Understanding Factors Affecting University Student's Adoption of E-learning Systems in NCR

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Abstract Many Universities and Colleges of higher learning have started off late various courses online in India for various reasons. This shows that E-learning is becoming buzzword for tomorrow in terms of acquiring higher education, which in India is in nascent stage but will continue to grow in the future. However, little research has been done to verify the process how the University/College students of higher education will adopt and use E-learning. The present study took a sample of 200 University and College students in NCR to carry out the research. The proposed theoretical model that included Perceived ease of use (PEOU), Perceived usefulness (PU), E-learning self-efficacy (SE), Subjective norm (SN), System accessibility (SA), and their impact on E-learning Attitude and Behavioral Intension to use E-learning was developed based on the extended technology acceptance model (TAM). The results of the study statistically proved that Perceived Usefulness and Perceived Ease Of Use are the most important factors in user's acceptance of E-learning based on the correlation and regression tests. However, subjective norms were found to be the least important factor in influencing e-learners attitude and behavioral intensions.

Keywords E-learning • Technology acceptance model • Online course acceptability • Subjective norms toward (E-learning)

Introduction

There has been tremendous shift in imparting education in the university system and traditional face-to-face education is giving way to E-learning. The higher education institutions in India are rapidly adopting the concepts and factors of e learning. One of the biggest Universities offering online courses in India is IGNOU,

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headquartered in Delhi. Practically, all types of Degree and Diploma courses are offered by this university, which has been branded as People's University. Many other Universities and institutions of higher learning have followed the suite and started offering technology-driven distance education (E-learning).

E-learning comprises all forms of electronically supported learning and teaching, facilitated through the Internet. Various studies have highlighted that E-learning as a medium allows the learner to access material, download the assignment, and even maintain contact with the professor and therefore ensure that the institution offering E-learning courses could deliver better information and education. Welsh et al. (2003) define E-learning as the "use of computer network technology, primarily over or through the Internet, to deliver information and instructions to individuals." Rosenberg (2001) shares a similar definition referring to E-learning as using Internet technologies to deliver various solutions to the learners. Holmes and Gardner (2006) simply state that E-learning provides us with access to resources that promote learning on anyplace and anytime basis. Bouhnik and Marcus (2006) stated that E-learning has four advantages: Freedom to decide, Lack of dependence on the time constraints of the lecturer, freedom to express thoughts, and the accessibility to the course online materials. Similarly, Capper (2001) listed the E-learning benefits as: any time, any place, asynchronous interactions, group collaboration, and a new educational approach.

Despite the perceived benefits of E-learning mentioned above, research studies have also shown that the students who commence E-learning courses, do not finish them (Dutton and Perry 2002). Bouhnik and Marcus (2006) have found out that students' E-learning dissatisfaction was based on the factors like lack of firm framework to encourage students to learn, absence of learning atmosphere, absence of self-discipline, lack of interpersonal, and direct interactions among students and less efficient learning process.

The present study is aimed to understand the factors affecting University Student's Adoption of E-learning Systems in NCR. Understanding the learner's attitude toward E-learning is important for improvement in E-learning usage; therefore, this research investigates the various factors in E-learning adoption among the students in NCR. There are five categories of E-learning implementation being evaluated, which are perceived ease of use, perceived usefulness, E-learning self-efficacy, subjective norm, and system accessibility. Studies have been conducted in developed and developing countries about acceptance of E-learning among students and to identify the factors that affect E-learning adoption (ELA).

Literature Review

Different factors have been enumerated as possible determinants of E-learning adoption. The following table illustrates selected studies on ELA, detailing the authors, the adoption factors that have been investigated, the country of study, and the research framework used (Table 1).

Table 1 Summary of literature review

Article	Theory	Country	Sample and methodology	Adoption determinants
Kuldip Kaur et al. (2004)	Assessment of E-learning readiness	Malaysia	A sample of 93 receivers and 35 enablers. E-learning Readiness Research Tool was used	Role of Regulatory body, Role of policy makers
Alaasadik (2007)	The readiness of faculty members to implement E-learning	Egypt	Academic staff of 100. Survey Method	Competencies, experience, Attitudes
Eslaminejad et al. (2010)	Assessment of instructors readiness for implementing E-learning	Iran	A sample of 70 faculty members. A factor analysis was employed to extract significant factors	Knowledge, attitudes, skills and habits toward E-learning in technology and pedagogy domain
Apitep Saekow et al. (2011)	E-Learning readiness	Thailand	30 online courses were compared between Thailand and USA Universities	Policy, technology, financial, human resource, infrastructure
Tagoe (2012)	The basic technology acceptance model	Ghana	Longitudinal survey of 534 university students, Descriptive analysis	Perceived usefulness, perceived ease of use, attitude toward use, Behavioral intention
Hassanzadeh et al. (2012)	Delone and McLean model measuring E-learning systems success (MELSS) model	Iran	Questionnaires completed by 369 instructors, students and alumni of 5 universities Structural equation modeling	Technical system quality Content and information quality User satisfaction Benefits of usage Goal Achievement
Raouf et al. (2012)	TOE framework Iraq	Iraq	Questionnaires Completed by 120 faculty members Structural equation modeling	IS expertise expected benefits It infrastructure competitive pressure Educational partners
Motaghian et al. (2013)	Technology acceptance model and IS model acceptance	Iran	Survey of 115 University Instructors	Perceived usefulness, perceived ease of use, system quality

(continued)

Table 1 (continued)

Article	Theory	Country	Sample and methodology	Adoption determinants
Patrick N. Mafenya et al. (2013)	An investigation of First-year students pedagogical readiness to E-learning	South Africa	Sample of 1st year students of five universities were taken and focus group and individual interviews were held to identify the factors	Skill, attitude, experience, organizational barrier, motivation
Oketch, Hada Achieng et al. (2013)	E-learning readiness assessment model	Kenya	A sample of 296 lecturers were taken	Technological, culture and content
Hamid Mohammad Azimi et al. (2013)	Readiness for implementation of E-learning in colleges of education	India	A sample of 35 receivers and 31 heads of college of education affiliated by University of Mysore. Survey method for assessing organizational readiness for E-learning	ICT infrastructure, human resources, budget and finance, psychological and content
Namisiko et al. (2014)	TAM and TOE	Kenya	Online questionnaires submitted to a total of 500 participants which included instructors, students and administrators both descriptive and inferential statistics	Availability of ICT infrastructure E-learning curriculum performance expectancy perceived usefulness. Perceived ease of use competitive pressure
(Amirkhanpour et al. 2014)	Conceptual framework	Cyprus	Online questionnaire distributed to all the public and private universities	Integration of social learning elements such as various social media tools

E-learning adoption has been studied from different perspectives in different countries using various research frameworks. E-learning is Technology based and is applicable in all spheres of Education. All the research studies pertaining to determining the readiness of E-learning were analyzed to identify the factors that are most widely used by the Researchers. The studies from developing countries have revealed that perceived influence (PI), perceived ease of use (PEOU) the variables of the TAM are important factors, which influence the adoption of E-learning (Al-Adwan et al. 2013; AlAmmary and Hamd 2008; Elkaseh et al. 2016). Further, perceived ease of use (PEOU) and perceived usefulness (PU) were found to be

important factors to influence student behavioral intention in using E-learning in case of Libyan Higher Education (Elkash et al. 2016). Further studies have shown that perceived usefulness (PU), perceived ease of use (PEOU), and self-efficacy are important determinants of E-learning, Anderson (2002), Bean (2003), Chapnick (2000), Clark and Mayer (2003), Gold et al. (2001) (Teo et al. 2008). Further studies have highlighted that computer self-efficacy or E-learning self-efficacy (SE) had a significant influence on the actual use of computer and therefore E-learning (Bandura 1977, 1986, 1997), Compeau and Higgins (1995). It was also found that students with high Internet self-efficacy learn better than the students with low Internet self-efficacy in a web-based learning task (Tasai, 2003). For measuring E-learning self-efficacy scales are available developed by Compeau and Higgins (1995) to measure computer self-efficacy and Eastin and Larose (2000) developed Internet self-efficacy scale. In the meantime, Grandon et al. (2005) insisted that E-learning self-efficacy was found to have an effect on student intentions to adopt E-learning. It was also advocated that E-learning self-efficacy represents the personal confidence the students have in finding information and communicating with the instructor within the E-learning system.

As suggested in TAM2, subjective norm (SM) is important variable in influencing E-learning behavior (Ajzen 1991). A subjective norm is a social influence and it refers to how the person's perception is influenced by the people who are important to him or her. It is also one of the variables included in the theory of reasoned action and the theory of planned behavior; Abbasi et al. (2013) and Rivis and Sheeran (2003). Subjective norm was found to be significant factor in affecting university student's intentions to use E-learning in South Korea by Alshare and Kwan (2005). Subjective norm was found to be extrinsic motivational factors, which can encourage university students to self-regulate the use of E-learning Park (2009). Hence, subjective norm is positively related to intention to use E-learning and therefore it is used as important construct in this study.

Further System Accessibility was found to be an important organization context variable identified by the researchers which influence the use of information technology in the learning process (Thong et al. 2002). System accessibility also referred to as E-learning accessibility means the degree of ease with which a University student can access and use campus E-learning system as an organizational factor. University students will adopt E-learning when they think that system accessibility is there and they can use E-learning platform. To what extent this factor is going to influence the adoption of E-learning will depend upon the results of the study.

Research Model and Research Design

Technology acceptance model (TAM) was used as a guiding force to conduct the study. The present study seeks to understand factors affecting university student's adoption of E-learning systems in NCR, India, from the perspective of a developing country. Since E-learning involves individual adoption of a technology, it comes in
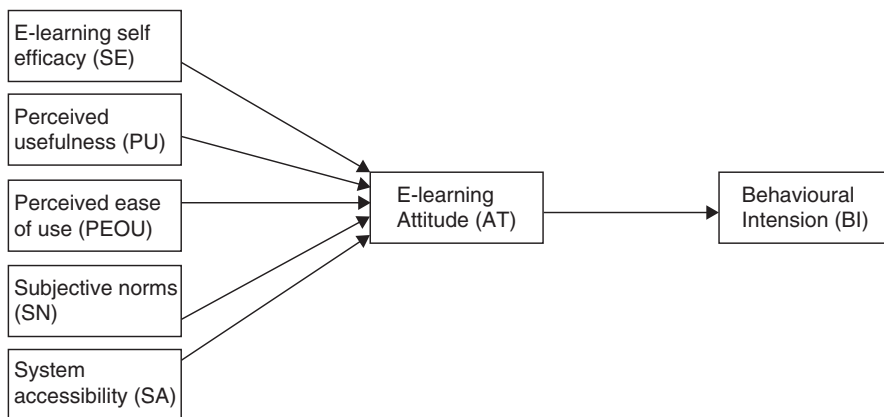
Fig. 1 Open-access tools

the domain of TAM. However, an extended version of TAM has been used to address the research purpose. Six factors as determinants of E-learning adoption from the developing country perspective have been used. These factors are E-learning self-efficacy (SE); perceived usefulness (PU); perceived ease of use (PEOU); subjective norms (SN); system accessibility (SA) and E-learning attitude (AT). These are shown in Fig. 1, which is a proposed theoretical model.

E-learning uses electronic devices and technological platforms to deliver the content of the courses sought by the students and therefore the ability of the students to use those devices and technology is important for its adoption. Hence, E-learning self-efficacy as a variable is taken in the present study. Various research studies have already shown that E-leaning self-efficacy has a significant effect on the use of adoption of E-learning from student perspective. Similarly, perceived ease of use (PEOU), perceive usefulness (PU), subjective norms (SN), system accessibility (SA) have influence on attitude of the students in the adoption of E-learning systems, so these variables are also taken in the study. Moreover, perceived usefulness, perceived ease of use, E-learning self-efficacy, subjective norms and system accessibility can be considered cognitive constructs, which are measurable, and E-learning attitude might be considered affective construct. In the same proposed model above behavioral intension that is intension to use could be regarded as behavioral construct.

Sampling Method and Procedure

The population in the study consisted of universities and college students in the NCR region where 20 universities and 20 college students were covered making a total population of around 1 lakh students. Among these 1 lakh, a sample size of 200 students was drawn by taking five students from each university and five students

from each college using judgmental sampling. Precautions were taken to look in that these students were Internet users and have also heard about E-learning courses; they may or may not have taken them.

Instrument for Data Collection

The instrument for data collection was developed based on the literature review and the main objective of the study. For every construct that was used in the proposed model, minimum five statements were taken and after pilot testing the instrument with 25 students and 2 E-learning administrative staff and faculty members respectively, the content validity was established. The completed instrument consisted of two parts where part I was used to capture the demographical attributes of the respondents like age, gender, years of experience using the Internet and experience with E-learning. Part II was in the context of the factors affecting E-learning adoption and consisted of seven subsections as follows: (1) E-learning self-efficacy, (2) Perceive ease of use (PEOU), (3) Perceive usefulness (PU), (4) Subjective norms (SN), (5) System accessibility (SA), (6) E-learning Attitude (AT), (7) Behavioral Intension (BI). All statements in different constructs were measured on the 7-point Likert type scale, from 1 = strongly disagree to 7 = strongly agree. The instrument was tested for its reliability using Cronbach Alpha, which was found to be 0.89, which is found to be good.

Statistical Procedure

Data collected by questionnaire was coded and entered into SPSS window. Various types of statistical tests were performed like Descriptive statistics of Mean and Standard Deviation. Correlation and Regression were also performed.

Results and Discussions

Part-I: Demographical Analysis: The age distribution of the participants included in the sample showed that most of the students were in age bracket of 21–25 years with 70% of the sample, followed by students with ages between 26 and 30 years with 15% while in the age group of 30 years and above there were only 15%. In relation to gender distribution, the male participants were more than the females with 60% and 40% respectively. Further, with respect to experience of using Internet almost 98% asserted having used the Internet. With respect to experience with E-learning or having used E-learning studies, only 50% respondents said in the positive. Platforms such as Facebook, WhatsApp, Class emails, course websites, etc.

Table 2 Demographical analysis

Item	Category	Frequency	Percentage %
Gender	Male	120	60
	Female	80	40
Total		200	100
Age	21–25 years	140	70
	26–30 years	30	15
Total		200	100
Experience using the Internet	Yes	196	98
	No	4	2
Total		200	100
Experience with E-learning	Yes	100	50
	No	100	50
Total		200	100

were identified as platforms used for E-learning and that was the only E-learning experience they were having as shown in Table 2.

Based on the descriptive information given in Table 2, although students were highly experienced Internet users with 98% of the sample but they did not have much E-learning experience and were found to be only 50%. This result denotes a very positive message that in the future E-learning will be a potential learning tool for learners and University/College-based E-learning is going to be the potential market for the universities and college of higher learning.

Based on the descriptive statistics it can be seen from Table 3 that perceived usefulness having a mean score of 4.30, followed by perceived ease of use having a mean score of 4.23, than followed with E-leaning self efficacy having a mean score of 4.07, followed with system accessibility with score of 3.94 and followed with system accessibility having a mean score of 3.94 are the factors that influence E-leaning attitude which further leads to behavioral intension. So the most important factor that influences E-leaning adoption is perceived usefulness followed with perceived ease of use. It was found that a subjective norm has the least influence on E-learning adaptation, i.e., on learner's behavioral intension of using E-learning and higher education. Based on the findings it can be recommended that in order to enhance the use of E-learning the educators and the students' parents and other people who influence the E-learning behavior should encourage their students and wards to adopt E-learning.

Looking at the correlation analysis done in Table 4 it is found that the cognitive variables like Perceived ease of use (PEOU), Perceived usefulness (PU), E-learning self-efficacy (SE), Subjective norm (SN, System accessibility (SA) are having low correlation among themselves but are highly correlated with E-learning Attitude (AT) and Behavioral intension (BI). Perceived usefulness (PU) is found to be highly correlated with E- Learning Attitude (AT) and the lowest correlation is found between subjective norms.

Table 3 The mean, standard deviation, and Cronbach Alpha of the construct

Item	Mean	SD	α
Perceived ease of use (PEOU)	4.23	1.39	0.85
I find E-learning system easy to use (E1)	4.24	1.30	
Learning how to use an E-learning system is easy for me (E2)	4.25	1.39	ááã
It is easy to become skillful at using an E-learning system (E3)	4.23	1.41	
I find E-learning system friendly to use (E4)	4.23	1.42	
I find E-learning system easy to navigate (E5)	4.22	1.43	
E-learning facilitates its usage any time of the day (E6)	4.23	1.42	
Perceived usefulness (PU)	4.30	1.39	0.87
E-learning would improve my leaning performance (U1)	4.30	1.30	
E-learning would increase academic productivity (U2)	4.33	1.36	
E-learning could make it easier to study course content (U3)	4.27	1.41	
In order for me to prepare for the future job, it is necessary to take E-learning courses (U4)	4.28	1.42	
E-learning helps me to grasp the subject better (U5)	4.29	1.43	
I believe E-learning contents are informative (U6)	4.30	1.35	
I believe E-learning is a useful learning tool (U7)	4.30	1.44	
I believe E-learning contents are useful (U8)	4.31	1.41	
E- Learning Attitude (AT)	3.94	1.24	0.91
Studying through E-learning is a good idea (A1)	3.93	1.14	
Studying through E-learning is a wise idea (A2)	3.85	1.20	
I am positive toward E-learning (A3)	4.04	1.22	
I feel more comfortable toward E-learning (A4)	3.94	1.24	
E-learning adds to my confidence building (A5)	3.90	1.28	
If I am using E-learning system, I feel I am doing positive for myself (A6)	3.92	1.31	
I did not notice any inconsistencies in using E-learning (A7)	4.02	1.32	
E-learning does everything I would expect it to do (A8)	3.95	1.24	
Behavioral intension (BI)	4.10	1.31	0.92
I intend to check announcements from E-learning systems frequently (B1)	4.10	1.18	
I intend to be a heavy user of E-learning system (B2)	4.14	1.40	
I intend to use E-learning contents to assist my learning (B3)	4.13	1.39	
I intend to use E-learning as an autonomous learning tool (B4)	4.04	1.28	
I intend to use E-learning to improve my academic performance (B5)	4.05	1.31	
E-learning self-efficacy (SE)	4.07	1.42	0.91
I feel confident finding information in the E-learning system (S1)	4.07	1.39	
I have the necessary technical skills for using an E-learning system (S2)	4.11	1.41	
I feel confident using E-learning system (S3)	4.06	1.45	
I feel confident operating E-learning system (S4)	4.04	1.43	
I find it interesting in using E-learning contents (S5)	4.05	1.44	

(continued)

Table 3 (continued)

Item	Mean	SD	α
Subjective norm (SN)	3.50	1.31	0.89
What E-learning stands for is important for me as admired by my university/college senior (N1)	3.50	1.22	
I like using E-learning based on the similarity of my values to take E-learning courses (N2)	3.56	1.24	
Most people who are important to me think that I should take up E-learning (N3)	3.51	1.35	
It is expected of me that I take up E-learning program in near future (N4)	3.53	1.33	
The people in my life whose opinions I value would like that I take up E-learning program in the near future (N5)	3.55	1.36	
I feel pressure from Peers to adopt E-learning system (N6)	3.32	1.38	
I feel under social pressure to use E-learning system (N7)	3.57	1.27	
System accessibility (SA)	3.94	1.21	0.92
I have no difficulty accessing and using an E-learning system in the university/college (SA1)	3.93	1.14	
I am in a position to find the learning material on E-learning platform whatever is required (SA2)	3.95	1.15	
Internet speed is good enough for E-learning (SA3)	4.02	1.20	
Interacting on E-learning system is often user friendly (SA4)	3.94	1.21	
Interacting on E-learning system requires less of my mental efforts (SA5)	3.90	1.22	
E-learning system is found to be flexible to interact way (SA6)	3.92	1.28	
I find it easy to get knowledge through E-learning system whenever I want (SA7)	3.93	1.27	
Overall scale reliability			0.89

Table 4 Correlation analysis

Variables	2 (PU)	3 (AT)	4 (BI)	5 (SE)	6 (SN)	7 (SA)
1. Perceived ease of use (PEOU)	.52*	0.71*	0.67*	0.55*	0.51*	0.52*
2. Perceived usefulness (PU)		0.76*	0.70*	0.53*	0.50*	0.54*
3. E-learning Attitude (AT)			0.68*	0.67*	0.53*	0.67*
4. Behavioral intension (BI)				0.67*	0.52*	0.63*
5. E-learning self-efficacy (SE)					0.54*	0.53*
6. Subjective norm (SN)						0.51*
7. System accessibility (SA)						

*p < 0.01

Regression analysis was done which was a simple regression with E-learning Attitude as an independent variable and Behavioral Intension as a dependent variable. Similarly, multiple regressions were run with E-Learning attitude as a dependent variable and five independent variables as Perceived ease of use (PEOU), Perceived usefulness (PU), E-learning self-efficacy (SE), Subjective norm (SN), System accessibility (SA). Table 5 demonstrates that Perceived usefulness (PU) has the highest beta score (0.45) and therefore influences E-learning attitude the most. The second variable influencing E-learning attitude in order of importance is Perceived ease of use (PEOU) and E-learning self-efficacy (SE) with beta scores as 0.43 and 0.42 respectively. The other two independent variables like Subjective norm (SN) and System accessibility (SA) were not found to have much influence on E-learning attitude and they were found to be insignificant based on the p values. Similarly, the relationship between E-learning attitude and Behavioral Intension (BI) was found to be high having a beta score of 0.51. This indicates that perceived usefulness and perceived ease of use are critical for E-learning adoption among the students of the NCR region.

The coefficients of determination R2 showed that 47.8% variation in E-learning Attitude is explained by Perceived Usefulness. Overall, it was found that 57.8% variation in a dependent variable that is E-learning attitude is explained by independent variables out of which three independent variables were found to be significant which were Perceived ease of use (PEOU), Perceived usefulness (PU), E-learning self efficacy (SE). Similarly, 59.3% variation in Behavioral Intension is explained by E-learning Attitude. Hence, the results of this study revealed that there are two readiness dimensions which are found to be important and they are Perceived Usefulness and Perceived Ease Of Use for making the students of higher education for forming positive attitude toward E-learning. Moreover, if E-Learning attitude is formed it will also result in Behavioral Intension to start using E-Learning as a tool of learning. Faculty members will be required to help the students to develop self-directed learning and learner control skills for online learning contexts. The role of faculty will be very important for encouraging the students to vote for using online courses. Faculty members can create learning community through which experience sharing, instant feedback, and other methods can be used to keep the students

Table 5 Regression results of predicted path relations

Dependent variable	Independent variable	β	R2	R2	P
E- Learning Attitude (AT)	Perceived ease of use (PEOU)	0.43	0.285	0.578	< 0.001
	Perceived usefulness (PU)	0.45	0.478		< 0.001
	E-learning self-efficacy (SE)	0.42	0.112		< 0.001
	Subjective norm (SN)	0.26	0.031		< 0.078
	System accessibility (SA)	0.32	0.094		< 0.089
Behavioral Intension (BI)	E- Learning Attitude (AT)	0.51	0.593	0.593	< 0.001

taking interest in online courses. As more and more Internet penetration will increase and more and more universities/colleges will be offering courses through E-learning mode, it can expect that students would adjust to the use of online courses.

Conclusions

The purpose of the present study was to (1) understand E-learning Attitude of the students in higher education, (2) find out the factors that influence E-Learning attitude, and (3) investigate the relationship between E-Learning attitude and behavior intension to continue to enrol in online programs. The findings of the study have been quite meaningful and using the extended TAM model it was found that out of the five factors that were used to study the adoption of E-Learning Attitude the factors were found to be highly significant and were Perceived Usefulness and Perceived Ease Of Use. The influence of these variables was statistically tested using correlation and regression analysis. It was also found that once the attitude formation takes place toward E-Learning, it will result in the behavioral intension to E-learning adoption. Previous researchers have already provided support to the results which have come out of the study. This study has made some significant contribution to the research and practice. This study has contributed to the body of E-learning by validating the extended TAM model from the Indian perspective. Moreover, the study will provide practical guidance to University/College administrators and instructors to pay close attention to the factors, which have been used in the study when implementing E-Learning projects in their respective institutions.

Limitations and Recommendations for Future Research

This study revealed several limitations that should be taken up in future research. Limited independent factors as antecedents of adoption of E-learning were taken which can be increased from five to many more. The scale that was used for data collection was not any standardized scale and therefore might have some errors. Hence, the tests of validity may be conducted in future research to make the scale more meaningful. Future research can also take higher sample and conduct the study in different parts of the country to understand how E-Learning readiness varies in different states of India and can some model be proposed which can help in standardizing the results in terms of the factors that are found to be consistent in influencing the adoption of E-Learning among students of higher education. Moreover, the study can also be done to design better online courses for maximizing student's online learning experiences. The sample size that was taken was also small which could be further increased in future research. More sophisticated statistical techniques like Structure Equation Modeling etc. could be used to make the results

more robust and statistically valid. However, the present research is the need of the hour as the future is going to be for online education.

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