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Lecturers' Adoption of E-Learning from the TAM Perspective: Transitioning from Lecture Halls to Virtual Classrooms

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Considering the post-COVID-19 pandemic, this study investigates how faculty members in higher education in Somalia are handling the shift from traditional classroom instruction to e-learning. *The* study looks at how factors like perceived usefulness (PU), attitude (ATT), behavioural intention (BI), and actual usage (AU) impact lecturers' acceptance of e-learning through the Technology Acceptance Model (TAM). A descriptive and cross-sectional design was used in the investigation. The information was gathered by surveying three hundred and seventy-five (375) lecturers from seven different Mogadishu universities. The study used a non-random, purposive sample. The results of the study showed that most of the factors influencing lecturers' adaptation to e-learning were significant, except for three exogenous variables: Perceived Teaching Self-Efficacy (PTSE), institutional support for lecturers (ISL), and digital tool access (DTA). These variables did not significantly impact perceived usefulness (PU), as their p-values were higher than 0.05.On the other hand, all the other hypotheses had p-values lower than 0.05, which means that the lecturers in the Benadir region, Somalia, were satisfied with the e-learning adaptation. To investigate the hypotheses of e-learning and digital resource adoption, the study used SPSS 26.0 and SmartPLS-4's Structural Equation Modeling (SEM). Based on the findings, the researchers advised instructors to receive technology and pedagogy training and institutions to fund infrastructure development

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E-learning, which refers to using electronic technologies and media to support learning, has grown in popularity and availability in recent years, but the pandemic has accelerated its adoption and innovation (Lytras et al., 2022)**.** As a form of ICT-based education, E-learning has also become increasingly popular among lecturers and students in higher education institutions (Alenezi et al., 2023). The rapid development of information and communication technology (ICT) has transformed the traditional mode of teaching and learning into a more flexible and interactive one.

Digital transformation in higher education institutions, as defined by Shaw and Rawlinson (2022), is the implementation of all digital processes necessary to simplify the transformation process and improve digital technology utilization. The official adoption of most African higher education institutions relied on face-to-face teaching methods (Mospan & Sysoieva, 2022). In Somalia, higher education institutions face limited access to learning facilities, such as limited access to computers and smartphones, the inability to use search engines and ICT software, and limited data provision and internet access. The level of preparedness and readiness

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of lecturers for e-learning varies depending on their access to technology and training (Anh et al., 2023).

Despite their challenges, some higher education institutions in Somalia have shown endurance and innovation by adopting digital learning environments. However, the pandemic may have also created some resistance among teachers to embrace online classrooms. After COVID-19, lecturers could evaluate their use of technology and how to improve their e-learning system in the event of the abrupt closure of academic institutions. This experience may have changed their perceptions of e-learning and increased their willingness to use it in future teaching plans (Farhan et al., 2019).

The study used the Technology Acceptance Model (TAM), which assumes that technology adoption depends on two personal beliefs: "perceived usefulness" and "perceived ease of use", to gain a deeper understanding of the effectiveness of online education (Patil & Undale, 2023; Dassanayaka et al., 2022).

This research investigates the views of university lecturers in Somalia regarding their readiness and motivation to continue using online platforms for teaching after the COVID-19 situation. The Technology. Insufficient studies about higher education lecturers' adaptation to e-learning were conducted. This study examined lecturers' readiness to shift from traditional lecture hall teaching to more sophisticated use of technology in teaching and learning by adapting virtual learning.

Literature Review

Various studies conducted by Al-Khresheh et al., (2022), Biberman-Shalev et al. (2023), and Cabero-Almenara et al., (2022) examined the impact and utilization of e-learning on lecturers' attitudes and intentions. According to Muhamad Don et al., (2022), after the COVID-19 epidemic, lecturers were more inclined to employ e-learning approaches, and their average score (3.8) indicated that they were better equipped for e-learning than traditional classroom teaching.

The COVID-19 pandemic accelerated the transition to online e-learning in the higher education sector. According to Haider and Al-Salman (2020), this profoundly affected educational institutions worldwide, prompting a swift transition to emergency remote instruction. The Technology Acceptance Model (TAM) might be a helpful resource to evaluate whether lecturers are prepared to embrace new technologies. Many scholars have utilized this model to examine the processes of technology adoption and utilization (Mohammadi, 2015). The model illustrates the relationship between lecturers' expectations of technology's usefulness in the classroom and their likelihood of adopting it. Researchers in information systems frequently use the TAM to comprehend better and predict the spread of various technologies (Dassanayaka et al., 2022). The TAM states that the perceived usefulness and perceived ease of use of technology are the most essential aspects in determining a person's intent to use it (Farhan et al., 2019). These considerations influence their actual patterns of use. It was initially envisaged that the TAM constructs and external factors would be related to the TAM scales. The ease of use of technology in intelligent classrooms and its connection to lecturers' comfort with technology are also investigated. There are instances where TAM is used productively in online education (Alismaiel et al., 2022). This research investigates the connections between TAM variables and lecturers' determination to use e-learning tools.

The study hypothesizes that teacher preparedness towards e-learning teaching is determined by some essential factors: Lecturers' institutional support, lecturer adaptation, Perceived Teaching Self-Efficacy, digital tool access, perceived ease of use, perceived usefulness,

attitude towards using digital tools, behavioural intention to use digital tools and actual use of digital tools for teaching and learning. The study also used structural equation modelling to look at the interconnections between these elements, and the diagram is shown at the end of this section.

Perceived Teaching Self-Efficacy (PTSE)

The role of technology in education is increasing, and teachers need to be confident in their ability to use it effectively. An educator's "ICT self-efficacy" is confidence in their abilities to effectively incorporate technology into their lessons (Mlambo et al., 2020). Teachers who use high-tech tools in their teaching tend to achieve better academic outcomes. Therefore, researchers are interested in exploring the factors influencing teachers' ICT self-efficacy (Alt, 2018). One of the domains where technology plays a significant role is e-learning, which offers many benefits such as flexibility, affordability, and personalization. E-learning instructors' self-efficacy can affect their performance and students' satisfaction. External variables, such as self-efficacy, can also shape the lecturers' perceptions of the ease of use and usefulness of e-learning platforms (Castro & Tumibay, 2021). Previous studies have shown that instructors who are confident in their ability to teach with and learn from ICT are likelier to adopt and implement e-learning in their courses (Ha & Lee, 2019).

Moreover, self-efficacy and perceived ease of use were predictors of instructors' intention to use e-learning. ICT instructors' self-efficacy also influenced their actual use of ICT in education. Therefore, teachers' self-efficacy can significantly impact their attitudes and behaviours toward technology in Education. Following this evaluation of the relevant literature, we propose the following hypotheses:

According to Hypothesis 1 (H1). PTSE and PEU are significantly related.

According to Hypothesis 2 (H2),. PTSE and PU are significantly related.

Institutional Support for Lecturers in the Use of E-learning Systems (ISL)

The COVID-19 pandemic has prompted numerous educational institutions to speed up their transition to online education. However, lecturers need institutional backing for technology use in higher education. Access to more technological tools has increased lecturers' attitudes towards e-learning instruction (Schoonenboom, 2014). No matter how mandatory or elective the use of technology may be, lecturers might benefit from institutional support to better incorporate it into their lessons (Lee & Jung, 2021). Therefore, these results suggest that institutions might encourage the use of technology in the classroom by providing instructors with training and resources on new technologies and by researching to comprehend the acceptance and utilization of technology by both lecturers and students (Granić & Marangunić, 2019). Another study examined how lecturers felt about e-learning and online courses (Haider & Al-Salman, 2020). Access to computers and other technology infrastructure inside the educational setting was crucial to making e-learning possible. In addition, the spread and adoption of e-learning education among faculty depended on factors such as institutional support, training methodologies, faculty workload, aims, and technology-related skills. Following this analysis, the following speculations were developed:

According to Hypothesis 3 (H3),. ISL and PEU are significantly related.

According to Hypothesis 4 (H4),. ISL and PU are significantly related.

Lecturer Adaptation in the Use of E-learning System (LA)

The COVID-19 epidemic has prompted universities to implement cutting-edge safety measures. As a result, many educators have shifted their focus to accommodate the rise of online education. Lecturers use online tools like Microsoft Teams, Google Classroom, Canvas, and Blackboard to design and implement curriculum, professional development, and skill-building programs (Pokhrel & Chhetri, 2021). Schools and students should continue using digital resources

to their advantage even after the COVID-19 pandemic. 94% of students and millions of lecturers worldwide will use online courses by 2020 (Vergara-Rodríguez et al., 2022). The new course design has helped lecturers rediscover the merits of online education and make the necessary pedagogical adjustments. After a pandemic, instructors and students with special needs may benefit from training via online learning platforms (Basilaia & Kvavadze, 2020). Because of the situation, many Somali universities have adopted new forms of technology and boosted faculty involvement. There is a consensus that technology has improved and democratized higher education. The lecturer's modification may have something to do with the availability of technological resources. Lecturers are efficient, flexible, persistent, teachable, and deeply invested in their students' development. These speculations are based on the findings of this study.
According to Hypothesis 5 (H5),. LA and PEU are significantly related.
According to Hypothesis 6 (H6),. LA and PU are significantly related.
According to Hypothesis 7 (H7),. LA and DTA are significantly related.

Digital Tools Access (DTA)

The epidemic has hastened the transition to online learning resources. With the help of e-learning, lecturers can use available digital tools to provide their students with an excellent education**.** Lecturers will still benefit from accessing and using digital resources, even after the pandemic (Gonzalez et al., 2022). Some lecturers have adjusted their teaching methods to accommodate the widespread adoption of digital tools in the classroom. Lecturers in today's digital classrooms must be creative to fulfil the requirements of students who grew up with the Internet. E-learning resources and innovative methods of digital instruction have flourished due to the digital age (Mospan & Sysoieva, 2022). E-learning platforms allow for distance education. There was less disruption at universities that had adopted online education. ICT resources, such as synchronous and asynchronous videos, online exams, collaborative learning tools, student monitoring systems, and family communication, have been encouraged by many educators to be used in innovative ways (Nuere & de Miguel, 2021). If all lecturers and students have access to and can afford digital tools, they can improve the teaching and learning environment. The study led to the following hypotheses:
According to Hypothesis 8 (H8),. DTA and PEU are significantly related.
According to Hypothesis 9 (H9),. DTA and PU are significantly related.

Perceived Ease of Use (PEU)

The term "perceived ease of use" (PEU) assumes a given technology or system would be simple and straightforward. The usefulness and appeal of digital resources are influenced by lecturers' and students' perceptions of how simple they are to use (Binyamin et al., 2019; Alismaiel et al., 2022). Furthermore, the perceived ease of use influences the intention to use e-learning instructional approaches. PEU and PU can also be influenced by extraneous variables like access to necessary resources (Khong et al., 2022). A technical system or gadget's perceived ease and usefulness greatly influence the user's propensity to adopt and utilize it (Esteban-Millat et al., 2018). As a result, a cheerful disposition towards technology adoption follows from an individual's assessment of its user-friendliness. This suggests that having a favourable opinion of people's willingness to adopt and use technology can boost one's mood. The success of online courses depends on the instructors' familiarity with and comfort with technology. These are the conjectures that can be drawn from this study's data.
According to Hypothesis 10 (H10). PEU and PU are significantly related.
According to Hypothesis 11 (H11). PEU and ATUD are significantly related.
According to Hypothesis 12 (H12). PEU and BIUD are significantly related.

Perceived Usefulness (PU)

The Technology Acceptance Model (TAM) introduces the concept of perceived usefulness, which is defined as the extent to which a person believes that using a particular system can improve his job performance (Wang et al., 2023). It reflects people's hopes that technology will make them more productive at work. Teachers who see the upsides of ICT are more likely to use it in the classroom. Students' beliefs about technology's usefulness impact their attitudes towards and plans for using it in the classroom (Alismaiel et al., 2022). In TAM, perceived usefulness influences behavioural intentions and technological attitudes (Saputra et al., 2023). The value that professors attribute to online education is a significant predictor of their views on and plans to implement it. According to Napitupulu et al. (2017), one's initial assessment of a technical advance is a significant factor in shaping one's attitude and behaviour toward accepting that innovation. We make the following assumptions based on this:

According to Hypothesis 13 (H13),. PU and ATUD are significantly related.

According to Hypothesis 14 (H14),. PU and BIUD are significantly related.

Attitude toward Using Digital Tools for Teaching and Learning (ATUD)

According to Wang et al. (2023), in the TAM model, users' attitudes towards activities are essentially their assessments of how much they want to utilize the system. Lecturers' openness to incorporating technology tactics into their lessons is frequently influenced by their personal feelings about the usefulness of such technologies. According to studies conducted by Bajaj et al. (2021), a person's attitude significantly impacts their propensity to act. Numerous studies have found that an individual's outlook is a significant predictor of their conduct when adopting technological aids in the classroom (Tosuntaş et al., 2015). This model postulates that positive mental frames about technology lead to increased interest in and eventual adoption of that technology. As a result, the TAM is a helpful model for explaining how technologies in education spread among college lecturers. The authors of this study are also particularly interested in lecturers' attitudes towards using digital resources in the classroom. The following hypotheses are drawn from this study:

According to Hypothesis 15 (H15),. ATUD and BIUD are significantly related.

According to Hypothesis 16 (H16),. ATUD and AUDT are significantly related.

Behavioural Intention to Use Digital Tools for Teaching and Learning (BIUD)

Behavioural intention is the outcome of actions that an individual performs based on the individual's prior experience (Prasetyo et al., 2021). A person's level of behavioural intention indicates how likely they are to perform the conduct in question. In accepted technology acceptance and use models, which attempt to capture acceptance-like processes (Mailizar et al., 2021), it is a mediator between individual or contextual factors and actual use. Tsourela and Nerantzaki (2020) argue that behavioural intention (BI) is similarly crucial in foreseeing uptake. Those who score higher on the intelligence scale are more willing to embrace new technologies. We base the following hypotheses on this analysis:

According to Hypothesis 17 (H17),. BIUD and AUDT are significantly related.

Actual Use of Digital Tools for Teaching and Learning (AUDT)

The TAM technique yields two categories of results: intent-to-use and actual use. Emergency remote teaching (ERT) is the rapid substitution of online learning for traditional classroom instruction (Tsang et al., 2021). Lecturers and students at today's universities have been much better at using technology and understanding its implications over the past several years (Timothy Teo, 2020). It has been suggested that students' ability to adapt to new learning environments and work at their own pace can be enhanced using digital technologies in online learning (Ottenbreit-Leftwich et al., 2010). Online education is becoming more popular among

university lecturers because of its adaptability and convenience. If university lecturers start using technology in the classroom, it is typically because they think it will help their pupils. Digital learning students tended to turn in research projects on time (Likhachev et al., 2020). Teachers use technological elements in their lessons to pique students' interests, boost their enthusiasm, and better prepare them for work in today's information age. The theoretical basis of the research is depicted in the following diagram:

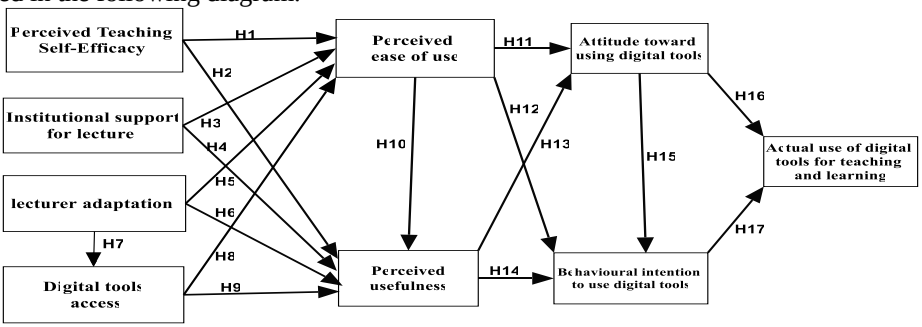

Diagram 1. Technology acceptance model (TAM)

Method

Research Design

A theoretical framework connecting external and internal influences is proposed in this paper (see diagram 1). The primary goal of this article is to assess the Transition to E-Learning: Lecturers' Adoption from the TAM Perspective of Somali Higher Education. This descriptive study used a cross-sectional survey (Almogren, 2022). The purpose of a descriptive study is to give reliable, empirical information in response to questions regarding measurable quantities.
The researchers used a purposive sampling strategy, with the sample chosen according to "Patton's (1990)—sampling principle criterion." (Aslam et al., 2023).

Participants

The participants in the research were staff members from one public and six private universities in the Benadir region of Mogadishu, Somalia, who made up the study's sample population. The universities were chosen for their recognition and prestige. Regarding academic rank, faculty members have held positions such as lecturer, senior lecturer, associate professor, and professor. Valid replies from the sample population totalled 375 for the study. The survey results indicate that out of the respondents, 319 (85.1%) were male, and 56 (14.9%) were female. In total, for this analysis (N = 375).

Instruments

The questionnaire was the main instrument used to gather data for this study. Participants were invited over WhatsApp after receiving approval from their department heads. We surveyed faculty members using a five-point Likert scale to gauge their satisfaction with their e-learning experiences. The questionnaire was divided into two sections. Part one collected demographic information about the lecturers, including their age, gender, educational level, and Academic ranking. The second section, which consists of 28 items, was modified from the original versions of the TAM (PEU, PU, AT, BI, and AU), and four external variables [Perceived Teaching Self-Efficacy (PTSE), Lecturer Adaptation (LA), Institutional Support (IS), and Digital Tools Access (DTA)].

Data Collection and Analysis

An online questionnaire aligned with TAM components was used to gather data. To verify our hypotheses, we used structural equation modelling (SEM). The analysis was well suited for partial least squares structural equation modelling (PLS-SEM). (Mailizar et al., 2021). Hypothesis testing was performed with Smart PLS 4.0, and respondent profiles were analyzed with SPSS 26.0. This SEM strategy evaluated the external (measurement) and internal (structural) models. The outer model, or the measurement model, puts the connections between indicators and constructs to the test. Indicator testing was used to assess the model for convergent validity, discriminant validity, and reliability.

Table

The components of the factors in the TAM model

Perceived Ease of Use	
1	There is clarity and understanding in my interaction with the e-learning system.
2	The e-learning system is easy to use for me.
3	Interacting with the e-learning system does not require a lot of mental effort.
Perceived usefulness	
4	My productivity is elevated through the utilization of e-learning in my study.
5	Using the e-learning system enhances my learning effectiveness.
6	I find the e-learning system to be useful in my learning.
Attitude towards use	
7	I feel positive regarding the utilization of the e-learning system.
8	In general, I admire the utilization of e-learning systems.
9	The e-learning system provides an attractive learning environment.
Behavioural intention to use	
10	I will make regular use of the e-learning system in the future.
11	I will give out my recommendation to others to use the e-learning system.
12	I will use the e-learning system regularly in the future.
Actual use	
13	I frequently use e-learning tools to collaborate with peers and Students.
14	I regularly utilize e-learning platforms and tools for course delivery.
15	E-learning has become an essential part of my higher education experience.
Perceived Teaching Self-Efficacy	
16	I feel confident in the utilization of an e-learning system even when no one is there for assistance.
17	I have sufficient skills to use the e-learning system.
18	I have the necessary skills and knowledge to assess student e-learning systems effectively.
Lecturer Adaptation for E-learning System	
19	I have successfully adapted my teaching methods for e-learning system delivery.
20	I regularly update my knowledge and skills in using e-learning systems for teaching.
21	I have modified my course content and assessments to suit the e-learning system environment.
Institutional Support for	

the lecturer	
22	My institution has provided adequate support and resources for transitioning to an e-learning system after COVID-19.
23	My institution offers training and professional development opportunities to help faculty adapt to e-learning system methods.
24	My institution has implemented policies and guidelines to facilitate an effective e-learning system.
25	My institution encourages and recognizes the efforts of lecturers in adapting to the e-learning system.
Digital Tools Access	
26	I have access to reliable internet connectivity for the e-learning system.
27	I can quickly obtain the digital tools needed for teaching and learning online.
28	I have access to technical support to address an issue with the e-learning system.

Ethical considerations

Before collecting the data, the researchers obtained ethical approval from the faculty leaders of the higher education institutions. They also built a trusting and respectful relationship with the participants to ensure their comfort. The participants were selected through WhatsApp after receiving permission from their department heads.

Findings

Demographics

Demographic Participants of the Survey as descriptive were illustrated in Table 1 below. Gender, Age, Educational level, and Academic ranking were presented. According to the survey, Among the respondents, 319 (85.1%) were male and 56 (14.9%) were female. Furthermore, 37 (9.9%) were below 30 years old, 254 (67.7%) were 30 but below 40 years old, and 84 (22.4%) were 40 and above years old. With regards to educational level, 47 (12.5%) had bachelor's degrees, 293 (78.1%) had master's degrees, and 35 (9.3%) had PhDs. Finally, regarding academic ranking, 122 (32.5%) were lecturers, 177 (47.2%) were senior lecturers, 54 (14.4%) were associate professors, and 22 (5.9%) were professors.

Table 1

Participants' description (n = 375)

Characteristics	Categories	Frequency	Percentage
Gender	Male	319	85.1
	Female	56	14.9
	Total	375	100
Age	Below 30	37	9.9
	30 but below 40	254	67.7
	40 and above	84	22.4
	Total	375	100
Educational level	Bachelor	47	12.5
	Master	293	78.1
	PHD	35	9.3
	Total	375	100
Academic ranking	Lecturer	122	32.5
	Senior lecturer	177	47.2
	Associate professor	54	14.4
	Professor	22	5.9
	Total	375	100
	Total	375	100

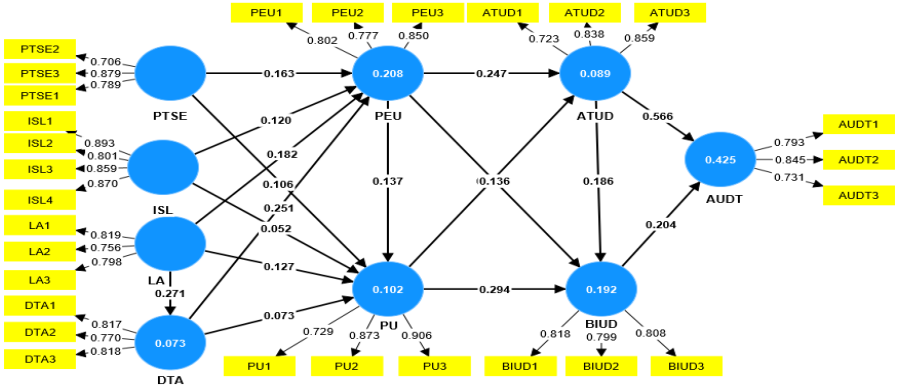

Figure 1. Measurement Model

Results

In this study, the proposed model was evaluated using PLS-SEM. The SEM methodology is becoming increasingly popular and is widely acknowledged in tourism and education research (Wang et al., (2023). The study used the SmartPLS-4 program with a two-stage procedure involving estimating the measurement model and testing the structural model.

Measurement Model Evaluation

There are two kinds of validity that we used to evaluate the measurement model, and they are convergent validity and discriminant validity. First, we analyzed the outer loadings of indicators, composite reliability, and average variance extracted (AVE), which were analyzed for convergent validity. According to the research (Patil & Undale, 2023), optimal values for factor loadings, composite reliability, and AVE are above 0.7 and 0.5, respectively. The item loading weights are also recommended to be greater than or equal to 0.5 for the corresponding latent variables (Likhachev et al., 2020). One PTSE item, PEU item, and ATUD item were also removed due to their low loading factors (Qureshi et al., 2021). Information regarding convergent validity can be found in Table 2. Results showed that item loadings were statistically significant above the recommended level. The average variance extracted (AVE), Cronbach's alpha, and composite reliability (CR) scores exceeded the statistical significance thresholds.

Table 2

Convergent validity and composite reliability

Constructs	Items	Factor loading	Cronbach's alpha	CR	AVE
Attitude toward Using Digital	ATUD1	0.723	0.736	0.734	0.655
	ATUD2	0.838			
	ATUD3	0.859			
Actual Use of Digital Tools	AUDT1	0.793	0.706	0.737	0.626
	AUDT2	0.845			
	AUDT3	0.731			
Behavioral Intention to Use Digital	BIUD1	0.818	0.735	0.735	0.653
	BIUD2	0.799			
	BIUD3	0.808			
Digital Tools Access	DTA1	0.817	0.722	0.723	0.643
	DTA2	0.77			
	DTA3	0.818			
Institutional Support for Lecturers	ISL1	0.893	0.879	0.882	0.733
	ISL2	0.801			
	ISL3	0.859			
	ISL4	0.87			
lecturer adaptation	LA1	0.819	0.701	0.704	0.626
	LA2	0.756			
	LA3	0.798			
Perceived Ease of Use	PEU1	0.802	0.738	0.738	0.657
	PEU2	0.777			
	PEU3	0.85			
Perceived Teaching Self-Efficacy	PTSE1	0.789	0.712	0.775	0.631
	PTSE2	0.706			
	PTSE3	0.879			
Perceived Usefulness	PU1	0.729	0.792	0.84	0.705
	PU2	0.873			
	PU3	0.906			

The second sort of validity, known as discriminant validity (Patil & Undale, 2023), evaluates the degree to which one concept differs from all other constructs in the research model. The Fornell-Larcker criterion (i.e., the square root of AVE), cross-loadings, and the Heterotrait-Monotrait ratio of correlations (HTMT) are used to evaluate discriminant validity. According to Table 3, the current study satisfies the first condition for discriminant validity, which requires that the square root of the AVE (diagonal value) for each construct in the correlation matrix be larger than the correlations between the latent constructs. Each item should have a more extensive loading than its related variable, a second criterion for discriminant validity, as stated in (Alammary et al., 2022). as shown in Table 4. Third, the HTMT values must be under 0.85 for discriminant validity. Discriminant validity is confirmed since Table 5 shows this condition is also met.

Table 3

Discriminant validity (Fornell-Lacker Criterion)

	ATUD	**AUDT**	**BIUD**	**DTA**	**ISL**	**LA**	**PEU**	**PTSE**	**PU**
ATUD	**0.809**								
AUDIT	0.622	**0.791**							
BIUD	0.275	0.36	**0.808**						
DTA	0.231	0.338	0.243	**0.802**					
ISL	0.175	0.095	0.147	0.039	**0.856**				
LA	0.301	0.289	0.29	0.271	0.048	**0.791**			
PEU	0.276	0.297	0.258	0.351	0.142	0.305	**0.81**		
PTSE	0.218	0.276	0.241	0.278	0.024	0.302	0.29	**0.794**	
PU	0.177	0.208	0.36	0.188	0.084	0.224	0.24	0.206	**0.84**

Note: PTSE= Perceived Teaching Self-Efficacy, LA = Lecturer Adaptation, IS = Institutional Support, DTA = Digital Tools Access, PEOU = Perceived ease of use, PU= Perceived usefulness, BIUD = Behavioral Intention to Use Digital, ATUD= Attitude toward Using Digital and AUDT = Actual Use of Digital Tools.

Table 4

Discriminant validity (cross-loading criterion)

	ATUD	AUDT	BIUD	DTA	ISL	LA	PEU	PTSE	PU
ATUD1	0.723	0.652	0.15	0.132	0.102	0.149	0.155	0.09	0.059
ATUD2	0.838	0.344	0.211	0.15	0.143	0.244	0.22	0.167	0.163
ATUD3	0.859	0.451	0.303	0.269	0.178	0.339	0.292	0.271	0.215
AUDT1	0.438	0.793	0.291	0.281	0.111	0.243	0.191	0.231	0.145
AUDT2	0.631	0.845	0.251	0.259	0.074	0.24	0.256	0.16	0.13
AUDT3	0.357	0.731	0.336	0.274	0.039	0.201	0.261	0.298	0.243
BIUD1	0.23	0.293	0.818	0.211	0.147	0.202	0.195	0.192	0.29
BIUD2	0.232	0.284	0.799	0.175	0.092	0.255	0.211	0.157	0.29
BIUD3	0.206	0.296	0.808	0.202	0.117	0.246	0.219	0.235	0.291
DTA1	0.235	0.304	0.198	0.817	0.056	0.232	0.298	0.228	0.134
DTA2	0.119	0.213	0.213	0.77	0.001	0.181	0.272	0.186	0.207
DTA3	0.2	0.296	0.173	0.818	0.037	0.237	0.271	0.254	0.11
ISL1	0.165	0.084	0.12	0.009	0.893	0.043	0.119	0.034	0.06
ISL2	0.12	0.039	0.162	0.046	0.801	0.052	0.137	-0.032	0.08
ISL3	0.136	0.137	0.106	0.008	0.859	0.027	0.123	0.034	0.076
ISL4	0.184	0.066	0.107	0.075	0.87	0.042	0.101	0.058	0.066
LA1	0.29	0.282	0.322	0.216	0.005	0.819	0.251	0.284	0.204
LA2	0.224	0.235	0.215	0.211	0.09	0.756	0.222	0.192	0.182
LA3	0.198	0.164	0.144	0.215	0.022	0.798	0.25	0.237	0.143
PEU1	0.201	0.225	0.264	0.287	0.089	0.225	0.802	0.247	0.227

PEU2	0.256	0.24	0.175	0.279	0.103	0.27	0.777	0.249	0.132
PEU3	0.215	0.257	0.183	0.286	0.154	0.247	0.85	0.209	0.221
PTSE1	0.206	0.193	0.184	0.21	0.018	0.244	0.149	0.789	0.178
PTSE2	0.169	0.225	0.154	0.174	0.03	0.237	0.224	0.706	0.084
PTSE3	0.16	0.239	0.226	0.264	0.014	0.246	0.293	0.879	0.211
PU1	0.06	0.111	0.245	0.165	0.026	0.091	0.159	0.067	0.729
PU2	0.154	0.174	0.326	0.128	0.096	0.207	0.216	0.194	0.873
PU3	0.203	0.219	0.325	0.186	0.076	0.235	0.222	0.224	0.906

Note: PTSE= Perceived Teaching Self-Efficacy, LA = Lecturer Adaptation, IS = Institutional Support, DTA = Digital Tools Access, PEOU = Perceived ease of use, PU= Perceived usefulness, BIUD = Behavioral Intention to Use Digital, ATUD= Attitude toward Using Digital and AUDT = Actual Use of Digital Tools.

Table 5

Discriminant validity (HTMT)

	ATUD	AUDT	BIUD	DTA	ISL	LA	PEU	PTSE	PU
ATUD									
AUDT	0.8								
BIUD	0.372	0.512							
DTA	0.31	0.478	0.333						
ISL	0.22	0.119	0.18	0.066					
LA	0.418	0.406	0.4	0.38	0.066				
PEU	0.374	0.412	0.348	0.48	0.175	0.424			
PTSE	0.309	0.407	0.326	0.378	0.058	0.429	0.384		
PU	0.231	0.281	0.466	0.251	0.099	0.283	0.308	0.264	

Note: PTSE= Perceived Teaching Self-Efficacy, LA = Lecturer Adaptation, IS = Institutional Support, DTA = Digital Tools Access, PEOU = Perceived ease of use, PU= Perceived usefulness, BIUD = Behavioral Intention to Use Digital, ATUD= Attitude toward Using Digital and AUDT = Actual Use of Digital Tools.

Structural Model

A structural model evaluation was used to test the suggested conceptual framework by examining the connections between the concepts. A preliminary evaluation (Purnama et al., 2021). they confirmed that the model was valid and reliable. This study utilised PLS estimation to investigate the relationships between constructs further and estimate the inner model. 500 bootstrapped samples were used to run the data from 375 occurrences. Then, we utilized SMART PLS 4's bootstrapping function to determine t-values for each path and determine whether they were statistically significant. The findings of the hypothesis testing are shown in Table 6. Each hypothesis was tested with a two-tailed test to see if they differed significantly from zero (0.000). There is a robust association between the variables; this is indicated by a high route coefficient value estimate (= t-value>1.645). Therefore, they were statistically significant if the p-value was less than 0.05. Figure 2 depicts this phenomenon.

Hypothesis	Effects	Beta	**T** values	**P** values	Study results
H1	PTSE -> PEU	0.163	3.176	0.002	Supported
H2	PTSE -> PU	0.106	1.767	0.077	Not Supported
H3	ISL -> PEU	0.12	2.716	0.007	Supported
H4	ISL -> PU	0.052	1.029	0.304	Not Supported

H5	LA -> PEU	0.182	3.641	0	Supported
H6	LA -> PU	0.127	2.35	0.019	Supported
H7	LA -> DTA	0.271	5.08	0	Supported
H8	DTA -> PEU	0.251	4.876	0	Supported
H9	DTA -> PU	0.073	1.369	0.171	Not Supported
H10	PEU -> PU	0.137	2.208	0.027	Supported
H11	PEU -> ATUD	0.247	4.877	0	Supported
H12	PEU -> BIUD	0.136	2.727	0.006	Supported
H13	PU -> ATUD	0.118	2.32	0.02	Supported
H14	PU -> BIUD	0.294	5.593	0	Supported
H15	ATUD -> BIUD	0.186	3.416	0.001	Supported
H16	ATUD -> AUDT	0.566	14.111	0	Supported
H17	BIUD -> AUDT	0.204	4.459	0	Supported

Factor analysis

Five internal TAM constructs models (PEU, PU, AT, BI, and AU) and four external variables (PTSE, ISL, LA, and DTA) were analyzed using a factor analysis to determine their relative importance. The outcomes of applying the proposed research model to the hypotheses are shown in Figure 3 and Table 6. Out of the seventeen hypotheses, fourteen were confirmed, and three were rejected on PU. The results supported H1 by showing that PTSE significantly influenced PEU (T = 3.176, = 0.163, p 0.05). T = 1.767 shows that PTSE did not significantly affect PU (β = 0.0106, p > 0.05), supporting H2. T = 2.716, p 0.05, = 0.12, all favouring H3: ISL positively and substantially affects PEU. On the other hand, the results supported H4 in that ISL had a negative and negligible effect on PU (T = 1.029, = 0.052, p > 0.05). T = 3.641 and T = 2.35 for PEU and PU, respectively, showing that LA substantially affected both variables, verifying hypotheses 5 and 6.

Results show that LA influences DTA in a significant way (T = 5.08, = 0.271, p 0.05), therefore supporting H7. The PEU is likewise significantly affected by DTA (β = 0.251, p 0.05, T = 4.876), proving the null hypothesis H8. However, a T value of 1.369 indicates that the effect of DTA on the BU is not statistically significant (β = 0.073, p > 0.05), supporting hypothesis H9. Supporting hypotheses (H)10, (H)11, and (H)12, the data show that PEU significantly affects the PU (β = 0.137, p 0.05), the ATUD (β = 0.247, p 0.05), and the BIUD (β = 0.136, p 0.05) with a T value of 2.208, 4.877, and 2.727, respectively. Consistent with predictions H13 and H14, the data demonstrate that PU significantly affects the ATUD (β = 0.118, p 0.05) and the BIUD (β = 0.294, p 0.05) with T values of 2.32 and 5.593, respectively. Validating hypotheses H15 and H16, we find that ATUD has a substantial effect on the BIUD (β = 0.186, p 0.05) and the AUDT (β = 0.566, p 0.05), with a T value of 3.416 and 14.111, respectively. The study concludes that BIUD significantly affects AUD (β = 0.204, p 0.05), with a T value 4.459, confirming hypothesis H17.

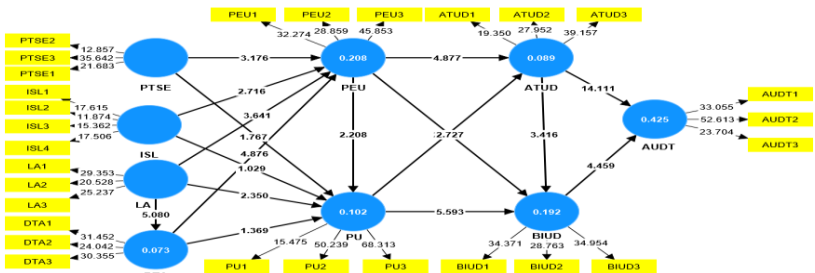

Figure 2. Results of Structural model and path coefficients.

Discussion

This study uses the Technology Acceptance Model (TAM) framework to assess how lecturers adjust to online education, including perceived usefulness and ease of use. The Technology Acceptance Model (TAM) was used in an experiment to determine lecturers' e-learning readiness (Mohammadi, 2015). Five internal and four external variables related to the Technology Acceptance Model (TAM) elements were used to create 17 hypotheses. The confirmatory analysis examined these hypotheses.

The research found that three external variable hypotheses (H2, H4, and H9) did not support the perceived usefulness (PU) construct. We expected PTSE Perceived Teaching Self-Efficacy (H2) to predict perceived usefulness. Unfortunately, the evidence did not support our findings. However, the literature on PTSE and e-learning usefulness is mixed. A study conducted by Abdullah et al. (2016) revealed that there was no correlation. On the other hand, Al-Mushasha (2013) found that there is a positive correlation. Table 6 shows that PTSE does not affect university lecturers' views on classroom technology.

Our findings show that institutional support for lecturers (ISL) did not affect perceived usefulness, contrary to our hypothesis (H4). Research has indicated that perceived usefulness is significantly impacted by (ISL). Tanduklangi (2017) says sufficient technical and management resources boost technology adoption. This indicates that the findings are dissimilar. However, our research shows that organizational support negatively impacts e-learning uptake. This implies that seven university instructors in Benadir, Mogadishu, do not value organizational aid in adopting and using e-learning. However, lecturers find e-learning user-friendly.

We found no significant effect of digital tool access (DTA) on the perceived usefulness (PU) of ICT readiness adoption in virtual classrooms, contradicting our third hypothesis (H9). This indicates that lecturers' impressions of ICT's benefits in digital transformation are not improved by its availability and accessibility. DTA and user support degrade PU. A study by Tick (2019) showed that DTA affected PU negatively. Our TAM model found that only lecturers' adaptation (LA) improved perceived usefulness. LA and DTA are positively correlated, showing that educators who like technology are more likely to use their academic institutions' digital resources (Pokhrel & Chhetri, 2021). The extensive use of technology has transformed higher education. Thus, teachers' attitudes and behaviours may affect their adoption of e-learning. The data supported our hypothesis (H7) that lecturers were efficient, flexible, persistent, and receptive. The success of DTA will help professors adjust to e-learning.

The TAM model (PEOU→PU →ATT→BI →AU) yielded substantial results. This shows that the initial TAM components accurately predicted the utilisation of lecturers' classroom digital tools. Lecturers' digital attitudes and intentions affected their teaching and learning use. These findings supported expanding the TAM to include teachers' technology use in the classroom (Lazar et al., 2020). This implies they liked online learning resources and planned to use them after COVID-19. Lecturers appreciate easy-to-use technology. Many studies have shown that digital tools' perceived simplicity and usefulness affect their adoption in educational institutions (Bajaj et al., 2021). When professors favour online instruction, they can better assess its potential for their domain. Somali universities can expedite e-learning integration with more interest and exposure. However, universities should invest in new technology and infrastructure to boost uptake and satisfy staff and students.

Pedagogical Implications

The study anticipates encouraging lecturers to engage in e-learning by examining its usefulness and ease of use. This will help foster a positive attitude towards technology, create a supportive environment, and provide the necessary training and resources for integrating technology into teaching. The research also predicts that providing lecturers with the necessary skills to utilize e-learning will promote technology adoption and enhance student performance.

Limitations and Recommendations

This study's limitations must be acknowledged. The study focused mainly on lecturers in the Benadir Region of Mogadishu, Somalia, and studied e-learning instruction at higher education institutions. Second, the article only assessed instructors' perceptions; student and administrative perspectives may be more helpful. More views would help the research understand Somali higher education e-learning readiness. These limitations should be addressed to improve higher education teacher e-learning research.

This paper suggests several E-learning improvements for Somalia—first, provide training for teachers in technology and pedagogy. Second, motivate and inform Somali teachers by sharing best practices of e-learning. The institutions should cooperate to foster e-learning and support infrastructure development. Monitor teacher readiness and e-learning effectiveness over time, implementing improvements.

Conclusion

This study employed the Technology Acceptance Model (TAM) to measure lecturers' online teaching adaptation, including perceived usefulness and perceived ease of use. The poll found Benadir lecturers satisfied with e-learning. This model was confirmed using PLS-SEM.

The study found that most factors affecting lecturers' e-learning adoption were statistically significant, except for three external variables: Perceived Teaching Self-Efficacy (PTSE), institutional support for lecturers (ISL), and digital tool access. The variables' p-values were above 0.05; hence, they did not affect perceived usefulness (PU). All other hypotheses had p-values below 0.05, indicating that Somali lecturers in Benadir were satisfied with e-learning. Research indicates that PEOU-PU-ATT-BI promotes instructors' usage of digital tools and e-learning post-COVID-19. This research improves Somali higher education e-learning pedagogy, notably post-COVID-19.

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