

**Transformative impact : Online learning evolution in higher education
Post-Covid-19 pandemic**

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Abstract

The COVID-19 outbreak led to a significant change in India's educational landscape, resulting in the widespread adoption of e-learning technologies in the classroom. To evaluate the success of this transition, a study was conducted utilizing the Unified Theory of Technology Acceptance and Use (UTAUT) framework. The objective of the research was to evaluate the usefulness of e-learning in higher education institutions. The study involved conducting a cross-sectional survey through a structured questionnaire to test the hypotheses through empirical evidence. The statistical findings, based on a sample of 313 participants from several educational institutions, show that factors such as faculty influence, quality of services, performance expectancy and facilitating conditions significantly influence students' behavioral intentions. The expectation of effort, however, had no impact on the students' intentions. Additionally, the students' behavioral intentions positively impact their usage behavior

Subject Classification: 94A05.

Keywords: Performance expectancy, Higher education institution, E-learning, Students' behavioral intentions.

1. Introduction

The unprecedented pandemic and subsequent national Lockdown significantly impacted the education sector. Consequently, the education industry was forced to tailor to the "new reality" by new methods and transitioning to new technology platforms. We had to replace antiquated educational norms with a framework that teaches both content knowledge and the 21st-century abilities of creativity, critical thinking, communication, and teamwork, according to the OECD's Future of Education and Skills Project (OECD, 2030). Improving the speed and popularity of e-learning in India requires expanding technology and infrastructure access in rural areas. The rise of online education in urban areas has the potential to revolutionize the field of education. Increased competitiveness and the appearance of innovative e-learning platforms guarantee that students and teachers will have access to more recent content, cutting-edge teaching strategies, and cutting-edge technological resources.

India has made great progress in technological innovation and its influence on many sectors and businesses (Lovelock, 2001; Lai, 2016). For long, India depended mostly on the competence of instructors to develop pupils, but with the Fourth Industrial Revolution, the country has begun to rely on technology to make learning easier and more comfortable. Around 600 million people in the country use the internet to acquire information, which is expanding exponentially to bring about change.

(www.mhrd.com). E-learning in metropolitan areas grew with technology, and during the COVID-19 pandemic, it gained popularity while universities and institutions shuttered owing to statewide limitations. It has become a popular teaching platform in colleges, schools, and other institutions.

In India, the Ministry of Education oversees the educational system, with the Department of Higher Education acting as an advising agency. Department of Higher Education capacities are being tested. The COVID-19 epidemic has led to a dramatic shift towards e-learning.

2. Reconsideration of Written Works or Literature

“In this research, the Unified Theory of Technology Acceptance and Use (UTAUT) developed by Venkatesh et. al. (2004) was employed to examine the effect of technology, specifically e-learning, on higher education. It is essential to grasp the UTAUT model and its associated ideas before formulating hypotheses.

Unified Theory of Acceptance and Use of Technology (UTAUT)

Technology adoption relies on user consent (Davis, 1989), resulting in the creation of concepts from diverse domains (e.g., sociology, psychology) to determine acceptability.

The Technology Acceptance Model (TAM) by Davis (1989) is widely studied (Cimperman et al., 2016; Chauhan and Jaiswal, 2016), although newer research have shown certain limitations (Tsai et al., 2016). Venkatesh et al. (2003) synthesized eight models and theories to create the Unified Theory of Acceptance and Use of Technology (UTAUT) model to overcome these problems. The UTAUT approach emphasizes responsible technology usage and system acceptance. This study used the UTAUT model to examine the impact of e-learning on higher education.

The UTAUT framework is made up of four elements that influence the acceptance of technology and the intent to use it. These elements are Facilitating Conditions (FC), Effort Expectancy (EE), Performance Expectancy (PE), and Social Influence (SI). The Facilitating Conditions pertains to the extent to which participants trust that they have access to the necessary resources and systems to utilize the technology. The Performance Expectancy reflects the belief that adopting the technology will improve performance, while the Effort Expectancy refers to the belief that it will make tasks simple and smooth. Social Influence refers to the

perception that make others believe the technology should be used. The intent to use the technology is influenced by PE, EE, and SI, while FC directly affects the actual usage. The original UTAUT framework also includes moderating components, but they were not included in this study. The revised version of the UTAUT model without the moderating components has proven to be sufficient in studying technology usage and adoption. This model has been utilized in previous studies on e-learning.

In this study, the factors explained below were used to assess the impact of e-learning on institutions:

Performance Expectancy:

Performance Expectancy (PE) measures participants' belief that adopting new technology would improve their performance (Venkatesh et al., 2003). Some studies suggest that PE significantly impacts behavioral intention (Moran, 2006; Chan et al., 2005; Venkatesh et al., 2003), while others show no impact (Wu et al., 2012; Cadinu, 2003). The following theory was created based on the outcomes.

H1: *Performance expectancy (PE) largely lays the impact on the students' behavioral intention.*

Effort Expectancy

Effort expectancy refers to an individual's belief in easing out and simplifying the use of technology (Venkatesh, 2003). Some research on shopping online and the hotel business found a positive connection between effort expectancy and behavioral intention (Pascual-Miguel, 2015; Venkatesh et al., 2003; Lai et al., 2015). However, other studies in financial system audits, internet-based mobile payments, in mobile shopping; (Handoko et. al., 2018; Kaneberg, 2016; Mansour, 2016) found no such correlation between effort expectancy and behavioral intention. Hence, theory has been developed as follows.

H2: *Effort expectancy (EE) largely lays the impact on the students' behavioral intentions.*

Faculty Influence: The present study considers the social influence of factors. In education, instructors significantly influence student behavior. Individuals connect online through communication, information exchange, idea sharing, and experience comparison.

Students' trust in online education is influenced by platforms like MS Teams and Google Meet, as recommended by professors and coworkers. Research by Venkatesh (2003), Kim (2007), and Ghalandar (2012) indicates that social impact significantly shapes user behavior. Other research (Foon, 2014; Handoko et al., 2018 & Kaneberg, 2016) disagree, stating that social influence does not impact behavioral outcomes. The following assertion may be made therefore:

H3: *Faculty influence (FI) lays the impact on the students' behavioral intentions.*

Quality of services: A study by Diep et al (2016), indicated that high-quality e-learning services increase student adoption of online education programs at higher education institutions. According to Parasuraman et al. (1991), customer happiness stems from the quality of services provided by the firm. Few studies (Park, 2009; Cronin, 2000) found that service quality did not significantly impact students' online education behavior.

H4: *Quality of services significantly affects the students' behavioral intentions.*

Facilitating Condition: As quoted by Venkatesh et. al. (2003), the organization's conducive conditions for system utilization considerably influence system usage. To encourage individuals to use technology, the company must give technical assistance such as training to increase the system's likeliness, consequently improving the utilization behavior and interpretation of performance (Lu et. al., 2003). As per the research conducted by Raman et. al. (2014) and Kim- Soon et. al. (2005), providing technical help to students can promote technology adoption in higher education. Although a few investigations discovered no association (Al Rababaa, 2013 & Mousa Jaradat). Hence, the hypothesis:

H5: *Facilitating conditions lays the impact on the students' behavioural intentions of the students.*

Behavioural intention

Students choose online education for studying due to their purpose to do so. Taylor and Todd (1995) define behavioral intention (BI) as a student's attitude and commitment to use the system. Research by Ajzen (2002) and Kim et al. (2005) indicates that BI impacts behavior (Venkatesh et al., 2012). Agudo-Peregrina et al. (2014) found that customers' enabling

factors and behavioral goals affect system use. Research suggests that BI has little impact on system usage in e-learning (Sedana & Wijaya, 2010; Pardemean & Susanto, 2015). Thus, the hypothesis was put forth as follows:

H6: *Behavioral intention has a significant impact on the use of online systems.*

2.9 Objectives of the study

The purpose of the study is two-fold:

- To assess the influence of online education on student learning outcomes.
- To assess the effect of certain variables on the intentions of students' to optimize e-learning programs as proffered by higher education institutions.

Methodological Tools Administered

The study employed a structured questionnaire, which utilized a 5-point Likert scale (ranging from 1-Totally No No to 5 - Totally Yes Yes) to gather data. The elements used in the questionnaire were adapted from previous research and reworded to fit the context of e-learning as shown in Figure 1. Four items are taken from Robert Allen's (2002) work on

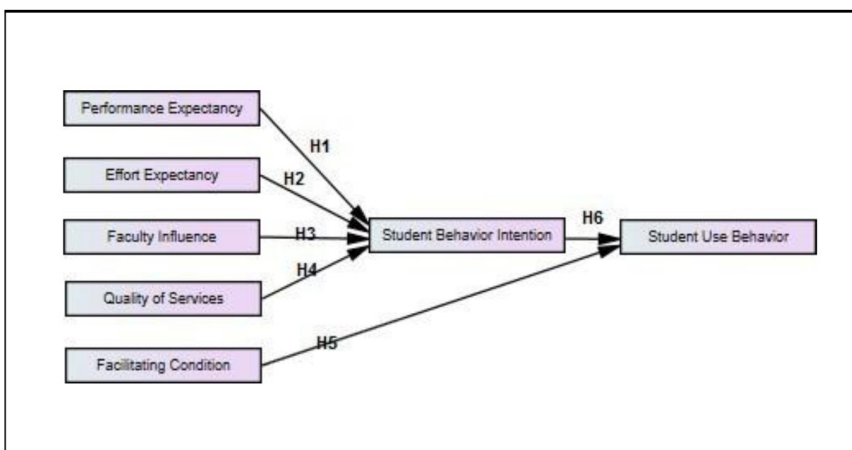


Figure 1
Research Framework

performance expectation, five from Sprenger and Schwaninger's (2021) work on effort expectancy, and five from Beheshti and Beheshti's (2010) and Sedera et. al. (2010) 's work on service quality, 5 questions were taken from Michaelidou and Hassan's (2008), Fu et. al. (2016) study to evaluate students' behavioural intention for e-learning. Sprenger & Schwaninger (2021), Robert Allen (2020), and four items for faculty impact from Martin & Herrero (2012), Sarfaraz (2017), and Venkatesh (2000). The current study makes use of four elements for sufficing the conditions and four variables related to students' behavior regarding technology usage, which were adapted from De Cannière et. al. (2007)

Table 2 explains these characteristics and variables. The study collected quantitative data using a Google form and link given to university and college students using convenience sampling. Out of 400 replies, 313 were valid. The data was processed using SPSS and AMOS software. The study used SPSS for frequency analysis, reliability assessment, and descriptive analysis. AMOS was used to analyze the relationship between endogenous and exogenous variables, as well as evaluate the model's fit. This information was utilized to create a research strategy to test the suggested idea.

4. Data Analysis

Demographic Profile of the participants

Table 1 shows that 31.95% of respondents had prior Covid-19 experience, whereas the remaining 68.05% of participants had only recently begun utilizing e-learning platforms. In addition, respondents from postgraduate programs made up 39.30% of the sample, compared to respondents from undergraduate programs, who made up 60.70% of the sample. On a total of 313 responders, there were 58.47% men and 41.53% women. Further, analysis shows that 54.31% of the students were below 25 years of age, followed by 27.80% in the 25 to 30 age range. Thus, the sample mentioned above was deemed suitable for evaluating the efficacy of e-learning.

Table 1
Population Traits

Population Anatomy			
Population Profile	Array	Aggregate	Percentage
Age (in years)	Less than & equals to 25	170	54.31
	26 - 30	87	27.80
	More than 30	56	17.89
Gender	Male	183	58.47
	Female	130	41.53
Program Enrolled	Graduate	190	60.70
	Postgraduate	123	39.30
Time spent utilizing an e-learning portal	<2 years	213	68.05
	2-4 years	68	21.73
	>4 Years	32	10.22

Source: Authors Compilation

Reliability Analysis:

For the present study, 30 items scale is used (Refer to Table 2). For all the variables, Cronbach's was 0.832.

Table 2
Reliability Analysis

Study Variables	Cronbach's	Comments
PE	0.858	Acceptable
EE	0.834	Acceptable
FI	0.845	Acceptable
QOS	0.754	Acceptable
FC	0.862	Acceptable
SBI	0.855	Acceptable
SUB	0.845	Acceptable

Source: Data compiled by authors

Nunnally (1978) found that all constructs had acceptable values between 0.753 and 0.859. Few variables were inconsistent due to their numerous scales, and the studied variables showed internal consistency. The SEM approach was utilized to analyze the relationships between dependent and self-dependant components and direct or indirect effects between constructs. This aimed to evaluate the theoretical framework of the study (as described by Hair et. al., 1998 & is shown in Table 2.) Using SEM involves several steps, including testing the theoretical model, estimating parameters, evaluating the final model, analyzing the measurement model, and implementing a structural model (Wang, 2013).

4.2 Evaluation of Measurement Structure

Establishing a relationship between the underlying concept and the observed items, as well as between the dependent and independent concepts, is essential for confirming the main hypothesis of the study (Wang, 2013; Hair et. al., 1998). Measurement model analysis and structural equation modeling are first stages in a sequence of assessments necessary to evaluate the suitability of a model in SEM (Gefen, 2003). By eliminating three elements based on factor loading from the original model and creating a new model with both endogenous and exogenous constructs. Table 3 displays the used questionnaire questions, factor loading for the evaluated model, and item codes.

The average scores of the participants, as analyzed through descriptive statistical analysis, varied from 2.978 to 3.669, pointing towards a neutral stance. The standard deviation result had a highest of 1.311 and a lowest of 0.791, showcasing diversity in the data and demonstrating that the responses are evenly distributed rather than clustered around the mean, which also suggests that the participants had varying opinions on the factors under investigation. All these is shown in Table 4.

Examination of proposed framework through practical observation and experimentation

Before analyzing the hypotheses, it is of vital importance to look at the numbers of GFI, AGFI, CFI, TLI, and RMSEA (Hu & Bentler, 1999). The initial model output did not meet the minimum requirement and had GFI and AGFI values below 0.9. To enhance the model and maintain uniformity among variables, items with factor loadings lower than 0.7 were eliminated, following the guidance of Schumacker and Lomax (2004), and the model was updated and reexamined to assess its accuracy. To raise the GFI, AGFI,

Table 3
Evaluation of Measurement Structure

Elements	Variables	Product code	Component loading	Writer
Performance Expectancy	Learning online software enhances my performance	PE1	0.84	Robert Allen (2020)
	An e-learning application saves time.	PE2	0.85	
	E-learning platforms assist me in efficiently managing and arranging my job.	PE3	0.79	
	E-learning platforms enhance productivity and enable the accomplishment of additional tasks and assignments.	PE4	0.76	
Effort Expectancy	My use of an e-learning platform facilitates work completion without misunderstanding.	EE1	0.77	Robert Allen (2020), Sprenger & Schwaninger (2021)
	E-learning tool interaction is simple and comprehensible.	EE2	0.75	
	The platform's e-classes are really helpful and educational.	EE3	0.78	
	My mistakes are decreased due to e-learning systems.	EE4	0.54	
	E-classes on a platform may be taken without exerting any mental effort.	EE5	0.71	
Behavioral intention	The fact that I have access to e-tools makes me more likely to use online learning modules this semester.	SBI1	0.84	Michaelidou and Hassan (2008), Fuetal (2016), RobertAllen (2020), Sprenger & Schwaninger (2021)
	Since I have access, I'll probably utilize this tool more frequently over the semester.	SBI2	0.81	
	I anticipate using it as required because I have access to it.	SBI3	0.54	
	I'll suggest e-learning resources to my friends and colleagues.	SBI4	0.83	
	I would attempt to use it throughout the semester because I have access to it.	SBI5	0.79	

Contid...

Student Use Behavior	To even further my knowledge and abilities, I favour using online learning resources.	SUB1	0.72	De Cannière et al
	There are a lot of people using these online learning resources.	SUB2	0.74	
	I invest more time using e- learning resources for personal development.	SUB3	0.81	
Quality of Services	The availability of information 24/7 plays a role in my decision to utilize electronic learning resources.	QOS1	0.81	Beheshti and Beheshti (2010), Sedera et al (2010) DeLone & McLean (2016)
	The intention to use e-learning tools is affected by the features and usefulness of these resources	QOS2	0.51	
	Dependability of tools affects my intention	QOS3	0.72	
	The system has a fast response time.	QOS4	0.72	
	E-learning materials facilitate access to information & knowledge.	QOS5	0.74	
Facilitating condition	The system can be used by users with the necessary resources.	FC1	0.829	Escobar-Rodriguez and Carvajal- Trujillo (2014),
	The usage of e-learning systems is compatible	FC2	0.809	
	Users of the online learning system are familiar with it.	FC3	0.818	Venkatesh et al(2003), Martin and Herrero (2012)
	Varied platforms are coupled with e-learning systems.	FC4	0.789	

Contd...

Faculty Influence	The level of adoption of online education is strongly influenced by suggestions from teachers or friends	FI1	0.819	Venkateshetal (2003);Venkatesh (2000),), Sarfaraz (2017), Jamil and Mat (2011),Martin & Herrero (2012
	E-learning facilitates knowledge sharing, interaction, and exchange.	FI2	0.838	
	Users believe that using online learning is present trend.	FI3	0.809	
	My close friends and colleagues think I should use online learning resources.	FI4	0.829	

Source: Author's analysis

4.4 Descriptive Statistical Analysis

Table 4
Results of the Descriptive Statistical Analysis.

Examined Parameters	Mean	Standard Deviation
Performance Expectancy	3.349	1.041
Effort Expectancy	2.978	1.032
Faculty Influence	3.669	0.881
Quality of Services	3.658	0.791
Facilitating Condition	3.049	1.232
Student Behavioral Intention	3.149	0.941
Student Use Behavior	3.049	1.311

Source: Authors Compilation

TLI, and CMIN/DF values, three items—SBI3, QOS2, and SBI3—were eliminated. Table 3, Illustration 3, and Illustration 4 display the original and amended models, respectively.

Table 5
Updated model

Model	Old Model	Updated/ New Model
Items	30	27
GFI	0.877	0.908
AGFI	0.873	0.905
RMSEA	0.065	0.053
CFI	0.921	0.943
CMIN/DF	3.122	2.893
TLI	0.934	0.946

Source: Authors Research Result

The values of GFI, AGFI, TLI, CMIN/DF, and RMSEA were established to meet the end results after deleting three items, as indicated in Table 5 (Vandenberg & Scarpello, 1994). The revised model in Figure 2 was used to Verify the hypothesis and the effect of variables in Table 6.

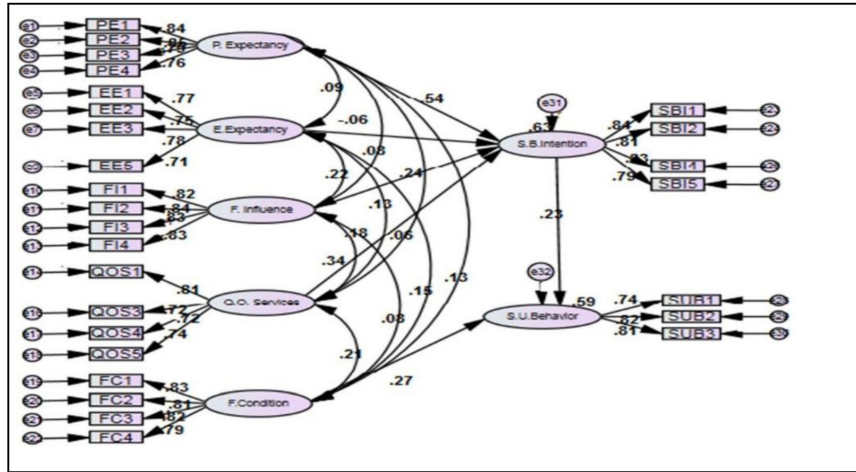


Figure 2
Revised Model

Source: Research Result

Table 6
Effect of variables

Hypothesis	Variables	Endogene Ous	Direct Effect	Critical Ratio	P-Value	Hypothesis S
H1	PE	Students behavioural Intention	.54	5.33	***	Supported
H2	EE	Students behavioural Intention	-.06	1.06	0.23	Rejected
H3	FI	Students behavioural Intention	.24	5.66	***	Supported
H4	QOS	Students behavioural Intention	.34	5.47	***	Supported
H5	FC	Students' usage behaviour	.27	5.34	***	Supported
H6	SBI	Students' usage behaviour	.23	5.51	***	Supported

Source: Author's Compilation

Conclusion and Suggestions

The purpose of the study was to evaluate the use of online education by universities using the UTAUT model. The outcome displayed that students' intentions to use e-learning were significantly influenced by the level of performance they expect from the system and the quality of services provided, with a coefficient of 0.54 ($P < 0.05$), thereby supporting hypotheses H1 and H3. Both the Faculty Influence (FI) and the Facilitating Condition (FC) were statistically crucial ($\beta = 0.24$ and $P < 0.05$). Hence H3 and H5 were supported. The value of Effort Efficiency (EE) was determined to be -.06 ($P = 0.23$). Hence, there was not enough evidence to support H2. It is possible that today's students are computer savvy and used to online learning tools. Further, the findings are in sync with past studies by Wu et. al. (2012) and Cadinu (2003), which concluded that students' intention to use online learning has a positive effect on their actual usage behavior.

The present research has some shortcomings like any other study. One such shortcoming is that the sample size of 313 participants is limited in comparison to the overall population of institutes and colleges. Secondly, the data were accumulated using a convenient sampling method, which may not represent the whole population. Moreover, a considerable number of participants were under 25 years old, which restricts the commonality of the results. In order to have a deeper understanding of the impact of the model, future research could consider increasing the sample size and incorporating moderator variables such as age, gender, and experience.

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