



## Employing Technology Adoption like Google Applications to Enhance E-learning in Iraqi Universities

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### ABSTRACT

**Purpose:** The present research examines the impact of perceived usefulness and perceived ease of use of Google application on the e-learning of the higher educational institutions in Iraq. The research also investigates the mediating role of behavioral intention among the perceived usefulness, perceived ease of use of Google application and e-learning of the higher educational institutions in Iraq. **Design / methodology / approach:** The study employed the survey questionnaires to gather the data from the selected students and also applied the SPSS-AMOS to analyze the data. The results indicated that the perceived usefulness and perceived ease of use of Google application have a positive linkage with e-learning of the higher educational institutions in Iraq.

**Findings:** The outcomes also revealed that the behavioral intention significantly mediates among perceived usefulness, perceived ease of use of Google application and e-learning of the higher educational institutions in Iraq. **Practical implications:** The research guides the regulators in making regulations related to the e-learning by developing interest among students regarding the using of Google application. The research guides the regulators in making regulations related to the e-learning by developing interest among students regarding the using of Google application. **Originality/value:** Recently, technology adoption has become the foremost element for the success of the organizational all around the globe and this aspect requires the researchers and policymakers emphasis. Hence, the research examines the impact of perceived usefulness and perceived ease of use of Google application on the e-learning.

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## Introduction

Incorporating technological techniques, such as Google applications, into educational institutions efficiently supports and improves E-Learning. Google provides various applications that can facilitate various E-Learning aspects, such as collaboration, content, and communication. The accessibility of Google applications is advantageous to the E-learning process. Google applications are cloud-based and can be accessed from any internet-connected device (Naim, 2021). This enables students to access course materials, communicate with instructors, and collaborate with peers regardless of location. The Internet is becoming an increasingly important means of providing access to learning and knowledge resources in the current era. E-Learning is the application of communication technologies to facilitate online instruction or learning resources. E-learning provides learning opportunities enabled by electronics and facilitated by digital technologies (Widodo & Slamet, 2020). Different E-Learning implementations include online distance learning, distributed learning, and hybrid learning. The use of communication and information technologies in the diverse education system enhances and supports learning in higher education institutions, and implements digital technologies as a supplement to the conventional learning process, according to previous research. This creative and innovative learning environment, centered on electronic networks, has enabled learners, particularly institutes, to receive individualized support and learning schedules that are distinct from those of others and better suited to their needs. This facilitates and encourages greater collaboration and interaction among peers, instructors, and teachers than the conventional method of education. E-Learning using multimedia constructs makes learning more engaging, interactive, and pleasurable in the classroom (Ventayen et al., 2018). The primary factors of cost, service, speed, and quality have made e-learning the most appealing and prospective form of educational technology. It became apparent that E-Learning would assist and empower students to acquire education in high educational institutions and assist them in pursuing and achieving personal objectives and excelling in their careers without the need for rigid schedules. Google applications such as Google Classroom, Google Docs, Google Meet, and Google Drive enhance students' E-learning experiences.

Google Classroom is a potent tool that allows instructors to construct and manage online courses, post assignments and communicate with students. In addition, students can use Google Docs to collaborate in real-time and save their modifications automatically. This also helps students collaborate with other students on assignments, even if they are not in the exact physical location. Students can collaborate on documents and share files using Google Drive, allowing them to save and store files used specifically for group assignments. Google Meet is an additional Google application that facilitates video conferencing used for the virtual classroom, as well as virtual office hours, live seminars, and discussion facilitation. A few factors significantly influence the implementation and adoption of technology in E-Learning. These variables consist of Behavior Intention, Perceived Usefulness, and Perceived Ease of Use.

PU refers to individuals who believe utilizing a particular technology will improve productivity or performance. PU is the extent to which the use of technology has been demonstrated. PU predicts a person's intention to use technology (Zhao, Ni, & Zhou, 2018). PEU refers to accepting technology when people assume that utilizing a particular

technology is effortless. PEU, or perceived ease of use, refers to the extent to which technology is perceived as user-friendly and free of obstacles. In the field of technology acceptance, the Technology acceptance paradigm is prevalent, and it suggests that PEU is an individual's primary determinant for technology use. If people perceive technology readily, they will be more interested in adopting it and using it more frequently (Chang, Hajjiev, & Su, 2017; Moslehpour et al., 2018). Behavior intention refers to a person's intent to engage in a particular behavior. The intention to engage in a behavior is influenced by two major factors: an individual's attitude toward the behavior and their subjective norm. Subjective norms denote social behavior that enables an individual to engage in a particular behavior, whereas attitude denotes the positive or negative evaluation of an individual's conduct.

The Iraqi government has endeavored to increase the country's technological implementation in recent years. The government recognizes the importance of technology to the nation's economy and is taking measures to facilitate technology development in various industries. The government released an ICT strategy in 2018 stating that measures should be taken to increase internet penetration and encourage the use of technology in various sectors to boost the economy (Ameen et al., 2019). E-learning in Iraq is garnering a great deal of attention, particularly after COVID-19, which compelled institutions to switch from physical classes to online learning so that education could continue. In 2020, the Iraqi Ministry of Education collaborated with UNDP to establish an E-Learning platform that provides educational content to institutes. In Iraq, the IOM has also partnered with several universities to provide individuals with online training and education. In addition, Al-Kawatar provided students with numerous engineering, medical, and business-related learning courses. The government has taken several initiatives to incorporate technology into the education system by 2020, providing access to E-learning platforms. The government has also allocated funds for developing and maintaining E-Learning content. However, the E-Learning adoption process is still in its infancy and faces obstacles such as lacking resources, infrastructure, and trained personnel to provide E-Learning support. Due to factors such as economic sanctions, political instability, lack of findings, and infrastructure, technological adoption is sluggish in Iraq. They estimate that 20% of the population has Internet access. The government is increasing Internet access by investing in fiber optic networks and providing initiatives to raise public awareness of the Internet's use, particularly in the E-learning process (Abdullah & Toygan, 2017). This paper analyzes several factors, including PU, PEU, and behavioral intention, to resolve these issues to improve the E-Learning process. This paper aims to highlight the factors that can increase the adoption of technology, particularly the Google application, which plays a crucial role in advancing the E-learning process to the advantage of students. Utilizing the TAM model, Natasia, Wiranti, and Parastika (2022) investigated the technology adoption in the E-Learning process. In addition, Setiyani, Effendy, and Slamet (2021) examined this framework in their research paper. Their research employed the TAM model and investigated the function of PU and PEU in enhancing the E-learning process in Indonesian educational institutions.

This paper is divided into the following sections; the first represents the introduction. The second segment consists of a review of the relevant literature, while the third section addresses methodology and data collection. Section four contains the discussion, theoretical and managerial implications, and limitations.

## Literature Review

This study investigates the impact of the PU and PEU of Google applications on e-learning and the function of behavioral intention as a mediator between PU, PEU, and e-learning in higher education institutions in Iraq. This era has revolutionized the world due to the development of innovative digital technologies that have altered the medical and commercial worlds and the educational world. Institutions of higher education have realized the significance of incorporating technology in their classrooms and the learning processes. Google is now providing instructors and students with access to course-relevant content. Google provides information on any topic for their use.

Additionally, the Iraqi government is attempting to comprehend and assimilate technology into its educational system. COVID-19 has also demonstrated the significance of digital technology during the global shutdown. Utilizing digital technologies through Google applications improves the E-Learning process.

PU is the degree to which an individual believes using a particular technology will improve their job performance. PU is also regarded as a significant determinant of technological utilization. Previous research has demonstrated that PU significantly affects the adoption of Google applications in e-learning. According to [Kashive, Powale, and Kashive \(2020\)](#), PU is crucial in adopting the Google application in higher education. People will be more interested in employing this technology if they believe students and teachers can perform more effectively using Google application technology. The PU in educational institutions concerning Google applications significantly impacts their E-Learning experience. The purpose of using digital technology, such as the Google application, is a significant factor in its adoption in educational institutions ([Othman, Alamsyah, & Utomo, 2022](#)). When educational institutions have permission to use Google applications, they should promote their adoption by emphasizing their utility, fostering an innovative culture, collaborating, and providing support. This led to the development of the subsequent hypothesis:

**Hypothesis 1:** *The positive impact of perceived usefulness on E-Learning.*

PEU is the extent to which a person recognizes that a particular technology is effortless and effortless. Like PU, PEU is a significant factor in enhancing the E-learning process. Suppose students and instructors perceive that using Google applications in their educational process is convenient and easy. In that case, they will be more interested in exploring these technologies and engaging with these digital tools to learn more about the field ([Alassafi, 2022](#)). Suppose people find the integration of digital technologies in the educational process to be user-friendly. In that case, they will be more satisfied, increasing the E-Learning process, as the positive results of the technologies will encourage others to implement them. Google applications include Google Docs, Sheets, and Google Classroom, enabling instructors and students to communicate, share, and collaborate during the E-Learning process, enhancing the learning experience. Suppose people perceive that these tools are simple to use. In that case, they will be more inclined to invest time using them, which increases their productivity because they can utilize these tools effectively for the learning process ([Bouyzem et al., 2022](#)). Therefore, educational institutions should prioritize their students' education through cutting-edge digital technologies that not only expand their knowledge but also help them stay current with the market. This dialogue leads to the following conclusion:

**Hypothesis 2:** *The positive impact of perceived ease of use on E-Learning.*

Behavior intention affected this perception (Dash, 2022). Behavior intention is the extent to which an individual believes they are motivated and encouraged to use Google applications. Previous research suggests that behavior intention mediates the relationship between PU and the E-Learning process. Individuals with high motivation and positive behavioral intent toward digital technology will be able to comprehend the PU, resulting in positive outcomes from the E-Learning process. Behavior intent can influence the E-Learning process through satisfaction, learning achievement, and engagement. Individuals with positive behavioral intentions while using Google applications can utilize these technologies effectively, resulting in positive outcomes (Alam et al., 2022). Therefore, the PU of the Google application should be promoted and encouraged to develop behavior intentions that can be utilized to promote E-Learning activities. This can be accomplished by emphasizing the advantages of utilizing Google applications, providing technical support, and fostering an environment that encourages the use of digital technology. The function of behavior intention as a mediator between E-Learning and PU demonstrates that PU can positively influence behavior intention, affecting E-Learning outcomes. This dialogue leads to the following conclusion:

**Hypothesis 3:** *The mediating role of behavior intention between perceived usefulness and E-Learning.*

PEU characterized the user's experience with the Google application in terms of its simplicity. This perception had a significant impact on the individual's intention to engage in a particular behavior, indicating the motivation of consumers to utilize technology in educational activities. When individuals have positive behavioral intentions regarding using digital technology in their educational process, they will be more motivated to engage with these tools to learn more. Effective application of technology can result in positive outcomes for the E-learning process (Chahal & Rani, 2022). The relationship between E-Learning and PEU is mediated by the intention to behave. The world is undergoing a rapid transformation, and digital technologies are transforming all aspects and fields of life. People now comprehend the utility and advantages of utilizing technology in daily life. In educational institutions, digital tools such as Google applications offer students numerous opportunities to excel academically. Individuals who perceive Google applications as user-friendly have a positive intent to use them, enhancing the E-learning process. Therefore, promoting digital technologies in educational institutions is essential to students' success. The preceding discussion led to the following conclusion:

**Hypothesis 4:** *The mediating role of behavior intention between perceived ease of use and E-Learning.*

### Research Methods

This study investigates the impact of the PU and PEU of Google applications on e-learning and the function of behavioral intention as a mediator between PU, PEU, and e-learning in higher education institutions in Iraq. The survey questionnaires were used to collect data from the designated students for the study. PU is measured with six items extracted from Rakoczy et al. (2019), PEU is measured with five items taken from Wilson (2019), behavioral intention is measured with four questions adapted from Baumsteiger and Siegel (2019), and e-learning is measured with six items extracted from Khanal et al. (2020).

Respondents to the study are students at institutions of higher education. The selection of these students is based on straightforward random sampling. The surveys were disseminated to the students via personal university visits. 547 surveys were sent out, but only 304 were returned for a response rate of 55.58 percent. The researchers also utilized SPSS-AMOS to

examine the data's dependability and the association between variables. This instrument focuses on primary data analysis and yields the most significant results with large data sets and complex models (Hair Jr, Howard, & Nitzl, 2020). The study also employed two independent variables: perceived utility (PU) and perceived ease of use (PEU). Nonetheless, one mediating variable, such as behavioral intention (BIN), and one dependent variable, such as e-learning (EL), were utilized in the study. Figure 1 depicts the presented variables.

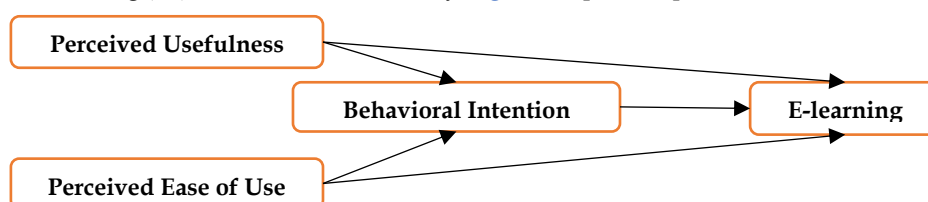


Figure 1: Theoretical model

### Research Findings

This study investigates the impact of the PU and PEU of Google applications on e-learning and the function of behavioral intention as a mediator between PU, PEU, and e-learning in higher education institutions in Iraq. The research examines the inter-item correlation and finds that loadings have values greater than 0.50, average variance extracted (AVE) has values greater than 0.50, composite reliability (CR) has values greater than 0.70, and Maximum Shared Variance (MSV) and average Squared Shared Variance (ASV) have values less than AVE. These values indicated a strong correlation between variables. These numbers are shown in Table 1.

Table 1

#### Convergent validity

Items and Constructs		Loadings	CR	AVE	MSV	ASV
PU1	<--- PU	0.992	0.908	0.673	0.092	0.053
PU2	<--- PU	0.756				
PU4	<--- PU	0.523				
PU5	<--- PU	0.989				
PU6	<--- PU	0.747				
PEU1	<--- PEU	0.643				
PEU2	<--- PEU	0.957				
PEU3	<--- PEU	0.704				
PEU4	<--- PEU	0.912				
PEU5	<--- PEU	0.560				
BIN1	<--- BIN	0.880	0.937	0.831	0.401	0.265
BIN3	<--- BIN	0.914				
BIN4	<--- BIN	0.940				
EL1	<--- EL	0.638	0.803	0.607	0.401	0.281
EL2	<--- EL	0.550				
EL3	<--- EL	0.565				
EL4	<--- EL	0.631				
EL5	<--- EL	0.727				
EL6	<--- EL	0.698				

The study examines the correlation between constructs and Fornell Larcker values revealing that the values revealing the association with the construct itself are greater than those revealing the association with other constructs. These values indicated a minimal degree of correlation between variables. These numbers are presented in [Table 2](#).

**Table 2**

*Fornell Larker*

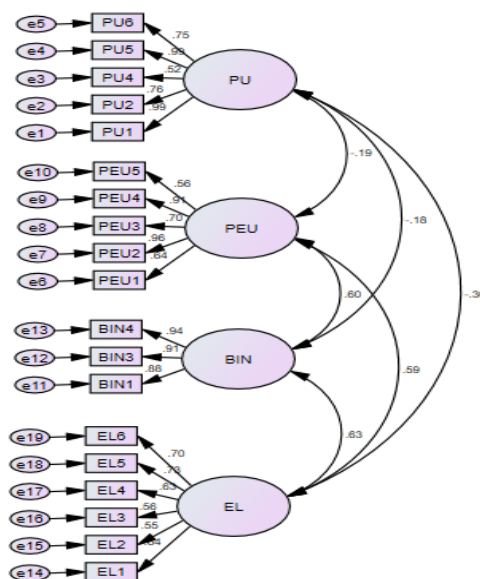
	BIN	PU	PEU	EL
BIN	0.912			
PU	0.177	0.820		
PEU	0.602	0.187	0.771	
EL	0.633	0.303	0.593	0.638

Tucker-Lewis index (TLI) and comparative fit index (CFI) values are more significant than 0.90, and root mean square error of approximation (RMSEA) values are less than 0.05, indicating the model's good fitness. These values indicate a strong model fit. These numbers are presented in [Table 3](#).

**Table 3**

*Model Good Fitness*

Selected Indices	Result	Acceptable level of fit
TLI	0.903	TLI > 0.90
CFI	0.910	CFI > 0.90
RMSEA	0.001	RMSEA < 0.05 good; 0.05 to 0.10 acceptable



**Figure 2:** Measurement model assessment

In addition, direct path analysis reveals the relationship between variables. According to the results, the PU and PEU of the Google application have a positive relationship with e-learning in Iraq's higher education institutions and approve hypotheses H1 and H3. These relationships are listed in Table 4.

**Table 4**

*Direct path analysis*

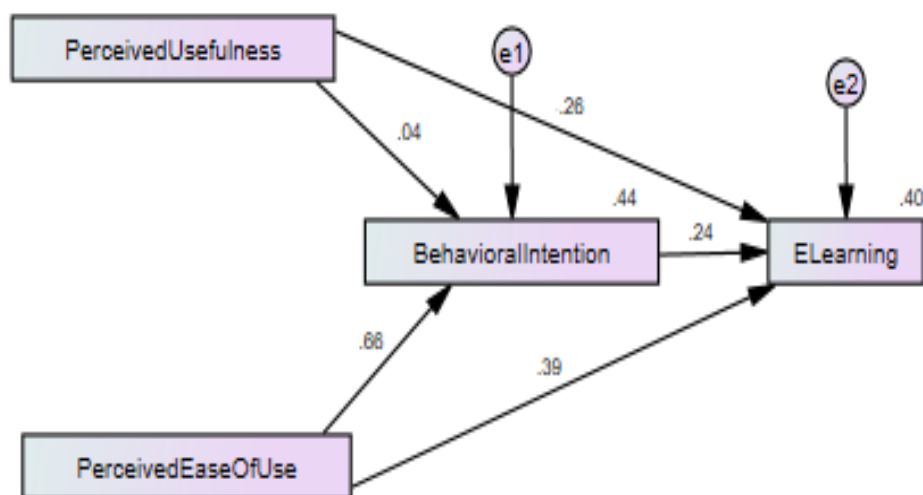
Relationships			Beta	Std. Beta	SE.	CR.	P
Behavioral Intention	<---	Perceived Usefulness	0.085	0.040	0.015	5.667	0.000
Behavioral Intention	<---	Perceived Ease of Use	0.754	0.660	0.050	14.996	0.000
E-Learning	<---	Behavioral Intention	0.154	0.241	0.039	3.981	0.000
E-Learning	<---	Perceived Usefulness	0.353	0.258	0.062	5.671	0.000
E-Learning	<---	Perceived Ease of Use	0.282	0.388	0.044	6.413	0.000

The indirect path analysis concludes with the mediation analysis. The results also revealed that behavioral intention substantially mediates the relationship between PU, PEU of the Google application, and e-learning in Iraqi higher education institutions and accepts hypotheses H3, H4, and H5. These relationships are listed in Table 5.

**Table 5**

*Indirect path analysis*

	Perceived Ease of Use	Perceived Usefulness	Behavioral Intention
Behavioral Intention	0.000	0.000	0.000
E-Learning	0.159	0.010	0.000



**Figure 3:** Structural model assessment



## Discussions

This study investigates the impact of the PU and PEU of Google applications on e-learning and the function of behavioral intention as a mediator between PU, PEU, and e-learning in higher education institutions in Iraq. The outcomes demonstrated that PU has a positive effect on E-learning. This hypothesis was also supported by Arunachalam's (2019) regression-based study of India, which supported this hypothesis. According to the author, PU positively affects e-learning because the technology's utility aids in improving the E-learning experience. Mailizar, Almanthari, and Maulina (2021) also supported this hypothesis in prior research. They analyzed their data using the technology adoption model and the Structural Equation Modelling method. They determined that PU can enhance the E-learning process. People will be more inclined to use digital technology in their education if they find Google applications beneficial.

The findings indicated that PEU has a positive effect on E-learning. Additionally, prior research by Nayanajith, Damunupola, and Ventayen (2019) has supported this hypothesis. They researched Sri Lankan educational institutions and conducted their investigation using regression analysis. According to them, the user-friendliness of the technology enhances the E-learning experience. Dash and Chakraborty's investigations (2021) also supported this hypothesis. The data collected from faculty and pupils in India and Saudi Arabia are analyzed using structural equation modeling. The authors assert that PEU regarding digital technologies in educational institutions improves the E-learning experience. According to our findings, if educational institutions promote the PEU of Google applications among individuals, they will become more aware of the benefits of E-learning.

The results demonstrated that behavior intention mediates the relationship between PU and E-learning. Almajali's (2020) prior research also supported this hypothesis. They gathered information from 100 students and used sampling equation modeling to investigate their study. According to the author, behavioral intention is crucial as a mediator. Strong positive behavior intentions make individuals more receptive to and appreciative of digital technologies, which enhances the E-learning process. Al-Okaily et al. (2020) supported this hypothesis in a previous study. The data collected from universities in Jordan have been analyzed using the Partial Least Squares - Structural Equation Modelling method. According to the instructors or students with solid behavioral intentions, the PU of using digital technologies in the E-learning process is directly influenced by using these technologies. Our findings indicate that individuals with positive attitudes and behaviors regarding the utility and advantages of using Google applications in the educational process will be able to compete and excel in their respective disciplines.

The results demonstrated that behavior intention mediates the relationship between PEU and E-learning. Humida, Al Mamun, and Keikhosrokiani (2022) investigated the mediating role of behavioral intention in prior research. They analyzed the data collected from 262 university students in Bangladesh using the SEM-PLS method in their paper. Individuals with favorable attitudes toward digital technology will find the technology straightforward to use. Teoh and Tan (2020) examined the mediating role of behavioral intention in additional research. They researched the Malaysian market and analyzed the data using innovative PLS and SPSS techniques. According to them, individuals whose attitudes toward using these technologies are favorable will influence the E-learning process.

### ***Theoretical Implications***

This article has made a substantial contribution to the body of knowledge. The world is undergoing a rapid transformation, and new and innovative technologies are being introduced daily to enhance the human experience. However, technology has revolutionized education just as it has other fields. Thanks to technological advancements, learners can use so many software and resources to enhance their E-learning process. This investigation focuses on educational institutions in Iraq. Iraq continues to struggle with incorporating digital tools into the educational system for various reasons, including government instability, a lack of funding, and a lack of technical support and infrastructure. However, the primary issue is that people are unaware of the advantages of digital technologies in educational institutions. This article identifies the factors, including PU, PEU, and behavior intention, that significantly enhance the E-learning process. Prior research has been conducted on the role of PU and PEU digital reading technology. Still, there has been no investigation into the role of these variables in enhancing E-learning in Iraqi institutions.

### ***Managerial Implications***

This investigation is of vital importance to educational institutions in Iraq. As we all know, it is challenging to contend if a country's educational system lacks innovative and creative methodologies. The Iraqi government must take measures to improve and emphasize the significance of E-learning in the institutes to address the country's financial and political problems. This document provides policymakers, managers, and non-profit organizations with guidelines for emphasizing integrating digital technologies in educational institutions. Google applications such as Google Drive, Google Classroom, and Google Slides, among others, have provided a collaborative and communicative platform for learners and instructors to initiate the learning process uniquely. This paper examines the function and perception of PU in the E-learning process. In addition, it investigates the role of behavior intention as a mediator between perceptions of PU and E-learning usage. The research assists regulators in formulating e-learning-related rules by arousing student interest in Google application usage. This paper concludes that educational institutions and administrations should take steps to promote the use of Google applications in the educational field. Without technology, it would be difficult for students and instructors alike to learn about the world.

### **Conclusion**

The global community now recognizes the significance of incorporating digital technologies into education. Nonetheless, due to economic issues, Iraq still faces significant obstacles in integrating digital tools into educational institutions. Using digital technologies, their administrations are doing their best to raise awareness of the benefits of the E-learning process. This paper investigates several factors, including PEU, PU, and behavioral intention, that enhance the E-learning experience. The investigation focuses on Iraq's educational institutions. The findings demonstrated that PU substantially positively impacts the use of digital technologies such as Google applications to enhance the E-learning experience. When learners, students, or instructors find the technology beneficial, they will be more interested in using digital tools to explore additional information. In addition, PEU substantially positively impacts using digital technologies such as Google applications to improve the E-learning experience. This indicates that when people find technology effortless, they will be more engaged and motivated

to use it to enhance their learning experience. This study also examined the role of behavioral intention as a mediator between PEU, PU, and the E-learning process. The mediating role indicates that people with positive behavior are more likely to utilize these technologies in their educational process, increasing both their productivity and their efficacy. This paper examines the factors in enhancing the E-learning experience through integrating Google applications in educational institutions. Iraq is a developing nation that necessitates measures that not only raise awareness about the use of technology but also educate its citizens about the current state of the world.

### Limitations

The limitations of this paper can be addressed in the future. First, the function of PU and PEU in the E-learning process has been discussed. In the future, additional variables, such as self-efficacy and social media influence, can be examined for their direct effect on enhancing the E-learning experience. Second, this research has only examined the role of behavior intention as a mediator between PU, PEU, and the E-learning process. Studying additional mediators, such as consumer satisfaction and technology acceptance, will be possible. Thirdly, this study was conducted on educational institutions in Iraq, a developing nation, so it may not apply to developed countries. Scholars or researchers can conduct this study on the educational institutions of developing or developed nations for future reference.

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