Teachers' Perception of E-Learning in Higher Education Institutions (HEIs) in Pakistan

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Abstract

The current study examines teachers' perceptions of e-learning in Pakistan's Higher Education Institutes (HEIs). For this purpose, an online survey questionnaire was distributed among teachers in four universities located in the larger campus of district Peshawar- Pakistan. 47 valid responses were analyzed using Structural Equation Modelling (SEM) to explore the relationships among different constructs. Our results reveal a positively significant effect of institutional support, perceived usefulness, and teacher-student interaction on teachers' satisfaction towards e-learning in Pakistani HEIs. Furthermore, perceived usefulness and teachers' satisfaction significantly influence teachers' attitudes, while teachers' satisfaction positively and significantly impacts continuance intention to adopt e-learning in HEIs. These findings hold significant implications for HEIs in Pakistan.

Keywords: *Teachers' Perception, E-Learning, Higher Education Institutes, Pakistan*

Introduction

In recent years, incorporating digital technology in education with instructional techniques, commonly known as Electronic Learning (hereafter e-learning), has become a significant educational innovation that reshapes the learning and teaching process. E-learning is acquiring knowledge using electronic devices and media such as computers, iPads, iPods, and mobile phones

(Bakare & Orji, 2019). E-learning encompasses many online platforms and digital tools, potentially transcending socioeconomic and geographic barriers while enhancing innovative pedagogical approaches. Without being limited by distance, time, and location, e-learning enables students and teachers to engage in dynamic learning approaches using various communication and information technology tools (Tarazi & Ruiz-Cecilia, 2023; Singh et al., 2024). The dynamic learning approaches cover synchronous and asynchronous, including virtual classrooms, online courses, educational apps, and learning management systems. Adopting these e-learning approaches makes e-learning a critical part of higher education curricula worldwide (Eze et al., 2020; Salloum, et al., 2019) because it assists teachers in delivering lectures and enabling the students to grab the materials quickly.

E-learning initiatives in Pakistan have gained momentum, reflecting the worldwide trend toward digitization in education. Substantial efforts have been made to support e-learning programs that improve educational quality, accessibility, and relevance. In Pakistan, e-learning has mainly developed in the 21st century (Toor, 2005). In 2020, due to the emergence of the COVID-19 pandemic, e-learning has become more popularised in Pakistan. To ensure people's health and safety, the government of Pakistan, in conjunction with the Ministry of Education, announced the closure of all public and private educational institutes from March 15, 2020, while shifting to online learning modes to ensure the continuity of students' education at home. The Higher Education Commission (HEC), specifically the HEIs in Pakistan, has implemented the online teaching mode as an alternative tool. Implementing e-learning platforms demands electronic equipment availability, soft skill proficiency (Yusuf & Ahmad, 2020), and total commitment from teachers (Husain et al., 2021). In addition, the e-learning model promotes alterations, and teachers can deliver the whole material efficiently and effectively (Husain et al., 2021). At the same time, a teacher can perform multiple roles, either as a mentor, facilitator, trainer, collaborator, study partner, or director (Verawardina et al., 2020).

However, several notable gaps exist that need investigation of the educators' perceptions regarding e-learning in HEIs. First, the rapid transition towards e-learning during the COVID-19 pandemic has emerged in extensive research with inconclusive results. The inconclusiveness in findings is due to contextual differences, measurement instruments, and sample size across studies (Raza et al., 2022; Tandon et al., 2022). This inconsistency also creates challenges for stakeholders to make informed decisions regarding the implementation of e-learning in HEIs (Zheng et al., 2025). Second, the e-learning model has been implemented on teachers without proper training/awareness and does not fit naturally in most teachers' behavior (El Omari et al., 2023). Teachers were not technically and psychologically prepared to adopt the e-learning mode of teaching (Kumar et al., 2023). Third, teachers were forced to cover the e-learning problems and deliver their courses at various locations based on their own and students' availability. Studies have highlighted that in an unrealistic timeframe, teachers were expected to transition to e-learning (Brooks et al., 2020). Lastly, in Pakistan, HEIs traditionally manage learning, teaching, and administrative activities due to a shortage of technological competencies (Salam et al., 2017). Moreover, students in remote areas face difficulties in e-learning due to a shortage of affordable, fast, and reliable internet connectivity (Wains & Mahmood, 2008). Therefore, the abrupt transition to e-learning left students and teachers without proper preparation for continuing higher education online. This abrupt

transition to online learning miserably failed due to barriers to the acceptance and delivery of online learning platforms (Qazi et al., 2024).

Based on the aforementioned gaps, the present study contributes to the existing body of literature in several ways. First, as Pakistan's HEIs get on this digital change, it is essential to understand how teachers, the primary part of knowledge dissemination, engage and perceive these e-learning initiatives. Understanding teacher's beliefs, attitudes, and concerns about e-learning is crucial and needs further examination (Shard et al., 2024). Teachers' acceptance and active participation make the e-learning initiative successful and shape the student's learning experience. Teachers' perceptions of e-learning can influence students' behavior and components of learning assessment for successful learning (Windiarti et al., 2019). Second, the present study extends the Technology Acceptance Model (TAM) application in e-learning in the Pakistani context. Lastly, the insights gained from the current study will help educators, policymakers, and the government to design and implement effective e-learning strategies in HEIs in Pakistan. Based on these, the present study was carried out under the following research question.

RQ: How teachers perceive the adoption of e-learning in HEIs of Pakistan.

Material and Methods

Research Design

We employed a quantitative research design to investigate teachers' perceptions of e-learning in Pakistan's Higher Education Institutions (HEIs). Quantitative research allows the collection of numerical data and performs statistical analysis to uncover relationships and trends within a numerical dataset. This research design is well-suited to answer this study's specific research objectives.

Population of the study

The prevailing study checked the influence of university teachers' perceptions of e-learning in Pakistani HEIs. The population of our study comprises seven public sector HEIs in the Peshawar district of Khyber Pakhtunkhwa, Pakistan. From these seven universities, the teaching faculty of four universities located on the larger campus was taken as the target population.

Sample and Sampling

Prior studies recommended numerous methods like formulas, tables, and rules of thumb to select an optimum sample size. For instance, Sekaran (2010) suggested that the sample size should be ten times the number of variables. Likewise, Green (1991) recommended a rule of thumb using a sample-to-item ratio. For survey studies a sample size of 400 is optimum (Zhang et al., 2012). Moreover, researchers most commonly used Yamane (1967) and Morgan (1970) formulas for sample size determination. However, all these methods create Type I and Type II errors (Hair et al., 2019; Memon et al., 2020).

Contemporary studies used power analysis to select an optimum sample size (Hair et al., 2019; Memon et al., 2020). Based on the significant number of model predictors, power analysis provides sample size (Hair et al., 2014; Roldán & Sánchez-Franco, 2012). Following Memon et al. (2020), the current study employed the G*power tool to perform power analysis. Hair et al. (2017) reported that to calculate sample size, power analysis requires effect size, power, level of significance, and

number of model predictors. In social sciences research, the most commonly recommended input parameters in G*Power are: the effect size of 0.35 (Large effect), α of 0.05, and power of 0.80 (Hair et al., 2017). From Figure 3, the study used value seven as input for the predictors and calculated the sample size. Figure 1 illustrates the trade-off between Type I error (α) and Type II error (β) in the hypothesis testing with a critical F-value (F=1.999). For effective power analysis, these factors must be balanced to minimize both types of error. Figure 2 based on power analysis revealed that our sample size is 59 teachers from the target HEIs to share their perceptions of e-learning. We used a stratified random sampling procedure to select the number of respondents from each stratum based on proportional allocation. Figures 1-2 and Table 1 illustrate the details of power analysis and sample size.

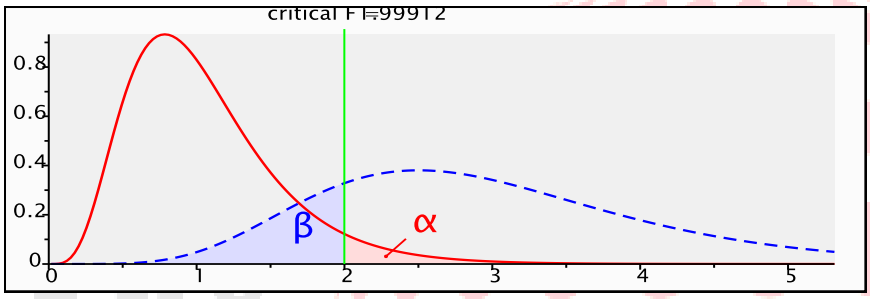

Figure 2. Power Analysis

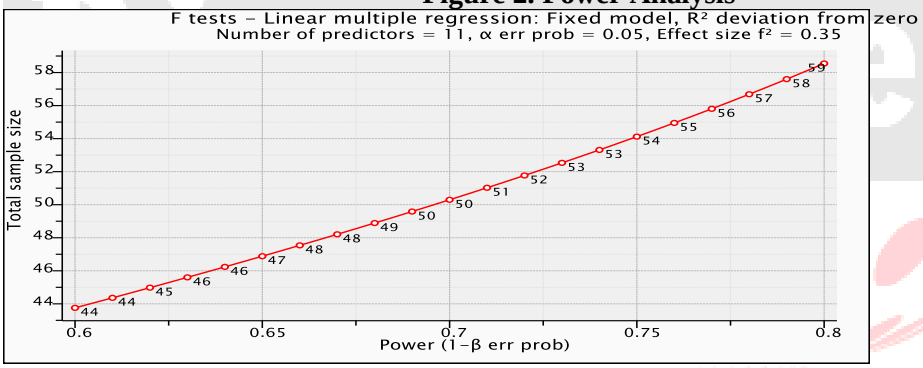

Figure 3. Sample Size by Using G*Power

Table 1. Sample Size

Universities	Total Faculty members	Selected Sample $n_i = \frac{N_i}{N} \times n$
University of Agriculture Peshawar	220	(220/1418) ×59 =9

Islamia College University	390	(390/1418) ×59 =16
University of Peshawar	540	(540/1418) ×59 =23
University of Engineering & Technology Peshawar	268	(268/1418) ×59 =11
Total	1418	59

Source: Registrar's office/official websites of the concerned universities

Survey Instruments/Questionnaire

For this purpose, the study followed Kumar et al. (2023) and utilized survey methodology. A structured questionnaire, which consists of 26 items including five demographic questions and the remaining 21 questions, was distributed into seven constructs (i.e., institutional support, perceived usefulness (PU), Perceived ease of use (PEU), teacher-students interaction, teachers' attitude, teachers' satisfaction, and teachers' continuance intention). The items used for these constructs were adopted from prior studies with minor changes in the wording to fit within the current examination of e-learning. Details about the scale, number of items, and source of adoption are mentioned in Table 2.

Table 2. Details of Instruments used

S#	Constructs	Items-Scale	Adopted from
1	Institutional Support (IS)	Four	Bolliger et al. (2014)
2	Perceived Usefulness (PU)	Four	Liaw et al. (2007) and Lin et al. (2011)
3	Perceived Ease of Use (PEU)	Four	Lin et al. (2011); Ngai et al. (2007)
4	Teacher-Students Interaction (TSI)	Three	Bolliger et al. (2014)
5	Teachers' Attitude (TA)	Two	Lin et al. (2011)
6	Teachers' Satisfaction (TS)	Two	Al-Busaidi and Al-Shihi (2012)
7	Teachers' Continuance Intention (TCI)	Two	Lin et al. (2011)

Data Collection and Procedure

The data for the teachers' perceptions regarding e-learning were collected from the faculty members from four different four universities on the larger campus during December 2024. Using Google Forms, the questionnaires were sent online to the faculty members through email, social media, and WhatsApp to achieve social distancing. In addition, to minimize nonresponse biases, the survey questionnaire was also personally distributed to the teachers to achieve the required sample of 59. After excluding incomplete responses by the respondents, the sample size was reduced to 47 valid responses, with a response rate of 79.7%. Moreover, the respondents' consent was obtained to ensure that they understood the purpose and benefits of participating in the study. Also, the respondent's confidentiality was protected by anonymizing the data and removing identifying information during data analysis.

Theoretical/Conceptual Framework

The present study adopted the Technology Acceptance Model (TAM) framework. TAM theory was initially proposed by Davis et al. (1989) with a focus on assessing and predicting the pre-acceptance of technology users. Initially, TAM theory posits that users' motivation towards the use of technology is influenced by perceived ease of use (PEU), perceived usefulness (PU), and attitude. Cheok et al. (2017) argued that teachers' perceptions and beliefs about technology are important

because they are free to use certain approaches and methods in their classrooms. Kumar et al. (2023) noted and validated that teachers' perceptions of e-learning are influenced by various factors namely institutional support (IS), perceived ease of use (PEU), perceived usefulness (PU), and teachers-student interactions (TSI) which further led to teacher satisfaction (TS), teacher attitude (TA) and continuance intentions (TCI) to adopt e-learning in their teaching methods. The TAM theory is a useful analytical procedure to understand and investigate the inherent features and factors of e-learning. Prior studies also adopted the TAM theory (see for example, Mailizar et al., 2021; Cheok, et al., 2017).

Following Kumar et al. (2023), the study investigates and validates teachers' perceptions of e-learning based on the conceptual model, as shown in Figure 3.

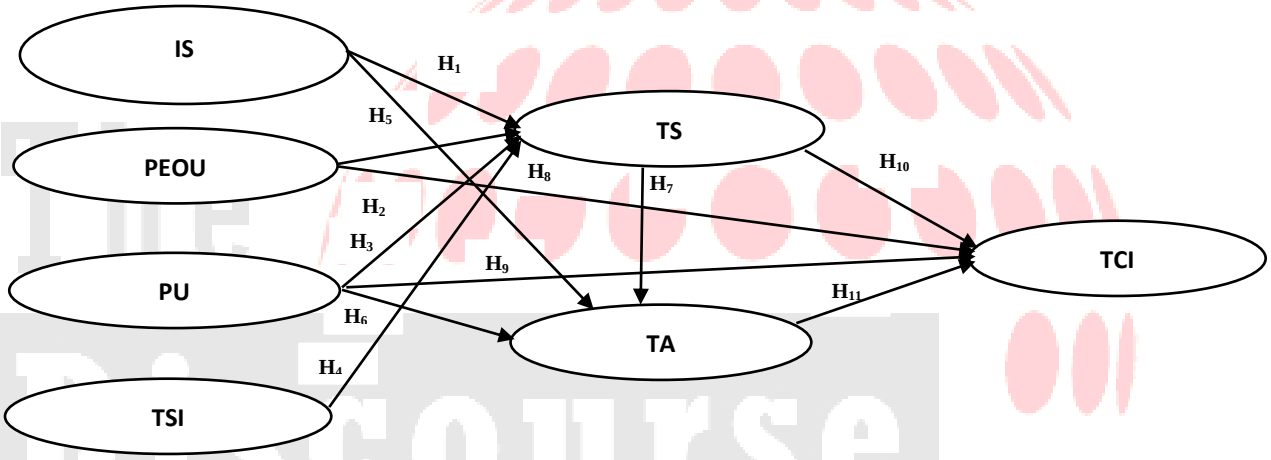

Figure 3. Theoretical/Conceptual Model

The study has framed the following hypotheses.
H1: Institutional support has a positive influence on teachers' satisfaction.
H2: Perceived ease of use has a positive influence on teachers' satisfaction.
H3: Perceived usefulness has a positive influence on teachers' satisfaction.
H4: Teacher-student interaction has a positive influence on teachers' satisfaction.
H5: Institutional support has a positive influence on teachers' attitudes.
H6: Perceived usefulness has a positive influence on teachers' attitudes.
H7: Teachers' satisfaction has a positive influence on teachers' attitudes.
H8: Perceived ease of use has a positive influence on continuance intention.
H9: Perceived usefulness has a positive influence on continuance intention.
H10: Teachers' satisfaction has a positive influence on continuance intention.
H11: Teachers' attitude has a positive influence on continuance intention.

Analysis Procedures

The two-step analytical approach of Hair et al. (2006) was followed for the analytical procedure. In the first step, the measurement model was calculated for the constructs' validity and reliability using Cronbach's alpha, average variance extracted (AVE), composite reliability (CR), and factor

loadings. An internal reliability for the items can be achieved if it is more than 0.70. Moreover, Bagozzi and Yi (1988) suggested that if AVE ≥ 0.5 and CR ≥ 0.70 then the instruments are reasonably reliable. In the second step, the structural model was assessed using structural equation modeling (SEM) to check the causal association among the constructs.

Results and Discussions

Table 3 reports the demographic profile of respondents; whereby male respondents are 37 (80.43%) and female respondents are 9 (19.57%). In terms of designation, 22(47.83%) respondents were lecturers, 17 (36.96%) respondents were assistant professors, 2(4.35%) respondents were associate professors, and 5 (10.87%) respondents were professors/meritorious professors. For the study discipline, 5 (10.87%) respondents were from the Engineering and Technology field, 12 (26.09%) respondents were from Management/Commerce, 21 (45.65%) respondents were from the Science field, and 8 (17.39%) respondents from Social Sciences/Arts field. In terms of teaching experience, 5 (10.87%) respondents have teaching experience between 0-5 years, 6 (13.04%) have teaching experience between 6-10 years, 18 (39.13%) have teaching experience between 11-15 years, 5 (10.87%) have teaching experience between 16-20 years, and 12 (26.09%) have teaching experience more than 20 years. Regarding online teaching experience, 26 (56.52%) have taught online between 0-10 hours, 4 (8.7%) have taught online between 11-20 hours, 2 (4.35%) have taught online between 21-30 hours, 2 (4.35%) have taught online between 31-40 hours, and 12 (26.09%) have taught online more than 40 hours.

Moreover, Appendix IA illustrates the mean comparison based on demographic categories for all the constructs. Our results revealed that there are no significant mean differences among the demographic categories for the constructs IS, PEU, PU, TS, TA, and TCI except TS for online teaching experiences. This indicates that the constructs used are consistent across different demographic groups.

Table 3. Respondents Demographic

Measure	Item	Count	Percentage
Gender	Male	37	80.43
	Female	9	19.57
Designation	Lecturer	22	47.83
	Assistant Professor	17	36.96
	Associate Professor	2	4.35
	Professor/Meritorious Professor	5	10.87
Study Discipline	Engineering and Technology	5	10.87
	Management/Commerce	12	26.09
	Science	21	45.65
	Social Sciences/Arts	8	17.39
Teaching Experience (Years)	0-5	5	10.87
	6-10	6	13.04
	11-15	18	39.13

	16-20	5	10.87
	>20	12	26.09
Online Teaching Experience (Hours)	0-10	26	56.52
	11-20	4	8.7
	21-30	2	4.35
	31-40	2	4.35
	>40	12	26.09

Table 4 and Figure 4 demonstrate that Cronbach's α value for all the constructs exceeds the recommended value of 0.70, indicating the adequate consistency of the entire scale. In addition, for convergent validity, the standardized factor loading for all the items exceeds the recommended value of 0.60 (Anderson & Gerbing, 1988). Similarly, the recommended value for the convergent validity (AVE) of constructs should be ≥0.50, and the composite reliability of constructs should be ≥0.70 (Hair et al., 2019). These guidelines are fulfilled by all the constructs used in this study, which confirm the convergent validity of the constructs.

Table 4. Internal Reliability and Convergent Validity

Construct	**Items**	**Internal Reliability**	**Convergent Validity**		
		Cronbach's α	**Factor loading**	**Composite reliability**	**Average variance extracted (AVE)**
Institutional Support (IS)	IS1	0.878	0.901	0.917	0.736
	IS2		0.946		
	IS3		0.807		
	IS4		0.766		
Perceived Ease of Use (PEU)	PEU1	0.908	0.871	0.935	0.783
	PEU2		0.892		
	PEU3		0.892		
	PEU4		0.884		
Perceived Usefulness (PU)	PU1	0.929	0.832	0.950	0.827
	PU2		0.873		
	PU3		0.964		
	PU4		0.962		
Teacher-Student Interaction (TSI)	TSI1	0.931	0.950	0.956	0.880
	TSI2		0.966		
	TSI3		0.896		
Teacher Satisfaction (TS)	TS1	0.926	0.965	0.964	0.931
	TS2		0.965		

Teacher Attitude (TA)	TA1	0.916	0.961	0.960	0.923
	TA2		0.961		
Teacher Continuum Intension (TCI)	TCI1	0.959	0.980	0.980	0.960
	TCI2		0.980		

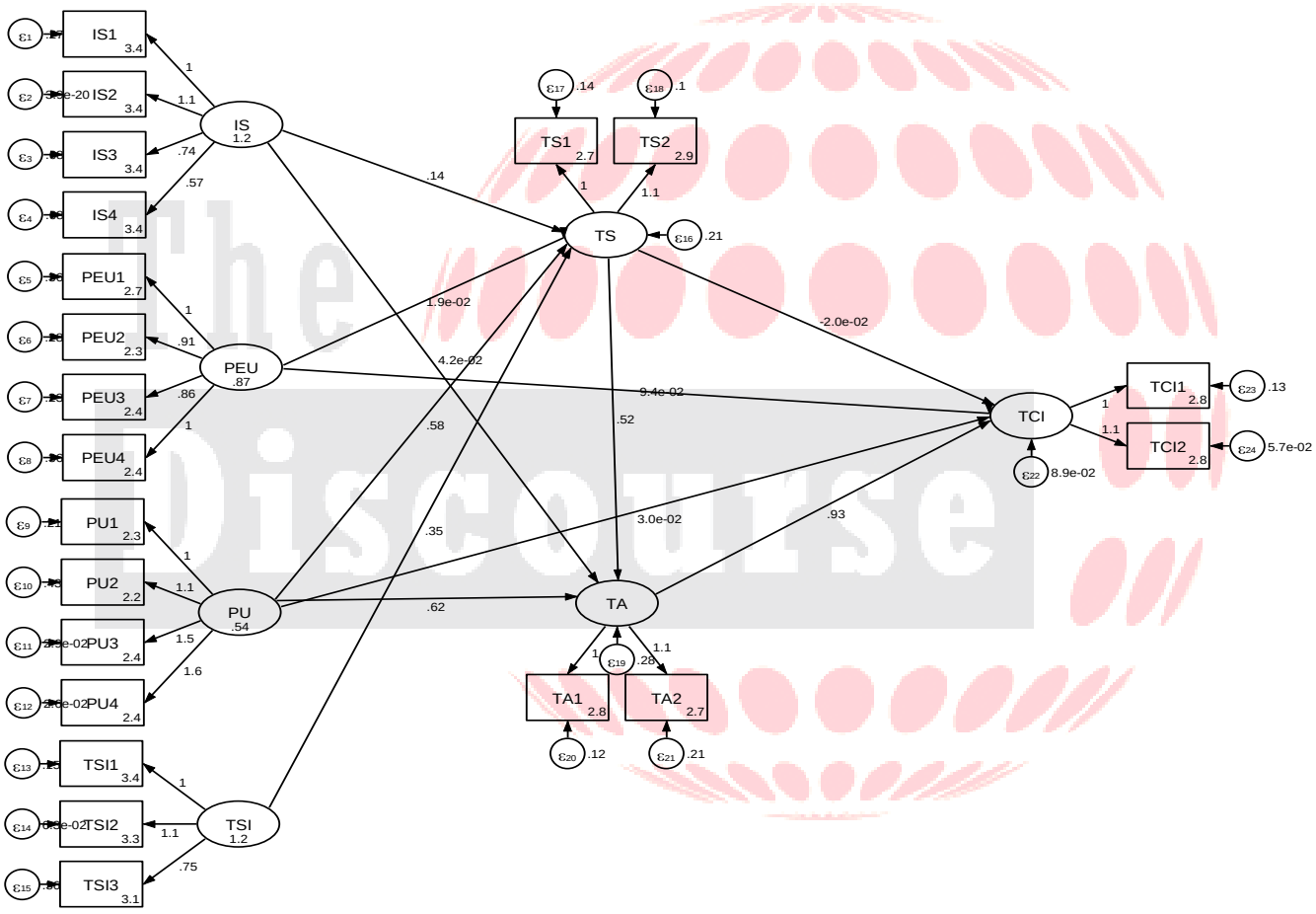

Figure 4. Path Diagram

Table 5 illustrates the causal relationship between the latent constructs for all the paths in Figure 4. The value of Chi-square (χ^2= 343.11, P<0.001) and RMESA (0.042) confirms the goodness of fit of the structural model in Figure 4. Further, the R^2 values of TS, TA, and TCI are 0.683, 0.574, and 0.780 respectively. This indicates that 68.3%, 57.4%, and 78% variation in the dependent variables TS, TA, and TCI respectively are due to the independent variables.

Table 5. Path Analysis using SEM

	TS			TA			TCI		
Path	**Coef.**	**z-value**	**Decision**	**Coef.**	**z-value**	**Decision**	**Coef.**	**z-value**	**Decision**
IS	0.138	1.93*	Accept	0.042	0.49	Reject			
PEU	0.019	0.15	Reject				0.094	0.87	Reject
PU	0.581	3.59***	Accept	0.615	3.33***	Accept	0.030	0.18	Reject
TSI	0.354	4.04***	Accept						
TS				0.519	3.13***	Accept	-0.020	-0.13	Reject
TA							0.934	5.51***	Accept
LR test(χ^2)								343.11***	
RMSEA								0.042	
R^2	0.683			0.574			0.780		
N								47	

Note: Significance at: *p<0.1, **p < 0.05, ***p < 0.01

The findings revealed that teacher satisfaction is positive and significantly influenced by institutional support (β=0.138, p<0.1) regarding e-learning in HEIs. The findings are consistent with Al-Busaidi and Al-Shihi (2012). Perceived usefulness (β=0.581, p<0.01) has a significantly positive influence on teacher satisfaction, which is in line with Hussein et al. (2021) and Kumar et al. (2023). Similarly, teacher-student interaction (β=0.354, p<0.01) has a significantly positive influence on teacher satisfaction. These results align with Pham and Nghiem (2022). The study has found an insignificant association between perceived ease of use and teachers' satisfaction, consistent with the prior study (Lei and So, 2021). Before the Pandemic, Pakistani HEI teachers were not well familiar with the technology usage in e-learning; therefore, our results indicate that appropriate institutional support, perceived usefulness, and teacher-student interaction can bring confidence and satisfaction among HEI teachers towards e-learning in Pakistan. As, confidence and belief in online learning and teaching can bring numerous benefits to HEI teachers (Kumar et al., 2023)

Regarding teachers' attitudes towards e-learning in HEIs in Pakistan, the perceived usefulness (β=0.615, p<0.01) has positively influenced teachers' attitudes regarding e-learning in HEIs in Pakistan. Furthermore, teachers' satisfaction (β=0.519, p<0.01) is positive and significantly influences teachers' attitudes. Prior studies have also found a significant influence of perceived usefulness (Kumar et al., 2023) and teachers' satisfaction (Kumar et al., 2023; Liao et al., 2009) on teachers' attitudes toward e-learning in HEIs. Moreover, teachers' continuance intention regarding e-learning in HEIs is positively influenced by teachers' attitudes (β=0.934, p<0.01). The results are aligned with the outcomes of Kumar et al. (2023), who argued that teachers' positive attitude toward e-learning shapes them more appealing and efficient in delivering courses online, leading to their continuance intentions. Moreover, compared to prior studies, our results are more diverse. In contrast to our findings, Chauhan et al. (2021) documented that PU is the key predictor of TCI toward e-learning in HEI. Similarly, Mailizar et al. (2021) found an insignificant relationship between PEOU, PU, and behavioral intentions to adopt e-learning in HEIs.

Conclusion and Implications

The study examines teachers' perception of e-learning in Pakistan's Higher Education institutes. For this purpose, primary data were collected using a survey questionnaire via online Google forms from teachers in four different universities in a larger campus in Peshawar-Pakistan. Forty-seven (47) valid responses were received from respondents. The study employs a structural equation modeling (SEM) procedure to examine the relationship among latent constructs. The results revealed that institutional support, perceived usefulness, and teacher-student interaction significantly and positively influence teachers' satisfaction regarding e-learning in Pakistani HEIs. Furthermore, perceived usefulness and teachers' satisfaction significantly affect teachers' attitudes. Moreover, teachers' satisfaction positively and significantly affects teachers' continuance intention to use e-learning in HEIs in Pakistan.

The findings have some important implications for HEIs. First, HEIs should facilitate teachers by providing institutional and technical support in online learning, as teachers are the key decision-makers and executors of online education. Lack of facilities and technical support hinders teachers to adopt and use technology in their classrooms. Second, appropriate training, workshops, seminars, and development programs should be organized for teachers to enhance the benefits and usefulness of e-learning with a positive teaching attitude, teacher-student interactions, and continuous intentions. Third, HEI teachers should use advanced technology to enhance their teaching ability, effectiveness, performance, and interaction with students in online classes. Finally, e-learning in HEI must be accompanied by sufficient pedagogical strategies and in-depth knowledge about the content, so that technology-enhanced learning environments are useful and ecologically valid.

Like other studies, our study has also some limitations that need to be addressed by future studies. First, our study only examined the perceptions of teachers about e-learning in HEI in Pakistan, therefore, future studies should examine teachers' perceptions of e-learning in other parts of the world, specifically in developing nations. Second, we took a sample of 47 respondents from four different public sector universities which limits the generalizability of the findings. Therefore, future studies could extend our study to other universities by taking a large sample size. Third, our study is purely quantitative, future research should use a qualitative or mixed approach to get a deeper understanding of the underlying factors. Lastly, based on the same TAM framework, future researchers should examine the students' perception of e-learning in HEIs.

Appendix 1A. Mean Comparisons based on demographics

Measure	Demographic Categories	IS		PEU		PU		TSI		TS		TA		TCI	
		Mean	Diff	Mean	Diff	Mean	Diff	Mean	Diff	Mean	Diff	Mean	Diff	Mean	
Gender	Male	3.37		2.39		2.26		3.37		2.78		2.82		2.91	
	Female	3.56	0.24	2.64	0.51		1.21		1.49		0.38		0.68		
						2.67		2.89		3.24		2.50		2.56	
Designation	Lecturer	3.22		2.19		2.08		3.29		2.70		2.48		2.59	
	Assistant Professor	3.44		2.54		2.46		3.33		2.76		2.85		2.91	
	Associate Professor	3.75	0.92	2.13	2.3	2.00	2.3	4.67	0.75	3.75	1.08	4.00	1.90	4.00	
	Professor/Meritorious Professor	4.69		3.30		3.25		2.73		3.20		3.20		3.20	
Study Discipline	Engineering and Technology	3.45		1.90		1.80		2.53		2.10		2.20		2.10	
	Management/Commerce	3.25	0.40	2.13	2.19	2.08	1.56	3.83	2.22	2.79	1.47	2.54	1.50	2.50	
	Science	3.57		2.79		2.65		3.22		3.05		3.10		3.19	
	Social Sciences/Arts	3.19		2.24		2.25		3.04		2.75		2.56		2.88	
Teaching Experience (Years)	0-5	2.80		2.27		2.10		3.07		2.70		2.40		2.50	
	6-10	3.13		2.50		2.38		2.83		2.50		2.08		2.17	
	11-15	3.54	0.72	2.31	1.01	2.21	1.24	3.61	1.44	2.83	0.32	2.94	1.16	3.11	
	16-20	3.50		2.30		1.85		3.73		3.10		2.60		2.40	
	>20	3.56		2.85		2.83		2.89		2.92		3.04		3.08	
Online Teaching Experience (Hours)	0-10	3.21		2.64		2.59		3.33		3.10		2.92		2.94	
	11-20	4.06		2.13		1.56		3.58		2.63		2.25		2.25	
	21-30	3.13	1.51	2.25	0.78	2.00	1.23	3.67	0.46	2.75	3.06**	2.75	2.06	3.00	
	31-40	4.63		1.88		2.25		3.50		3.75		4.25		4.25	
	>40	3.46		2.23		2.15		2.94		2.17		2.33		2.54	

Note: ** represents significance at a 5% level. Diff represents mean differences based on Wilks' Lambda Statistics.

Appendix 1B. Survey Questionnaire

Section A: Respondent's Demographics (Note: Mark only one)

1. Gender: Male ☐ Female ☐
2. **Designation**

Professor/Mariturius Professor ☐ ociate Professor ☐

Assistant Professor ☐ Lecturer ☐

3. Study Discipline

Engineering and Technology	☐	Management/Commerce	☐
Science	☐	ial Sciences/Arts	☐
Others	☐		

4. Teaching Experience (Years)

0–5	☐	6–10	☐
11–15	☐	16–20	☐
>20	☐		

5. Online Teaching Experience (Hours)

0–10	☐	11–20	☐
21–30	☐	31–40	☐
>40	☐		

Section B: Your perception of e-learning in HEIs.
1: Strongly disagree 2: disagree 3: Neutral 4: Agree 5: Strongly Agree

Institutional Support
IS-1: My institution provides the essential technology tools (equipment or hardware and software) for online teaching.
IS-2: I have appropriate technical support provided by my institution.
IS-3: My institution provides me with training to prepare and teach online.
IS-4: The policies toward online teaching that my institution has implemented are appropriate.

Perceived Ease of Use
PEOU-1: I feel learning to operate a web-based online teaching system is easy.
PEOU-2: I feel it is easy for me to become skillful in using the web-based online teaching system.
PEOU-3: The process of using a web-based online teaching system is clear and understandable to me.
PEOU-4: Overall, I feel that teaching online is easy for me.

Perceived Usefulness
PU-1: I believe that using the e-learning system is helpful for online teaching.
PU-2: I believe that by using the e-learning system, I can improve my teaching ability.
PU-3: I believe that using the e-learning system can improve my teaching effectiveness.
PU-4: I believe that using the e-learning system can improve my teaching performance.

Teacher-Student Interaction
TSI-1: Students participate enthusiastically in my online class.
TSI-2: I am pleased with the student's performance in my online class.
TSI-3: My interactions with online students are satisfying.

Teachers' Satisfaction

TS-1: I am pleased with the experience of using the e-learning system in online teaching.
TS-2: I am satisfied with the performance of the e-learning system in online teaching.

Teachers' Attitude

TA-1: I like teaching using the e-learning system.
TA-2: The e-learning system provides an attractive online teaching environment.

Teacher's Continuance Intention

TCI-1: I intend to continue using the e-learning system in my teaching.
TCI-2: I will continue using the e-learning system for teaching in the future.

References

Al-Busaidi, K. A., & Al-Shihi, H. (2012). Key factors to instructors' satisfaction of learning management systems in blended learning. Journal of Computing in Higher Education, 24, 18-39. https://doi.org/10.1007/s12528-011-9051-x

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. Psychological Bulletin, 103(3), 411-423. https://doi.org/10.1037/0033-2909.103.3.411

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. Journal of the Academy of Marketing Science, 16, 74-94. https://doi.org/10.1007/BF02723327

Bakare, J., & Orji, C. T. (2019). Effects of reciprocal peer tutoring and direct learning environment on sophomores' academic achievement in electronic and computer fundamentals. Education and Information Technologies, 24(2), 1035-1055. https://doi.org/10.1007/s10639-018-9808-1

Brooks D.C., Grajek S., Lang L. (2020). Institutional readiness to adopt fully online learning. Educause Review.https://er.educause.edu/blogs/2020/4/institutional-readiness-to-adopt-fully-remote-learning. Published April 9, 2020.

Bolliger, D. U., Inan, F. A., & Wasilik, O. (2014). Development and validation of the online instructor satisfaction measure (OISM). Journal of Educational Technology & Society, 17(2), 183-195. https://www.jstor.org/stable/jeductechsoci.17.2.183

Chauhan, S., Goyal, S., Bhardwaj, A. K., & Sergi, B. S. (2022). Examining continuance intention in business schools with digital classroom methods during COVID-19: a comparative study of India and Italy. Behaviour & Information Technology, 41(8), 1596-1619. https://doi.org/10.1080/0144929X.2021.1892191

Cheok, M. L., Wong, S. L., Ayub, A. F., & Mahmud, R. (2017). Teachers' perceptions of E-learning in Malaysian secondary schools. Malaysian Online Journal of Educational Technology, 5(2), 20-33. Retrieved from https://mojet.net/index.php/mojet/article/view/98

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. Management Science, 35(8), 982-1003. https://doi.org/10.1287/mnsc.35.8.982

El Omari, H., Chlouchi, K., Talbi, F. Z., Benboubker, M., Alaoui, M. M., Lahouiti, K., ... & Lalami, A. E. O. (2023). E-learning experience during COVID-19 pandemic management:

Perception of secondary schools teachers' in Morocco. Scientific African, 19, e01536. https://doi.org/10.1016/j.sciaf.2022.e01536

Eze, S. C., Chinedu-Eze, V. C., Okike, C. K., & Bello, A. O. (2020). Factors influencing the use of e-learning facilities by students in a private Higher Education Institution (HEI) in a developing economy. Humanities and Social Sciences Communications, 7(1), 1-15. https://doi.org/10.1057/s41599-020-00624-6

Green, S. B. (1991). How many subjects does it take to do a regression analysis. Multivariate Behavioral Research, 26(3), 499-510. https://doi.org/10.1207/s15327906mbr2603_7

Hair, J.F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). Multivariate Data Analysis (Sixth Edit). Pearson International Edition.

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. https://doi.org/10.1108/EBR-11-2018-0203

Hair Jr, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. International Journal of Multivariate Data Analysis, 1(2), 107-123. https://doi.org/10.1504/IJMDA.2017.087624

Hair Jr, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. European Business Review, 26(2), 106-121. https://doi.org/10.1108/EBR-10-2013-0128

Husain, B., Idi, Y. N., & Basri, M. (2021). Teachers' perceptions on adopting e-learning during COVID-19 outbreaks; advantages, disadvantages, suggestions. Journal Tarbiyah, 27(2). https://dx.doi.org/10.30829/tar.v27i2.738

Kumar, P., Kumar, P., Garg, R. K., Panwar, M., & Aggarwal, V. (2023). A study on teachers' perception towards E-learning adoption in higher educational institutions in India during the COVID-19 pandemic. Higher Education, Skills and Work-based Learning, 13(4), 720-738. https://doi.org/10.1108/HESWBL-03-2022-0052

Lei, S. I., & So, A. S. I. (2021). Online teaching and learning experiences during the COVID-19 pandemic–A comparison of teacher and student perceptions. Journal of Hospitality & Tourism Education, 33(3), 148-162. https://doi.org/10.1080/10963758.2021.1907196

Liao, C., Palvia, P., & Chen, J. L. (2009). Information technology adoption behavior life cycle: Toward a Technology Continuance Theory (TCT). International Journal of Information Management, 29(4), 309-320. https://doi.org/10.1016/j.ijinfomgt.2009.03.004

Liaw, S. S., Huang, H. M., & Chen, G. D. (2007). Surveying instructor and learner attitudes toward e-learning. Computers & Education, 49(4), 1066-1080. https://doi.org/10.1016/j.compedu.2006.01.001

Lin, J. S. C., & Chang, H. C. (2011). The role of technology readiness in self-service technology acceptance. Managing Service Quality: An International Journal, 21(4), 424-444. https://doi.org/10.1108/09604521111146289

Mailizar, M., Almanthari, A., & Maulina, S. (2021). Examining teachers' behavioral intention to use E-learning in teaching of mathematics: An extended TAM model. Contemporary Educational Technology, 13(2), 1-16. https://doi.org/10.30935/cedtech/9709

Memon, M. A., Salleh, R., Mirza, M. Z., Cheah, J. H., Ting, H., Ahmad, M. S., & Tariq, A. (2020). Satisfaction matters: the relationships between HRM practices, work engagement, and

turnover intention. International Journal of Manpower, 42(1), 21-50. https://doi.org/10.1108/IJM-04-2018-0127

Morgan, K. (1970). Sample size determination using Krejcie and Morgan table. Kenya Projects Organization (KENPRO), 38, 607-610.

Ngai, E. W., Poon, J. K. L., & Chan, Y. H. (2007). Empirical examination of the adoption of WebCT using TAM. Computers & Education, 48(2), 250-267. https://doi.org/10.1016/j.compedu.2004.11.007

Pham, N. T., & Van Nghiem, H. (2022). Online teaching satisfaction amid the covid-19 pandemic: evidence from a Vietnamese higher education context. International Journal of TESOL & Education, 2(1), 310-326. https://doi.org/10.54855/ijte.222119

Qazi, M. A., Sharif, M. A., & Akhlaq, A. (2024). Barriers and facilitators to adoption of e-learning in higher education institutions of Pakistan during COVID-19: Perspectives from an emerging economy. Journal of Science and Technology Policy Management, 15(1), 31-52.

Raza, S.A., Qazi, Z., Qazi, W. and Ahmed, M. (2022), "E-learning in higher education during COVID-19: evidence from blackboard learning system", Journal of Applied Research in Higher Education, 14(4), 1603-1622. https://doi.org/10.1108/JARHE-02-2021-0054

Roldán, J. L., & Sánchez-Franco, M. J. (2012). Variance-based structural equation modeling: Guidelines for using partial least squares in information systems research. In Research methodologies, innovations and philosophies in software systems engineering and information systems (pp. 193-221). IGI Global. https://doi.org/10.4018/978-1-4666-0179-6.ch010

Salam, S., Jianqiu, Z., Pathan, Z. H., & Lei, W. (2017). Strategic barriers in the effective integration of ICT in the public schools of Pakistan. In Proceedings of the 2017 International Conference on Computer Science and Artificial Intelligence (pp. 169-172). https://doi.org/10.1145/3168390.3168422

Salloum, S. A., Al-Emran, M., Shaalan, K., & Tarhini, A. (2019). Factors affecting the E-learning acceptance: A case study from UAE. Education and Information Technologies, 24, 509-530. https://doi.org/10.1007/s10639-018-9786-3

Sekaran, U., & Bougie, R. (2010). Research methods for business: A skill building approach. Chichester, West Sussex: John Willey & Sons. https://doi.org/10.1108/lodj-06-2013-0079

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.

Shard, Kumar, D., & Koul, S. (2024). Digital transformation in higher education: A comprehensive review of e-learning adoption. Human Systems Management, 43(4), 433-454.

Tarazi, A., & Ruiz-Cecilia, R. (2023). Students' perceptions towards the role of online teaching platforms in enhancing online engagement and academic performance levels in Palestinian higher education institutions. Education Sciences, 13(5), 449. https://doi.org/10.3390/educsci13050449

Tandon, U., Mittal, A., Bhandari, H. and Bansal, K. (2022), "E-learning adoption by undergraduate architecture students: facilitators and inhibitors", Engineering, Construction and Architectural Management, 29(10), 4287-4312. https://doi.org/10.1108/ECAM-05-2021-0376

Toor S K, (2005). Hybrid model for e-learning at Virtual University of Pakistan. The Electronic Journal of e-Learning, 3(1), 1-10, available online at www.ejel.org

Verawardina, U., Asnur, L., Lubis, A. L., Hendriyani, Y., Ramadhani, D., Dewi, I. P.,.. & Sriwahyuni, T. (2020). Reviewing online learning facing the COVID-19 outbreak. Talent Development and Excellence, 12 (3), 385–392.

Wains, S. I., & Mahmood, W. (2008). Integrating m-learning with e-learning. In Proceedings of the 9th ACM SIGITE conference on Information Technology Education, 31-38. https://doi.org/10.1145/1414558.1414568

Windiarti, S., Fadilah, N., Dhermawati, E., & Pratolo, B. W. (2019). Teachers' perception toward the obstacles of e-learning classes. Ethical Lingua: Journal of Language Teaching and Literature, 6(2), 117-128. https://doi.org/10.30605/25409190.v6.117-128

Yamane, T. (1973). Statistics: An introductory analysis. New York, N.Y. (USA) Harper and Row.

Yusuf, B. N., & Ahmad, J. (2020). Are we prepared enough? A case study of challenges in online learning in a private higher learning institution during the Covid-19 outbreaks. Advances in Social Sciences Research Journal, 7(5), 205-212. https://doi.org/10.14738/assrj.75.8211

Zhang, K., Peters, J., Janzing, D., & Schölkopf, B. (2012). Kernel-based conditional independence test and application in causal discovery. arXiv preprint arXiv:1202.3775. https://doi.org/10.48550/arXiv.1202.3775

Zheng, H., Han, F., Huang, Y., Wu, Y., & Wu, X. (2025). Factors influencing behavioral intention to use e-learning in higher education during the COVID-19 pandemic: A meta-analytic review based on the UTAUT2 model. Education and Information Technologies, 1-39.