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DETERMINANTS OF HIGHER EDUCATION STUDENTS' CONTINUANCE INTENTION TOWARD E-LEARNING IN THE POST COVID-19 ERA WITH AN EXTENDED UTAUT APPROACH

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ABSTRACT

The sustainability of e-learning in higher education has become a key concern in the post COVID-19 era as students are no longer compelled to rely on online learning. The limited empirical evidence explains students' continuance intention once traditional classroom teaching resumes as prior studies have largely focused on the initial adoption of e-learning. To address this gap, the current study investigates the determinants of higher education students' intention to continue using e-learning by extending the Unified Theory of Acceptance and Use of Technology (UTAUT) with student satisfaction and perceived learning effectiveness as mediating mechanisms. Using survey data collected from 350 undergraduate and graduate students enrolled in public and private universities, the study employs Structural Equation Modeling through PLS-SEM 4.0 to analyze the data. The findings highlight the importance of experiential and outcome-based evaluations in shaping sustained e-learning usage. The study findings have contributed to e-learning literature by shifting the focus from adoption to post adoption continuance. The results provides actionable insights for higher education institutions seeking to sustain digital learning beyond crisis conditions.

Keywords: *E-learning, Student satisfaction, UTAUT, continuance intention, Perceived learning effectiveness.*

INTRODUCTION

The COVID-19 pandemic has changed higher education worldwide. It has moved from face-to-face to tech-mediated teaching. The first pivot was critical for survival, but the post-pandemic "new normal" raises questions about these digital systems' sustainability (Cocosila, Trabelsi, & Farrelly, 2024; khaled Amin & Rattanawiboonsom, 2025).Digital technologies are changing higher education delivery, assessment, and experience. E-learning platforms have evolved from additional tools to essential instructional delivery in universities globally over the past decade. The COVID-19 pandemic prompted universities to use online learning technologies nearly exclusively to maintain academic continuity, accelerating this shift. This emergency change allowed colleges to continue teaching, but it raised important questions about e-learning's future in higher education.

As universities return to on-campus or hybrid modes of instruction therefore students are no longer required to use e-learning systems. They have now discretion to decide to opt online learning platforms. This transition or shift from compulsory use to voluntary engagement indicate the significance of continuance intention (CI). CI is defined as users' willingness to persist in using a system after initial adoption. Recent studies suggest that determinants of continuance differ meaningfully from those influencing initial adoption due to post-adoption decisions. These decisions are shaped by accumulated experiences rather than expectations alone (Bhattacherjee, 2001; Guo, 2024). Therefore, models designed to explain technology adoption may offer only partial explanations of sustained e-learning use in the post-pandemic era.

The Unified Theory of Acceptance and Use of Technology (UTAUT) has been widely applied to explain individuals' acceptance of new technologies, including e-learning systems. UTAUT posits that performance expectancy, effort expectancy, social influence, and facilitating conditions jointly determine behavioral intention and use behavior (Venkatesh et al., 2003). Empirical evidence from recent e-learning studies continues to confirm the relevance of these constructs, particularly performance expectancy and facilitating conditions, in shaping students' technology-related decisions (Ermilinda, Handarkho, & Emanuel, 2024; Utomo & Alamsyah, 2024). However, UTAUT was originally developed to explain early stage acceptance and its explanatory power may be limited when applied when users have already accumulated substantial usage experience i.e Post-adoption context.

In parallel, Information Systems (IS) continuance theory (Bhattacherjee, 2001) emphasizes that sustained system usage is driven by users' evaluative judgments formed after interacting with the system. Keeping in current phenomena, satisfaction and perceived performance outcomes play a central role in shaping continuance intention (Bhattacherjee, 2001). Student satisfaction and perceived learning effectiveness reflect emotive and cognitive assessments of learning outcomes in educational environments. Recent research shows that post-adoption evaluations affect continuing intention more than initial acceptance assumptions (Li, Wang, & Li, 2022).

Even while it's becoming clearer how vital post-adoption support systems are but still e-learning study requires to be further explored. A wide available literature on topic has used models of direct effects (Al-Adwan et al., 2022; Belajj, Zekri, & Albugami, 2015; Kelkay et al., 2025). These models analysed technology acceptance constructs directly to continuance intention. Therefore, offering limited insight into the underlying mechanisms through which these effects occur. Second, prior research often focuses on either satisfaction or perceived usefulness (Patil & Undale, 2023; Yan, Eng, & Seong, 2024). Such analyses reported findings without distinguishing between affective and outcome based evaluations. This limits theoretical clarity regarding how emotional experiences and perceived learning gains jointly shape students' decisions to continue using e-learning systems. Further, empirical evidence from developing country higher education contexts remains relatively scarce, even though infrastructural limitations and institutional constraints may significantly influence students' e-learning experiences (Almaiah, Al-Khasawneh, & Althunibat, 2020; Guo, 2024).

The current study is an attempt to extends the UTAUT framework by adding student satisfaction (SAT) and perceived learning efficacy (PLE) as mediating mechanisms relating technology acceptance attitudes to e-learning continuance intention. This study emphasizes persistent and voluntary use over emergency adoption by focusing on the post-pandemic scenario. By encapsulating affective and cognitive evaluative processes, UTAUT and IS continuance theory can better explain continuation intention. Examining e-learning continuity in a resource-constrained developing nation higher education system adds to the literature. Such contexts may emphasize helpful conditions and social influence on students' e-learning system experiences and evaluations. Policymakers and university administrators must understand these dynamics to

ensure digital learning programs' long-term success and durability.

The PLS-SEMis well suited for prediction oriented research and theory extension involving complex models with multiple mediators. Recent methodological guidelines emphasize the suitability of PLS-SEM for educational and information systems research specifically when the objective is to explain variance in behavioral intentions and test mediation effects (Hair et al., 2019; Hair Jr et al., 2021). The study employs the same here.

This research results significantly contribute to the e-learning and technology adoption literature. First, it expands UTAUT beyond initial adoption by applying it within a post-adoption continuation paradigm. Second, it presents SAT and PLE as dual mediators by differentiating between affective and outcome-based pathways that have influence on continuing intention. Third, it offers mechanism-based empirical evidence through simultaneous mediation analysis. These analysis results provided more profound theoretical elucidations in post-pandemic e-learning research. Finally, the study makes existing theories more relevant and useful in other situations by focusing on a developing-country context.

LITERATURE REVIEW:

The UTAUT continues to be a dominant baseline for explaining technology intentions across contexts including education. Recent empirical studies consistently confirm that UTAUT core constructs are Performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC) remain important predictors of students' intentions to use e-learning systems and post-COVID work has repeatedly found PE especially salient. The shift in academic focus from initial technology adoption to long-term continuance intention reflects a maturing field of study. During the height of the pandemic, researchers were primarily concerned with how quickly students and faculty could accept e-learning platforms (adoption). However, in the post-pandemic environment, where traditional classrooms have reopened, the voluntary persistence of e-learning use becomes the central concern for institutional longevity and return on investment(Alshammari, Yusoff, & Abas, 2024). However, much of the recent evidence focuses on initial adoption or short term use under emergency conditions rather than voluntary and post pandemic continuance(Ermilinda, Handarkho, & Emanuel, 2024; Utomo & Alamsyah, 2024). Studies report that while PE and FC retain strong explanatory power while the relative weight of EE declines as users gain experience. These findings suggest that post adoption contexts change the predictors' roles (Utomo & Alamsyah, 2024; Yang, 2024).Despite this progress, two gaps remain. First, many studies still treat continuance as a direct outcome of UTAUT constructs without examining *how* these beliefs translate into sustained behaviour. Second, the majority of recent empirical work comes from single institution or developed-country contexts; comparatively fewer robust large-sample studies examine continuance in developing country higher education settings where infrastructural constraints and institutional support vary widely (Guo, 2024; Li, Wang, & Li, 2022). This leaves open whether classic UTAUT pathways operate the same way when access and quality problems are pervasive.

Given the consistent empirical support for direct effects but the theoretical need to explain mechanisms in post-adoption settings, this study tests the canonical UTAUT direct paths to continuance intention while explicitly situating them in the context of Lahore, Pakistan where FC and SI may be especially consequential. Considering the current phenomena the following hypothesis are constructed.

H1: There exists a positive impact of PE on students' CI toward e-learning.
H2: EE positively affects students' CI toward e-learning.
H3: SI positively affects CI toward e-learning.
H4: FC positively affect CI toward e-learning.

Satisfaction is central to IS continuance theory (Bhattacherjee, 2001) and has regained attention in recent e-learning research as a post-adoption evaluative construct. The empirical work shows that satisfaction is a robust predictor of continuance and that its antecedents include perceived usefulness, useability and institutional

supports(Guo, 2024; Yang, 2024). A study of (Al-Samarraie et al., 2018) reported that satisfaction mediates the relationship between system beliefs and continuance in higher education. These studies have used limited measures of satisfaction or do not compare affective satisfaction and outcome (Ermilinda, Handarkho, & Emanuel, 2024; Utomo & Alamsyah, 2024). In literature satisfaction is conceptually distinct from perceived effectiveness. Effectiveness reflects an outcome appraisal (Davis, 1989). It is a functional assessment rather than an emotional one. Treating satisfaction as the sole mediator risks missing the cognitive pathway through which students decide to continue using an e-learning system. Further, empirical work from resource constrained settings suggests that FC and EE may influence satisfaction more strongly than they influence direct intention as support and ease reduce frustration and improve perceived experience quality (Al Amin et al., 2023; Utomo & Alamsyah, 2024). Te current study explicitly models satisfaction as a mediator between UTAUT beliefs (PE, EE, FC) and continuance intention to capture the affective route from beliefs to behaviour.

H5: Performance expectancy (PE) positively affects student satisfaction (SAT).
H6: Effort expectancy (EE) positively affects SAT.
H7: Facilitating conditions (FC) positively affect SAT.
H10: Student satisfaction (SAT) positively affects continuance intention (CI).

Perceived learning effectiveness (PLE) measures students' subjective assessment of whether the learning platform helped them learn. PLE refers to the "extent to which learners perceive that an e-learning system helps them understand the knowledge, achieve learning goals, and improve their academic performance"(Liaw, 2008). In many studies reported that PLE often mediates acceptance to continuance relations and have indirect effects than affective mediators (Li, Wang, & Li, 2022). However, prior studies tend to operationalize PLE inconsistently and often collapse it with perceived usefulness; this conflation obscures whether outcome perceptions are a distinct driver of continuance.

Additionally, social influence has been shown in recent work not only to affect intentions directly but also to shape perceived outcomes. As findings of (Ermilinda, Handarkho, & Emanuel, 2024; Yang, 2024) reported instructor endorsement or peer norms can lead students to attribute better learning outcomes to the platform due to improved engagement or pedagogical design. These findings suggest a dual role for SI as normative pressure and outcome-shaping. This study addresses by positioning PLE as a mediator for PE and SI.

H8: Performance expectancy (PE) positively affects perceived learning effectiveness (PLE).
H9: Social influence (SI) positively affects PLE.
H14: Perceived learning effectiveness (PLE) positively affects continuance intention (CI).

Recent reviews and empirical papers emphasize the need to go beyond direct effect models in post-adoption e-learning research because continuance reflects a translation of beliefs into experienced outcomes prior to behavioural commitment(Guo, 2024; Li, Wang, & Li, 2022). Modeling both an affective mediator (SAT) and an outcome based mediator (PLE) allows us to test competing and complementary pathways. As beliefs may increase satisfaction and they may enhance perceived learning. Studies reported that multiple mediators report stronger and nuanced explanations of continuance intention than single-mediator models in context of developed country higher education samples (Ermilinda, Handarkho, & Emanuel, 2024; Utomo & Alamsyah, 2024).

H11: PE indirectly affects CI via SAT
H12: EE indirectly affects CI via SAT.
H13: FC indirectly affects CI via SAT.
H15: PE indirectly affects CI via PLE.
H16: SI indirectly affects CI via PLE.

As existing literature elaborated UTAUT's relevance, it often lacks mechanism testing and limited to developed country contexts. The primary gaps are lack of dual-mediator models that separate affective and outcome pathways, inconsistent operationalization of perceived learning outcomes, and limited evidence from developing countries with constrained facilitating conditions. This study addresses these gaps by integrating UTAUT with IS continuance theory, operationalizing SAT and PLE distinctly and testing mediation chains in context of developing

economy to examine whether FC and SI play amplified roles.

METHODOLOGY:

This study employs a cross-sectional quantitative research design to examine the determinants of higher education students' continuance intention toward e-learning in the post-COVID-19 context. A structured survey approach was employed to test an extended UTAUT model incorporating post-adoption mediating mechanisms. The research design is appropriate for theory testing and prediction-oriented modeling, consistent with prior information systems and e-learning research. The target population consists of undergraduate and graduate students enrolled in public and private sector universities who had prior experience with e-learning during and after the COVID-19 pandemic. Data were collected using an online questionnaire distributed through institutional mailing lists and student social media groups. A non-probability convenience sampling technique was adopted due to accessibility constraints. A total of 350 valid responses were obtained. The minimum sample size requirements for PLS-SEM, recommends samples based on model complexity and predictive objectives rather than distributional assumptions (Hair et al., 2019). The study follows the ethical standards to collect the data.

Responses were collected on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Independent Variables (UTAUT Constructs) are Performance Expectancy (PE) defined as the degree to which students believe that using e-learning enhances their academic performance. Measurement items were adapted from Venkatesh et al. (2003). Effort Expectancy (EE): Refers to the perceived ease of using e-learning systems. Items were adopted from the original UTAUT scale (Venkatesh et al., 2003). Social Influence (SI) represents the extent to which students perceive that important others (peers, instructors, family) encourage the continued use of e-learning. Measurements were made by using UTAUT model (Venkatesh et al., 2003). The cinstruct Facilitating Conditions (FC) is defined as students' perceptions of the availability of technical, organizational, and infrastructural support for e-learning. Items for the construct is adapted from (Venkatesh et al., 2003). The mediators of the study are SAT and PLE. SAT analyze the overall affective evaluation of prior e-learning experiences. The satisfaction (SAT) construct captures users' cumulative experience rather than initial expectations which consistent with IS continuation theory (Bhattacherjee, 2001). Measurement items for these constructs were adapted from Bhattacherjee (2001). The Perceived learning effectiveness (PLE) refers to students' perception that e-learning systems effectively support knowledge acquisition, skill development and learning outcomes. This construct reflects experienced learning outcomes rather performance expectancy. PLE measurement items were adapted from validated online learning effectiveness scales(Sun et al., 2008). The dependent variable is continuance intention (CI) and is defined as the students' intention to persist in using e-learning platforms. CI measurement items were adapted from (Bhattacherjee, 2001).

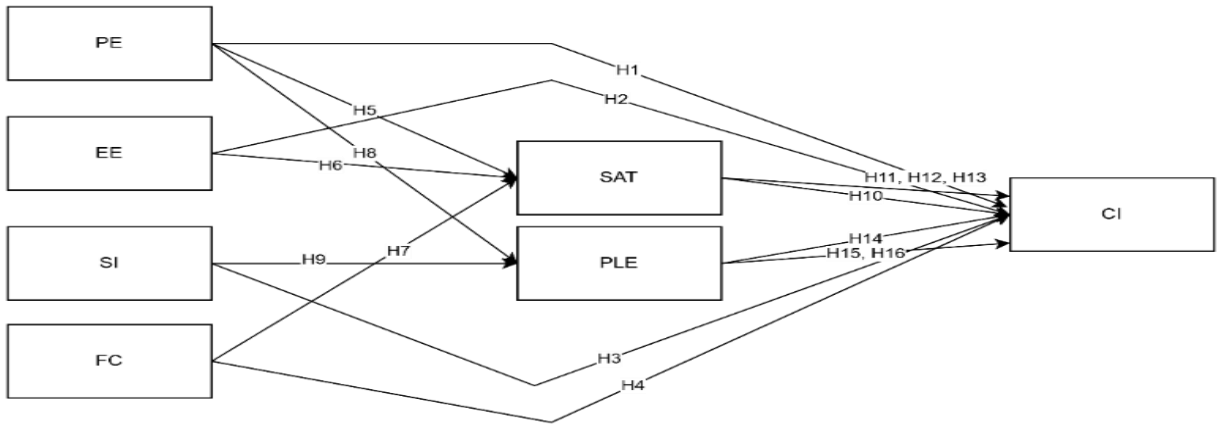

Figure 1 Theoretical Framework

RESULTS:

The analysis followed established best practice guidelines for PLS-SEM reporting in high-impact journals (Hair et al., 2019; Hair et al., 2022). In the measurement model, Internal consistenc reliability was assessed using Cronbach's alpha, composite reliability, Convergent validity was examined through AVE values. The results are shown in Table 1, all constructs are within the threshold level of respective value.

Table 1 Constructs Validity and Reliability

Construct	Cronbach's α	ρA	CR (ρc)	AVE
CI	0.859	0.859	0.895	0.586
EE	0.840	0.841	0.886	0.609
FC	0.836	0.839	0.884	0.603
PE	0.838	0.840	0.885	0.607
PLE	0.837	0.838	0.880	0.551
SAT	0.857	0.859	0.894	0.584
SI	0.805	0.806	0.865	0.563

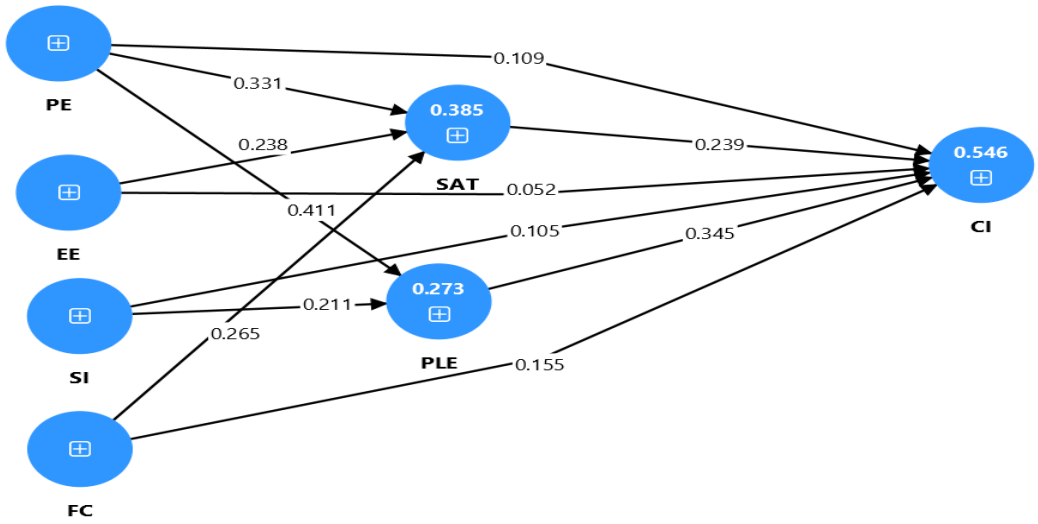

Figure 2: Measurement Model

As reported in Table 2, all HTMT values were well below (I.e. >0.85), confirming adequate discriminant validity among the constructs.

Table 2 HTMT Matrix

	CI	EE	FC	PE	PLE	SAT	SI
CI	-						
EE	0.052	-					
FC	0.155		-				
PE	0.109			-			
PLE	0.345			0.411	-		
SAT	0.239	0.238	0.265	0.331		-	
SI	0.105				0.211		

Following confirmation of the measurement model, the structural model was assessed by examining path coefficients, coefficient of determination (R^2), and mediation effects.

The direct relationships between UTAUT constructs and continuance intention were tested using bootstrapping. Table 3 summarizes the results.

Table 3 Direct Effect Bootstrapping Results

Hypothesis	Path	β	t-value	Decision
H1	PE → CI	0.221	7.768	Supported
H2	EE→CI	0.057	3.648	Supported
H3	SI → CI	0.073	4.181	Supported
H4	FC → CI	0.063	4.051	Supported

All direct effects are positive and statistically significant. These findings suggest that students are more likely to continue using e-learning systems when they perceive them as beneficial to academic performance, socially supported, easy to use, and adequately facilitated by institutional infrastructure.

The study further examined the determinants of student satisfaction as a mediating construct, for

H5–H7 See Table 4 and for H10 & H14 see table 5.

Table 4 Results of H5-H7, H10 and H14 Hypothesis

Hypothesis	Path	β	t-value	Remarks
H5	PE → SAT	0.273	4.00	Supported
H6	EE → SAT	0.209	3.50	Supported
H7	FC → SAT	0.231	4.00	Supported
H10	SAT → CI	0.239	5.07	Supported
H14	PLE → CI	0.345	8.407	Supported

All above hypothesis are supported in the study. This result confirms that satisfaction is a significant predictor of continuance intention, consistent with IS continuance theory. Perceived learning effectiveness also exerts a positive and statistically significant effect on continuance intention (β = 0.345, p < .001), thereby supporting H16.

Mediation analysis was conducted using bootstrapped indirect effects. The results in Table 6 reveal that student satisfaction and perceived learning effectiveness significantly mediate the relationships between UTAUT constructs and continuance intention. Since both direct and indirect effects are significant, all mediation relationships represent partial mediation.

Table 6 Indirect Effects

Hypothesis	Indirect Path	β	t-value	p-value	Decision
H11	EE → SAT → CI	0.057	3.648	<0.001	Supported
H12	FC → SAT → CI	0.063	4.051	<0.001	Supported
H13	PE → SAT → CI	0.079	4.268	<0.001	Supported
H15	PE →PLE→CI	0.142	5.887	<0.001	Supported
H16	SI→PLE→CI	0.073	4.181	<0.001	Supported

All indirect effects are statistically significant.

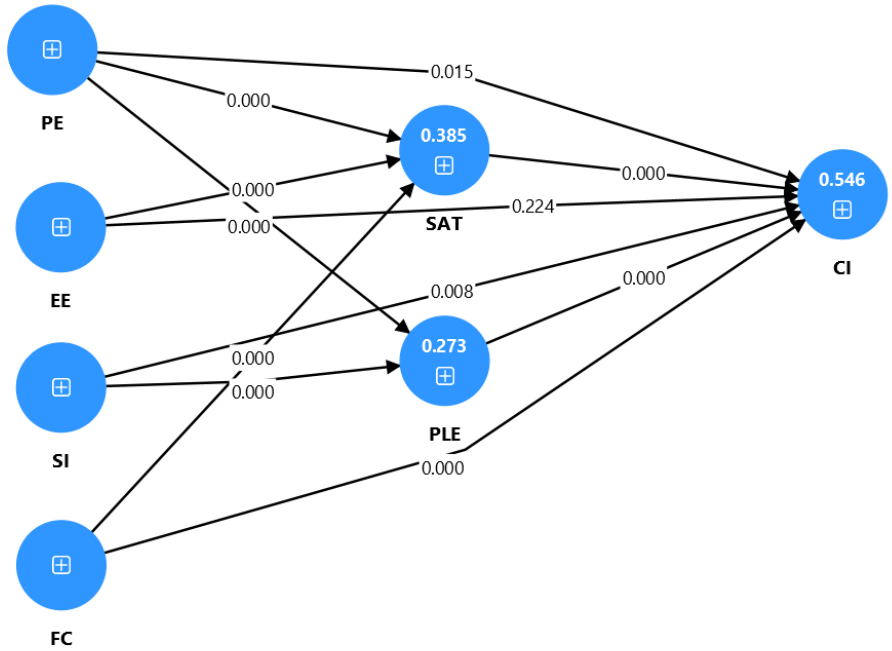

Figure 3 Bootstrap Mediation Analysis

Table 7 R^2 Values

Construct	R^2	Remarks
CI	0.546	Moderate
SAT	0.385	Moderate
PLE	0.273	Weak to Moderate

The model explains 54.6% of the variance in continuance intention, indicating strong explanatory power for post-adoption e-learning behavior.

DISCUSSION:

The results show that students are slowly adjusting to e-learning after the pandemic. At this stage, online learning is no longer something new for them. It has become part of their routine. Among all the factors examined, performance expectancy appears to matter the most. Students are more willing to continue using e-learning when they feel it actually helps them do better in their studies. If they do not see clear academic benefits, their motivation drops. The basic idea behind UTAUT, which suggests that usefulness and performance gains shape intention more than anything else (Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012). In the post-pandemic period, students have clearly moved beyond the initial shock of switching to online learning. Their expectations have changed. Once users gain experience, they focus less on how easy a system is and more on what they get out of it (Al-Emran, Mezhuyev, & Kamaludin, 2020; Bhattacherjee, 2001). Recent studies report similar trends, showing that students evaluate e-learning mainly in terms of learning outcomes rather than technical features (AL-Nuaimi et al., 2024).

Social influence also plays an important role. hen teachers support digital tools, students are more likely to accept them. When peers use them, the platforms feel more legitimate (Dwivedi et al., 2019; Raman & Don, 2013).Guidance from instructors signals that digital learning is not temporary or inferior. Recent studies also suggest that this kind of support helps prevent students from fully returning to traditional teaching methods (Ismail et al., 2025; Singh, Singh, & Mishra, 2024). Lack of facilitating conditions like internet instability, lack of technical help and system breakdowns quickly frustrate students. These issues decline motivation even if the platform itself is useful (Almaiah, Al-Khasawneh, & Althunibat, 2020). Institutional support is central to sustaining digital learning, particularly in resource-limited environments (Tang et al., 2025).

While ease of use may not directly motivate students to continue, it supports a positive experience. That experience matters over time. It helps students stay engaged instead of withdrawing.(Roca & Gagné, 2008; Tam et al., 2023). However, the emphasis of evaluation now has shifted from the interface to the depth of content and its cognitive engagement (Soliman et al., 2025). This impact is particularly prevalent in developing countries. In these countries, social behavior and academically recognized hierarchies are taken into account (Roca & Gagné, 2008; Tam et al., 2023). The mere function of the online learning system becomes less of a barrier to a student community that has literally been coerced into learning online when the pandemic situation resulted in a lockdown. A user-friendly interface has now become a minimum requirement and is not any longer a motivating factor. The ease of use may not drive the decision for long-term continued use as a means of supporting a positive emotional response as a crucial factor for long-term retention (Alarabiat et al., 2024).

When universities provide stable systems and basic technical students satisfaction enhanced. Earlier studies have reported the same pattern especially in contexts where digital access is not always reliable (Almaiah, Al-Khasawneh, & Althunibat, 2020). These findings provide an insight that satisfaction majorly depends on the environment created by the institution. The students judgment is based on experience not only on expectations and social influence adds to this process. In academic systems where instructor endorsement carries particular weight then the instructor support online learning enhance trust in students

towards e learning as a legitimate and effective mode of education. Then result is increases confidence in the learning outcomes (Dwivedi et al., 2019; Zhou & Zhang, 2024). When students feel satisfied over time, they stay. Satisfaction reflects repeated experiences where expectations are met or exceeded (Bhattacherjee, 2001). Perceived learning effectiveness acts as a key channel linking performance expectancy and social influence to continuance intention. The system must deliver real academic value. These findings respond to long-standing calls to move beyond technical acceptance models and focus more on learning outcomes (Islam et al., 2025; Sabah, 2020). In simple terms, performance expectancy reflects what students hope to gain in the future. Perceived learning effectiveness reflects what they experience right now. The mediation of social influence through learning effectiveness shows that social pressure alone does not sustain long-term use. Encouragement only works when students actually feel they are learning. Overall, the findings suggest that lasting digital engagement after COVID-19 depends on three things. Institutional support. Social reassurance. And clear academic value delivered through e-learning systems.

The objective of this study is to determine factors that drive higher education students to continue using e-learning in a post-pandemic world when technology is no longer a necessity but a choice. This study shifts focus from looking at e-learning from merely an adoption standpoint by providing a broader view of a post-adoption process of e-learning. This study is an extension of the Unified Theory of Acceptance and Use of Technology model by incorporating student satisfaction (SAT) and perceived learning effectiveness (PLE) through PLS-SEM analysis of a sample of university students in Lahore, Pakistan. The findings reported that the primary motivating factor is actually performance expectancy. The results shown that performance expectancy, effort expectancy, social influence and facilitating conditions continue to play a crucial role as antecedents of continuance intention. Thes results indicates that university students continue to participate in e-learning only if they find it of intellectual worth. The significant findings shown that predispositions are actually screened by the students' satisfaction and perception of the actual effectiveness of the experience and technology related tendencies are not direct behavior predictor. Satisfaction and learning effectiveness have concentrated on the route the learner takes from acceptance to commitment. The study is consistent with past studies concerning the topic of digital learning assessments centering on the learner.

From a strictly pragmatic perspective, these insights require a paradigm shift in terms of how universities should administer their technology. The results provide important insights to university administration and the policymakers to focus upon the facilitation of conditions in higher education institutions for sustainable digital learning adoption.

This research provides important insight about the digital world after the pandemic. The limitations of the study are it follows survey method and data is cross sectional collected from public and private universities of Lahore Pakistan. The students elearning continuance intence intention was observed through self reported survey which may have self reported bias. The current scope of this research did not permit the inclusion of objective performance indicators like direct academic records or learning platform analytics. The findings reflect the perceived reality of the participants rather than an externally verified record of their digital engagement. Another limitation of the study is it treated e-learning as a singular and broad experience instead of examining it through the lens of specific academic disciplines. Future research may be initiated by following longitudinal research designs to analyze how SAT, PE and CI fluctuate across an entire academic degree. Moreover, the context of the data collection concerning the specific national and institutional configuration was another major limitation. The study viewed e-learning as a single broad experience and did not test it against individual academic disciplines. The teaching and learning needs and the technical challenges of quantitatively intensive fields such as engineering, finance, or statistics may vary a lot from those of the humanities and possibly masking subject-specific nuances in the current model. In future

studies should delve into discipline specific contexts to identify how the requirements of different fields of study influence student persistence. Comparative analyses between diverse academic departments could reveal whether certain teaching models are more effective for technical versus non-technical subjects.

To improve the generalizability of the study the cross-country analysis to account for cultural, infrastructural and regulatory would enhance understanding of contextual influences. The use of advanced analytical tools and methods would identify specific risk of students disengagement. These findings would contribute towards personalized and effective institutional interventions.

REFERENCES

Al-Adwan, A. S., Yaseen, H., Alsoud, A., Abousweilem, F., & Al-Rahmi, W. M. (2022). Novel extension of the UTAUT model to understand continued usage intention of learning management systems: the role of learning tradition. *Education and Information Technologies*, *27*(3), 3567-3593.

Al-Emran, M., Mezhuyev, V., & Kamaludin, A. (2020). Towards a conceptual model for examining the impact of knowledge management factors on mobile learning acceptance. *Technology in society*, *61*, 101247.

AL-Nuaimi, M. N., Al Sawafi, O. S., Malik, S. I., & Al-Maroof, R. S. (2024). Extending the unified theory of acceptance and use of technology to investigate determinants of acceptance and adoption of learning management systems in the post-pandemic era: A structural equation modeling approach. *Interactive Learning Environments*, *32*(5), 1710-1736.

Al-Samarraie, H., Teng, B. K., Alzahrani, A. I., & Alalwan, N. (2018). E-learning continuance satisfaction in higher education: a unified perspective from instructors and students. *Studies in higher education*, *43*(11), 2003-2019.

Al Amin, M., Muzareba, A. M., Chowdhury, I. U., & Khondkar, M. (2023). Understanding e-satisfaction, continuance intention, and e-loyalty toward mobile payment application during COVID-19: An investigation using the electronic technology continuance model. *Journal of Financial Services Marketing*, 1.

Alarabiat, A., Hujran, O., Al-Fraihat, D., & Aljaafreh, A. (2024). Understanding Students' Resistance to Continue Using Online Learning. *Education and Information Technologies*, *29*(5), 5421-5446.

Almaiah, M. A., Al-Khasawneh, A., & Althunibat, A. (2020). Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. *Education and Information Technologies*, *25*(6), 5261-5280.

Alshammari, M. F., Yusoff, R. C. M., & Abas, H. (2024). A Systematic Literature Review of Factors Influencing Satisfaction and Continuance Intention to Use E-Learning Systems in Higher Education. *Advances in Social Sciences Research Journal*, *11*(8), 326-346.

Belajj, M., Zekri, I., & Albugami, M. (2015). The continued use of e-learning system: An empirical investigation using UTAUT model at the University of Tabuk. *Journal of Theoretical & Applied Information Technology*, *72*(3).

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS quarterly*, 351-370.

Cocosila, M., Trabelsi, H., & Farrelly, G. (2024). An empirical investigation of student online learning continuance intention in the post-COVID-19 pandemic era. *Journal of Systems and Information Technology*, *26*(3), 447-472.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., & Williams, M. D. (2019). Re-examining the unified theory of acceptance and use of technology (UTAUT): Towards a revised theoretical model. *Information systems frontiers*, *21*(3), 719-734.

Ermilinda, L., Handarkho, Y. D., & Emanuel, A. W. R. (2024). Factors influencing student intention to continue using e-learning platform post Covid-19 Pandemic: Case study of University of Nusa Nipa Indonesia. *Procedia Computer Science*, *234*, 1043-1052.

Guo, M. (2024). The Influence of Educational and Emotional Support on e-Learning Continuance Intention: A Two-Stage Approach PLS-SEM and ANN Analysis. *SAGE Open*, *14*(4), 21582440241280793.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*, *31*(1), 2-24.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. Springer Nature.

Islam, S., Islam, M., Tamanna, A. K., Sakib, M. N., Aziz, A. L., & Fahlevi, M. (2025). The potential of online learning: investigating pre-use expectations, intentions, actual use and post-use outcomes in Massive Open Online Courses (MOOCs). *Cogent Psychology*, *12*(1), 2500157.

Ismail, M. H., Ali, S. H. S., Husin, H. S., Hassan, S., & Ali, S. N. D. M. (2025). From Adoption to Continuance: Understanding Self-Efficacy's Role in TVET Digital Learning. *Journal of Technical Education and Training*, *17*(2), 128-136.

Kelkay, J. M., Wubante, S. M., Anteneh, D. S., Takilo, M. K., Gebeyehu, C. D., Alameraw, T. A., & Gashu, K. D. (2025). Intention to use eLearning-based continuing professional development and its predictors among healthcare professionals in Amhara region referral hospitals, Ethiopia, 2023: using modified UTAUT-2 model. *BMC Health Services Research*, *25*(1), 178.

khaled Amin, M., & Rattanawiboonsom, V. (2025). MODELING USERS'CONTINUED ENGAGEMENT IN E-LEARNING IN THE POST-COVID ERA IN A DEVELOPING COUNTRY: GSCA-SEM APPROACH. *Turkish Online Journal of Distance Education*, *26*(3), 97-127.

Li, L., Wang, Q., & Li, J. (2022). Examining continuance intention of online learning during COVID-19 pandemic: Incorporating the theory of planned behavior into the expectation–confirmation model. *Frontiers in psychology*, *13*, 1046407.

Liaw, S.-S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers & education*, *51*(2), 864-873.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of marketing research*, *17*(4), 460-469.

Patil, H., & Undale, S. (2023). Willingness of university students to continue using e-Learning platforms after compelled adoption of technology: Test of an extended UTAUT model. *Education and Information Technologies*, *28*(11), 14943-14965.

Raman, A., & Don, Y. (2013). Preservice teachers' acceptance of learning management software: An application of the UTAUT2 model. *International education studies*, *6*(7), 157-164.

Roca, J. C., & Gagné, M. (2008). Understanding e-learning continuance intention in the workplace: A self-determination theory perspective. *Computers in human behavior*, *24*(4), 1585-1604.

Sabah, N. M. (2020). Motivation factors and barriers to the continuous use of blended learning approach using Moodle: students' perceptions and individual differences. *Behaviour & Information Technology*, *39*(8), 875-898.

Singh, R., Singh, S. K., & Mishra, N. (2024). Influence of e-learning on the students' of higher education in the digital era: A systematic literature review. *Education and Information Technologies*, *29*(15), 20201-20221.

Soliman, M., Ali, R. A., Khalid, J., Mahmud, I., & Ali, W. B. (2025). Modelling continuous intention to use generative artificial intelligence as an educational tool among university students: Findings from PLS-SEM and ANN. *Journal of Computers in Education*, *12*(3), 897-928.

Sun, P.-C., Tsai, R. J., Finger, G., Chen, Y.-Y., & Yeh, D. (2008). What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & education*, *50*(4), 1183-1202.

Tam, C. C., Li, X., Li, X., Wang, Y., & Lin, D. (2023). Adherence to preventive behaviors among college students during COVID-19 pandemic in China: The role of health beliefs and COVID-19 stressors. *Current Psychology*, *42*(20), 17280-17290.

Tang, Q., Kamarudin, S., Rahman, S. N. A., & Zhang, X. (2025). Bridging Gaps in Online Learning: A Systematic Literature Review on the Digital Divide. *Journal of Education and Learning*, *14*(1), 161-176.

Utomo, S. M., & Alamsyah, D. P. (2024). Technology Adoption: Continuance Intention of E-Learning. *Procedia Computer Science*, *245*, 1-7.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view1. *MIS quarterly*, *27*(3), 425-478.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS quarterly*, 157-178.

Yan, S., Eng, L. G., & Seong, L. C. (2024). Influencing factors of continuous intention to use e-learning system of undergraduates in Guangxi, China: The mediating role of perceived ease of use and perceived usefulness. *SAGE Open*, *14*(4), 21582440241305231.

Yang, H. (2024). Factors impacting college student satisfaction, perceived usefulness, and continuance intention with e-learning in Dezhou, China. *Scholar*, *16*(1), 171.

Zhou, J., & Zhang, H. (2024). Factors Influencing University Students' Continuance Intentions towards Self-Directed Learning Using Artificial Intelligence Tools: Insights from Structural Equation Modeling and Fuzzy-Set Qualitative Comparative Analysis. *Applied Sciences (2076-3417)*, *14*(18).