

# DETERMINANTS OF E-LEARNING ADOPTION BY THE STUDENT IN ALGERIA: A Structural Equation Modelling Approach

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**ABSTRACT.** Although previous studies have confirmed the importance of e-learning systems for both students and teachers, the level of adoption of such systems in Algeria is still low. This paper aims to determine the factors influencing the adoption and use of e-learning by Algerian students. A theoretical model was proposed based on the Unified Theory of Acceptance and Use of Technology and the Technology Acceptance Model. To assess the proposed model, a survey was conducted on 300 students in Algeria, and the data were analyzed using structural equation modeling. In the end, the findings indicate that perceived usefulness and perceived ease of use significantly positively influence behavioral intention. In turn, behavioral intention influences e-learning adoption. The results also emphasize how facilitating conditions have a strong and significant impact on the adoption of e-learning. Overall, the findings shed light on the factors that influence Algerian students' adoption of e-learning, providing clear benefits to universities in their efforts to improve their e-learning systems and student satisfaction.

**KEYWORDS:** E-LEARNING, TECHNOLOGY ACCEPTANCE MODEL, STRUCTURAL EQUATION MODELING, STUDENT, ALGERIA

## INTRODUCTION

The rapid growth of information technology (IT) and the usage of innovative technologies has resulted in new modes of learning and teaching. E-learning is becoming common in today's classrooms. According to El-Hussein and Cronje,<sup>1</sup>

e-learning is the application of wireless technology and portable mobile devices' ubiquitous communication capabilities and user-friendly interfaces in formal learning processes.

E-learning offers various benefits for the student; it enables students to continue their academic activities and obtain crucial information

<sup>1</sup> El-Hussein, M. O. M., Cronje, J. C. (2010). Defining mobile learning in the higher education landscape.

without being constrained by space or time.<sup>2</sup> Moreover, the e-learning system is important in educational places for distance education; students can retain the educational information and materials well while saving a lot of time compared to traditional face-to-face learning.<sup>3</sup>

Despite its potential benefits, e-learning is still a major challenge since technology for learning may be badly embraced, terminated, or refused by learners.<sup>4</sup> Thus, the adoption of e-learning remains an interesting topic for researchers.<sup>5</sup>

In Algeria, the country worked to digitize the higher education sector by providing educational digital platforms and platforms such as the Moodle platform and the Progress platform to keep pace with global trends and improve the educational process. However, despite the advantages offered by the distance education process to students, Algerian e-learning adoption is still in its early stages. Therefore, it would seem beneficial to comprehend the key elements affecting students' adoption and utilization of online learning.

Many researchers attempted to determine the factors affecting e-learning adoption and use based on theories and models of technology acceptance, such as the unified theory of acceptance and use of technology (UTAUT) and the technology acceptance model (TAM). Their findings demonstrate various factors explaining the higher rate of e-learning adoption, including facilitating conditions,<sup>6</sup> perceived ease of use, and

perceived usefulness.<sup>7</sup> However, there is no universal agreement on the factors that influence e-learning adoption, and the findings differ depending on context, place, and time. Furthermore, the question has not been extensively examined in the context of Algeria. Thus, this paper aims to investigate the crucial factors affecting e-learning adoption by students in Algeria.

For this paper, the following research question was addressed:

### **What are the factors influencing the adoption of e-learning by students in Algeria?**

The remainder of this paper is presented as follows: Section one presents the literature review. Section two proposes the conceptual framework. Section three explains the research methodology of the study. Section four presents the results. Section five discusses the results and provides the academic and managerial Implications. Finally, section six concludes our work.

## **LITERATURE REVIEW**

E-learning, additionally referred to as electronic learning or online learning, is the utilization of electronic technology as well as digital media to enhance education and learning. It includes the sharing of educational content, resources, and interactive activities through various digital platforms, such as computers, mobile devices, and the Internet. In e-learning, learners can access educational materials, participate in online courses, interact with instructors and peers, complete assessments, and receive feedback using digital tools and technologies. E-learning provides flexibility in terms of time and location, allowing learners to engage in educational activities at their own pace and from anywhere with an internet connection.<sup>8</sup>

2 Hunde, M. K., Demsash, A. W., Walle, A. D. (2023). Behavioral intention to use e-learning and its associated factors among health science students in Mettu University, southwest Ethiopia: Using modified UTAUT model. *Informatics in Medicine Unlocked*, 36, 105.

3 Alassafi, M. O. (2022). E-learning intention material using TAM: A case study. *Materials Today: Proceedings*, 61, 875.

4 Mehta, A., Morris, N. P., Swinnerton, B., Homer, M. (2019). The influence of values on E-learning adoption. *Computers & Education*, 141, 113.

5 Zhu, M., Sari, A., Lee, M. M. (2018). A systematic review of research methods and topics of the empirical MOOC literature (2014–2016). *The Internet and Higher Education*, 37, 35.

6 Alfalah, A. A. (2023). Factors influencing students' adoption and use of mobile learning management systems (m-LMSs): A quantitative study of Saudi Arabia. *International Journal of Information Management Data Insights*, 3(1), 120.

7 Alassafi, M. O. (2022). E-learning intention material using TAM: A case study. *Materials Today: Proceedings*, 61, 875.

8 Dinh, L. P., Nguyen, T. T. (2023). Convenient and comfortable, yet limited in many ways: advantages and disadvantages of online learning during the COVID-19 pandemic from perspectives of social work students in Vietnam. *Asia Pacific Journal of Social Work and Development*, 33(3), 196.

The concept of e-learning encompasses a wide range of approaches and technologies, including online courses, virtual classrooms, educational apps, multimedia resources, simulations, gamified learning experiences, and learning management systems (LMS) that facilitate course administration and delivery.<sup>9</sup>

E-learning offers several advantages, such as accessibility, convenience, self-paced learning, personalized instruction, and the ability to reach a global audience. It is used in various educational settings, including schools, universities, professional training programs, and lifelong learning initiatives. In addition, e-learning platforms often facilitate communication and collaboration among learners. Discussion forums, chat features, and collaborative tools enable learners to connect with peers, engage in group projects, and share knowledge and experiences. This fosters a sense of community and encourages peer learning.<sup>10</sup>

Based on the technology acceptance theories, several researchers have tried to examine the factors affecting the adoption and use of e-learning, in the first study, Abdullah and Ward<sup>11</sup> investigated the effect of TAM variables in the context of the adoption of e-learning and performed a quantitative meta-analysis of 107 papers. The findings indicated that computer anxiety, self-efficacy, and experience are the most important factors affecting perceived ease of use and perceived usefulness of e-learning adoption. In the second study, Jameel et al.<sup>12</sup> examine the factors that affect the

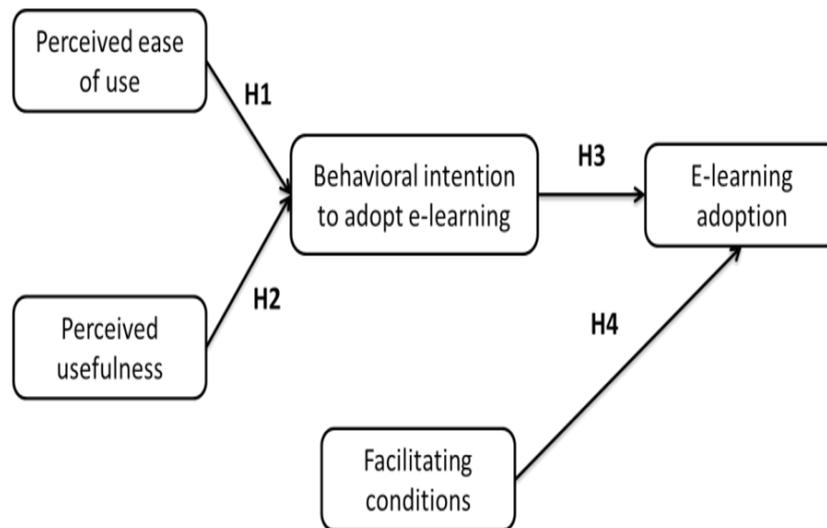
intention to use e-learning in Iraq based on the UTAUT. The data of 187 responses were analyzed using the structural equation modeling. The results found that performance expectancy, effort expectancy, and facilitating conditions raised the willingness to use e-learning and had a significant and positive effect on the intention to use e-learning. In another study, Twum et al.<sup>13</sup> explored the factors that influence the intention to use E-learning during the COVID-19 pandemic using the unified theory of acceptance and use of technology 2. The data were collected from 617 university students and were analyzed using partial least squares structural equation modeling. The results indicated that personal innovativeness, perceived financial cost, performance expectancy, and hedonic motivation have a significant impact on behavioral intention to use E-learning. Finally, Hunde et al.<sup>14</sup> examined the factors affecting students' behavioral intention to use e-learning in Ethiopia. Structural equation modeling analyses were used on 637 responses from health science students to test the hypotheses. The findings showed that effort expectancy and facilitating conditions have a significant impact on the behavioral intention to use e-learning by the student.

In the end, and even if these studies provide some understanding of the interactions that can occur between students and their e-learning acceptance and use, there is still some knowledge gap in developing countries, and it seems essential to conduct more studies. Indeed, little research exists regarding the adoption of e-learning in North African or Middle Eastern nations, including Algeria.

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FIGURE 1. RESEARCH MODEL



### CONCEPTUAL MODEL

To determine the factors that influence Algerian students' acceptance of e-learning, an integrated conceptual model based on the TAM and the UTAUT was constructed (see Figure 1).

Over the past two decades, the TAM was most commonly utilized by information technology researchers and had accumulated large empirical support.<sup>15</sup> Therefore, the research model proposed in this study contains all factors adopted by TAM. Nevertheless, this model ignores several crucial theoretical constructs, and it does not reflect the variety of user constraints.<sup>16</sup> Then, we based on UTAUT in addition to the TAM, Therefore, we adopt the facilitating conditions from the UTAUT.

#### Perceived Ease of Use

Perceived Ease of Use (PEOU): The extent to which an individual perceives that using technology is easy and needs the least effort.<sup>17</sup> In the con-

text of e-learning, perceived ease of use relates to how learners believe the user interface and overall usability of e-learning platforms.<sup>18</sup> Previous studies have found that perceived ease of use has a significant effect on consumers' intention to use and adopt e-learning.<sup>19</sup> Consequently, the first hypothesis is as follows:

H1: Perceived ease of use positively influences behavioral intention to adopt e-learning.

#### Perceived Usefulness:

Perceived Usefulness (PU) is the level to which a person believes that utilizing new technology would improve their efficiency and performance.<sup>20</sup> In the e-learning area, PU describes how learners believe e-learning resources and platforms can contribute to their learning outcomes, such as improving knowledge acquisition or skills development. Several studies<sup>21</sup> indicated that PU posi-

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16 Olushola, T., Abiola, J. O. (2017). The efficacy of technology acceptance model: A review of applicable theoretical models in information technology researches. *Journal of research in business and management*, 4(11), 76.

17 Davis, F. D. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 984, 995.

18 Bailey, D. R., Almusharraf, N., Almusharraf, A. (2022). Video conferencing in the e-learning context: explaining learning outcome with the technology acceptance model. *Education and Information Technologies*, 27(6), 7685.

19 Humida, T., Al Mamun, M. H., Keikhosrokiani, P. (2022). Predicting behavioral intention to use e-learning system: A case study in Begum Rokeya University, Rangpur, Bangladesh. *Education and information technologies*, 27(2), 2256.

20 Davis, F. D. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35 (8), 996.

21 Revyathi, A., Tselios, N. (2019). Extension of technology acceptance model by using system usability scale

TABLE 1. MEASUREMENT SCALES

FACTOR	NUMBER OF QUESTIONS
E-learning adoption	3 items
Behavioural intention to adopt e-learning	3 items
Perceived ease of use	4 items
Perceived usefulness	3 items
Facilitating conditions	3 items

tively affects behavior intention to use e-learning. Thus, the second hypothesis is:

H2: Perceived usefulness positively influences behavioral intention to adopt e-learning.

**Behavioural Intention to Adopt e-learning:**

According to Davis et al.<sup>22</sup>, behavioral intention (BI) is a measure of a person’s readiness to adopt new technologies. Theories and models of technology acceptance found that intention is the most powerful influencing factor in the adoption of technology.<sup>23</sup> E-learning prior studies cite behavioral intention as a key factor influencing the adoption of e-learning. As a result, this research puts forth the following hypothesis:

H3. The behavioral intention will positively influence students’ adoption of e-learning.

**Facilitating Conditions:**

Facilitating Conditions (FC) represents a measure of which individuals think that the required resources, support, and infrastructure are available to enable the use of technology.<sup>24</sup> According to prior studies, FC provides an important influence in the adoption of e-learning.<sup>25</sup> Therefore,

the fourth hypothesis is formulated as follows:

H4. Facilitating conditions will positively influence students’ e-learning adoption.

**Methods and Materials**

The empirical study was conducted on a sample of the students in Algeria. The survey method was used to test the hypotheses because it is the most common method of collecting data on constructs connected with behavioral theories.

Regarding the measurement, as shown in Table 1, the instruments (items) were derived from previous research,<sup>26</sup> and their reliability and validity have been proven. Items in this paper were rated using a 5-point Likert scale. (1=strongly disagreed; 5=strongly agreed) (see Table 1).

This study’s hypotheses were investigated using Covariance-Based Structural Equation Modeling (CB-SEM). The data analysis was completed in two stages. The first stage entailed conducting a reliability and validity analysis with SPSS (version 22) to determine the stability and consistency of the assessed items. The second phase was testing the study assumptions using AMOS (version 22).

**Sample Characteristics**

A total of Three hundred (300) valid questionnaires were collected. Table 2 shows that respondents consisted of 174 males (58%) and 126 females (42%). Their age ranged from 19 to more than 29 years, with 55.3% being 19-24 years and 42% being 25-29 years (see Table 2).

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24 Ali, M., Raza, S. A., Qazi, W., Puah, C. H. (2018). Assessing e-learning system in higher education institutes: Evidence from structural equation modeling. *Interactive Technology and Smart Education*, 15(1), 67.

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**TABLE 2. DEMOGRAPHIC ANALYSIS**

VARIABLE	RESPONSE'S CHOICE	FREQUENCY	PER CENT
Gender	Male	174	58%
	Female	126	42%
Age	19-24 years	166	55.3%
	25-29 years	126	42%
	25+ years	8	2.7%

**RESULTS**

**The Measurement Model**

To examine the reliability and validity of the items, the constructs were assessed using Cronbach’s alpha. According to Table 3’s findings, all of the variables have values higher than the 0.70 cut-off point.<sup>27</sup> This shows a sufficient level of internal consistency in the measurement model.

We conducted a confirmatory factor analysis (CFA) to ensure sufficient levels of construct validity, reliability, and model fitness. Table 3 illustrates that all factor loading values ( $\lambda$ ), which ranged from 0.71 to 0.97, are significant and above the suggested criterion of 0.50.<sup>28</sup>

**Structural Model**

**Goodness-Of-Fit Indicators**

The values of the goodness of fit indices in Table 4 appeared that the structural model is an excellent fit for the data (Hair et al. 2010, 96) [35].

**TABLE 3. RELIABILITY AND VALIDITY TEST**

VARIABLE	NOTATION	ITEMS	$\lambda$	(A) CRONBACH
e-learning adoption	Adoption	A1	0.92	0.938
		A2	0.95	
		A3	0.84	
Behavioural intention	BI	BI1	0.96	0.944
		BI2	0.97	
		BI3	0.84	
Perceived ease of use	PEU	PEU1	0.71	0.863
		PEU2	0.77	
		PEU3	0.90	
		PEU4	0.77	

Perceived usefulness	PU	PU1	0.85	0.910
		PU2	0.88	
		PU3	0.91	
Facilitating conditions	FC	FC1	0.83	0.891
		FC2	0.89	
		FC3	0.84	

**Source: Prepared by researcher based on the outputs of AMOS and SPSS**

Table 4. Goodness-of-Fit Indicators

INDICATOR	VALUE
RMSEA	0.07
IFI	0.94
RFI	0.91
CFI	0.94
TLI	0.92
NFI	0.92
CMIN/DF	2.15

Source: Prepared by researcher based on the outputs of AMOS

**Coefficient of Determination (R2):**

The research yielded highly satisfactory R2 values for the endogenous components. To be precise, Table 5 estimates this coefficient as follows: 42.3% for e-learning adoption and 40.5% for behavioral intention.

**TABLE 5. COEFFICIENT OF DETERMINATION (R2)**

CONSTRUCT	R SQUARE
Adoption	0.405
BI	0.423

Source: Prepared by researcher based on the outputs of AMOS

**Hypothesis Test:**

Figure 2 and Table 6 indicate the findings of the structural equation analysis. The results validate the positive impact of perceived usefulness and perceived ease of use on behavioral intention to use and adopt e-learning ( $\beta=0.0.326$ ,  $p<0.001$ ;  $\beta=0.538$ ,  $p<0.001$ ). Therefore, H1 and H2 are supported. In addition, behavioral intentions ( $\beta=0.481$ ,

27 Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford publications, 105.

28 Black, W. C., Babin, B. J., Anderson, R. E. (2010). *Multivariate data analysis: A global perspective*. Pearson, 115.

$p < 0.001$ ) and facilitating conditions ( $\beta = 0.373$ ,  $p < 0.001$ ) have both a significant and positive influence on the adoption of e-learning. Therefore, H3 and H4 are supported.

**TABLE 6. STRUCTURAL MODEL RESULTS AND HYPOTHESIS TESTING**

HYPOTHESIS	ESTIMATE	SE	CR	INFERENCE
H1: PEU → BI	0.326***	0.073	4.461	Supported
H2: PU → BI	0.538***	0.085	6.295	Supported
H3: BI → Adoption	0.481***	0.051	9.359	Supported
H4: FC → Adoption	0.373***	0.051	7.365	Supported
*** $p < 0.001$				

Source: Prepared by researcher based on the outputs of AMOS

See Figure 2.

**DISCUSSION**

To identify the factors affecting students' use and adoption of e-learning in Algeria, we suggested a research framework that combined TAM

components (PEOU, PU, and BI) with FC from the UTAUT element. Four hypotheses were addressed by this model. We used the questionnaire-based survey approach and the CB-SEM method of data analysis to test the suggested model and hypotheses.

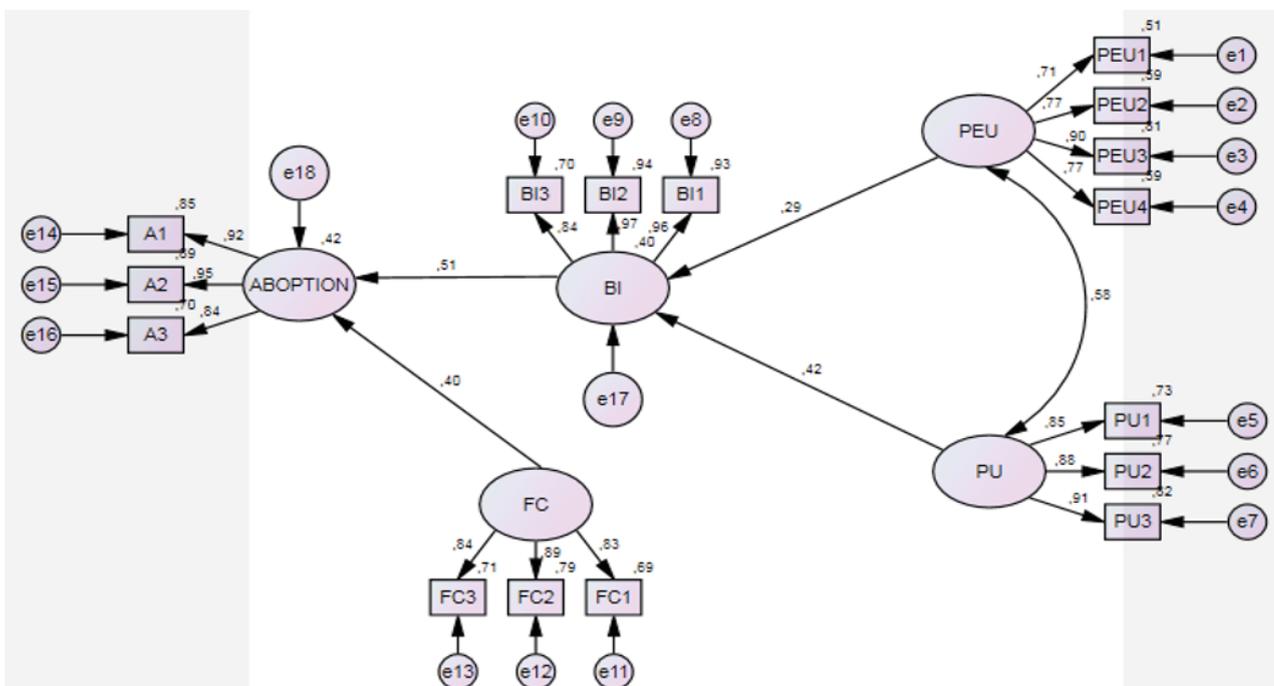
First, the study's findings provide strong support for our hypothesis; the R square of 40.5% was higher than the suggested threshold of 40%.<sup>29</sup> This indicates that the model has a high predictive value and considerable explanatory power. We have been able to improve the TAM model's prediction capacity by using FC. According to a study by Mubuke et al.,<sup>30</sup> 48.6% of the variation in the use of e-learning was explained by conducive conditions.

Second, the results also indicate that PU and PEOU are positively associated with behavioral intention to adopt e-learning. Thus, as long as

29 Straub, D., Boudreau, M. C., Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association for Information Systems*, 13(1), 36.

30 Mubuke, F., Kutosi Masaba, A., Ogenmungu, C., Mayoka Kituyi, G. (2017). Examining the Effect of Facilitating Conditions as an imperative input in enhancing the intention to use Mobile Learning systems in Universities, 341.

**FIGURE 2. STRUCTURAL MODEL**



individuals perceive that the use of e-learning platforms is free of effort and facilitates their studies, their intention to use and adopt e-learning is increased. Therefore, the findings validated our original relationship with the TAM. This is consistent with the literature regarding e-learning adoption.<sup>31,32</sup>

Finally, the findings found that behavioral intention and facilitating conditions determine the adoption of e-learning. This suggests that students will use and adopt e-learning if they desire to use these technologies and believe that the resources and support services are available. These findings are consistent with the overall literature on technology adoption,<sup>33</sup> in which behavioral intention and conducive conditions have always been important determinants in the acceptance of technological advancements. The findings are also consistent with earlier e-learning research.<sup>34</sup>

### Academic Implications

This study makes significant scholarly contributions to the body of knowledge regarding the acceptance and use of technology. First, it examined the factors that influence e-learning in Algeria using the TAM and UTAUT models, which were established in Western culture, to explain a similar behavior in a non-western (Arabic) culture and confirm and extend the results of Mailizar et al.<sup>35</sup> to the case of e-learning. As a result, the

study adds to the contextual implications of the TAM and UTAUT models used in Algeria, a developing country case study. In the Algerian context, there are a limited number of e-learning adoption studies. The findings of this study will contribute to a general understanding of the factors that affect the adoption and use of e-learning in Algeria. Second, the study used the models and theories, which were created in an organizational context, to study an individual user behavior type (e-learning).

### Managerial Implications

This study presents several managerial implications for fostering a stronger relationship between universities and e-learning users. One key finding is the exploration of students' adoption of e-learning. Understanding their behavior toward e-learning use can assist universities in crafting strategies that encourage engagement with these platforms. Specifically, Algerian universities can leverage these insights to enhance the promotion of e-learning initiatives. The study highlights that perceived ease of use and perceived usefulness are critical factors influencing e-learning adoption in Algeria. To increase adoption rates, universities should design user-friendly e-learning platforms and provide clear instructions for their use. Moreover, creating compelling promotional campaigns that emphasize the benefits and opportunities offered by e-learning can motivate students to explore these platforms further. Additionally, the research reveals that facilitating conditions significantly impact e-learning adoption, underscoring the need for robust support resources and accessible services. Therefore, improving the infrastructure, such as enhancing internet access and ensuring smooth connectivity, is essential for Algerian universities aiming to attract more students to e-learning platforms.

### CONCLUSION

This study examines the key factors influencing students' adoption and use of e-learning in Algeria. A research model was created by integrating

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- 31 Revythi, A., Tselios, N. (2019). Extension of technology acceptance model by using system usability scale to assess behavioral intention to use e-learning. *Education and Information Technologies*, 24, 2350.
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- 34 Alblooshi, S., Abdul Hamid, N. A. B. (2021). The role of the unified theory of acceptance and use of technology in e-learning adoption in higher education institutions in the UAE. *IBIMA Business Review*, 1(26), 12.
- 35 Mailizar, M., Burg, D., Maulina, S. (2021). Examining university students' behavioral intention to use e-learning during the COVID-19 pandemic: An

elements from both the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). To test the proposed hypotheses, a survey involving 300 Algerian students was conducted, and the data were analyzed using structural equation modeling. The re-

sults showed that students' behavioral intention to adopt e-learning is significantly and positively influenced by perceived usefulness and ease of use. Additionally, both behavioral intention and facilitating conditions play a crucial role in shaping e-learning adoption and usage.

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