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An Assessment of Students' Intention of Technology Acceptance for Online Education

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Abstract

Technology has a significant impact on university activities such as teaching, learning, research, and administration. It is a strong tool for disseminating knowledge and information. The success of students in online education is determined by how they integrate technology into their learning activities (Muthuprasad et al. 2021). Many research have been conducted to investigate the aspects of technology that contribute to the success or failure of online education (Bolliger & Halupa, 2018; Shelton et al. 2017; Yang et al. 2017) as well as the essential factors impacting learner satisfaction in an online learning environment (Dziuban et al. 2015; Liaw & Huang, 2013; Weidlich & Bastiaens, 2018). The study of technology adoption looks at the decisions that people make when it comes to adopting, embracing, or rejecting new technologies. A framework is offered based on the Technology Acceptance Model (TAM; Davis et al. 1989) to explain students' intention to use online education effectively, that is, to fully exploit the system's features in learning processes. A questionnaire was administered to determine the intention of students regarding technology acceptance for online learning based on the five constructs; perceived usefulness, perceived ease of use, intention to use, perceived enjoyment and attitude toward use. A sample of 300 university students from across Punjab was taken for the current research. The findings of this study will help to develop effective online courses by taking into account all of the aspects that influence students' intention and satisfaction.

Keywords: Technology, TAM, online education, online learning, students' intention.

1. Introduction

India is a vast country with considerable diversity in culture, language, tradition and so on-which is reflected in its education system as well. Many changes have happened in various aspects of life over a period of time and education system is no exception. Classrooms are no longer the same as they once were. The impact of information technology on human existence is enormous, and its significance in education cannot be underestimated. The closure of educational institutions had created obstacles for students' learning under the COVID 19 pandemic scenario. The augmented leap of technological innovations over the years have changed the whole meaning of education and has created a pressing need for education research on how the learning has been mediated by emerging technologies. Different learning environments like face to face learning, distance learning and online learning are available to the students for learning across the globe. Technologies used for online education are vast and include audio recordings, video recordings, computer-assisted instructions, group communications (synchronous and asynchronous, web and multimedia materials, simulation and gaming, collaborative learning, asynchronous learning networks (ALN), wireless and handheld devices (Hiltz and Turoff, 2005). Online learning is becoming a bigger element of the education system all around the world. Education is now more convenient and accessible to everyone. In India, the education industry is constantly expanding. When it comes to higher education, India is one of the world's largest markets.

It has approximately 1.42 million schools with 227 million students enrolled and over 36,000 Higher Education Institutes (HEI) (www.ibef.org).

1.1 What is Online Education

The explosion of new technology, particularly information technology, has altered the shape of the entire world and influenced all aspects of human life. The same is true for the educational sector as well, where traditional student-teacher interaction and learning techniques have been aided by cutting-edge technologies. Online education is a term used to describe learning that takes place entirely online; where students learn outside of the classroom. It is considered similar to the distance learning but takes place entirely online (Oblinger *et al*. 2005). For students learning online, the online delivery mode can provide relevant and convenient approaches to attain learning outcomes (Junco *et al*. 2013). Many elements can influence the success of online learning, including technological aspects, a user-friendly online platform, class activities, and assessments (Wijekumar *et al.* 2006; Shuey, 2002). Most of the terminology (for example, online learning, open learning, web-based learning, computer-mediated learning, blended learning, m-learning) share the capacity to utilise a computer connected to a network, which allows you to learn from anywhere, at any time, in any rhythm, and with any means (Cojocariu *et al*. 2014). As a result of the COVID-19 epidemic, many institutions have been compelled to convert to online teaching rather than face-to-face teaching. It is critical for institutions to understand what factors may influence student satisfaction and their desire to take courses online in the future. As a result, the primary goal of this study is to determine what characteristics influence students' intentions of adopting technology for online education.

Online education is a flexible instructional delivery system that encompasses any type of learning that occurs via the internet. It enables teachers to reach students who would otherwise be unable to enrol in a traditional classroom setting, as well as students who need to work on their own time and at their own speed. Online learning is believed to be simple to use and may even reach rural and remote areas. It is seen as a less expensive form of education due to large cost savings on issues such as transportation, accommodation, and other expenses, as well as a significant reduction in overall costs when compared to institution-based learning. Another appealing feature of online learning is its adaptability; students can arrange their time and work according to their abilities to complete tasks. Demand for online courses stems from a desire to “provide quality education to all students, regardless of location or time” (Chaney, 2001). Blended learning and flipped classrooms are created by combining face-to-face lectures with technology; this form of learning environment can boost students' learning potential.

As a result, online education can be considered as a flexible instructional delivery system that includes any type of learning that takes place through the internet. It has also been described as a learning environment that uses information and communication technology to make teaching and learning more student-centered and flexible (ICT).

1.2 Online Education: The need of the hour

Over the last decade, online learning has grown significantly as the internet and education have combined to provide people with the opportunity to learn new skills. The growth of COVID-19 cases had put everyone under house arrest under duress, forcing them to rely on digital channels to carry on with their daily lives. It has compelled everyone involved in the educational sector to adopt e-learning since it allows students to study from anywhere in the world at any time. During the epidemic, all schools and universities around the world were impacted, and many educational institutions were forced to continue educating online because it was the only option available at the time. This digital shift has been made possible by the usage of online platforms such as Google Classroom, Zoom, Google Meet, and Microsoft Teams, as well as the creation of more accessible, engaging, and contextualised e-learning books and notes. Because of its ease of use, learning flexibility, and regulated environment, educational institutions and students all around the world have adopted and welcomed the online education. At this stage of the virtual teaching-learning process, it's even more critical to learn about the learners' perspectives and investigate their attitudes regarding this methodology. With such a major disruption on the horizon, online education has gained popularity. It is student-centered and provides a

great level of time and location freedom.

2. Review of Literature

2.1 Factors that influence online learning

When compared to traditional face-to-face classroom sessions, the virtual classroom offers a significantly different environment. The design and delivery of online courses have a significant impact on student satisfaction, learning, and retention (Irani, 2005). To make learning successful and productive, it is critical to consider the preferences and perceptions of learners while building online courses. According to several studies, the majority of students enrolled in online courses are satisfied with the form of instruction. However, studies show that a variety of factors influence learners' views (Shreshtha *et al*. 2019; Salloum *et al*. 2019; Pérez-Pérez *et al*. 2019). Previous research has found that one's attitude is a powerful predictor of one's intention (Ajzen and Fishbein, 2000; Glasman and Albarracin, 2006). The attitude of students enrolling in an online programme is influenced by their perceptions of online learning (Zebregs *et al*. 2015). Students are more inclined to adopt online learning if they believe it is simple and easy to use, as well as if it improves their academic performance and progress (Yeap *et al*. 2016). The individuals' perception of the usefulness of online learning is an additional attribute that may increase students' academic success in an online environment (Proffitt, 2008). Age, gender, prior computer literacy skills, and individual learning styles are all important determinants of student technology acceptance (Kurdi *et al*. 2020). Country-wise research was carried out in United Kingdom (Green and Hannon, 2007) United States of America (Kvavik, 2005) and Australia (Kennedy *et al*. 2006; Kennedy *et al.* 2008). These surveys showed that the vast majority of students have access to internet-enabled devices such as computers and smartphones. They communicate with these digital devices through formal and informal networking venues such as emails, blogging, and so on. The social influence of students' referent groups, student's attitude towards online learning are additional factors related to individuals' attributes and may influence their intention to accept technology and learn online. (Bertea, 2009; Shen *et al*. 2006). Course design, psychological characteristics, and institutional assistance can all help in successful academic integration (Lee and Choi, 2011). Blackwell, Lauricella, and Wartella (2014) surveyed over 1000 early childhood educators to investigate the relationship between extrinsic and intrinsic factors that influence their technology use. They discovered that teachers' perceptions toward the importance of technology in assisting children's learning had the greatest influence on technology use.

2.2 Technology Acceptance Model (TAM)

Several studies have shown that using technology empowers teachers and students while also improving teaching and student accomplishment. Students find well-planned classes that include technology to be more interesting, memorable, and motivating (Tornabene, 1998). The technology acceptance model (TAM), which examined how users accept and use technology, was the first model to integrate technology adoption based on psychological considerations (Davis *et al.* 1992). The Technology Acceptance Model (TAM) was introduced by Davis (1989) to be used in predicting the user acceptance of any information technology system and to diagnose design problems before the users actually use this system. TAM serves as a foundation for tracing how external factors influence beliefs, attitudes, and intentions to use. According to Davis (1989), there are two important factors that determine intention to use a technology: Perceived Usefulness (PU) and Perceived Ease of Use (PEU). Perceived Usefulness (PU) refers to how much a user believes a technology will improve his/her performance, whereas Perceived Ease of Use (PEU) refers to how easy the individual believes utilising the technology would be free from efforts. According to TAM, the user's behavioural intentions, attitude, perceived usefulness of the system, and perceived ease of the system all influence one's actual use of a technology system, either directly or indirectly. External influences may also influence intention and actual usage, according to TAM, through mediated effects on perceived usefulness and perceived ease of use (Park, 2009). The learner's preference is related to his or her readiness or willingness to participate in collaborative learning, as well as the elements impacting readiness for online learning (Muthuprasad *et al*. 2021). Positive attitudes of users will encourage greater intentions of using e-learning technology (Cheung and Vogel, 2013). Several studies have found that an instructor's interaction with students has

a significant impact on students' perception of online learning. The users' actual usage of the technology is strongly influenced by their behavioral intention, which in turn is influenced by their prior experience with this technology (Sumak *et al*. 2011). The variables PU, PEU, and attitude toward technology were utilised to predict intention to use technology in their study (Bazelais *et al.* 2018).

3. Objective of the Study

The majority of previous researches had focused on various aspects of online learning, such as differences in students' performance, attitudes, and satisfaction levels while taking courses online vs offline (on campus). Some studies looked at how to construct effective learning activities for online education. However, very few studies have focused on determining students' intentions to undergo courses using online education. Hence, this work will contribute to the body of knowledge in this area. Also, TAM has been utilized in different studies yet the factors picked to investigate the Online Learning Intention (OLI), characterized as an aim to keep learning the courses online later on, were distinctive in those investigations, (for example, intrinsic motivation, online course plan, user interface layout, past learning experience, PU, PEU). For the current study, the researchers have involved additional variables like external factors that include ICT framework and internet resources and also intrinsic variables like PEU and self-efficacy and Institutional Support comprising class learning activities and support from instructors to the existing TAM. The extrinsic variables have not been deployed in other studies to assess students' learning intentions for online education. Thus, the present study intends to bridge this gap and add to the growing body of literature by connected with extraneous element in the current model. The hypotheses appended below have risen-up out of the reviews of the previous studies and emphasize on students' intention for online education. learning, and those are tended to in this review. Therefore, the outcome of the present study will help the Higher Education Institutes (HEIs) in designing better and effective online courses which can draw students more towards online education.

4. Hypotheses Development

4.1 Intrinsic factors, extrinsic factors and perceived enjoyment

Intrinsic considerations such as self-efficacy (Brinkerhoff 2006; Teo and Noyes 2011), and perceived usefulness (PU) (Davis, 1989) and extrinsic factors such as available resources (access to internet, technical assistance) are all hurdles to successful technology integration in the online class (Butler and Sellbom 2002; Shamburg 2004; Teo and Noyes 2011). Perceived self-efficacy is described as a person's view that he or she is capable of doing a specific behaviour (Bandura, 1986). Individuals are more likely to engage in a behaviour if they believe they can master a skill or achieve a desired end. Higher levels of perceived self-efficacy in the use of computing technology, for example, were linked to higher levels of intention to utilise that technology. Lack of self-efficacy will have negative effect on the use of technology and this will prevent students to integrate technology in their learning (Piper & Yan, 2001). Perceived Usefulness (PU) refers to the user's subjective probability that employing a given application system will boost his or her job performance within an organisational setting (Davis, 1989). Learners are more inclined to use technology if they believe it is quick to use and simple, as well as if it improves their academic progress and performance. Extrinsic factors include persons' assessment of the level of support provided by the organisational and technological infrastructure and resources to encourage them to use the system (Venkatesh *et al.* 2003). Previous studies have found that extrinsic factors influence users to use technology to a great extent (Venkatesh *et al.* 2003; Zhou, 2011; Ain *et al.* 2016). Through this current study, researchers want to find out if there exists a relation among intrinsic factors, extrinsic factors and perceived enjoyment. Hence, it is asserted that:

H_1: There is a significant relationship between intrinsic factors and Perceived Enjoyment (PE).

H_2: There is a significant relationship between extrinsic factors and Perceived Enjoyment (PE).

4.2 Institutional support, perceived enjoyment and online learning intentions
Institutional support refers to the organisational and technical resources that users believe are available to assist them in implementing information systems in their online learning activities (Venkatesh *et al.* 2003). The study by Simpson and Du (2004) found that during synchronous online sessions, students' participation and class interaction have an impact on their learning experience. To overcome the limitations of asynchronous learning, most instructors have adjusted their instruction to use synchronous learning mode (Hsiao, 2012). The contentment of students with their online learning is affected by all learning activities during synchronous sessions. If students experience a lack of sense of community and isolation in online education, this may significantly impact their engagement with classmates and teachers. Users' cognitive effort necessary to interact with a specific ICT tool would be reduced if institutional support was available, boosting their perception of the system's ease of use (Bhuasiri *et al*. 2012; Jawadi & El Akremi, 2006; Martins & Kellermanns, 2004). According to Asaari and Karia (2005), ICT availability (PC ownership and internet connection) influences users' opinions of the utility and convenience of use of online education systems, and thus their levels of online education preparedness. Lim (2001) discovered a positive link between learners' perceived enjoyment and their intention to take more online courses in the future. Classroom activities and course integration in developing the course with suitable learning activities increase class participation and improve learners' intention to learn online (Hung and Jeng, 2013). Hence, the following hypotheses are proposed in this study, based on the importance of class participation and teachers' assistance on perceived enjoyment, as well as their impact on intentions towards learning online:

H_3: There is a significant relationship between Institutional Support (IS) and Perceived Enjoyment (PE).
H_4: There is a significant relationship between Institutional Support (IS) and online learning intentions (OLI).
H_5: There is a significant relationship between Perceived Enjoyment (PE) and online learning intentions (OLI).

4.3 Intrinsic factors, perceived usefulness and intentions toward online learning
Intrinsic considerations such as self-efficacy and perceived usefulness are important consideration in online education. Learners who believe they are extremely self-efficacious are better able to overcome difficulties or hurdles (Bandura, 1986) and will work harder and longer. Learners who are confident in their abilities and experience will gradually enhance their intentions to learn (Yoo, Han, & Huang, 2012). Many studies (Islam, 2013; Weibel, Stricker, & Wissmath, 2012) have discovered that user perceptions of ease of use, usefulness, enjoyment and service quality all influence learner attitudes about a technology. Both self-efficacy and motivation theory support the idea that in technology-mediated environments, learners who are confident in their abilities and the usefulness of a task will do better (Huang & Liaw, 2007). Thus, the following hypotheses are proposed:

H_6: There is a significant relationship between intrinsic factors and perceived usefulness (PU).
H_7: There is a significant relationship between perceived usefulness (PU) and online learning intentions (OLI).

4.4 Perceived enjoyment, perceived usefulness and attitude towards use (of technology) Perceived enjoyment is an intrinsic motivator that focuses on the usage process and reflects the pleasure and enjoyment involved with using a technology. The attitude toward using a given source is positively connected to perceived enjoyment. One of the main reasons users use technology for online learning is to have fun (Moon and Kim, 2001). If learners can have fun while adopting new technology, their attitude toward adoption will be positive (Suki and Suki, 2011). It's been known for a long time that attitude is a strong factor of intention. Many users today are probably exposed to online education and have formed an opinion towards using the same, ranging from positive to negative (Suki and Suki, 2011). Learners who embrace constructivist views exhibit more positive attitudes regarding technology in the classroom, according to the findings (So *et al*. 2012). According to the TAM model, perceived

usefulness influences behavioural attitudes and intentions to use. Hence, the following hypotheses are stated:

H_8: There is a significant relationship between Perceived Enjoyment (PE) and attitude towards the use of technology.

H_9: There is a significant relationship between Perceived Usefulness (PU) and attitude towards the use of technology.

4.4 Attitude towards use (of technology) and learning intentions

An individual's favourable or negative feelings (evaluative affect) about executing the target behaviour" is how attitude is defined (Davis *et al*. 1989). It was proposed that one's intention to effectively use an information system is directly influenced by one's attitude toward this activity, drawing on theories of reasoned action and planned behaviour (Ajzen, 1991; Fishbein & Ajzen, 1980). Because effectively employing a technical tool is more complex and time-consuming than merely using it, an individual's willingness to engage in such conduct should be based on how favourable his or her ideas about the consequences are and how favourably he or she judges the outcomes (Davis *et al*. 1989). In the context of online and distance learning, the findings show that attitudes regarding technology utilisation have a positive impact on the system's intention to be used (Hernandez *et al*. 2011; Jawadi & El Akremi, 2006). The Theory of Planned Behaviour (TPB) explains a variety of behaviours and behavioural intentions that are not under the will of an individual (Ajzen 1991, 2001). It is a development of the Theory of Reasoned Action (TRA), which holds that people are influenced by their own attitudes as well as what others think they should or should not do (Ajzen and Fishbein 1980). To put it another way, behavioural intention is established based on one's attitude toward the behaviour and subjective norms about it. According to Ajzen (1991), the first component in TPB, attitude toward behaviour is the degree to which the behaviour's performance is favourably or unfavourably valued; it is influenced by behavioural beliefs about the anticipated consequences. The more favourable an individual's attitude toward a behaviour is, the more likely that person will engage in that behaviour (Ajzen and Driver 1991; Miesen 2003). Instead of actual behaviour, behavioural intention was chosen as the final dependent variable because it was assumed to be the immediate antecedent of real behaviour. Simply stating, a person's behavioural intention is one of the most accurate predictors of future, actual behaviour (Davis 1989; Davis *et al*. 1989; Sheppard *et al*. 1988; Venkatesh and Davis 2000; Venkatesh *et al*. 2000). The stronger the intention to engage in a behaviour, the more likely the individual will indulge in that conduct (Cheon *et al*. 2012). Therefore, with respect to these relationships, the following hypothesis is framed:

H_{10}: There is a significant relation between attitudes towards use of technology and online learning intentions.

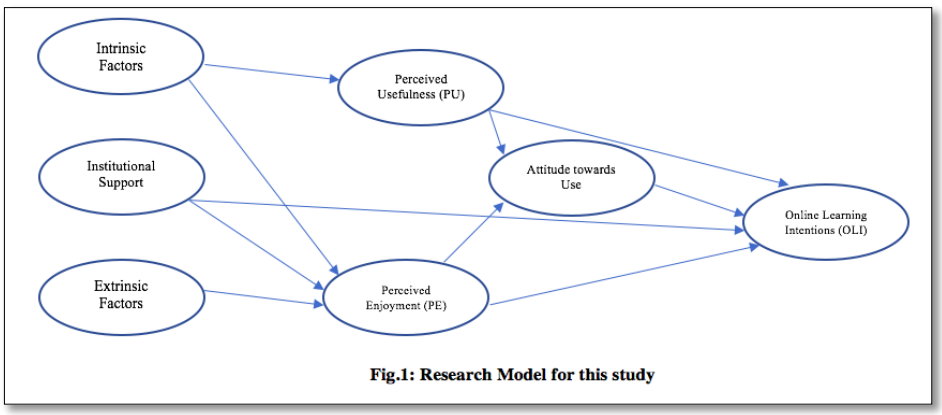

Fig.1: Research Model for this study

5. Methodology

The population for the present study was the learners pursuing higher education in the State of Punjab. Multistage sampling technique was used to select the appropriate sample for the study. In the first stage, all universities of Punjab as per University Grants Commission (UGC) website were referred to and in the second stage, universities that are ranked under National Institute Ranking Framework (NIRF) were selected for drawing the sample. In the third stage, within the selected universities, the respondents were chosen from different academic fields like Management, Commerce, Humanities, Science and Engineering. The sample consisted of 200 Under Graduate and Post Graduate students. These students were sent a WhatsApp message with a link to a Google form. Data was collected using a structured questionnaire which was designed with the help of literature survey. The respondents were then asked to answer questions pertaining to the variables like Extrinsic Factors which included ICT infrastructure support and resources, Institutional Support (IS), Intrinsic Factors that included Perceived Ease of Use, Self-Efficacy, Perceived Enjoyment, Perceived Usefulness, Attitude towards Online Education, and Intention to Use Online Learning.

5.1 Respondents' profile

In this study, males (56.5%) out-numbered females (43.5%) which mirrors the gender ratio in universities of Punjab. It included 87% of Post Graduate students whilst the Under Graduate students were only 13%.

5.2 Measures

Before the scale was finalized it was pretested. "Expert" pretest was done with the help of ten academicians having exhaustive knowledge of the subject area. The pretests showed that some statements were seen as confusing or repetitive with other mentioned statements with context to online education and hence these items were not included in the questionnaire. The scale was modified and feedback from the experts was taken again. This time, the experts were fine with the scale and did not suggest any item to be deleted or modified. After that, second pretest comprising 30 respondents similar to the research group was conducted. To check the reliability of the overall scale the Cronbach's Alpha was calculated and found to be .981 which is more than the minimum acceptable limit (Nunnally, 1994). This shows that the consistency between items is adequate and researchers can go ahead with the final data collection.

Table 1: Cronbach's alpha (Reliability)

Scale	Cronbach's Alpha
Extrinsic Factors	.759
Institutional Support	.874
Intrinsic Factors	.925
Perceived Enjoyment	.927
Perceived Usefulness	.941
Attitude	.940
Intentions	.954

To examine construct validity of scale adopted in this study, factor analysis was performed. Principal factor analysis with varimax rotation was conducted to assess the underlying structure. Table 2 display the items and factor loadings for the rotated factors, with loadings less than 0.5 not considered to improve clarity. The total variance explained was 70.21%. After rotation, the first factor accounted for 15.46% of the variance, the second factor accounted for 11.40%, the third factor accounted for 10.97%, the fourth factor accounted for 10.05%, the fifth factor accounted for 9.05%, the sixth factor accounted for 8.34% and seventh factor accounted for 4.94% of the total variance.

Scale Item	1	2	3	4	5	6	7
IF6			.666				
IF2			.635				
IF5			.564				
IF4			.556				
IF9			.541				
IF3			.519				
PE2				.776			
PE1				.729			
PE3				.716			
PE4				.696			
PE5				.673			
PE7				.653			
PE6				.596			
PU5					.807		
PU6					.770		
PU1					.761		
PU3					.740		
PU4					.731		
PU2					.665		
ATT1						.786	
ATT2						.779	
ATT4						.774	
ATT3						.730	
ATT5						.688	
ATT7						.621	
ATT6						.606	
OLI5							.862
OLI6							.851
OLI2							.822
OLI3							.817
OLI1							.812
OLI4							.799
OLI7							.768

Table 2: Factor Loadings

Scale Item	1	2	3	4	5	6	7
EF7	.824						
EF6	.800						
EF3	.740						
EF4	.709						
EF5	.696						
EF2	.693						
EF8	.682						
EF1	.533						
IS1		.713					
IS3		.696					
IS2		.694					

5.3 Hypothesis Testing & Results

The research model shown in Figure 1 was tested using Statistical Package for the Social Sciences (SPSS) software. Separate liner regression analysis was applied to test the hypotheses. Table 3 summarizes the results of hypotheses testing.

Table 3: Result of Regression

Hypothesis	Beta	*t* value	Significance	Comment
H_1: There is a significant relationship between intrinsic factors and Perceived Enjoyment (PE).	.947	19.9	.000	Accepted
H_2: There is a significant relationship between extrinsic factors and Perceived Enjoyment (PE).	.984	11.75	.000	Accepted
H_3: There is a significant relationship between Institutional Support (IS) and Perceived Enjoyment (PE).	.699	13.40	.000	Accepted
H_4: There is a significant relationship between Institutional Support (IS) and online learning intentions (OLI).	.716	11.16	.000	Accepted
H_5: There is a significant relationship between Perceived Enjoyment (PE) and online learning intentions (OLI).	.993	25.74	.000	Accepted
H_6: There is a significant relationship between intrinsic factors and perceived usefulness (PU).	.935	19.05	.000	Accepted
H_7: There is a significant relationship between perceived usefulness (PU) and online learning intentions (OLI).	.977	24.4	.000	Accepted
H_8: There is a significant relationship between Perceived Enjoyment (PE) and attitude towards the use of technology.	.850	25.92	.000	Accepted
H_9: There is a significant relationship between Perceived Usefulness (PU) and attitude towards the use of technology.	.865	28.29	.000	Accepted
H_{10}: There is a significant relation between attitudes towards use of technology and online learning intentions.	1.013	25.27	.000	Accepted

6. Discussion on Results

The current study results present a very useful insight to understand the intentions of the students to adopt the online education in future. The results indicated that there is significant relationship between perceived enjoyment in online education, institutional support provided and online learning intentions. The findings corroborated Lee's (2010) findings, which revealed that students' opinions of the institute's assistance and the quality of the course influenced their intentions to learn online. The institute's support for students in the form of instructor support, class interactions, and class activities had a substantial impact on students' decisions to pursue online education in the future or not. It was discovered in this study that there is a substantial association between institutional support and perceived enjoyment (a measure of student satisfaction), and this conclusion backed up prior research by Lee *et al*. (2011) and Yukelturk and Yildirim (2008). Also, perceived enjoyment had a positive relationship with the online learning intentions. It is very clear from the results that higher the students' enjoyment and satisfaction with their learning, higher are the chances that they will study online in future.

The perceived enjoyment had a positive relationship with the attitude towards use and online learning intentions and further perceived enjoyment positively affected by extrinsic factors as per the results of this study. So, extrinsic factors (availability of devise, internet access, speed and ICT infrastructure support) has indirect effect on online learning intentions. This result supported the fact that online learning can be enjoyed only with the availability and access of good internet speed and timely support provided to students to solve their ICT related issues.

Literature very clearly supported that perceived usefulness has a positive impact on attitude towards use and students' intentions to study online; Amoako-Gyampah (2007); Huang *et al*. (2020), and same has been supported in this study as well. Also, majority of the studies (Balog and Pribeanu 2010; Khalid 2014) done in the past found that perceived ease of use and self-efficacy have positive impact on perceived enjoyment and the same has been found in this study. The results are not surprising, given the majority of students stated that they are very confident in their ability to use online education and that they have the requisite skills. Students also remarked that learning new abilities through online education is simple. Students' goals are significantly influenced by their perceived enjoyment. This result supports the findings of previous studies by Balog and Pribeanu (2010); Khalid (2014). Lastly, in this study, attitude towards use has a positive impact on students' online learning intention which is consistent with the outcomes of previous studies by (Davis 1989; Davis *et al*. 1989; Sheppard *et a*l. 1988; Venkatesh and Davis 2000; Venkatesh *et al*. 2000). The extrinsic factors had positively affected perceived enjoyment and further perceived enjoyment had a positive effect on students' online learning intentions. So, as a contribution to ICT Infrastructure support area, this study highlights the new variables related to extrinsic motivation which includes availability of devise, internet access and speed and ICT infrastructure which positively influenced the students online learning intentions indirectly. With this added contribution which was not found in other studies, the results might give more comprehensive view of already existing research models.

7. Conclusion, Limitations and Implications

Online education is at the early stage in India. Internet penetration and speed, instructional design, institutional support are the important factors which will influence the students learning intentions in future. To support the teachers and students' online learning and teaching, training course can be developed along with effective and user-friendly learning platforms. The students and teachers might have difficulty in switching the learning and teaching mode and hence in future to equip them well, the proper training is recommended.

The current pandemic is an opportunity for the educational institutes to review and build up their online learning and training capacity. The growth in educational sector in India is inevitable in future. So, it is really very critical for the educational institutes and the government to be ready and prepare themselves to handle any uncertainties in future. With the penetration of internet and availability of smart devices, the potential of online education in India is enormous and current pandemic may be the turning point of India's digital transformation of education system by inculcating online learning mode in the system. But this requires improvement in every aspect which influence the students' intentions to learn online like curriculum design, infrastructure, support to students and teachers training.

Inculcating the online education will require a careful analysis of cost and benefits. Cost of online education includes the cost of developing online learning platform, hiring of experts to train teachers to develop online content and using of platform effectively. Availability of digital learning platforms is already there and educational institutes can use these platforms as per their requirements. Some of the popular learning platforms are Canvas, Blackboard, Google Meet, My Class, Zoom, and Microsoft Teams. All these platforms have different functions to support online learning and it is up to the educational institutes to decide which platform they want to use to give best learning experience to the students. In terms of benefits, embedding the online learning in the system will prepare well to the students and educational institutes for any future crises. Also, online learning will make the students independent learners for the upcoming digital world. Flexibility in online learning is much more than traditional learning and if explored well, it can grow more than traditional learning in future. Online learning also provides the opportunity to work along with their studies. With online learning students can see the recorded content later on to review the content. If educational institutes feel that benefits

are more than cost after doing the cost benefit analysis, then the current pandemic could be a turning point in re-structuring the teaching and learning.

One of the limitation of this study is that it is only focused on Universities students. So, results of this study could not be generalized to the entire education system as school students may have different capabilities and perceptions towards online learning. As neither students nor teachers were trained to study and teach online as pandemic was very sudden, so result of this study may differ from the previous studies done so far. As the sample was taken from the state of Punjab, only so the results cannot be generalized to the whole of India as students from different regions/states have their specific issues with respect to internet penetration, infrastructure and institutional support.

In future, comparative studies could be conducted between the local and international educational institutes to understand whether there is any difference in students' intentions to online learning. Comparative studies could be conducted between school and universities students to understand the difference between their intentions to learn online. Cross-cultural studies could also be conducted to understand the influence of culture on learning styles and online learning intentions.

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