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The Imperative of Implementing and Adopting E-Learning and its Influences On Education Sustainability In Northern Iraq

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Abstract

This study investigates and identifies the imperative of implementing and adopting e-learning systems and how they influence education sustainability in northern Iraq. The e-learning implementation and adoption levels are evaluated based on acceptance, diffusion, and intention to use information systems and technologies. Moreover, identifying relationships that affect implementation and adoption leads to educational sustainability. The Northern Iraq Ministry of Education uses a two-step research methodology that combines ELR and technology acceptance models (TAM). First, MOE officials and staff analyzed 132 participants using the ELR model to determine implementation factors. The second research goal is to examine the intentions of teachers and students in MOE schools using the TAM model. These factors were investigated through a survey conducted with officials and influential people in e-learning in northern Iraq (Ministry of Education as a case study). A Google Form-based quantitative survey of MOE staff, teachers, and students was used to gather data, from which results were reported in the findings. Participants were chosen using the accessibility sampling method for all selected participants. All used the SPSS software to evaluate their selection. The results reveal that the lack of Technology, Equipment, content, and financial readiness, the lowest value of human resource readiness, sociology, and psychology readiness factors from education providers' perspectives, is crucial for a sustainable e-learning application. These findings suggest that educational institutions should focus on factors influencing teachers' and students' attitudes toward adopting and using e-learning services when implementing the system.

Keywords: Adoption; E-Learning, Education; ELR model; Implementation; TAM; Sustainability.

Introduction

In conjunction with the emergence of the Corona pandemic and its challenges, and for the sustainability of the education process in northern Iraq, educational institution directors, teachers, and educational professionals are busy finding ways to maintain the educational process. In other words, online learning and e-learning concepts and dialects are in vogue. They are widely used in advertising in educational institutions and social networks. Sibbetl (2009) takes advantage of increased opportunities for collaboration that are made possible by new online learning technologies, specifically collaborative learning environments. E-learning, which utilizes face-to-face and online Education, has the researcher believing it is a great way to integrate environmental issues into Education.

In this paper, the term sustainable education is used to identify a new approach to teaching that incorporates sustainability principles rather than promoting sustainability awareness without making any changes to the educational system (Jashapara & Tai 2006; Figueiro & Raufflet, 2015). Sustainability education must teach the general population and specific professions to confront and respond to evil problems. Most recently, there has been an emphasis on decision-making and people management, which can all be supported by Sustainability education and related literature (Thomas, 2018). Sustainability education is, therefore, an essential component of future educators and leaders. As a result, "employability" and "ready-to-work" are both parts of sustainability education (Artess et al., 2016). The focus on 21st-century skills should be applied more broadly globally. Information on danger, complexity, and critical thinking must be integrated into various degree programs in the educational sphere. Every discipline is involved, meaning every field has a role in promoting and supporting sustainability education. It depends on four variables: the demand for e-learning, the capabilities required, and the necessities for e-learning. Achieved sustainability gives educational institutions the capacity to surmount any difficulties they may face in long-term digital learning development. Institutions with different cultures and facility requirements are interested in disseminating e-learning applications. The first step is identifying the

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barriers to implementation (Madan Mohan & Prabhu 2013; Muoneke & Muoneke, 2019). Almarzooqi (2020) stated that various issues must be resolved in learning modes, such as a lack of an instructional environment, an e-learning experience, an ineffective learning experience, and low interaction between students and teachers.In previous studies, it has been found that e-learning applications have difficulty in being successful (Rohayani et al., 2015). Even so, Ali et al. (2018) discovered that e-learning experiences often included problems with changes, understanding computers, and internal organization infrastructure. Thus, since it is necessary to start with a metric to determine readiness for e-learning, we must begin as a result of the use of e-learning. Using Technology to promote teaching and learning could be effective if done correctly (Namaziandost & Mehdi, 2019).

After the discussions, many challenges were discovered, such as those that made sustaining e-learning initiatives and long-term deployment challenging. Northern Iraq has established a new and sustainable e-learning system incorporating new information and communication technology to enhance the overall education quality in the region. With the introduction concerning the Corona crisis, the Northern Iraq e-learning leaders' initiative will also take place in 2020. Our discussions showed that many obstacles to e-learning deployments and long-term sustainability exist. However, the lack of awareness and background for this method of Education in northern Iraq caused concern and anxiety, raising the voice of discontent among students, many teachers, and even officials of educational institutions. Students and teachers must be confident in e-learning and the Environment to have the whole learning experience. The conclusions of this investigation will significantly improve people's comprehension and understanding of the factors affecting e-learning sustainability.

Aim and objective of the study

This article aims to comprehend, perceive, and explain the variables affecting the uptake of e-learning in northern Iraq. The ELR Model for implementation and the TAM for acceptance are two well-known theoretical models that the study uses to achieve this. The project aims to put the conceptual model into practice and develop recommendations to close knowledge gaps in northern Iraq's uptake and sustainability of e-learning.

Literature Review

Research on educational technology sustainability factors due to rapid technological development also began with the introduction of Technology in Education. Gagnon et al. (2012) identified ten sustainability factors for e-learning: leadership, professional development, finance, technical support, evaluations, digital content, technology integration, accessibility to communication, Connectivity, and communication / shared practices. Additionally, in their article " E-Learning Design Success Criteria, " Agariya and Singh (2012) outlined several goals for e-learning programs in their article "E-Learning Design Success Criteria." To this end, there are support structures such as institutional and faculty support, a pedagogical process, course design, student involvement, faculty involvement, assessment, and evaluation. Educational leaders have started to investigate the various sustainability factors of e-learning. The five other facets of the research done by Al-Fraihat et al. (2020) were that programs must respond to incorporating e-learning, developing e-learning resources, teaching and Training capacities, and pedagogical approaches. Teachers, students, and the surrounding Environment were all part of the scope of this study, as thirteen different elements in six different dimensions were identified: teacher, learner, Environment, design, course, and Technology. According to Prayudi (2009), the ELR model provided the necessary information to develop e-learning. Kirkpatrick's model offers four levels of ELR in terms of reaction, knowledge, behaviour, and result. Also, according to other researchers, such as the proposed model, six different measurement components are utilized to evaluate e-learning implementation readiness. The factors that make up these measurement components are Student readiness, teacher readiness, technology infrastructure, management support, school culture, and introductory activities. According to Akaslan & Law (2011), the ELR model considers three main components: Technology, people, and content, and each of these three components represents a specific element of an institution's e-learning readiness. Haney (2002) proposed seven categories to comprise the ELR model: HR, LMS, learners, content, IT, costs, and vendors.

Technological innovation in educational institutions can be utilized by technological innovation (Prescott & Prescott, 2013; Bandera et al., 2019). According to the Aydin and Tasci (2005) study, to be prepared to adopt e-learning, educational institutions need to have access to Technology, be innovative, possess dynamic people, and foster self-development. To complete their research, they found that these factors increase the e-learning system's likelihood of success in an organization because they define the new e-learning technology's requirements and elements that help it be implemented successfully. Chapnick (2000) also developed a model capable of gauging an institution's e-learning readiness. Also considered in this model are resource categories, skills, and attitudes, which serve as general readiness indicators for e-learning accreditation.

The study hypothesizes that the following elements influence e-learning system implementation:

H1: There is a positive correlation between psychology readiness factors and the implementation of e-learning services.

H2: There is a positive correlation between sociology readiness factors and the implementation of e-learning services.

H3: There is a positive correlation between environment readiness factors and the implementation of e-learning services.

H4: There is a positive correlation between human resource readiness factors and the implementation of e-learning services.

H5: There is a positive correlation between financial readiness factors and the implementation of e-learning services.

H6: There is a positive correlation between technology readiness factors and the implementation of e-learning services.

H7: There is a positive correlation between equipment readiness factors and the implementation of e-learning services.

H8: There is a positive correlation between content readiness factors and the implementation of e-learning services.

E-learning adoption model and hypotheses

New technologies have been evaluated in the past using a variety of theories. Also referred to as the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), and the Theory of Planned Behavior (TPB). The model used in this study is a rewrite and expansion of the well-known TAM model, incorporating the concepts of infrastructure themes, mentality acceptance, and system trust. It can also be considered an innovation system at the educational level when e-learning adoption is widespread in society. Moving state-of-the-art can assist educational knowledge management (KM) with our findings (Alenezi et al., 2017).

The Technology Acceptance Model had to be developed because there was a time gap between assessment and actual behaviour (TAM). A critical component of the TAM model was PEOU or perceived ease of use (PU). When measuring a person's technology proficiency, PEOU will tell how easy it is to use. However, when measuring job performance, PU will do so better (Davis, 1989). Therefore, the perceived utility can be used to determine which people use it and whether they adopt it. A student's motivation to seek out e-learning resources may be due to a perceived benefit of the system. The following are some hypotheses that have been proposed. In light of the preceding discussion and TAM assumptions:

H9. A positive correlation exists between perceived usefulness and attitude toward using e-learning services.

H10. A positive correlation exists between perceived ease of use and attitude toward using e-learning services.

H11. A positive correlation exists between attitude and behavioural intentions to use e-learning services.

H12. A positive correlation exists between perceived ease of use and perceived usefulness of e-learning services.

H13. A positive correlation exists between perceived usefulness and behavioural intentions to use e-learning services.

H14. A positive correlation exists between perceived ease of use and behavioural intentions to use e-learning services.

While previous research has shown the influence of that socio-demographic variable intent to use (Davis & Venkatesh, 2004), the following hypotheses are proposed:

H15. There is an important difference between the age and behavioural intentions to use e-learning services.

H16. There is an important difference between gender and behavioural intentions to use e-learning services.

H17. There is an important difference between the study qualification and behavioural intentions to use e-learning services.

4.1 External variables are added to the TAM model.

The modified TAM is used to help students understand how they adopt e-learning services. Each external Variable is addressed below.

4.1.1 Trust of system

Trust is emerging as a potential driver of IT adoption. In the Internet's uncertain and ever-changing Environment, Trust was theorized as a direct predictor of behavior. There are many definitions of Trust in the

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literature. Students should trust the e-learning system and the enabling technologies (El-Masri & Tarhini, 2017).

To summarize, It is hypothesized that Trust will increase the ease of use and public perception of e-government services.

H18. There is a direct and positive link between Trust and the perceived usefulness of e-learning services.
H19. There is a direct and positive link between Trust and perceived ease of use of e-learning services.

4.1.2 Infrastructure

The preceding statement is based on what is stated above. According to Chang et al. (2012), Quality of information, service, system, and instructor have a mutually reinforcing relationship and influence students' perceptions of acceptance of e-It through that learning. Thus, it is believed that infrastructure issues will help increase the perceived usefulness and usability of the e-learning intent to use.

H20. There is a direct and positive link between Infrastructure themes and the perceived usefulness of e-learning services.

H21. There is a direct and positive link between Infrastructure themes and the perceived ease of e-learning services.

4.1.3 Mentality acceptance:

It should be emphasized that the level of personal motivation affects e-learning. And social support is available when a person first adopts it (Gunn, 2010). According to the previously provided information, people who lack belief in their abilities have more confidence in their intentions to utilize e-learning. Learners may be more satisfied and eager to continue learning if they can control and personalize their learning experiences (Dascalu et al., 2015). So, here are some hypotheses:

H22. There is a positive link between mentality acceptance and the perceived usefulness of e-learning services.

H23. There is a positive link between mentality acceptance and perceived ease of use of e-learning services.

Proposed research conceptual model

To understand the gap between the implementation and adoption of e-learning services, the proposed research model helps identify relationships between factors after identifying the main factors that directly affect the system's performance and adoption and contribute to its long-term sustainability. A study conducted in northern Iraq uses the ELR implementation and TAM accreditation models to create a sustainable and future-proof e-learning system.

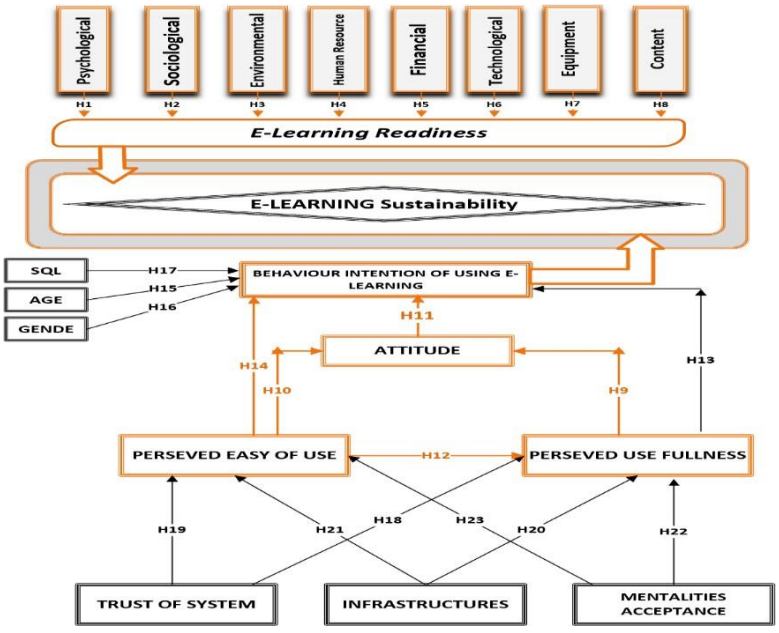

Figure 1: Proposed research conceptual model

Research methodology

Quantitative research methodology is applied to identify the readiness factors in implementing e-learning, including human psychology, sociology, Environment, employee resources, finance, technology skills, and Equipment. One hundred thirty-two officials, influential and staff (e-learning providers) in Education were given a Google form questionnaire to distribute online. The survey questions were taken from a previous questionnaire administered to learners. They asked participants to describe their understanding, perceptions, and experiences with e-learning system applications. The e-learning system questionnaire was distributed to 400 students and academic and administrative staff (education providers) via Google Forms. This study included 367 students from northern Iraqi educational institutions. All things were scored on a five-point Likert scale, with 1 representing "Strongly Disagree," 2 meaning "Disagree," 3 signifying "Neutral," and five meaning "Strongly Agree." Before deployment, all data needed to be inspected by SPSS to discover how ready e-learning was for implementation.

Analysis and Result

Linear Regression with PSR predicting ELR

Table 1: PSR predicts ELR in linear regression

Variable	**B**	**SE**	**95% ci**	**B**	**t**	**p**
(Intercept)	1.10	.26	[.59, 1.61]	0.0	4.24	< 0.001
PSR	.74	.06	[.62, .86]	0.73	12.28	< 0.001
F (1,130) = 150.87, p < 0.001, R^2 = 0.54; Unstandardized Regression Equation: ELR = 1.10 + 0.74*PSR.						

The results of the first hypothesis test (H1) and psychological readiness (PSR) are shown in Table 1. 54% of the variables have been explained, R2 = 0.54. This study backs up the idea that PSR has a significant influence on ELR (β=.73). The estimated value of F (1,130) is 150.87, with a p-value of <.001. That means there is a positive relationship between variables, which means B (0.73) = 12.28, t (130) = 12.28, with a p-value of <.001. An increase of PSR from 1 to 2 indicates that the average ELR value rises by 0.73 units.

Linear Regression with SOR predicting ELR

Table 2: SOR predicts ELR in Linear Regression

Variable	***B***	***SE***	**95% CI**	**B**	***T***	***P***
(Intercept)	1.11	.23	[.65, 1.56]	.00	4.80	< 0.001
SOR	.74	.05	[.63, .84]	.77	13.76	< 0.001
F(1,130) = 189.36, p < 0.001, R^2 = 0.59 ; Unstandardized Regression Equation: ELR = 1.11 + 0.74*SOR						
Dependent Variable: E-learning readiness (ELR)						

Table two shows the results of the second hypothesis test (H2), which involved using linear regression to measure the relationship between the independent Variable, SOR, and the dependent Variable, ELR. R2 explains a whopping 55% of the total variability in the model, resulting in a value of .59. It has a significant effect, according to Anderson and Gerbing (1988). According to this analysis, there is a strong relationship between SOR and ELR (β=.74). The F (1,130) value of 189.36 is significant at the 5% level, and the R-squared of 0.59 means there is a meaningful relationship between variables, B = 0.74, t(130) = 13.76, p < .001. When SOR increases by one unit, the average ELR value increases by 0.74 units.

Linear Regression with ENR predicting ELR

Table 3: ENR predicts ELR in Linear Regression

Variable	***B***	***SE***	**95% CI**	**B**	***T***	***P***
Intercept	.97	.26	[.47, 1.48]	.00	3.81	<0 .001
ENR	.77	.06	[.65, .88]	.75	12.92	<0 .001
Note. results: F (1,130) = 166.91, p < 0.001, R^2 = 0.56, Regression Equation: ELR = 0.97 + 0.77*ENR						

Table 3: ENR predicts ELR in Linear Regression						
Variable	***B***	***SE***	**95% CI**	**B**	***T***	***P***
Dependent Variable: E-learning readiness (ELR)						

The third hypothesis test (H3) has the independent Variable being environment readiness (ENR) and the dependent Variable being e-learning readiness (ELR). The coefficient of determination (R2) for ELR is .56, which shows that it has explained 56% of the variance. According to Anderson and Gerbing (1988), it has a significant effect. According to this analysis, there is a significant correlation between ENR and ELR (β=.75). 166.91 is the positive correlation coefficient between variables B and F(1,130), with a p-value of < .001 and an R-squared of 0.56. A one-unit increase in ENR causes an increase in ELR on an average of 0.77 units.

Linear Regression with HRR predicting ELR

Table 4: HRR predicts ELR in Linear Regression						
Variable	***B***	***SE***	**95% CI**	**B**	***T***	***P***
(Intercept)	1.38	.23	[.94, 1.83]	.00	6.13	<0 .001
HRR	.67	.05	[.57, 0.78]	.74	12.84	<0 .001
*F (1,130) = 164.99, p < 0.001, R^2 = 0.56, ELR = 1.38 + 0.67*HRR*						
Dependent Variable: E-learning readiness (ELR)						

The diagram shown in Figures 4, H4, HRR, and ELR is shown as independent variables. 49% of the variables have been explained with R2 = .49. It has a significant effect, according to Anderson and Gerbing (1988). This analysis supports the hypothesis that H4 is correct: H4: HRR strongly influences ELR (β=.74). The quantity F (1,130) has a value of 164.99 with a p-value of 0.001 and an R2 of 0.56, meaning a positive relationship between variables, B = 0.67, with at (130) of 12.84 statistically significant relationship. It implies that adding one HRR unit will result in an average 0.67 unit increase in ELR.

Linear Regression with FIR predicting ELR

Table 5: ELR Prediction by Linear Regression with FIR						
Variable	***B***	***SE***	***95% CI***	***B***	***T***	***P***
(Intercept)	1.27	.23	[.82, 1.73]	.00	5.53	< 0.001
FIR	.70	.05	[.59, 0.80]	.75	13.09	< 0.001
F (1,130) = 171.25, *p* < 0.001, R^2 = 0.57, ELR = 1.27 + 0.70*FIR.						
Dependent Variable: E-learning readiness (ELR)						

According to Table 5, the fifth hypothesis test (H5) involved independent variables of finance readiness (FIR) and e-learning readiness (ELR). 56% of the variables have been explained by R2, which indicates that R2's value is .57. It has a significant effect, according to Anderson and Gerbing (1988). This analysis lends support to the hypotheses that FIR has a strong influence on ELR (β=.75). This phrase, which uses math formulas, describes the above as expressing a positive relationship between variables, where B is equal to 0.70, and t(130) is similar to 13.09, all with a significance level of p < .001. Increasing the FIR by one unit will raise the value of ELR by an average of 0.7 units.

Linear Regression with TSR predicting ELR

Table 6: TSR predicts ELR in Linear Regression						
Variable	***B***	***SE***	**95% CI**	**B**	***T***	***P***
(Intercept)	1.22	.26	[.71, 1.72]	.00	4.77	< 0.001
TSR	.71	.06	[.59, 0.82]	.72	11.97	<0 .001

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Table 6: TSR predicts ELR in Linear Regression						
Variable	***B***	***SE***	**95% CI**	**B**	***T***	***P***
*F (1,130) = 143.38, p <0 .001, R^2 = 0.52, ELR = 1.22 + 0.71*TSR.*						
Dependent Variable: E-learning readiness (ELR)						

ELR is the dependent Variable in the table above, while TSR is the independent Variable. 52% of the variables have been explained. According to Anderson and Gerbing (1988), it has a significant effect. This analysis supported the conclusion that TSR significantly influences ELR (β=.72). The absolute value of F (1,130) is 143.38. The relationship between variables is positive. The parameter B is 0.71, with a significant t (130) of 11.97. TSR increases the value of ELR by 0.71 on average when there is an increase in TSR.

Linear Regression with EQR predicting ELR

Table 7: EQR predicts ELR in Linear Regression						
Variable	***B***	***SE***	**95% CI**	**B**	***t***	***P***
(Intercept)	1.46	.19	[1.08, 1.84]	.00	7.56	< 0.001
EQR	.65	.04	[.56, .74]	.79	14.68	<0 .001
F (1,130) = 215.48, *p* < 0.001, R^2 = 0.62, ELR = 1.46 + 0.65*EQR.						
Dependent Variable: E-learning readiness (ELR)						

See Table 7, which shows the Linear Regression Analysis of the H7 hypothesis (Equipment Readiness (EQR) vs. e-learning Readiness (ELR)) where equipment readiness (EQR) is used as the independent Variable and e-learning readiness (ELR) is the dependent Variable. The value of R2 has explained 62% of the variables. According to Anderson and Gerbing (1988), it has a significant effect. This analysis supported Hypothesis 7, which says that an advertisement's effectiveness is greatly influenced by the individual's emotional response to the advertisement. F (1,130) has a value of 215.48, with a p-value of <.001 This indicates that variables B and t (130) have a positive correlation, with B equal to 0.65 and t(130) similar to 14.68, with p < .001. This graph shows that, on average, ELR rises by 0.65 units for each 1-unit increase in EQR.

Linear Regression with COR predicting ELR

Table 8: COR predicts ELR in Linear Regression						
Variable	***B***	***SE***	**95% CI**	**B**	***T***	***P***
Intercept	.70	.20	[.32, 1.09]	.00	3.60	< 0.001
COR	.83	.05	[.74, .92]	.85	18.29	< 0.001
F (1,130) = 334.63, *p* < 0.001, R^2 = 0.72, ELR = 0.70 + 0.83*COR.						
Dependent Variable: E-learning readiness (ELR)						

Table 8 illustrates the results of the eighth hypothesis test (H8), which sought to examine the correlation between content readiness (COR) and e-learning readiness (ELR). To test this hypothesis, the researcher calculated the value of R2. The result is .72, which implies that 72% of the variables have been explained. According to Anderson and Gerbing (1988), it has a significant effect. This study's findings supported the theory that the COR effect is considerable (β=.85). The F (1,130) score was 334.63, with a p-value of 0.001, and B (0.83) was equal to 18.29, with a p-value of 0.001. COR increases the value of ELR by 0.83 units on average with a one-unit increase.

A linear regression analysis determined the predicted association between each independent and dependent Variable. Researchers discovered a relationship between seven variables (independent and dependent) that also referred to e-learning readiness using the data presented. These findings, shown in Tables 1, 2, 3, 4, 5, 6, and 8, demonstrate that content readiness significantly influences e-learning readiness. E-learning implementation is affected considerably by numerous readiness factors such as (β = .77, p<0.001), Sociological (β = .77, p<0.001), Human resource (β = .75, p<.001), Environment (β = .70, Technology (β = .72, p<0.001), p<0.001), Equipment (β = .79, p<0.001), and Finance (β = .75, p<0.001). According to the study, All educational institutions welcome such software. Employees' and Training program officials' preparedness impact e-learning. While it is less potent than other readiness factors, it is not insignificant.

Table 9: The analysis is performed on the sample dataset, which contains the following: For the dependent Variable, e-learning attitudes (ATT). For the independent Variable, perceived usefulness (PU). R2 is.69, meaning that 69% of the variables are explained. This has a large effect (Anderson and Gerbing 1988). PU strongly influences ATT (=.83), supporting Hypotheses 9. F = 800.24>0.01, B = 0.94, t (365) = 28.29, p.001. Increasing PU by one unit increases ATT by 0.94 units.

Table 9: PU predicts ATT in linear regression							
Variable	**B**	**SE**	**95% CI**	**B**	**T**	**P**	**Decision**
Intercept	.27	.14	[-.01, 0.55]	.00	1.89	.059	
PU	.94	.03	[.87, 1.00]	.83	28.29	<0 .001	Supported
Note. Results: F(1,365) = 800.28, p < 0.001, R2 = 0.69. Unstandardized Regression Equation: ATT = 0.27 + 0.94*PU							
Dependent Variable: Attitude toward e-learning							

The independent Variable, perceived ease of use (PEOU), relates to attitude toward e-learning (ATT). R2 is.66, meaning that 66% of the variables are explained. This has a large effect (Anderson and Gerbing 1988). PEOU strongly influences ATT (=.81), supporting Hypotheses 10. F = 704.36>0.01, B = 0.93, t (365) = 26.54, p.001. Increasing PEOU by one unit increases ATT by 0.93 units.

Table 10: PU predicts ATT in linear regression							
Variable	**B**	**SE**	**95% CI**	**β**	**T**	**p**	**Decision**
Intercept	0.23	0.15	[-0.07, 0.53]	0.00	1.51	.132	
PEOU	0.93	0.04	[0.86, 1.00]	0.81	26.54	< .001	supported
Note. Results: F (1,365) = 704.36, p < .001, R2 = 0.66. Unstandardized Regression Equation: ATT = 0.23 + 0.93*PEOU							
Dependent Variable: e-learning Attitude toward							

H11 linear regression analysis with attitude toward e-learning as an independent variable and behaviour intention (BI) dependent Variable. R2 is.60, meaning that 60% of the variables are explained. This has a large effect (Anderson and Gerbing 1988). ATT strongly influences BI (=.78), supporting Hypotheses 11. F = 558.68>0.01, B = 0.74, t (365) = 23.64, p.001. Increasing ATT by one unit increases BI by 0.74 units.

Table 11: PU predicts ATT in linear regression							
Variable	**B**	**SE**	**95% CI**	**B**	**T**	**p**	**Decision**
Intercept	1.09	.14	[.83, 1.36]	.00	8.08	< 0.001	
ATT	.74	.03	[0.68, 0.81]	.78	23.64	<0 .001	supported
Note. Results: F (1,365) = 558.68, p < 0.001, R2 = 0.60. Unstandardized Regression Equation: BI = 1.09 + 0.74*ATT							
Dependent Variable: Behavioral intention to adopt e-learning							

This study shows that the independent Variable of perceived ease of use (PEOU) was linked to the dependent Variable of perceived usefulness (PU). R2 is.66, meaning that 66% of the variables are explained. This has a

large effect (Anderson and Gerbing 1988). PEOU strongly influences PU (.81), supporting Hypotheses 12. F = 707.61>0.01, B = 0.82, t (365) = 26.60, p.001. Increasing PEOU by one unit increases PU by 0.82 units.

Table 12: PEOU predicts PU in linear regression							
Variable	**B**	**SE**	**95% CI**	**B**	**T**	**p**	**Decision**
Intercept	.69	.13	[.42, .95]	.00	5.11	0.001	
PEOU	.82	.03	[.76, .89]	.81	26.60	< 0.001	supported
Note. Results: F (1,365) = 707.61, p < 0.001, R2 = 0.66. Unstandardized Regression Equation: PU = .69 + .82*PEOU							
Dependent Variable: Perceived Usefulness of E-learning							

Table 13: H13 linear regression analysis, perceived usefulness as the independent Variable, and behaviour intention toward e-learning as a dependent. R2 is.58, meaning that 58 per cent of the variables are explained. This has a large effect (Anderson and Gerbing 1988). PU strongly influences BI (=.76), supporting Hypotheses 13. F = 505.33>0.01, B = 0.82, t (365) = 22.48, p.001. This means that increasing PU by one unit increases BI by 0.82 units.

Table 13: PU predicts BI in Linear Regression							
Variable	**B**	**SE**	**95% CI**	**B**	**T**	**p**	**Decision**
Intercept	.75	.16	[.45, 1.06]	.00	4.81	<0.001	
PU	.82	.04	[.75, .90]	.76	22.48	< 0.001	supported
Note. Results: F (1,365) = 505.33, p <0 .001, R^2 = 0.58. Unstandardized Regression Equation: BI = 0.75 + 0.82*PU**.**							
Dependent Variable: Behavioral intention e-learning							

(H14) - Perceived ease of use is an independent variable, and behavior intention toward e-learning (BI) is dependent. R2 is.60, meaning that 60% of the variables are explained. This has a large effect (Anderson and Gerbing 1988). PEOU has a strong influence on BI (=.78), supporting Hypotheses 14. F = 553.83>0.01, B = 0.85, t (365) = 23.53, p.001. Increasing PEOU by one unit increases BI by 0.85 units.

Table 14: PEOU predicts BI in linear regression							
Variable	**B**	**SE**	**95% CI**	**B**	**T**	**p**	**Decision**
Intercept	.58	.16	[.27, 0.89]	.00	3.68	0.001	
PEOU	.85	.04	[.78, .92]	.78	23.53	<0 .001	Supported
Note. Results: F (1,365) = 553.83, p < .001, R2 = 0.60. Unstandardized Regression Equation: BI = .58 + .85*PEOU							
Dependent Variable: Behavioral intention e-learning							

Table 15: Age Predicts BI in Linear Regression							
Variable	**B**	**SE**	**95% CI**	**β**	**T**	**P**	**Decision**
Intercept	4.33	0.04	[4.24, 4.42]	.00	97.30	< 0.001	
FROM 20-24	0.34	0.26	[-0.18, 0.85]	0.14	1.29	.199	supported
FROM 25-29	0.14	0.12	[-0.10, 0.37]	0.06	1.15	.251	
FROM 30- 34	0.13	0.09	[-0.05, 0.31]	0.05	1.43	.154	
FROM 35-39	-0.45	0.12	[-0.68, -0.22]	-0.18	-3.82	< .001	
MORE THAN 40	-0.97	0.11	[-1.19, -0.75]	-0.40	-8.51	< .001	
Note. Results: F (5,361) = 19.95, p < 0.001, R^2 = .22 Unstandardized Equation of Regression : BI = 4.33 +							

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Table 15: Age Predicts BI in Linear Regression							
Variable	**B**	**SE**	**95% CI**	**β**	**T**	**P**	**Decision**
0.34*FROM 20-24 + 0.14*FROM 25-29 + 0.13*FROM 30- 34 - 0.45*FROM 35-39 - 0.97*MORE THAN 40							
Dependent Variable: Behavioral intention e-learning							

Table15 shows the linear regression results of the 15th hypothesis test (H15), F (5,361) = 19.95, p 0.001, R2 = 0.22.

When applying the two-tailed independent samples t-test, no statistical significance was reached, as the calculated value of the standard error of the mean (0.036) was more significant than the 0.05 alpha threshold (t (365) = 0.38, p =.704). This demonstrates that the null hypothesis cannot be ruled out. This shows that the average BI between MALE and FEMALE genders was not significantly different.

Two-Tailed t-Test for BI by Gender

Table 16: Independent sample t-test								
	MALE		**FEMALE**					
Variable	**M**	**SD**	**M**	**SD**	**T**	**P**	**d**	**Decision**
BI	4.25	.75	4.22	.65	.38	.704	0.04	Not Supported
Note. N = 367. Freedom Degrees of the *t*-statistic = 365. *d* represents Cohen's *d.*								

Table 17: The 17th hypothesis test linear regression analysis (H17) found that STQ explains approximately 14% of the variance in BI, rejecting hypothesis 17.

Table 17: Linear Regression Predicting BI							
Variable	**B**	**SE**	**95% CI**	**B**	**T**	**P**	**Decision**
Intercept	4.17	.27	[3.64, 4.70]	.00	15.44	<0 .001	
Master	.23	.30	[-.35, .81]	.13	.77	.444	supported
Bachelor	0.27	0.28	[-0.28, 0.81]	0.15	0.95	.344	
Diploma	0.37	0.33	[-0.28, 1.02]	0.21	1.11	.268	
High School	0.11	0.27	[-0.42, 0.65]	0.06	0.42	.676	
STQ-Basic School	-0.53	0.28	[-1.09, 0.03]	-0.30	-1.85	.065	
*Note results: F (5,361) = 11.39, p < 0.001, R2 = .14 Unstandardized Regression Equation: BI = 4.17 + 0.23*Master + 0.27*Bachelor + 0.37*Diploma + 0.11*High School 0.53*Basic School.*							
Dependent Variable: Behavioral intention e-learning							

As shown in Table 18, the 18th hypothesis test (H18) uses Trust of the system (TOS) as an independent variable and perceived usefulness (PU) as the dependent Variable. R2 is.61, meaning that 61% of the variables are explained. Anderson and Gerbing (1988) TOS strongly influences PU (=.78), supporting Hypotheses 18. F = 565.96>0.01, B = 0.80, t (365) = 23.79, p.001. Increasing TOS by one unit increases PU by 0.80 units.

Table 18: Linear Regression Predicting PU							
Variable	**B**	**SE**	**95% CI**	**B**	**T**	**P**	**Decision**
Intercept	.83	.14	[.55, 1.11]	.00	5.76	< 0.001	
TOS	.80	.03	[.73, .87]	.78	23.79	< 0.001	supported
Note. Results: F (1,365) =655.85, p <0.001, R^2 =0.64 Unstandardized Regression Equation: PEOU = 0.85 + 0.81*TOS							
Dependent Variable: e-learning's Perceived usefulness							

Table 19 shows that the test H19 is dependent on system trust (TOS) and perceived ease of use (PEOU) for the independent and dependent variables, respectively. R2 explains 64% of the variables. This has a significant

impact (Anderson and Gerbing 1988). The TOS considerably impacts PEOU (as defined above) and supports Hypotheses 19. For example, the following formulas give F = 655.85 < 0.01, B = 0.81, and t (365) = 25.61, all with p.001. TOS must be increased by one unit in order to achieve a 0.81-unit increase in PEOU.

Table 19: Linear Regression Predicting PEOU							
Variable	**B**	**SE**	**95% CI**	**β**	**T**	**P**	**Decision**
Intercept	.85	.14	[.59, 1.12]	.00	6.29	<0 .001	
TOS	.81	.03	[.75, .87]	.80	25.61	< 0.001	supported
Note. Results: F(1,365)=655.85, p <0.001, R2 =0.64Unstandardized Regression Equation: PEOU = 0.85 + 0.81*TOS							
Dependent Variable: e-learning's Perceived ease of use							

Perceived usefulness (PU) of e-learning (INI) as an independent variable. R2 is.69, meaning that 69% of the variables are explained. This has a large effect (Anderson and Gerbing 1988). INI strongly influences PU (.83), supporting Hypotheses 20. F = 804.13>0.01, B = 0.72, t (365) = 28.36, p.001. Increasing INI by one unit increases PU by 0.72 units.

Table 20: Linear Regression predicting PU							
Variable	**B**	**SE**	**95% CI**	**β**	**T**	**p**	**Decision**
(Intercept)	1.13	.11	[.92, 1.35]	.00	10.26	<0 .001	
INI	.72	.03	[.67, .77]	.83	28.36	<0 .001	supported
Note. Results: F (1,365) = 804.13, p <0 .001, R2 = 0.69. Unstandardized Regression Equation: PU = 1.13 + 0.72*INI.							
Dependent Variable: e-learning's Perceived usefulness							

Perceived ease of use toward e-learning (PEOU) is the dependent Variable in the 21st hypothesis test (H21) linear regression analysis (Table 28). R2 is.67, meaning that 67% of the variables are explained. This has a large effect (Anderson and Gerbing 1988). INI strongly influences PEOU (=.82), supporting Hypotheses 21. F = 756.09>0.01, B = 0.70, t (365) = 27.50, p 0.001. This means that a one-unit increase in INI increases PEOU by 0.70 units.

Table 21: Results for INI predicting PEOU							
Variable	**B**	**SE**	**95% CI**	**B**	**T**	**P**	**Decision**
Intercept	1.28	.11	[1.06, 1.50]	.00	11.47	<0 .001	
INI	.70	.03	[.65, .75]	.82	27.50	<0 .001	supported
Note. Results: F (1,365) =756.09, p <0.001, R^2 =0.67 Unstandardized Regression Equation: PEOU = 1.28 + 0.70*INI							
Dependent Variable: e-learning's Perceived ease of use							

As shown in Table 22, the 22nd hypothesis test (H22) uses mentality acceptance (MA) as the independent Variable and perceived usefulness (PU) as the dependent Variable. R2 is.61, meaning that 61% of the variables are explained. This has a large effect (Anderson and Gerbing 1988). MA strongly influences PU (.82), supporting Hypotheses 22. F = 580.22>0.01, B = 0.82, t (365) = 24.09, p 0.001. This means that a rise of one unit in MA increases PU by 0.82 units.

Table 22: Linear Regression Predicting PU							
Variable	**B**	**SE**	**95% CI**	**β**	**T**	**P**	**Decision**
Intercept	.75	.15	[.46, 1.03]	.00	5.13	< 0.001	
MA	.82	.03	[.75, .88]	.78	24.09	<0 .001	supported
Note. Results: F (1,365) = 580.22, p < 0.001, R2 = 0.61. Unstandardized Regression Equation: PU = 0.75 + 0.82*MA							

Table 22: Linear Regression Predicting PU							
Variable	**B**	**SE**	**95% CI**	**β**	**T**	**P**	**Decision**
Dependent Variable: Perceived usefulness of e-learning							

Table 23: H23 linear regression analysis with mentality acceptance (MA) as the independent Variable and perceived ease of use (PEOU) is the dependent. R2 is.61, meaning that 61% of the variables are explained. This has a large effect (Anderson and Gerbing 1988). MA strongly influences PEOU (.79), supporting Hypotheses 23. F = 580.22>0.01, B = 0.81, t (365) = 24.87, p00.001. This means that a one-unit increase in MA increases PEOU by 0.81 units.

Table 23: Results for MA Predicting PEOU							
Variable	**B**	**SE**	**95% CI**	**β**	**T**	**P**	**Decision**
Intercept	.82	.14	[.55, 1.10]	.00	5.85	<0 .001	
MA	.81	.03	[.75, .88]	.79	24.87	<0 .001	supported
Note. Results: F (1,365) = 618.48, p < 0.001, R2 = 0.63 Unstandardized Regression Equation: PEOU = 0.82 + 0.81*MA							
Dependent Variable: e-learning's Perceived ease of use							

The revised conceptual model for e-learning readiness

The conceptual model will be revised based on the research and analysis findings. The final model will include new research contributions from e-learning designers and MOE officials in Northern Iraq. Also, the study hypotheses. Moreover, as shown in Figure 2, the final model will identify the relationships between factors that directly affect e-learning implementation and adoption.

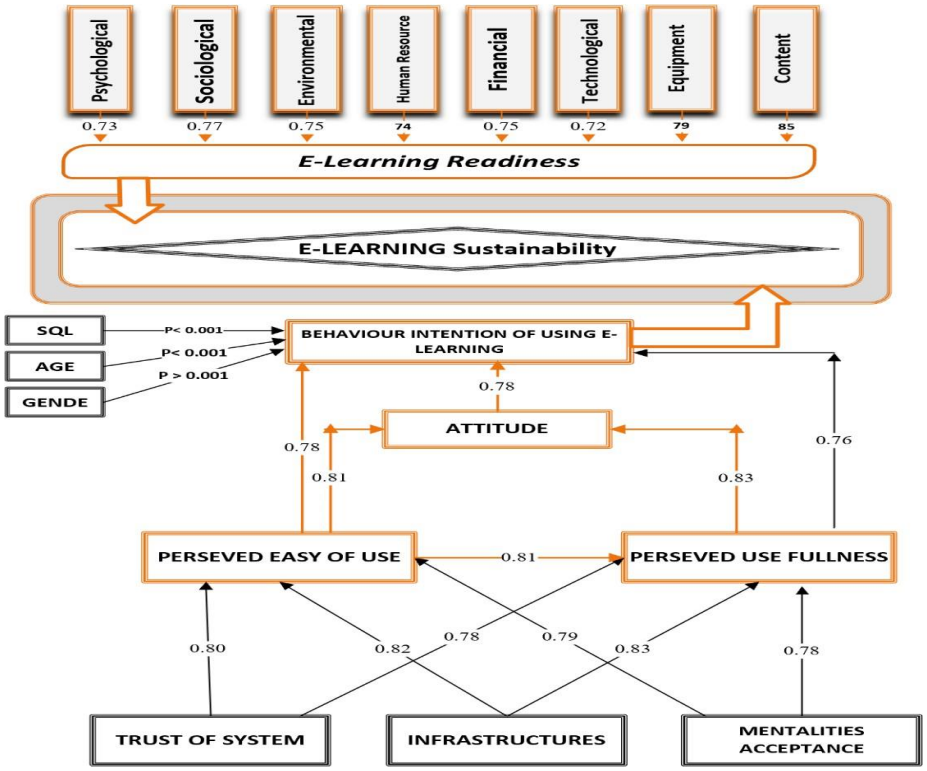

Figure 2: Revised conceptual model

Discussion

This research demonstrates the interdependencies of learners, providers, adopters, and users in Northern Iraq. The quantitative research methodology utilized to discover the factors affecting the Ministry of Education's e-learning technology adoption includes two distinct stages: the implementation and adoption phases. Of the participants, the majority felt that the Technology (hardware and software) was unavailable, and this shortage of tech was interrelated with other problems. They believe that there are not enough trained e-learning support staff to meet all their customers' needs. Although all staff members, faculty, and student body have insufficient knowledge of information and communication technology, which stifles e-learning, the level of knowledge is significant (beta = .72, p<.001). Moreover, regarding psychological readiness, most respondents agree that online Education leads to improving teaching and helping students be more active than traditional methods, especially during the coronavirus pandemic, for its contribution to providing the necessary feedback to prepare for the following semesters. It contributes to the sustainability of the educational process (β = .73, p<.001), which supported H1 of the first-step study. To sustain the educational process, the executive authorities must ensure the availability of a portal or website that contains information about educational curricula and study and training programs that improve the e-learning process (β = .85, p<.001), which supported H8 of the first-step study. Furthermore, professionals also realize that there is a need to provide the necessary Environment to enact laws and policies that support the application of the system in the educational Environment. Moreover, establishing a research centre to effectively organize and develop competencies and research and e-learning initiatives (β = .75, p<.001) supported H 3 of the first-step study. Conversely, the study's findings showed that education leaders were dedicated to using Technology to meet strategic academic goals. However, the Foundation does not have sufficient human resources to support the e-learning initiative (β = .75, p<.001), which supported H5 of the first-step study. While participants mostly agreed that organizations should have implemented mechanisms to maintain high levels of employee morale and motivate employees to use these e-learning applications, few thought it would have been better if organizations had built such mechanisms from the start (β = .74, p<.001). A training program for professionals should be implemented under a management initiative. Many respondents agreed that the federal government provides no special financial assistance for implementing the e-learning system. A system of rewards and incentives must be used to motivate employees to continue using e-learning. An allocation of funds should be provided to pay for Training concerning implementing e-learning. A special budget is allocated to purchase computers for schools and students. Most respondents agreed that society in northern Iraq faces difficulty implementing the e-learning system due to customs and traditions and awareness campaigns. Moreover, the social factors in terms of (culture, social status, and economic status of the employee) have a direct impact on the implementation and sustainability of the e-learning system (β = .77, p<0.001), which supported H2 of the first-step study. The findings concluded that many school assets, such as labs, Equipment, supplies, and the arts, contribute to developing an e-learning system. Anomalies may impact the implementation of the e-learning system because of the lack of computer networks and Internet devices in remote areas, and anomalies may slow the school down because of the lack of information and communication technology infrastructure. The lack of support for current Equipment for digital transformation hinders the e-learning application's sustainability. Furthermore, they agreed that it would be beneficial if the government used incentives to encourage employees to join the e-learning courses (β = .79, p<.001), which supported H7 of the first-step study. These findings are similar to other sources that have found that students should plan for long-term educational effectiveness when implementing the e-learning system. Act to provide the necessary psychological, sociological, Equipment, and environmental conditions for the system's implementation (Lopes, 2007; Nambirajan & Prabhu, 2010; Saekow & Samson, 2011; Bhuasiri et al., 2012; Oketch & Otchieng, 2013; Azimi, 2013; Al-araibi et al., 2019). The study identified a set of contributions that were not included in the research model, and that includes Training, which is consistent with the study of Abdul-Fattah Alshaher (2013) mentality accept, consistent with findings of (Sakorn & Waranya, 2009), Politics and Regulations, which is consistent to study of (Darab & Montazer, 2011b; Abas et al., 2015), leadership vision, that supported by (Ali & Magalhaes, 2008), and Trust of System, consistent of findings of (Abdul-Fattah Alshaher, 2013).

The TAM model illustrates a unique pattern of responses from teachers and students in Northern Iraqi educational institutions affiliated with the Ministry of Education. H9: The perceived usefulness of e-learning influenced its use, supporting this study's H9. We found that ease of use was directly related to the likelihood of applying e-learning, supporting H10. Additionally, the attitude towards e-learning implementation significantly predicted positive behaviour intentions (β =.778, p.001), confirming the H11 of the study. The perceived ease of use in e-learning implementation was strongly related to perceived usefulness (β =.812, p.001), suggesting H12. The perceived usefulness factor significantly predicted behaviour intention toward e-learning implementation (β =.762, p.001), supporting H13 of the study. The perceived ease of use factor especially indicated behaviour intention toward e-learning implementation (β =.776, p.001), supporting H14 of the study. The study also found significant differences between demographic variables (age and Education) and intention to use and adopt e-

learning (p-values 0.001 and 0.001). This backed up H15 and H17. Since the p-value (0.704) is more significant than 0.05, the study rejected H16. The TAM model has been enriched with external factors such as system trust, Infrastructure, and mental receptivity to examine their effect on perceived ease of use and utility. The study found that system trust positively predicted e-learning's perceived usefulness toward implementation (β =.780, p.001), supporting H18.

The system trust factor predicted the perceived ease of use of e-learning toward implementation (β =.802, p.001), supporting H19. The system infrastructure factor also significantly predicted e-learning's perceived usefulness toward implementation (β=.829, p.001), supporting H20 of the study. The infrastructure factor predicted the perceived ease of use of e-learning toward implementation (β =.821, p.001), supporting H21. Finally, H22 of the study found that the mentality acceptance factor positively predicted e-learning's perceived usefulness toward implementation (β =.783, p.001). The mentality acceptance factor predicted perceived ease of use toward e-learning implementation (β =.793, p.001), supporting H23. Users are more likely to adopt new Technology when they see its benefits than existing options. The perceived usefulness of new Technology influences attitude and intention to use it (Punik et al., 2011).

PEOU is critical in the early stages of adopting new technologies. Previous research shows that if someone is familiar with the proposed Technology, they will accept it without much resistance (Huang et al., 2012). Other researchers have found the same thing (Teo, 2010). The study found that student and teacher trust in the system increases adoption rates (Esteban-millat et al., 2018). The study also found that teachers' and students' attitudes, beliefs, and behaviours influence their decision to use e-learning systems and the importance of raising student and teacher awareness through appropriate educational means and e-learning system training.

Moreover, infrastructure readiness directly affects and positively affects the PEOU and PU. (Kimathi & Zhang, 2019); findings, there is a need to improve school ICT readiness by improving Internet service, computers, and technical staff specialized in information systems (Tawafak et al., 2018). Because of this, MOE's educational decision-makers should concentrate on improving the quality of instructional material content integration while promoting students' and teachers' perceptions of the advantages of e-learning. Compared to awareness campaigns on TV, radio, social media, and government websites.

Figure 3: gaps between the two sides of the implementation and adoption of e-learning.

Conclusion

The main objective of this study is to investigate and identify the factors that affect the implementation and adoption of the e-learning system and its sustainability in northern Iraq. A two-step research methodology is applied in the Ministry of Education of Northern Iraq by utilizing a hypothesized combination model of ELR and the Technology acceptance model (TAM). First, the implementation factors were investigated by MOE

officials and staff by analyzing 132 participants based on the ELR model. As the second research objective, the intention of teachers and students is explored with 367 valid respondents in MOE schools, based on the TAM model. Data were obtained from MOE officials, staff, teachers and students via a Google form-based quantitative survey. The respondents were selected for the first and second research steps based on convenience sampling and evaluated using the SPSS software. Most respondents indicated that the Technology (hardware and software) and content are not up to standard and that the administration (the leadership's vision) intends to take the necessary measures to implement e-learning applications in schools in northern Iraq. There is a lack of financial support from management to implement e-learning applications due to a lack of a particular budget.

On the other hand, human resource readiness is available to some extent, but with a lack of skills and capabilities. The study also revealed the effect of (psychological and social) factors on the employees' behaviour and intention towards implementing the system. Most e-learning service providers are well-versed in information technology and ready to use such applications. However, this is not enough because a successful strategy requires other employees familiar with teaching methods, experience in educational fields and trainers in the e-learning field.

The first step findings reveal that the lack of technology readiness, equipment readiness, content readiness, financial readiness, the lowest value of human resource readiness, sociology readiness, and psychology readiness factors from education providers' perspective is crucial for a sustainable e-learning application. The second step findings that perceived ease of use and usefulness positively influence the attitude and behavioural intention of e-learning services. Moreover, the study results indicated that Trust in the system, Infrastructure, and mentality acceptance positively influence PU and PEOU. In addition, the study findings show a statistically significant difference between age and education level, except gender and behaviour intention of e-learning use.

The study identified new contributions that must be taken into account by project executives. The study revealed the role of the leader's vision in developing the system by implementing the system as a priority. Work has also been determined to clarify the importance and benefits of this system through cultural awareness campaigns that help in the mental acceptance of the shift from traditional methods of Education to modern forms. Other contributions include setting clear policies, regulations and strategies by strengthening the information security system. Finally, the team member e-learning training and educating students and teachers is another factor affecting implementation.

Finally, the study found a set of new contributions and factors that directly affect the adoption and implementation of the system, which include (technological readiness, Trust in the design, social influence, Training, awareness, regulation and law, material and structure coordination, and portal ease of use), through which the identification of relationships and gaps between the two sides of the implementation and adoption of the e-learning system as shown in the final revised form of the research figure 3.

Conflicts of Interest: "The authors declare that they have no conflicts of interest to report regarding the present study."

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