikaciju i interakciju, u *online* okruženju i izvan njega. Na taj se način olakšava njegova primjena. Možda bi se uspješno e-učenje moglo postići i pomoću aktivnosti učenja i poučavanja u *online* okruženju tijekom pandemije bolesti COVID-19 te isto tako i podržati autonomiju i fleksibilnost sustava za *online* učenje. Ovaj je rezultat u skladu s rezultatima ranije provedenih istraživanja koja su pokazala da percipirano korištenje i rezultati učenja imaju pozitivan i značajan utjecaj na proces e-učenja (Baucum i Capraro, 2021; Cao i sur., 2020; Nikou i Maslov, 2021; Patra i sur., 2021).

### Teorijske implikacije

Ovo istraživanje daje svoj doprinos literaturi iz nekoliko aspekata. Kao prvo, omogućava bolje znanje o tome kako se e-učenje koristi tijekom pandemije bolesti COVID-19 (npr.

pomoću povratnih informacija studenata i iskustva studenata), o uspješnom korištenju e-učenja kroz percipiranu lakoću korištenja te o ishodima učenja. Ovaj proces pokazuje jaku korelaciju između povratne informacije studenata, iskustava studenata, percipirane lakoće korištenja i ishoda učenja. Ima pozitivan utjecaj na uspješno korištenje e-učenja i na proces učenja tijekom pandemije bolesti COVID-19. Kao drugo, uočeno je da percipirana lakoća korištenja i ishodi učenja imaju medijatorsku ulogu u vezi između povratnih informacija studenata, iskustava studenata i uspješnoga korištenja e-učenja. Iako su ranije provedena istraživanja pokazala da povratne informacije studenata imaju pozitivan utjecaj na uspješno korištenje e-učenja, neki su aspekti proučavani odvojeno i nepotpuno. Uloga medijatorske varijable za uspješno korištenje e-učenja puno je veća nego prije, nakon što su percipirana lakoća korištenja i ishodi učenja detaljno razrađeni. To pokazuje važnost povratnih informacija studenata i njihovih iskustava u korištenju e-učenja jer oni mogu poslužiti kao reference u području obrazovanja i kao medij za učenje u budućnosti. Na kraju, ovo istraživanje podupire prijedlog za predviđanje faktora (npr. povratne informacije studenata, iskustva studenata i uspješno korištenje e-učenja) koji utječu na uspješnost procesa učenja.

### **Implikacije za nadležne institucije**

U novijim se istraživanjima navodi da bi akademska zajednica i nadležne institucije trebale imati detaljan uvid u okolnosti u kojima studenti žive (kroz njihove povratne informacije, iskustva, uspjeh i uvjete života) kada koriste *online* učenje. Rezultati nedavno provedenih istraživanja odredit će budućnost učenja. U obrazovnom kontekstu, rezultati ovoga istraživanja omogućavaju analizu nekoliko primjera, poput povratnih informacija i iskustava studenata koji su u skladu s ciljevima učenja (npr. zadovoljstvo, uгода i uspješno korištenje e-učenja u procesu učenja). Lakoća koju studenti osjećaju te ishodi učenja omogućili su im uspješno korištenje e-učenja, posebno tijekom pandemije. Ne samo da su uspješno koristili e-učenje, nego su stekli ugodna iskustva koja su pozitivno utjecala na ishode učenje.

Rezultati ovoga istraživanja imaju nekoliko implikacija za nadležne institucije. Uspjeh u e-učenju i proces učenja studenatima olakšavaju korištenje e-učenja i rezultiraju boljim ishodima učenja. Nadležne institucije moraju implementirati medije za *online* učenje, kako u normalnim, tako i u izvanrednim okolnostima, poput pandemije bolesti COVID-19. Mediji za *online* učenje imaju važnu ulogu u uspješnom učenju, uzimajući u obzir činjenicu da gotovo svi studenti provode vrijeme ispred ekrana svojih mobitela. To je u jakoj korelaciji s navikama studenata pri korištenju *online* medija i njihovom percipiranom ugodom. Uloga percipirane lakoće korištenja i ishoda učenja kao medijatora između povratne informacije studenata, iskustava studenata i uspješnoga korištenja e-učenja pokazuje da je studentima lakše koristiti e-učenje u procesu učenja jer postižu bolje ishode učenja. Osim toga, studenti stječu ugodnija iskustva i daju pozitivne povratne informacije. Drugim riječima, pozitivne povratne informacije i iskustva studenata (poput lakoće korištenja e-učenja, brzih odgovora te

praktičnosti) povećavaju njihov interes za korištenje e-učenja u procesu učenja (poput interakcije između studenata i nastavnika, traženja referenci, slanja zadataka itd.), za proces poučavanja i učenja, razmjenu mišljenja i aktivnosti učenja.

Ovi rezultati upućuju na to da bi pozitivne povratne informacije i iskustva studenata trebalo i dalje uvažavati. Na ishode učenja koje studenti postižu utječu ugodna iskustva stečena korištenjem e-učenja i percipirana lakoća korištenja. Stoga bi kurikulum trebao obuhvatiti medije za *online* učenje u svim vrstama učenja, u bilo kakvim okolnostima. U obrazovnom okružju u kojemu se kurikulum provodi mora se voditi računa o tome da svi studenti budu upoznati s korištenjem medija za *online* učenje i da imaju potrebna znanja o tome. S druge strane, studenti moraju polako primjenjivati *online* učenje u procesu učenja u školi i kod kuće (kada rade domaće zadaće). Isto tako, studenti kojima je korištenje medija za *online* učenje dosadno ili nisu posebno zainteresirani za njih, mogu isprobati neke druge medije za *online* učenje. Odluka o provedbi *online* učenja kod njih može uzrokovati ozbiljne probleme i nameće im teret u procesu učenja. U tom slučaju, obrazovno okružje ima važnu ulogu tako što će im taj proces olakšati jasno navodeći ono što stoji u kurikulumu. Uloga ministra obrazovanja i njegova osoblja, uključujući nastavnike i roditelje, jest da nadzire aktivnosti studenata kada koriste medije za *online* učenje. To je jako bitno za rješavanje problema u području obrazovanja, kao što je način na koji studenti shvaćaju upotrebu e-učenja, posebno u izvanrednim okolnostima. Osim toga, opsežne metode i mehanizmi koje je lako razumjeti važni su faktori koji mogu povećati uspjeh u korištenju e-učenja. Studenti su u *sretnom* stanju i daju pozitivne povratne informacije o upotrebi medija za *online* učenje.

### **Ograničenja istraživanja i upute za buduća istraživanja**

Postoji nekoliko ograničenja ovoga istraživanja. Kao prvo, provedeno je u području obrazovanja i medija za *online* učenje tijekom pandemije bolesti COVID-19 pa se zato rezultati ne bi trebali generalizirati. U buduća bi se istraživanja trebalo uključiti i različita uvjerenja, veće uzorke ispitanika, druge regije i geografska područja jer bi se tako mogli izvesti bolji zaključci. Nadalje, u istraživanju se koriste samo dva medijatora: percipirana lakoća korištenja i ishodi učenja. U budućim bi se istraživanjima trebali dodati medijatori iz nekih drugih perspektiva i ispitati problemi koji se javljaju u *online* učenju. Osim toga, mora se voditi računa o tome da studenti mogu koristiti e-učenje u pogodnom okružju te postići bolje ishode učenja. Na kraju, iako je većina hipoteza predloženih u ovome istraživanju potvrđena, one su ograničene na povratne informacije studenata, iskustva studenata, percipiranu lakoću korištenja, ishode učenja, uspješno korištenje e-učenja te interes za preliminarna istraživanja.

### **Zaključak**

Obrazovanje i iskustvo mogu izgraditi kulturološki i psihološki konstrukt koji treba češće ispitati u obrazovnim istraživanjima. Razlog tomu je što obrazovanje zahtijeva kombinaciju specifičnih vještina kako bi se prikupili podatci i kako bi se pomoglo

razvoju tehnologije. Zato ovo istraživanje predstavlja jedno od prvih istraživanja koja ispituju korelaciju između iskustava studenata i percipirane obrazovne infrastrukture. I nadležna tijela i oni koji provode nastavni proces morali bi surađivati i educirati studente o razvoju kvalitete. To je bitno zato što proces učenja zahtijeva kombinaciju specifičnih vještina i znanja (npr. komunikacija i interakcija) te razvoj tehnologije kako bi se došlo do pouzdanih informacija i obrazovnih materijala i referenci. Zbog toga je ovo istraživanje jedno od prvih istraživanja koja istražuju povratne informacije studenata i njihova iskustva kao prediktore percipirane lakoće korištenja i ishoda učenja. Ona imaju različite uloge kroz koje utječu na stavove i ponašanja studenata, poput reakcija na ograničenja u procesu učenja tijekom pandemije bolesti COVID-19. Ovo istraživanje pokazuje da su sudionici s jako pozitivnim povratnim informacijama i iskustvima više svjesni potrebe traženja pouzdanih informacija i znanja. Proces e-učenja vjerojatno studentima olakšava traženje informacija i znanja s različitim svrhom i na različite načine. Ako studenti koji traže informacije mogu aktivnije sudjelovati u virtualnim zajednicama i u specifičnom kontekstu, osjetit će utjecaj faktora kvalitete na komunikaciju i interakciju. Zbog toga će moći samostalno tražiti pouzdane informacije, što će utemeljiti put prema krajnjem uspjehu učenja u virtualnom okružju (tj. e-učenja).

## Dodatak

### **Povratne informacije studenata** (Ho Thao, N.T. i sur., 2020; Jiang i sur., 2010)

1. Sustav za *online* učenje predstavlja privlačno okružje za učenje.
2. Trenutačni sadržaj kolegija je modificiran kako bi odgovarao *online* učenju tijekom pandemije bolesti COVID-19.
3. Korištenje sustava za *online* učenje tijekom pandemije bolesti COVID-19 je dobra ideja.
4. Mislim da bih trebao/trebala učiti u *online* obliku tijekom pandemije bolesti COVID-19.
5. Nastavu u kojoj se obrađuje novi sadržaj u *online* kolegiju tijekom pandemije bolesti COVID-19 lako je razumjeti.
6. Praćenje kolegija u sustavu e-učenja vrijedno mi je iskustvo.

### **Iskustva studenata** (Ho Thao, N.T. i sur., 2020; Kim Sodam i sur., 2022)

1. Smatram da je sustav za *online* učenje koristan i praktičan u učenju tijekom pandemije bolesti COVID-19.
2. Korištenje sustava za *online* učenje unaprjeđuje moje rezultate učenja tijekom pandemije bolesti COVID-19.
3. Korištenje sustava za *online* učenje unaprjeđuje moju učinkovitost u učenju tijekom pandemije bolesti COVID-19.

4. Sustav e-učenja dobro je organiziran i mogu lako pronaći sve što mi je potrebno.
5. Općenito gledajući, volim koristiti sustav za *online* učenje tijekom pandemije bolesti COVID-19.

**Lakoća korištenja e-učenja** (Ho Thao, N.T. i sur., 2020; Patra, S.K. i sur., 2021)

1. Komunikacijski alati u sustavu za *online* učenje su učinkoviti.
2. E-učenje je lakše koristiti nego direktno/*offline* učenje.
3. Interakcija sa sustavom za *online* učenje ne zahtijeva moj veliki mentalni napor.
4. E-učenje omogućava pristup materijalima u bilo koje vrijeme i na bilo kojem mjestu.

**Ishodi učenja** (Ho Thao, N.T. i sur., 2020; Patra, S.K. i sur., 2021)

1. Mogao/mogla bih dovršiti sve svoje aktivnosti putem sustava za *online* učenje da sam prvo vidio/vidjela nekoga drugog kako taj sustav koristi.
2. Sustav za *online* učenje omogućava interaktivnu komunikaciju između predavača i studenata.
3. E-učenje olakšava mi nalaženje referenci i pisanje zadaće.
4. Sve dok koristim e-učenje, moji se ishodi učenja popravljaju.
5. E-učenje povećava produktivnost, a pogotovo ishode učenja.

**Uspješno korištenje e-učenja** (Ho Thao, N.T. i sur., 2020; Patra, S.K. i sur., 2021)

1. Aktivnosti učenja i poučavanja u *online* kolegiju tijekom pandemije bolesti COVID-19 su odgovarajuće i prikladne.
2. Korištenje sustava za *online* učenje daje mi veću autonomiju i fleksibilnost učenja tijekom pandemije bolesti COVID-19.
3. Mogu uložiti dovoljan napor u korištenje sustava za e-učenje.
4. Korištenje e-učenja čini proces učenja lakšim.