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**Investigating E-Readiness and Factor Affecting the Acceptance of  
Digital Learning Among the Students of Kathmandu Valley: An  
Application of Technology Acceptance Model**

by

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The undersigned certify that they have read, and recommended to the Institute of Engineering for acceptance, a thesis entitled "**Investigating E-Readiness and Factor Affecting the Acceptance of Digital Learning Among the Students of Kathmandu Valley: An Application of Technology Acceptance Model**" submitted by Shankar Bhattarai in partial fulfillment of the requirements for the degree of Master of Science in Engineering in Technology and Innovation Management.

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## **ABSTRACT**

The application of digital technology has become the most essential tool which impacts human life in every aspect. Also, in education it provides a platform to support teaching-learning activities since numerous studies have indicated that use of technology can improve educational performance. The motivation for this research was to investigate the current state of practices of using digital learning tools and also to determine the factors affecting acceptance of digital learning tools among the students studying at different levels in Kathmandu valley (includes 3 districts: Kathmandu, Lalitpur, and Bhaktapur), Nepal.

The research was conducted with the response of 384 students studying at different levels in Kathmandu Valley with the research instrument as a quantitative approach of questionnaire survey. The result of the data analysis revealed that almost all (97%) of the students had at least a digital device (desktop computer, laptop or smartphone) that be used for digital learning purpose and were connected to the internet through different medium. Most of the educational institutions are sufficiently ready with 62% of equipped with digital tools, 85% having their own websites and more than 59% had ICT curriculum and proper ICT lab. Also, 45% of them suggest requirement of enhance computer skill among teachers. Stability and reliability of internet access and frequent power cut of electricity found to be major challenge while implementing digital learning as suggested by more than 70% respondent.

However, Technology Acceptance Model (TAM) was used to examined the factors affecting how students come to accept and use technology. Different statistical analyses were performed to investigate the significance of considered factors that may impact the digital learning practices among students. The result revealed that social influence, accessibility, computer self-efficacy, infrastructure, and enjoyment have a significant positive affect on perceived ease of use of the digital learning system. Furthermore, social influence, accessibility, computer self-efficacy, infrastructure, and enjoyment were also found to have a positive impact on the perceived usefulness of the digital learning system. The study support that using digital tools in education makes academic activities more interesting, easy to access, creative, effective, and productive. And, the concerned authority should be focused to establish the appropriate ICT infrastructure and promote the use of ICT in teaching-learning activities.

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## **LIST OF ABBREVIATIONS**

ACS	Accessibility
ATT	Attitude
AU	Actual Use
AVE	Average Variance Extracted
BI	Behavioral Intention
CAN	Computer Association of Nepal
CBT	Computer Based Training
CD	Compact Disc
CR	Composite Reliability
CSE	Computer Self-Efficacy
DVD	Digital Versatile Disc
ENJ	Enjoyment
FM	Frequency Modulation
HTTM	Heterotrait - Monotrait Ratio
IBM	International Business Machine
ICT	Information and Communication Technology
IDI	ICT Development Index
INF	Infrastructure
ISP	Internet Service Provider

IT	Information Technology
ITT	Initial Teachers Training
ITU	International Telecommunication Union
KUSOED	Kathmandu University School of Education
LMS	Learning Management System
MoCIT	Ministry of Communication and Information Technology
MoE	Ministry of Education
MoIC	Ministry of Information and Communication
MOOC	Massive Open Online Course
MoST	Ministry of Science and Technology
NAST	National Academy of Science and Technology
NCED	National Centre for Educational Development
NOU	Nepal Open University
NTA	Nepal Telecommunications Authority
ODL	Open and Distance Learning
OLE	Online Learning Exchange
PEOU	Perceived Ease of Use
PLS	Partial Least Square
PU	Perceived Usefulness
RONAST	Royal Nepal Academy of Science and Technology

SAARC	South Asian Association for Regional Cooperation
SEE	Secondary Education Examination
SEM	Structured Equation Model
SD	Standard Deviation
SOI	Social Influence
SPSS	Statistical Package for the Social Sciences
SSDP	School Sector Development Plan
TAM	Technology Acceptance Model
T.V.	Television
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VLE	Virtual Learning Environment

## CHAPTER ONE: INTRODUCTION

### 1.1 Background

Digital advancements have penetrated every aspect of human lives. Information and Communication Technology (ICT) has become an integral part that has changed people's lives and their daily habits, according to the current global scenario using these devices for educational purposes has become an important tool and has brought major changes to conventional teaching methods. During this time its usage has grown enormously (Uerz, et al., 2018). Having proper devices, the student can have access to the information what they required from anywhere and anytime they want and also, they can communicate with the resource person. They can become digitally proficient only when they receive sufficient opportunities to use technology and to learn and enhance their digital skills in their education. Schools around the world are not utilizing computers or ICT, as a substitution for day to day regulatory work, but have managed to integrate it into core classroom teaching thus bringing in a paradigm shift on traditional teaching-learning procedures.

The Ministry of Education Nepal had prepared the strategies introducing “ICT in Education Master Plan 2013–2017” where the need of technology in education had figured out, accordingly they applied efforts in promoting digital literacies and the use of technologies in education in Nepal (MoE, 2013) . Also, the government of Nepal developed a formal ICT policy in 2015 which also includes the steps to integrate technology into education within the entire Nepalese educational system by enhancing its accessibility (National ICT Policy, 2015). The later school sector development plan (SSDP) introduced in 2016 and targeted to complete by 2023 where ICT was included as essential tools to improve the accessibility of educational resources and planned to maximize the performance of teaching-learning (MoE, 2016). However, one must understand the fact that the current presence of technology does not satisfy and ensure the successful integration of ICT. Research in different developing countries including Nepal has revealed that technology integration in institutions, infrastructure could not satisfy the requirement (Hitesh, 2019).

If educational activities get encouraged with innovations, advancement can be observed with the positive affects like improvement in learning, accessibility, productive and cost

beneficence of education. Because of these benefits, the integration of ICT in education has raised the importance.

## **1.2 Problem statement**

The importance of digitization on education is still underlying in our Nepalese education System. It is not only changing the way teaching and learning activities but it also builds the skill set to be competitive in the current and future technological age. Now the generation student is seeking the quality education from anywhere they are and at any time they wish which doesn't make a difference in any part of the county they are living; they can join the course and begin learning. As well, because a positive overtone is associated with digital technologies, as they are considered to have potential to transform educational practices, there is a growing trend to make technologies a part of educational activities.

Analyzing the existing technology implementation used by students and different academic institutions, identifying the factors affecting on the adoption of technology in education among the students in Kathmandu Valley. At present context, in Nepalese education need to carryout customization on education system using Information Communication Technology (ICT). At the same time, it is also essential to assess the preparedness of the educational system and its infrastructure to integrate the use of information technology.

## **1.3 Objectives**

### **1.3.1 Main objective**

The main objective of this research is to investigate the students' perceptions towards use of technology and identify the factors that affects the technology acceptance among the students using Technology Acceptance Model in Kathmandu Valley, Nepal.

### **1.3.2 Specific objectives**

- To assess the current readiness to implement the ICT tools in educational activities among the students in Kathmandu, Valley.
- To assess the current readiness of ICT integration for teaching learning activities among educational institutions in Kathmandu, Valley.

- To Investigate the challenges faced while implementing ICT tools teaching and learning activities in Kathmandu, Valley.

#### **1.4 Limitation**

Since the survey carried out through quantitative method in order to gather data from the selected study population which is one of markable limitation of this study. Conducting final survey without pre pilot study led research to unexpected error in some point. And next limitation of this research is employing purposive sampling limits the participation of students who are away from researchers' focus which lack the sample to be highly representative. Moreover, the focuses were only on the students in one city region who knows about internet. Students' status and perception who were not participated might be different from targeted students.

## **CHAPTER TWO: LITERATURE REVIEW**

This section starts by reviewing the various national and international reports, journal papers, articles related to the study. The study finds out the history on development of ICT, use of ICT use in education, current state of an ICT development, framework, policies, theories, and hence TAM model is considered to be a workable and powerful model which is used widely. Therefore, it is acceptable in broad context to identify the factor influencing the acceptance of technology in learning with its most used construct variables.

### **2.1 Digital Transformation**

The changes which the digital technology like social media, smart devices, internet, or multimedia tools makes advantages in all human activities is termed to be a digital transformation (Stolterman and Fors, 2004). Digitization in education is educational method implemented based on the rapid use of electronic technology like computer, cell device and other categories of digital web-technology (Sangrà et al., 2012). It is supposed to improve the teaching-learning process by uniting the students and teachers with a greater scope of gravating information in a proficient manner utilizing ICT devices.

Nepal has thus shown its importance with extraordinary achievement in computerized selection compared with its neighbors, with portable entrant surpassing 100% and web-based Internet infiltration arriving at 63%. The report shown by the Nepal telecommunications authority (NTA), has an expansion of 2.25 million new Internet with new entrant in 2017, with growth of about 250 new Internet users consistently. Thus, Nepal is required to lead Internet infiltration by 2025 in contrast with significant economies, for example, China and India, given its development pattern throughout the following barely any years. The developing prevalence of web-based social networking is a critical driver for Internet reception in Nepal, coming next just to Bhutan in South Asia in web-based life entrance. As at January 2018, Nepal has about 9.3 million Facebook clients. Amusement and video sharing are other famous use cases with more than 6.4 million enlisted clients on YouTube (Joshi, 2017).

The Digital Nepal program is intended to empower Nepal to outfit its development potential by utilizing disruptive innovations and driving financial development. The program is relied upon to deliver an impact of up to NPR 800 billion by 2022. Digital Nepal framework includes eight sectors, they are: energy, agriculture, education, health, tourism, digital foundation, urban infrastructure, and finance (MoCIT,2019).

## **2.2 Information and Communication Technology**

Information and Communication Technologies (ICTs) is a very wide term for Information Technology (IT), which is considered to all communication technologies which significant role in exchange of data and information, including the computers, hardware, internet, wireless-networks, mobile devices, software, social networking, video-conferencing, and other web based applications and services facilitating to every single client to access, extract, store, share, compute and gather information in a digital form.

ICT devices are the union of media innovation, for example, multimedia devices, computer and phone systems, by which it is possible to communicate, exchange the information and data.

Now a day's smartphones (mobile devices) are not simply are communication devices, but they have become a catalyst for the new social group that are being created (Ally and Prieto-Blázquez, 2014). These devices not only allow us to speak with others over distances, but put the world's knowledge at our fingertips through the Internet, store our data and allow us to manage our lives and our work. Indeed, they let us complete our work in many cases, with applications that allow us to word process, send emails, transfer files, produce web sites and input data into spreadsheets (La Polla et al., 2013).

## **2.3 Digital learning**

Digital learning material was widely available on the internet, so students can have versatility in learning with the optional subject they want, and the learner-centered learning approach provides students with the opportunity for self-paced learning (Ashraf et al., 2016). After viewing the technique of both learning strategy, Digital learning has no any limitation of gathering information compared to the conventional learning limited accessing the information for the students. Thus, it can be seen that many of the schools and universities are implementing its the educational system and

implementing digital learning approach from conventional learning approach that are also helping for distance learning (Yanuschik et al.,2015). Advancement in technology is more helpful for creating educational material including text, images, audio and video that are helping educator for creating good learning environment improving communication and interacting with students. So, digital learning tools has been using more adequately for educational activities (Ashraf et al., 2016).

E-learning systems is considered to be the web-based technological systems which circulates each individual with access to education by the utilization of the Internet (Islam, 2013). Thus, the e-learning systems is inclusive of any systems that deliver educational information and resources to learners utilizing the electronics medium and devices.

With the establishment of information and communication technologies, the field of education got a rise to accept the new method in educational technology like e-learning systems, learning management system (LMS), virtual learning environments (VLE), and computer-based training systems (CBT). E-learning has therefore become a facilitator for information and knowledge sharing. E-learning is dependent on internet technologies, computers, web technologies, social networks and new instructional technologies (McGreal and Anderson, 2007). E-learning modes of delivery are also categorized as synchronous and / or asynchronous (Clark and Mayer, 2003) such as internet technologies, interactive multimedia, educational games/simulations and social networks. Sometimes the use of instructor-led group work combines both synchronous and asynchronous learning events. Driscoll (2002 ) noted that the e-learning framework includes teaching tools, instructional design methods and methodologies. Hence it too includes the use of social networks to support the social dynamics of culture, relationships and learning (McGreal and Anderson, 2007).

#### **2.4 Learning management systems (LMS)**

LMS is a web-based technological learning system which is introduced for multiple features, allowing educators to plan course content and learning activities and learners to fulfil learning assignments (Chaubey and Bhattacharya, 2015). The definition thus elaborates that LMS is a type of e-learning system and hence managing the delivery of e-learning courses. User registration, announcements, email, forums, assignment

submission, quizzes, course materials, and calendars are the various tools of LMS. (Kabassi et al., 2016). Blackboard, Moodle, and Sakai are also an LMS. LMS is broadly used in North America, compared to the similar system term VLE is widely used in Europe and Asia (Martindale and Dowdy, 2010).

CBT is a software package that is implemented for delivering training courses via computers which involves interactions between trainees and personal or networked computers for accessing training programs (Gorecky et al., 2017). Accordingly, CBT is considered as an intuitive instructive procedure with less association from teachers. CBT is more often used by companies and organizations compared to LMS and VLE to provide training courses for their employees than in schools or universities (Machado and Tao, 2007). In Nepal, Open University has implemented e-learning platform with the help of Moodle LMS. Now, different other universities are also integrating LMS.

## **2.5 Massive open online course (MOOC)**

The initial implementation of MOOCs in the year 2007/2008 has made a constant progress in providing learning opportunities and enhancing learning experiences (Gaebel, 2013). MOOC refers to the simplified form of open and distance education which is characterized by open technology (Kennedy, 2014). Open too mean that it is training free openly available resources with the exception of learner who might require certification and skill development (Gaebel, 2013) and hence MOOCs is also the representative of their massive nature which involves large number of students making it widely access to anyone with real-time or offline to the course (Kennedy, 2014). Participation is therefore available to all students who are enrolled inside the hosting institution as well as global community students. Because participation is without credits to the course, students can often receive a recommendation from the lecturers. Gaebel (2013) described the motivation of universities to implement MOOCs due to different reason such as to providing education in cost efficient manner, to easy resource sharing and to improve the classical methodology. Universities can reach globally with the facility of MOOCs providing the enrollment opportunities from every nook and corner of the world.

Few Universities of Nepal (Kathmandu University, Tribhuvan University and Nepal Open University) are facilitating the students easy enrollment available over the internet

with online courses and thus MOOCs can be a way for Nepal to participate and contribute to the world education movement, through courses that consider the necessity of Nepalese learners which are informed by an understanding of Nepalese culture. The survey carried out during the study indicated that 30.57% (535) of students were found to be known of MOOCs. Out of 1,750 participants 1,232 (70.4%) of them were interested in participating in a MOOC. The course designed by Kathmandu University was the first introduced MOOC system in Nepal (Shakya and Shrestha, 2018).

## **2.6 History of ICT development in Nepal**

History of ICT in Nepal can be dated back to 1913 of with the start of telecommunication service in Nepal. Telephone lines were installed for the first time and open wire trunk service was established between Kathmandu and Raxaul a year later. In 1951, Radio Nepal started its broadcasting using the short-wave technology (Karki, 2019). The Radio Act was introduced in 1957 A.D. Government started using FACIT electronic calculators for the first time in 1962. Computers first introduced in Nepal and were used in processing the census data in the 1960. After a decade in 1971, IBM 1401 a second-generation computer was introduced by the government to process census data. National Computer center was officially started in 1974. The first foreign direct investment in software development was made in 1982 with a company called Data Services International (Shakya, 2007). State owned Nepal Television started broadcasting in 1985. After 1990, rapid increased in the number of private IT companies in Nepal. National communication policy was drafted in 1992 and also Computer Association of Nepal was also formally established on same year. In Nepal Internet was first introduced in 1993 with the venture of RONAST (now NAST) and Mercantile (Karki,2019). In 1994, Institute of Engineering launched computer engineering course first time in Nepal. The Internet facilities for public in 1995 when Mercantile Communications started with dial-up internet service. In 1997, the telecommunications regulation was initiated with the formation of Nepal Telecom Authority. The first step in officially promulgating ICT policy in 1997 when the Ministry of Science and Technology (MoST) applied for a grant policy formulation and ICIMOD was awarded to lead. Cellular telephone service was launched by Nepal Telecommunication Corporation in 1999 (Shakya, 2007).

## **2.7 State of Education System in Nepal**

Nepal's formal education program is composed of eight years of basic education (class 1-8), four years of secondary education (class 9-12), and three to seven years of higher education (Bachelor, Masters, and M.Phil.). Furthermore, there is next course offering technical education of 1.5 years to 3 years (TSLC and Diploma). With evolving learning technology in Nepal, the learning environment is changing with a new approach, i.e. online learning, which is a form of distance learning, and e-learning supports distance learning because it is the wider definition of electronic materials learning. These days, with technological adaptation, it has assisted in providing the educational sector via the Internet (Pangeni, 2016). Students use the internet to access learning materials. The Ministry of Education has also introduced school-level distance education programs. Nevertheless, services are not entirely online because some of the services concentrate on radio tutoring for a common intent, such as training guides for SLC (now SEE) examination, using the digital medium. Those tutorials are provided through T.V., FM radios, and newspapers (Laudari,2019).

In the past, the Nepalese teaching medium had no other options than to use chalk, duster, blackboard and textbook as teaching materials. These days they are able to use all possible teaching materials including audio, video, animated and digital devices, software apps, internet and web tools, tablet, electronic pen, and much more. However, very few education institutions have built infrastructure and ready to offer the facilities (Pangeni, 2016).

## **2.8 ICT in the curriculum of Nepal**

The need for ICT in education has been realized and as a result, some policies, plan and framework have been formulated and some activities related to ICT have been carried out. ICT use and computer education in school courses have been offered. For example, National Centre for Educational Development (NCED) has been providing training to the teacher through national radio and FM, computer science subject has been taught as an optional subject in school (grades 9 to 12), computer engineering/computer Science/ ICT programme in Bachelor's and Master's levels are run by different colleges under various universities; various Training Institutes conduct technical education and vocational training courses in computer and ICT.

Dhakal and Pant (2015) noted that ICT in education courses at the universities in Nepal are oriented to computer programmes rather than focused to develop competitive ICT skills required in market. Smith (2009) stated that, although Schools of Education in the institutions are responsible for improving the quality of initial teacher training (ITT) and equipping prospective teachers with appropriate practice, teacher education programme in Nepal do not sufficiently cover ICT education and overall seem to be fragile.

## **2.9 Adoption of digital learning practices in Nepal**

Department of Education and other some National/ International organizations has been funding to public schools which includes computer distribution, laptop and computer accessories distribution for schools. Also, they assist in expanding education suitable to the modern world by utilizing computer literacy at all levels of education; and teach the subjects related to ICT in the schools (NPC, 2002 PC education is extra subject in secondary level (class 6 to 10) comprising essential idea of PC. Open Learning Exchange Nepal (OLE-Nepal) is an association working to upgrade quality and access through the joining of innovation in study hall. It has appropriated PCs to 225 government funded school understudies of 34 areas. It has two types of content e-paath and e-pustakalaya, and working towards teacher training, technology and network infrastructure (OLE Nepal, 2020). Furthermore, it has developed several ICT based documentaries for the support of class 1 to 8 students on the basis of school curriculum. Distance Education and Open Learning Division under NCED has been building up some arithmetic, science and English educational plan related various media narratives since not many years and broadcasting by Radio Nepal and broadcasting by Nepal Television for the help of children and instructors of school level. Furthermore, UNESO and other some organizations in Nepal have been organizing some ICT based activities in different parts of the country (Karki, 2019). Indeed, even non-government schools have been overseeing ICT related exercises and financing themselves for vital instruments.

As E-learning materials base of schools grew up, there is being set up condition for blend of partition guidance through electronic advancement. Likewise drawing nearer to this rising innovation of E-learning in Nepal, a portion of the school, universities or colleges offering adaptable learning on discretionary courses and empowering access

to the course assets (Shankya et al., 2017). In 2011 July/August Kathmandu University School of Education (KUSOED) reported affirmation offer to 1-year and 2-year ace projects with specialization in Educational Management. It was the initial advanced education program offered through web-based learning mode in Nepal. Despite the fact that, there were different acts of open separation learning (ODL) in Nepal, the credit of starting online mode ODL goes to KUSOED. As an able individual for dealing with understudy backing and e-learning plan, the creator consistently centered around understudy benevolent web-based learning framework configuration to encourage the confirmation procedure, learning exercises, communication and end-semester examination (Pangeni, 2016). Now most of the higher education institutions along with Kathmandu University and Tribhuvan University have developed the system and culture for online education and implemented ICT based learning rapidly growing.

Nepal Open University has set up in 21st century fast and front-line innovation improvement and advancement in instruction, so the college must begin with settled present day data correspondence innovation framework with the act of open and separation training framework. Understudies when they are in the entrance of web must have choices to take an interest in virtual coordinated classes, live cooperation with the instructors and partners who are in learning groups and teachers must have opportunity to utilize various academic ways to deal with suit the assorted students (NOU,2016).

### **2.10 ICT framework and policies in Nepal**

IT strategy 2000 right off the bat present data innovation in Nepal. It was reconsidered in 2010. Arrangement of that was extension of access of Internet to all schools, coordination and joint effort with national and global organizations to create talented HR for persistent, significant and quality instruction and detailing and usage of unique IT program concentrating on understudies, instructors and schools so as to capable HR (MoIC,2010). Some administration schools for the arrangement of PC buying and a few NGOs/INGOs gave 10 PCs in certain schools of remote places. Also School Sector Reform Plan (SSRP) 2009-2015 was actualized and extends ICT related educating/learning systems in all schools and to create ICT foundations in schools (MoE, 2009) and during usage of that approach Department of Education (DOE) provided 140,000/- amount for secondary schools for the purpose of purchasing 3 computers and one printer additionally some non-governmental bodies had also

provided computers in schools. Three Year Plan 2011-2013 concentrated on consolidation of utilizing ICT in school instruction to build gets to quality training in provincial territories, to diminished advanced gap, and combination of ICT in all part of training (NPC, 2011). ICT in Education Master Plan 2013-2017 was the principal separate strategy identified with ICT in school instruction expected to extend evenhanded access to training, enhance the quality of education, lessen the advanced partition and improve the National ICT Policy 2015 has created by Ministry of Information and Communication and that strategy concentrated on mix and sending of ICT in instruction framework, e-learning framework, ICT based instructor preparing, joining of PC expertise into educating and learning procedure, and improvement, arrangement and use of electronic based separation instruction, preparing and training framework (MoIC, 2015). School Sector Development Plan (SSDP) 2016-2023 resembles as expanded type of SSRP has as of late created by MoE and ICT related issues has additionally remembered for it. The arrangement has been centered around (1) the suitable utilization of ICT to improve instructive practices (2) improvement of instructional materials, HR and joining of innovation in educational plan and (3) the use of ICT for the improvement and increased adequacy and effectiveness of in general instructive administration and the board (MoE, 2016).

The ICT in Education Master Plan, 2013-2017 in Nepal has distinguished the significant foundations, for example, accessibility of the web, gifted workforce, content turn of events and framework upgrade, that it considers as principal segments to be thought of while making strategy on ICT in instruction (MoE, 2013). Besides, ICT Policy, 2015 expressly expresses that the Government of Nepal expects to make an open and private association to give ICT foundation in government schools (MoIC, 2015). Pangeni (2016) battled that the fast development of web office in Nepal has furnished the current age of students with choices of doing unfamiliar college courses from Nepal and getting to the gigantic online open courses of a few neighborhood and worldwide preparing foundations from their home.

### **2.11 Current state of Nepal in ICT**

Nepal's ICT development index (IDI) ranking is 139th out of 175 member states. It improved by one position in 2017 than in previous study which was conducted by international telecommunication union (ITU). That report presented country status

using the new and emerging technology. According to that report, Nepal has ranked low and also failed to make any progress compared to the previous year. In terms of ICT access, Nepal ranked 143<sup>rd</sup> in 2016 from 144<sup>th</sup> in 2015. In a singular global standing, Nepal has failed miserably to take position, ranking 142<sup>nd</sup> out of 175 countries. In Asia Pacific region, Nepal ranked 28<sup>th</sup> out of 34 countries. SAARC countries, Nepal ranks 5<sup>th</sup> position. The remaining positions are occupied by Bangladesh, Pakistan and Afghanistan. For instance, our cellular telephone subscriptions per 100 inhabitants have grown significantly from 4.46 in 2006 to 123.3 in 2017 (ITU, 2017).

According to the NTA (2020), telephone subscription including fixed and mobile users per 100 people have reached to 129.34 and only mobile subscriber reached 126.7 per 100 people. Total 40 internet service provider (ISP) were serving to facilitate the internet connectivity to the above 1 million customers. Among which, almost 45 thousand customers are using wireless connection for Internet, 2 lakh 24 thousand using cable connection and 8 lakh 37 thousand using fiber connection. According to Census of 2011, in a family there are 4.88 members each (household size = 4.88) hence assuming 1 connection for a family, nearly 50 lakh population are taking facility of broadband internet from ISP. On the same report it was mentioned that 72.22% of total population are with broadband internet where 75% market share with mobile data. But according to Digital Nepal Framework, it claims 60% of population have connection to internet and 100% population have connected with mobile phone.

## **2.12 COVID-19 impact on education in Kathmandu Valley**

As the consequence of the lockdowns due to global COVID 19 pandemics, all the organizations along with educational institutions in Nepal have been temporarily closed starting from last week of march 2020 and after two months some of the institutions started online system to continue educational activities. UNESCO Nepal's report estimates that nearly nine million (8,796,624) students in Nepal are affected as a response to the pandemic due to the shutdown of educational institutions (UNESCO, 2020). Among all, institutions from Nepal, Kathmandu valley represents the major population. Because of the compulsory closure of on school educational activities during this period, the education system has changed dramatically, with the distinctive rise of e-learning whereby teaching and learning are undertaken remotely and on digital

platforms. However, there are many implementational challenges for smooth operation of e-learning system in Nepal. According to Pandit (2020), only 13% of schools could run online classes while 35 percent of schools have internet access. Most of the schools and colleges in Kathmandu valley had implemented online class using different video conferencing applications like zoom, Microsoft team, google meet etc. but Universities couldn't take action for long time with the dilemma either to take examination with alternative way or to run new session. Among all, Kathmandu University had implemented immediate online class and examination with alternative approach. Laboratory for ICT Research and Development (LITC) under Institute of Engineering, Tribhuvan University has conducted a survey with in its 5 constituent and 10 affiliated college where 6353 students participated, which revealed the fact that 59% of engineering students have access to internet, 42% of students want to study using online platform and only 15% of them had good internet connection mentioned on "report on feasibility of online teaching/learning process for IOE".

### **2.13 Technology-Acceptance Theories**

There are large number of theories and models which study the widespread use of technologies as well as how well they are received such as Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), Social Cognitive Theory (SCT), Diffusion of Innovation Theory (DOI), and Uniform Theory of Acceptance and Use of Technology (UTAUT) (Tarhini et al., 2016). For determining the user acceptance in Information System applications, the theoretical model TAM is found to be widely used.

#### **2.13.1 Technology Acceptance Model (TAM)**

Designed by Devis D. Fred in 1986, the Technology Acceptance Model(TAM) has a specialized use ,i.e., to predict the acceptability of an information system. This theory was inherently based on Theory of Reasoned Action (TRA) in order to investigate user acceptance for using specific system on their work platform. This theory concluded that perceived ease of use and perceived usefulness can be influenced by external factors which in retrospect impacts its significance towards use of technology. The behavioral intention towards the technology can be affected by the level of attitude and affinity the technology receives which would be ultimately significant in estimation of the actual

system usage. (Salloum , 2018). Perceived usefulness (PU) refers to the subjective likelihood of the prospective user that using a given application framework would improve the efficiency of the prospective user within a context. Perceived ease of use (PEOU) implies the extent to which the targeted user finds the system to be efficient. (Davis et al., 1986) . For foreseeing the acquiring of diverse technologies and innovation, TAM model has been extensively used but since its introduction has gone several alterations in its original design. Behavioral intention was added by Davis and Warshaw in 1989 based on the assumption that higher belief about its usability would prompt the greater intent in use of technology, in spite of their attitudes. The external parameters which significantly affected the users' belief were taken into consideration which ultimately devised our first modified TAM1 which expounded usage based on internal beliefs, attitudes and behavioral intentions of users' as shown in figure 2.1, below.

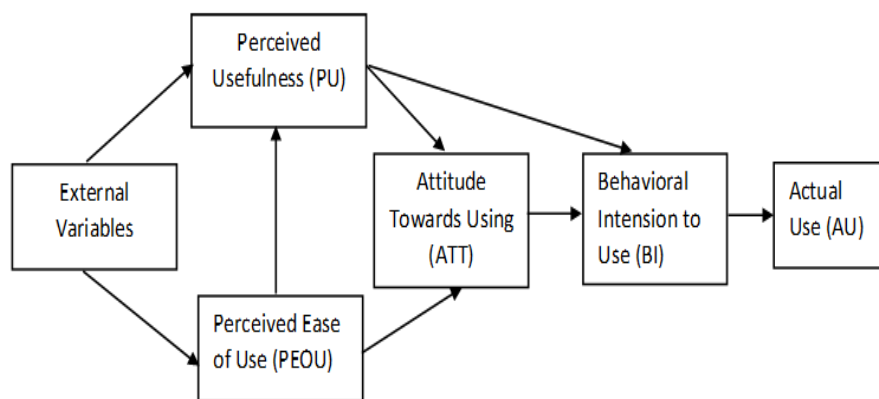


Figure 2.1 Technology Acceptance Model (TAM) (Davis et al.,1989)

### 2.13.2 Significant features of Technology Acceptance Model

The model presented in this research is based on TAM (Davis et al., 1989) and the published literature reviews are acquired only regarding the usability of technologies in educational sectors. The selection of TAM as our model is based on the following considerations:

- Popularity in information systems:** The TAM is TAM has been an eminent theory for deeper insights regarding the concepts of the use of the technologies and how readily the technology is being accepted by the prospect user (Aljeeran, 2016). TAM has been used to analyze the acceptability of the technology in various structures ( e.g. sex, literacy level, institutions) among wide range of

prospect users (e.g. students, bankers, teachers, other occupations and so on) with use of extensive range of technologies ( e.g. mobile phones and applications, Learning Management Systems (LMS), Computer Software , the internet and so on) (Al-Gahtani, 2008). Often the popularity of a theory is connected with the numbers of citations and its adoption in the further research studies. The number of citations for TAM by Davies (1989) has exceeded over 52,178 times and more than 27,163 times, his work has been adopted for further studies, according to the Google Scholar ( as of July 07, 2020). The validation of its veracity has been done by King and He (2006) when 88 published research papers were scrutinized and buttressed the resilient truth about its validation. Nabavi et al. (2016) reviewed 191 research papers to conclude that TAM is one of the most widely used model for the analysis of technology continuation behaviors after information system continuous model (Bhattacharjee, 2001). These well stated statistical analysis further lobbies the influential nature of the theory along with its affectability in information system field (Amin, 2016).

- **Popularity in e-learning systems:** The literature review provides the evidence of the popularity of the TAM when studying student acceptance and use of LMS. In addition, many studies (Al- Adwan, and Smedley, 2013; Tarhini et al., 2017) have achieved successful outcomes by using the TAM to understand student utilization of LMS. Furthermore, meta-analysis studies Baki et al. (2018) have revealed that the TAM is dominant and robust for understanding the acceptance and use of e-learning systems. For example, Baki et al. (2018) reviewed previous literature concerning technology acceptance and demonstrated that 203 papers used the TAM to assess e-learning systems. Šumak et al. (2011) found that 86% of their reviewed studies (42 papers) used the TAM and concluded that it is a good model for measuring the acceptance of e-learning. Abdullah and Ward (2016) conducted a quantitative meta-analysis of 107 studies of e-learning adoption and confirmed the popularity of the TAM. This popularity indicates the effectiveness of the TAM when examining student acceptance and uncovering factors that might influence their use of LMS.
- **Flexibility:** One of the significant features of TAM is its flexibility of adding more and more variables as per the requirements on original model along with

the examination of these external variables for contribution in use of the technology and its acceptance (Aljeeran, 2016). The objective of this research paper is to determine the degree to which the students are familiar to the digital tools, so flexibility of the TAM provides the researcher an additional attribute to integrate which can be telling factor for determining usability of digital tools for students.

### **2.13.3 External variables of the Technology Acceptance Model**

The TAM offers a conceptual basis for determining how the external factors or variables account for the interpretations provided by foregoing theories as mentioned by Yang et al., (2014).

According to Davies et al., (1989), the two key building blocks of TAM are perceived ease of use and perceived usefulness which are still influenced by the exterior attributes or variables associated with the technology involved. These variables had a significant impact on the intention of the individual to aim to conduct and the real use of the technology that was induced by the behavior which in turn improves the variation of the build of the system. Al-Busaidi and Al-Shihi (2010) added that these external variables differed from the technologies used and varied with the addition of new technologies and also was directly dependent on the users as well as the culture.

The significance of having a flexible TAM is specially a key when you want to determine the factors which can affect the two key idea of the theory i.e. perceived ease of use and perceived usefulness which in retrospect can provide the insight about the technologies that would be used and readiness as well as familiarization about the possibility of being accepted by the users.

Even though, original TAM is usually preferred because of its clear and concise illustrations of the output according to Almarashdeh and Alsmadi (2016) however the descriptive capacity of TAM exclusively depends on how well you can define the external variables which elucidate the outcome of TAM. According to Abdullah and Ward (2016), without properly definition of external factors, only total variance of 50% to 70% could be achieved and for better understanding of the relevant technology, the exterior attributes must be considered, thus giving having a better explanatory power about the technologies which was mentioned by Nikou and Economides (2017).

Reviewing the literature revealed that e-learning researchers have extended the TAM and examined the effect of various psychological, personal, demographic, and technical factors regarding perceived ease of use and perceived usefulness. Abdullah and Ward (2016) reviewed 107 e-learning studies and found that self-efficacy, subjective norm, enjoyment, computer anxiety, and experience are the most widely used external factors for the TAM regarding e-learning systems. Baki et al. (2018) reviewed 203 TAM studies of e-learning systems and identified 129 external factors and demonstrated that self-efficacy, social influence, accessibility, infrastructure, and enjoyment, are the variables most validated for use with the TAM.

#### **2.14 Structured Equation Model (SEM)**

Structural equation modelling (SEM) was conducted to assess the rationality of the hypotheses related to various relationships in the model. Model validation has been performed by numerous studies with the help of SEM or multiple regression and path analysis, both of which are incorporated into SEM (Davis et al., 1989; Venkatesh, 2000). Compared to multiple regression and path analysis, SEM is deemed to be more advantageous because it enables identification and assessment of other relationships recommended by the software package according to the evaluation of the existing data, aside from assessment of hypotheses (Hair et al., 2010). Furthermore, effects like moderation, mediation and interaction can be tested easily with SEM thus providing the complete detailed picture of analysis of model. It can be referred as a simple trial and error model, where all the models are tested until the best model can be concluded and has a tendency to suggest the strongest model whose acceptance is performed by the analysis of the philosophies based on quantified associations (Bryne, 2016). This rigorous trial and error leads to the most suitable and most grounded model to be acknowledged perfectly summing up the relationship of model's reliability and validity. Thus, SEM allows to simultaneously inspect up to 200 external parameters or variables giving us the convoluted relationship among the attributes and latent prediction variable pointers (Al-Gahtani et al., 2007).

#### **2.15 Previous studies regarding adoption of technology**

Luan and Teo (2009) explored the intention to use technology among the Malaysian student teachers using TAM which supported all the proposed hypotheses found that

perceived usefulness, perceived ease of use and attitude towards use of computer are significantly influenced intention to use technology. Elkaseh et al. (2016) conducted a study of Social Media for e-Learning in Libyan Higher Education in which Perceived Ease of Use and Perceived Usefulness of social networking media are considered as the key factors in measuring the students' and teachers' behavioral intention of accepting and using e-learning in Libyan higher education which results use of social networking media plays an important role in the adoption of e-learning in Libyan higher education. From the result of hypotheses, social networking media found to be significantly affected both the Perceived Ease of Use and Perceived Usefulness for both students and teachers.

According to Krishnan and Hussin (2017), a quantitative research approach comprising of 152 external factors were identified and assessed using 107 published articles in the duration of ten years was considered for carrying out a systematic review and analysis. The results of their study revealed that self-efficacy, enjoyment, subjective norm, computer anxiety, and experience were considered the most widely used external factors that extend the TAM. Although (Chu and Chen, 2016) achieved significant contribution to the existing of body literature, their study does not cover all the related studies in the context of the e-learning adoption. As a result, this study aims to analyze the studies that were already examined by (Bhattacharya et al. 2012) as well as other relevant studies that were collected based on the inclusion and exclusion criteria of this study. That study is more comprehensive and considers more external factors. It aims to develop a new model by extending the TAM with the most extensively external factors that achieved significant results in the previous literature. Nevertheless, this new model examines the e-learning acceptance and validates the proposed model using the partial least squares-structural equation modeling (PLS-SEM).

## **CHAPTER THREE: RESEARCH METHODOLOGY**

This chapter addresses the selection of analytical methods used to collect and evaluate data to test the model and hypotheses suggested. Detail methodology used in this research which includes research design, research strategy, research process, population and sampling, tool creation, data collection procedures, and data analysis technique is explained.

### **3.1 Research framework**

TAM was used widely to explain the acceptance of technology in the area of information processing, and became recognized as a valid guide for evaluating the human acceptance of technology.

A number of studies had introduced external variables into TAM and investigate whether they affect the core TAM constructs PU, PEOU, ATT, BI and AU and their correlations. Utilizing the original TAM as the core framework, this study proposes an extension of it by introducing five external variables within it. According to Davis et al. (1989), those variables can be regarded as external TAM variables which could impact perceived ease of use and perceived usefulness constructs of TAM core variable. Social Influence (SOI), Accessibility (ACS), Computer Self Efficacy (CSE), Infrastructure (INF) and Enjoyment (ENJ) are integrated into the original TAM as external variables that determine the students' perceptions towards the use of technology for learning. Hypotheses on each variable were developed and data were analyzed to confirm if hypotheses are supported or rejected about the relationships built between the variables in the proposed model. The proposed model is illustrated in Figure 3.1.

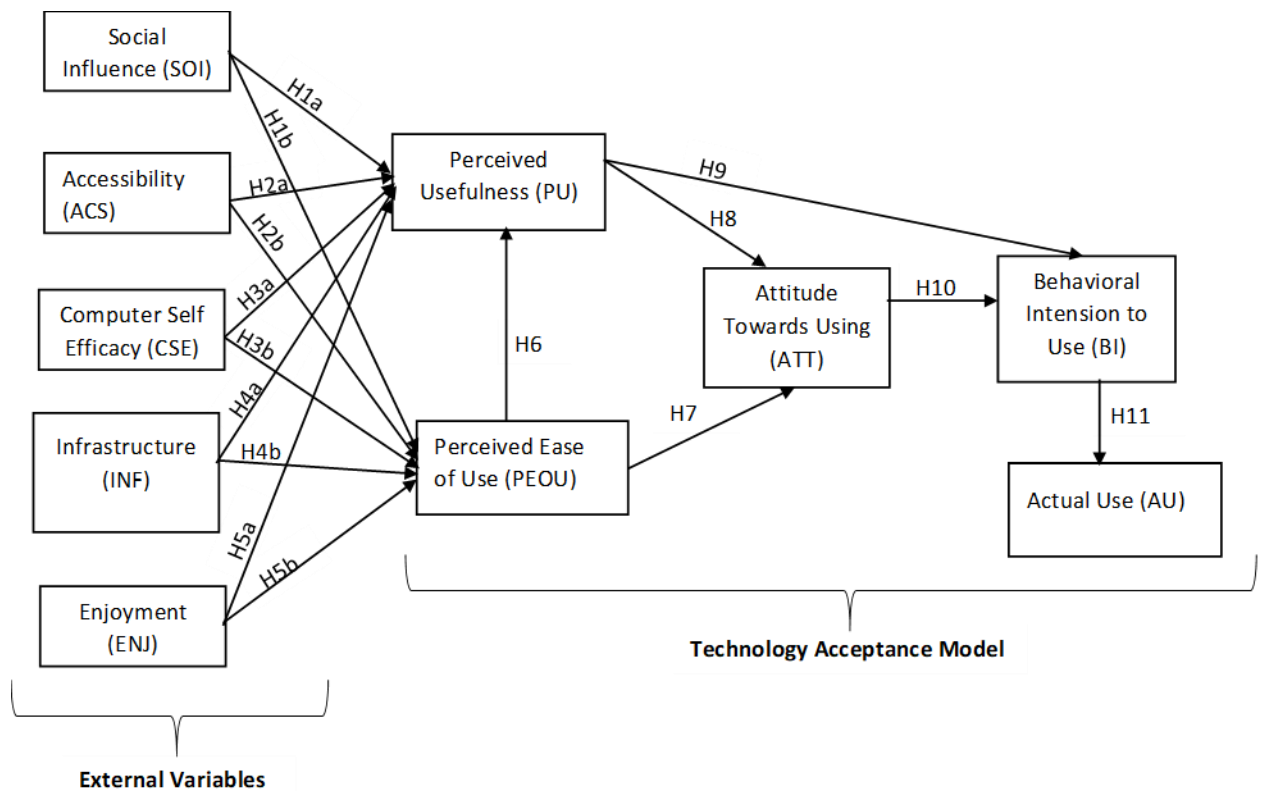


Figure 3.1: Proposed research model of TAM with external variables

### A. Social influence (SOI)

The social influence indicates the degree to which an individual belief to use the system or technology is affected by the opinion of other people closed to him/her. It was recognized in previous researches that social influence (SOI) could affect on perceived usefulness (PU) and perceived ease of use (PEOU) of digital learning (Al-Emran and Salloum, 2017). Hence, the following hypotheses were suggested:

**H1a:** Social influence (SOI) has a positive impact on perceived usefulness (PU).

**H1b:** Social influence (SOI) has a positive impact on perceived ease of use (PEOU).

### B. Accessibility (ACS)

Accessibility (ACS) refers to “the degree of easiness on how an individual has access and can utilize the system to interact and withdraw the required information using that system” (Alsabawy et al., 2016). It was supported that from previous studies having adequate access to the digital learning system directly impact how individual perceived the system (Arteaga Sánchez et al., 2013). It is identified that accessibility of system has significant impacts on perceived ease of use of a system (Attis, 2014) as well as on

perceived usefulness (PU) (Baleghi-Zadeh et al., 2014). Hence, following hypotheses were suggested:

**H2a:** Accessibility (ACS) has a positive impact on perceived usefulness (PU).

**H2b:** Accessibility (ACS) has a positive impact on perceived ease of use (PEOU).

### **C. Computer self-efficacy (CSE)**

Computer self-efficacy is the degree to which an individuals' ability to execute the desired operation using the computer or any digital tools (Sánchez et al., 2010). Specific analytical experiments have shown that computer self-efficacy (CSE) had a significant impact on the perceived usefulness (PU) and perceived ease of use of technology (PEOU) (Fathema et al., 2015). Therefore, the following hypotheses were formulated:

**H3a:** Computer self-efficacy (CSE) has a significant impact on perceived usefulness (PU).

**H3b:** Computer self-efficacy (CSE) has a significant impact on perceived ease of use (PEOU).

### **D. Infrastructure (INF)**

Infrastructure refers to the physical and organizational structure built in order to provide the service or facility whereas ICT Infrastructure includes the computer system including hardware, software, mobile phones, internet, servers, websites and other technologies (Mtebe and Kissaka, 2015). ICT Infrastructure specifies the availability of the related resources which helps to establish communications like technical support, communication services, equipment, application, instruction, etc. to perform the work. Venkatesh et al. (2003) indicated that infrastructure is a key factor that influences technology adoption by users. A number of prior studies found infrastructure's significant effects on PU and PEOU (Teo, 2010). Two hypotheses were formed to indicate the relationship with infrastructure:

**H4a:** Infrastructure (INF) has a significant impact on perceived usefulness (PU).

**H4b:** Infrastructure (INF) has a significant impact on perceived ease of use (PEOU).

### **E. Enjoyment (ENJ)**

Enjoyment indicates the degree to which an individuals' practice of using technology or system to be enjoyable and entertained (Venkatesh, 2000). Enjoyment is also a markable factor that impact the adoption of technology. From the previous study enjoyment has a significant influence on perceived ease of use (Elkaseh et al.,2015) and perceived usefulness (Ramírez-Correa et al., 2015) of digital learning. Therefore, the following hypotheses were suggested:

**H5a:** Enjoyment (ENJ) has a significant impact on perceived usefulness (PU).

**H5b:** Enjoyment (ENJ) has a significant impact on perceived ease of use (PEOU).

#### **F. Hypotheses related to five core Technology Acceptance Model (TAM) constructs**

Perceived usefulness (PU) to which individual feel that the implementation of a system or technology will boost the efficiency of their jobs where Perceived ease of use (PEOU) refers to the degree to which the individual believes that while utilizing digital learning tools will not have any mental or physical stress (Davis, 1989). These two are the main measuring construct of TAM. With reference of TAM core variables introduced by TAM (Davis, 1989) focusing to estimate acceptance of the technology by an individual, the following core TAM hypotheses for acceptance of digital learning.

**H6:** Perceived ease of use (PEOU) has a significant impact on perceived usefulness (PU).

**H7:** Perceived ease of use (PEOU) has a significant impact on attitude towards using (ATT).

**H8:** Perceived usefulness (PU) has a significant impact on attitude toward using (ATT).

**H9:** Perceived usefulness (PU) has a significant impact on behavioral intention to use (BI).

**H10:** Attitude towards using (ATT) has a significant impact on their behavioral intention to use (BI).

**H11:** Behavioral intention to use (BI) has a significant impact on their actual usage (AU).

### **3.2 Methodology for research**

This study followed a quantitative approach data analysis method to identify the students' readiness and acceptance of technology using TAM framework including external variables. The participants were students of different education level enrolled at School to University in Kathmandu Valley, Nepal. Data was collected using a questionnaire designed in two parts, total of 53 questions among which first part consists of 23 questions related to measure the readiness which included demography, exposure on ICT tools, digital learning practices, ICT integration on their institutions, and challenges faced during implementation of digital tools on their educational activities and the second part of the questionnaire included of 30 questions to investigate the acceptance of technology towards using digital learning tools and their inter relationship which consists of 10 constructs SOI, ACS, CSE, INF, ENJ, PEOU, PU, ATT, BI, and AU of TAM collected on five point Likert scale ranging from 1 to 5 where 1 as "Strongly Disagree" to 5 as "Strongly Agree". The measurement scales were adapted from previously studied and validated measures (Davis, 1989; Venkatesh and Davis, 1996). The descriptive and inferential analysis of collected data was performed with the Statistical Package of Social Science (SPSS) software (version 25.0) then modeling the structured equation model (SEM) to measure loadings, reliability, validity, path estimation and hypotheses test was performed resulting significant effects between constructs of TAM with the help of SmartPLS software (version 3.2.2.). The relationship between the indicators and variables were computed with measurement model and external variables and the TAM core construct was computed as described by the structural model which examine the significance between the variables of proposed model. The steps of research process are presented in Figure 3.1

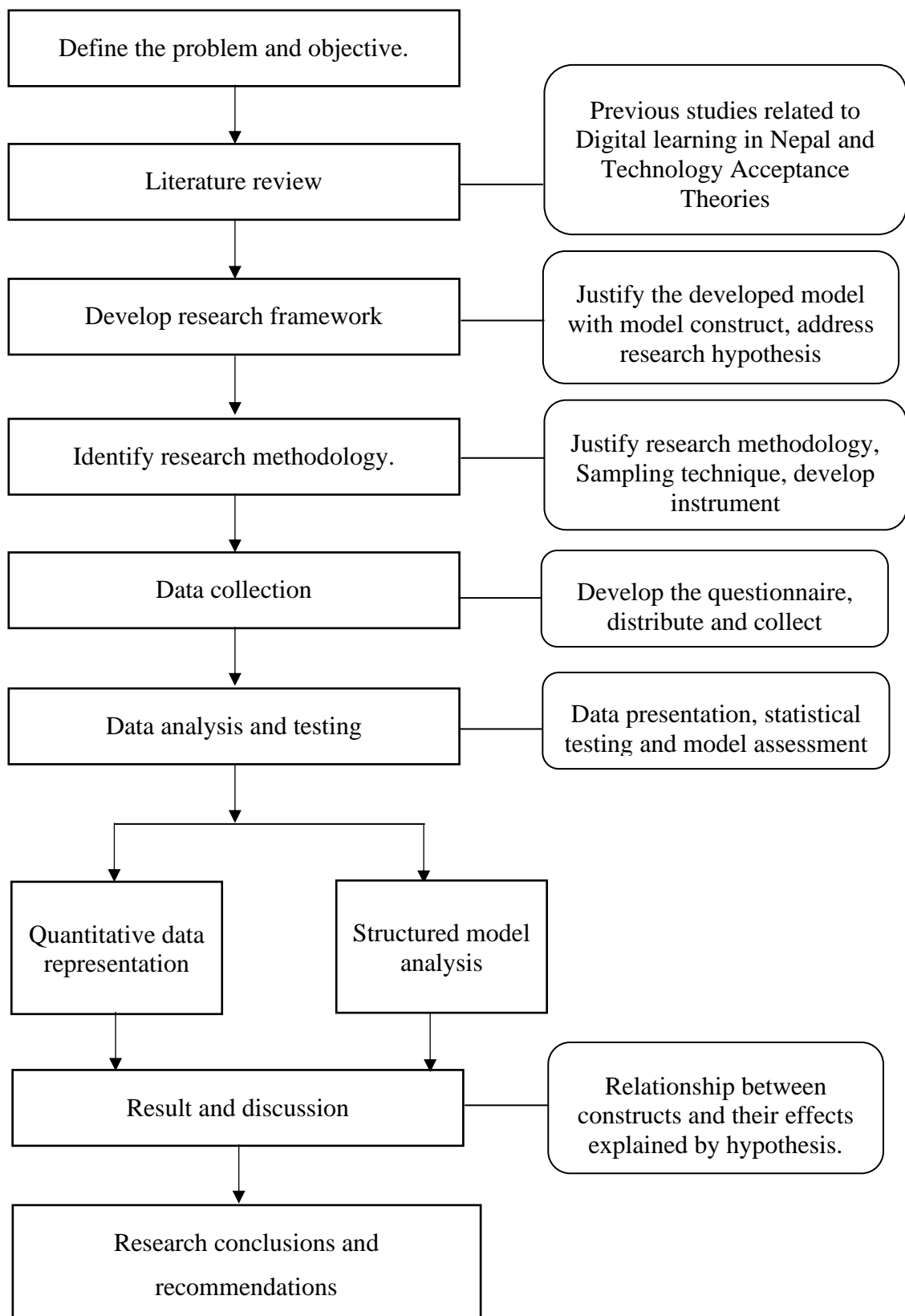


Figure 3.2 Flowchart of research process

### 3.3 Study site

The research has been conducted in three districts of Kathmandu valley, Nepal. They are Kathmandu, Lalitpur and Bhaktapur.

### 3.4 Study Population

All the students studying at different level from school to higher education institution (University) from Kathmandu valley were target population of this research.

### 3.5 Sampling technique

The study used purposive non- random sampling procedure. Purposive sampling, also called judgmental or subjective sampling, indicates a group of sampling techniques that depend upon the judgment of the researcher. Purposive sampling method was utilized where participants were readily available and willing to engage in the study, based on particular demographic area of concern, which they would better allow addressing study query. (Al-Emran and Salloum, 2017).

### 3.6 Sample size

Out of selected 450 circulated questionnaire, 384 responses were obtained that had completely filled valid responses which is considered to be an appropriate sample size for conducting research as described by Krejcie and Morgan (1970) for a population of about 1,000,000 with 95% confidence level and margin error of 5%. Hence, this sample size is sufficient and can be evaluated using structural equation modeling to test the formulated hypotheses (Chuan and Penyelidikan, 2006).

$$s = \frac{X^2 NP(1-P)}{(d^2 (N-1) + X^2 P(1-P))} \dots \dots \dots \text{Equation 3.1 (Krejcie and Morgan, 1970)}$$

s = required sample size

$X^2$  = value of chi-square for 1 degree of freedom at the confidence level of 95% i.e. 3.841

N = target study population

P = the population proportion (considered the value 0.50 which would provide maximum sample size).

d = the degree of accuracy expressed as a proportion (0.05)

$$s = 3.841 * 1000000 * 0.5 * (1 - 0.5) / (0.052 (1000000 - 1) + 3.841 * 0.5 (1 - 0.5))$$

$$s = 383.952$$

$$s \approx 384$$

### **3.7 Data Collection**

In this research survey with self-reported questionnaire was employed for collecting data. Since, employing purposive sampling technique 450 questionnaires were circulated via digital medium (web-based survey using social network, e-mail and messaging application) as well also physical interview were taken among the students studying in Kathmandu valley at different level (School to University) were part of the study sample.

The sample contained five parts. The first section includes the participant's personal details which provide demographic data. The second section participants exposure and availability of digital technology which can be utilized for learning. This examines the readiness of students to adopt digital leaning practice. The third section of the questionnaire examines the implementation of ICT tools and practice in institutions. In the fourth section, which indicate challenges and difficulties faced while implementing digital learning system. Lastly, fifth section consist of 30 questions that covers all construct of TAM model which could help predicting the acceptance and relation among construct, here five-point Likert scale ranging from value 1 to 5 which indicate strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1).

### **3.8 The Study Instrument**

Questionnaires are known as one of the most widely considered methods used to obtain numerical data. Johnson and Christensen (2008) stated it as a 'self-report data collection instrument,' which includes a set of questions or statements regarding a specific subject, allowing participants to address such questions in some manner. Also, questionnaires are used to obtain details from persons relating to specific factors or personal knowledge, such as their address, age, qualifications, sex, employment, background and efficiency. It has also been used to seek to explain the values, feelings , emotions, behaviors, experiences, personalities, behavioral purpose, views, preferences to habits of individuals (Hartas, 2010).

## CHAPTER FOUR: RESULTS AND DISCUSSION

In this chapter, analysis of the students' readiness with descriptive data presentation and measuring the factors affecting the technology adoption in digital learning employing the technology acceptance model (TAM) is presented. TAM was a strong analytical tool for recognizing the adoption of digital learning by the participants, according to the recommendation from previous studies. There has been successful use of IBM SPSS Statistics software (version 25) to draw the demographic data and descriptive analysis and SmartPLS (version 3.3.2) to carry out structural equation modeling (SEM). The structural model is considered as the inner model and the outer model is considered as a measurement model that will be brought together with constructs and indicators. In fact, the structural model evaluation and final test analysis must be satisfactory to the calculation standard.

### 4.1 The demographic data

Out of the 384 respondents 221 (57.55%) were male and 163 (42.46%) were female. Among all participants 224 (58.33%) were of age between 15-24, 104 (27.08%) were at age range of 25-34, 38 (9.9%) were at below 14 years and 18 (4.69%) were at above 34 years. 214 (55.7%) of respondents were from Kathmandu district, 129 (33.6%) of respondents were from Lalitpur district and 41(10.7%) of respondents were from Bhaktapur district. 163 (42.45%) respondent represented were from government or community institution, 211 (54.94%) were from private institution and 10 (2.6%) from international affiliated institution. Most of the respondents of the study are university students, 35.68% individuals were at bachelor level, 30.7% were at school level (up to grade 10), 20.05% were at master or higher level, 13.02% were at intermediate level (grade 11-12 or diploma or PCL) while the remaining 0.78% were enrolled for some kinds of professional certification. Table 4.1 provides the complete demographic information of the participants.

Table 4.1: Students' demographic data

Characteristics	Answer	Frequency	Percent (%)
Gender	Male	221	57.55
	Female	163	42.46

	Total	384	100
Age	Up to 14	38	9.90
	15-24	224	58.33
	25-34	104	27.08
	Above 34	18	4.69
	Total	384	100
District	Kathmandu	214	55.7
	Lalitpur	129	33.6
	Bhaktapur	41	10.7
	Total	384	100
Type of Institution	Government / Community	163	42.45
	Private / Institutional	211	54.95
	International Affiliated	10	2.60
	Total	384	100
Level of education	Up to Grade 10	117	30.47
	Grade 11-12/ Diploma/PCL	50	13.02
	Other Professional Certification	3	0.78
	Bachelor	137	35.68
	Master and Higher	77	20.05
	Total	384	100

## 4.2 Analysis of readiness with descriptive analysis

### 4.2.1 Students' ICT availability and competency

In this section research was focused on examine the students' availability and exposure to the ICT tools. Students were asked different questions to measure their exposure, availability and familiarity of ICT tools through which It can be estimated their ICT knowledge and communication ability which can directly influence their academic activities. As shown in figure 4.1 and figure 4.2, nearly all (97%) of the respondent could use laptop or smartphone and had access to the internet technology and only 3% of respondent were unable to use these facilities.

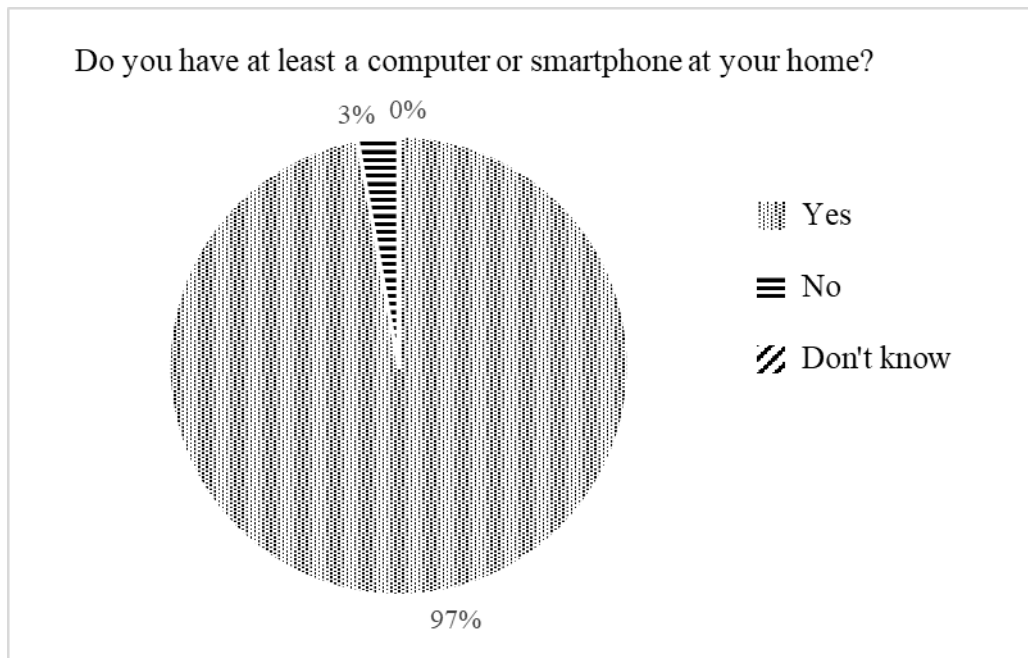


Figure 4.1: Availability of computer or smartphone

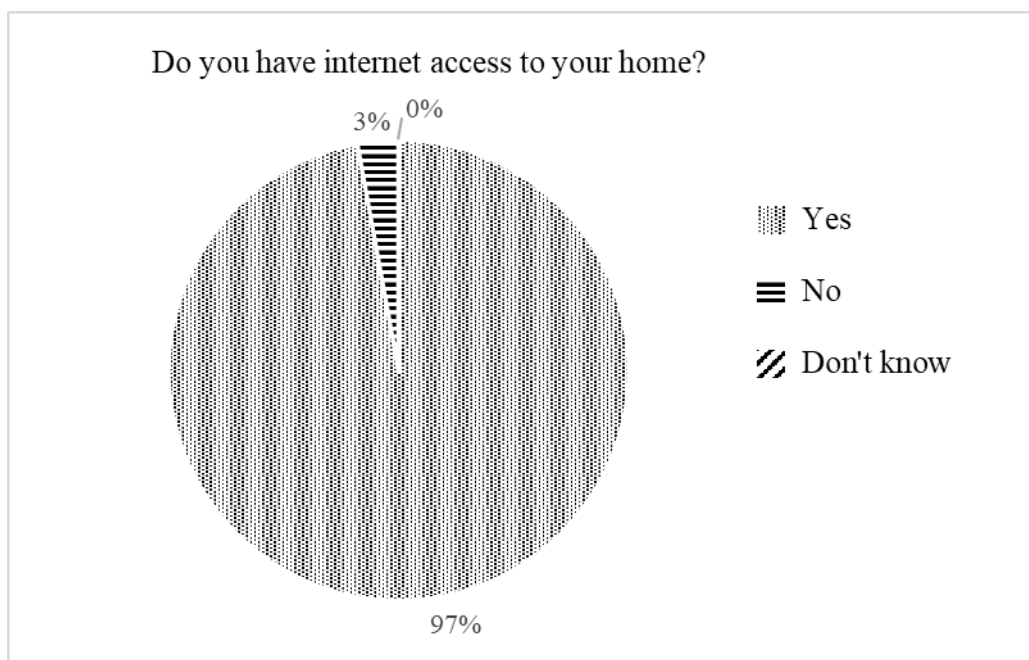


Figure 4.2: Accessibility of internet

Figure 4.3 indicates that 50% of participants were connected with wired internet connection from ISP, 32% wireless internet form ISP, 12% mobile data and 6% were not sure about their connection. Figure 4.4 measures the engagement on social media application form option provided where that most of the respondent were (57%) used to engage in facebook, 23% of participants used to engage in youtube, 16% were in

Instagram, 2 % of them do not use any and 1% of them were using other applications. These days social media are becoming the common and easy platform for entertainment and communication.

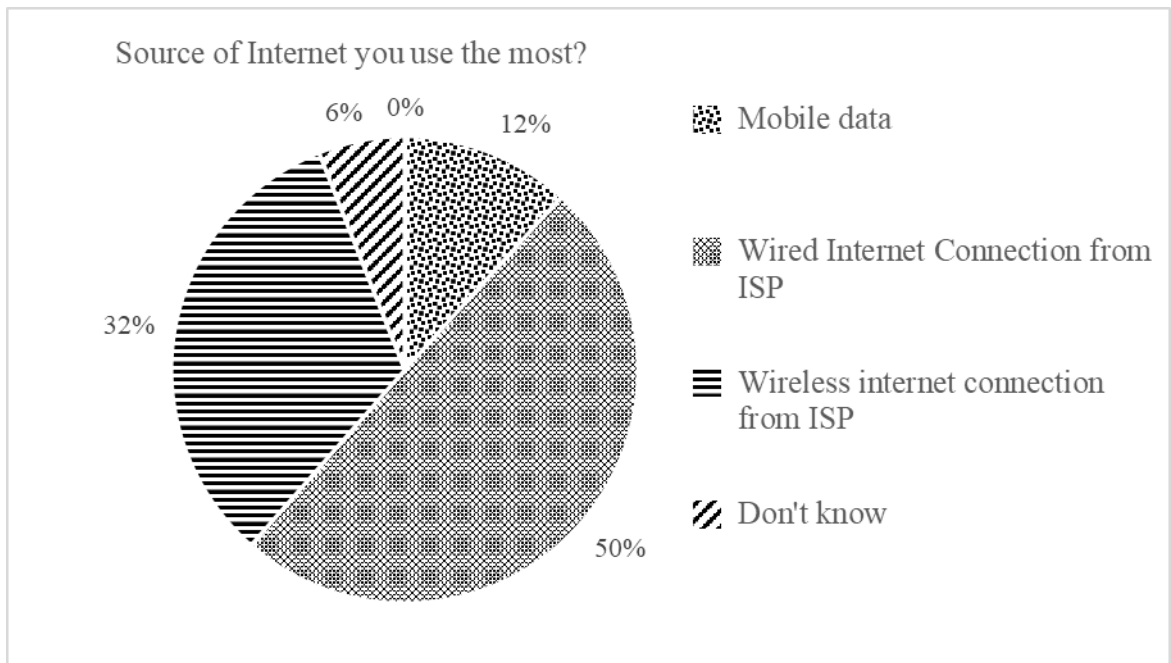


Figure 4.3 Source/Medium of internet

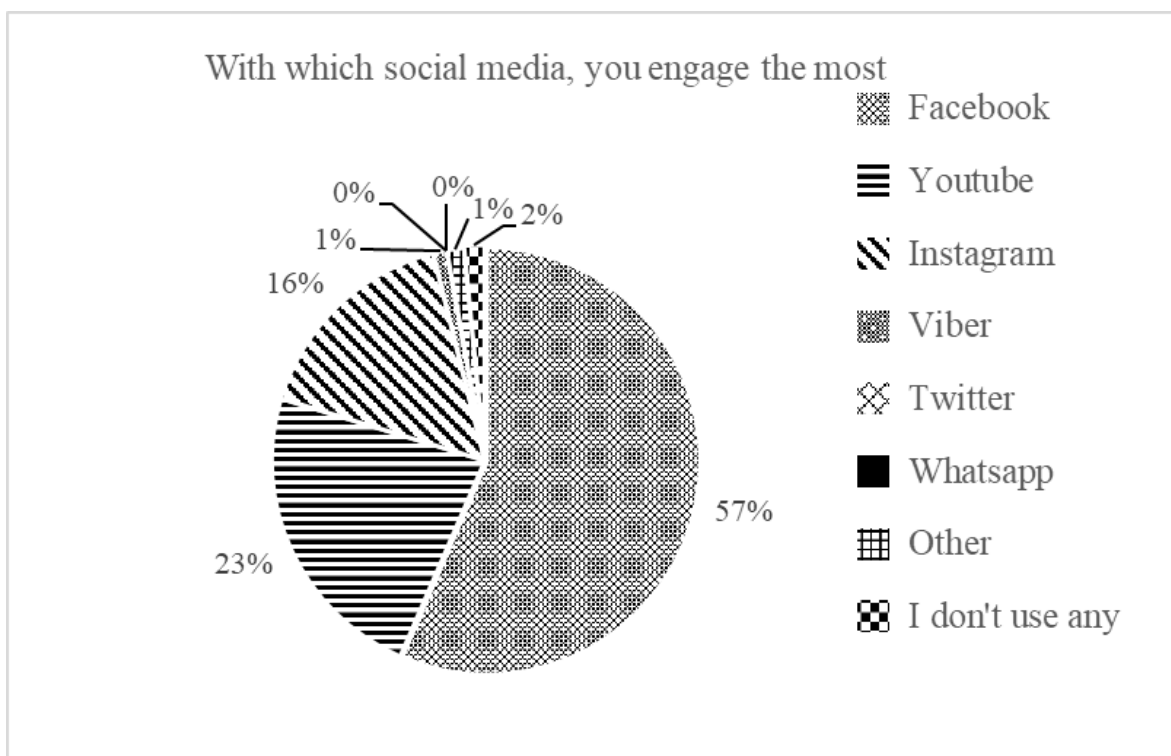


Figure 4.4: Social media in which student engage the most

Information security imply data protection from being stolen or utilization from unethical person which is especially indicates electronic data (ISO, 2008). in this era where every people are connected digitally, there is also the risk of data stolen so information security also should be considered while utilizing digital tools. From this research measuring the students' awareness towards information security it is found that 63% of participants were aware about information security while 29% were found to be unaware about information security and 8% were found to be not sure about their concept on information security shown in figure 4.5.

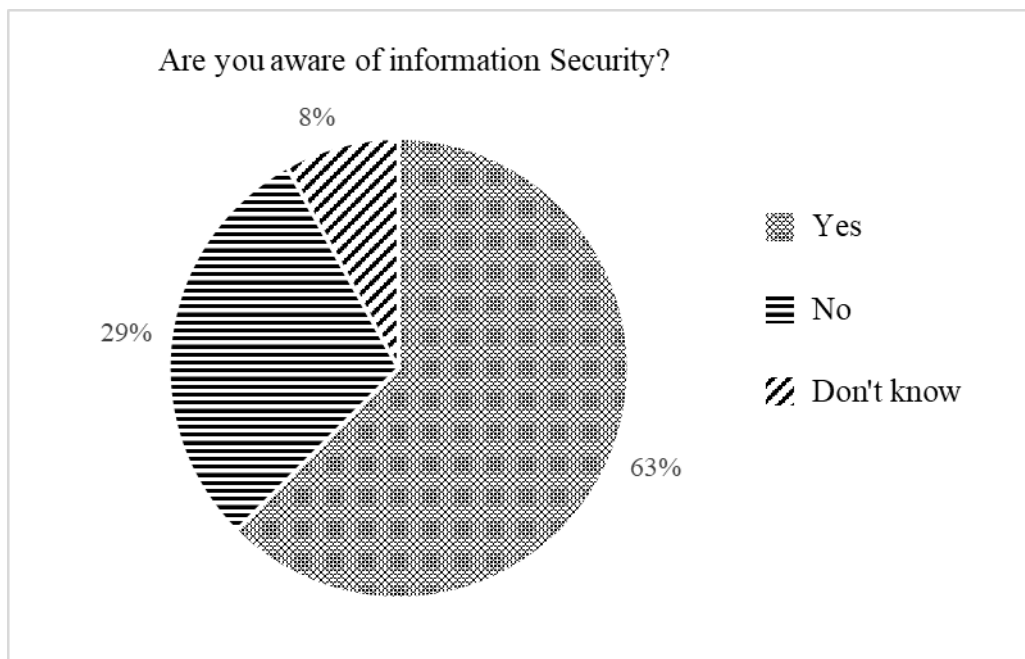


Figure 4.5: Awareness towards information security

Figure 4.6 illustrates the result from the total respondents asked to select those option which applies to them from multiple option provided (option included projector, Printer, Scanner, Digital Camera/Web Cam, Audio devices and Pen drive/Hard drive) to examine their familiarity on using common digital multimedia tools which could be used in educational activities. Out of 384 participants majority of them i.e. 303 participants were found to be familiar using audio devices, pen drive/ hard drive and digital camera/webcam other rest are found to be satisfactorily familiar with listed devices. 13 of them were found to be unfamiliar with all the devices listed in option.

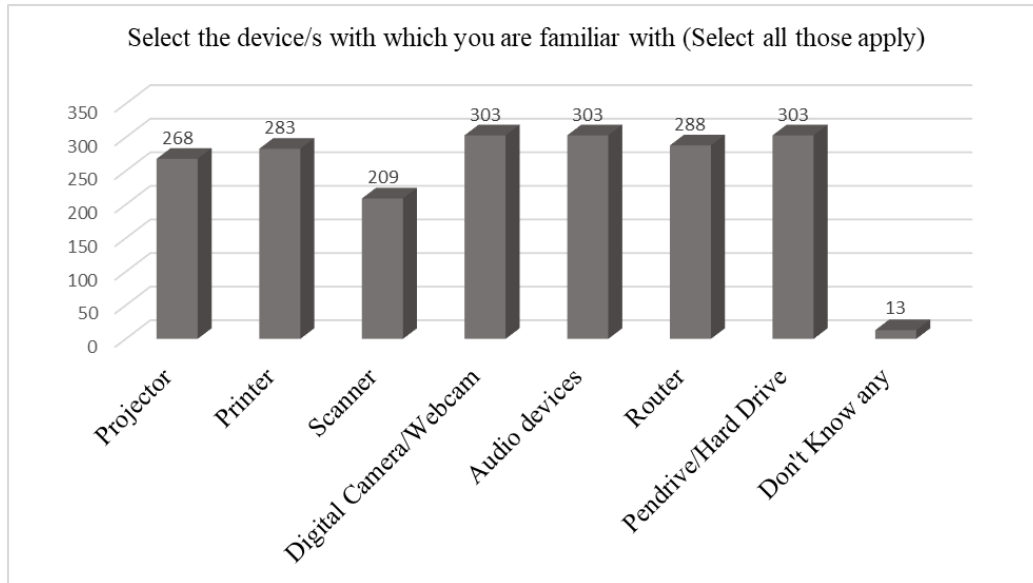


Figure 4.6: Familiarity with digital tools

Table 4.2 indicates the numbers of respondents who were familiar with respective basic operations provided on options during survey. Most of the respondent (350/91%) found to be familiar with using basic applications like word processing, browser etc. while 24% were found to be skilled of basic repairing and troubleshooting the problem encountered while operating computer and 3% of the respondent were unknown of any operation provided in option. Overall, most of them were found to be familiar with different basic computer operations shown in Table 4.2.

Table 4.2: Familiarity with basic computer operations

Select the operation/s with which you are familiar with (select all those apply)	Respondents (N=384)	Percent
Using basic applications (like Microsoft word, PowerPoint, browser etc.)	350	91%
Managing files (copy, paste, move, delete etc.)	346	90%
Downloading files/Application	312	81%
Installing/Uninstalling application	312	81%
Sending E-mail	312	81%
Posting attachments (files, photos, video etc.) using internet	273	71%
Connect / Disconnect hardware	222	58%
Basic repairing and troubleshooting	94	24%
Don't know any	13	3%

Figure 4.7 shows that among 384 participants, 229 had used zoom application to take online class/conference, 107 had used Microsoft team, 48 had used Moodle learning management system, 29 had used google meet, 24 had used google classroom and 61 hadn't used any application.

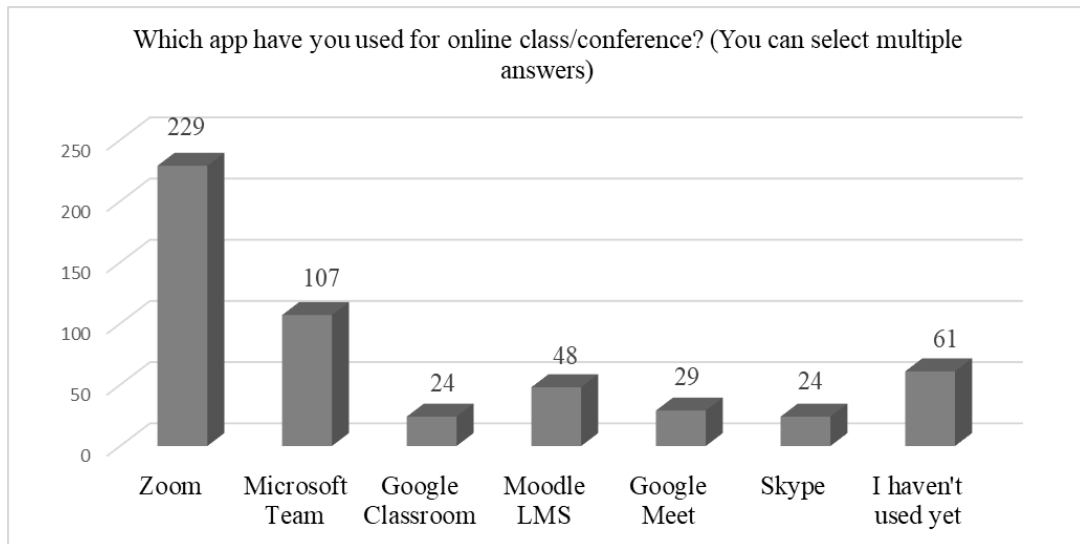


Figure 4.7 Application used for online class/conference

Figure 4.8 shows the readiness to take online class for 6 hours a day and 6 days a week with proper break in between the class where 46% of students were found to be not interested, 39% were interested and 15% of them were not sure on their decision.

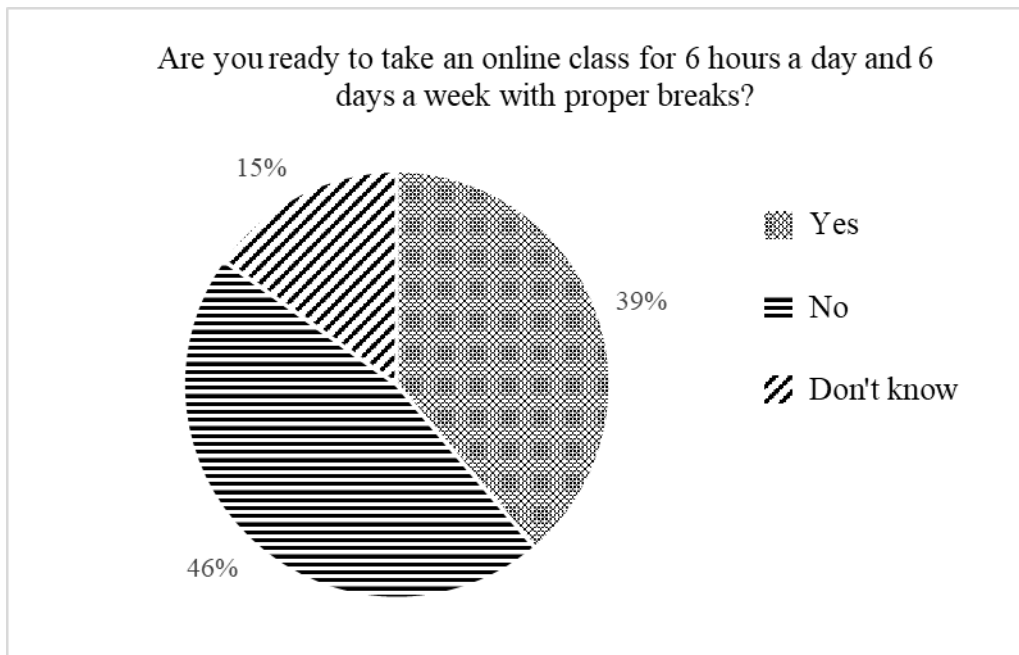


Figure 4.8: Interest to take online class 6 hours a day and 6 days a week

#### 4.2.2 Application and Integration of ICTS in Institutions

In this section research was focused on examine the adoption of ICT among the institutions from students provided information. Figure 4.9 indicated that 62% of the respondents' teacher use projector or other multimedia tools in classroom while delivering the content.

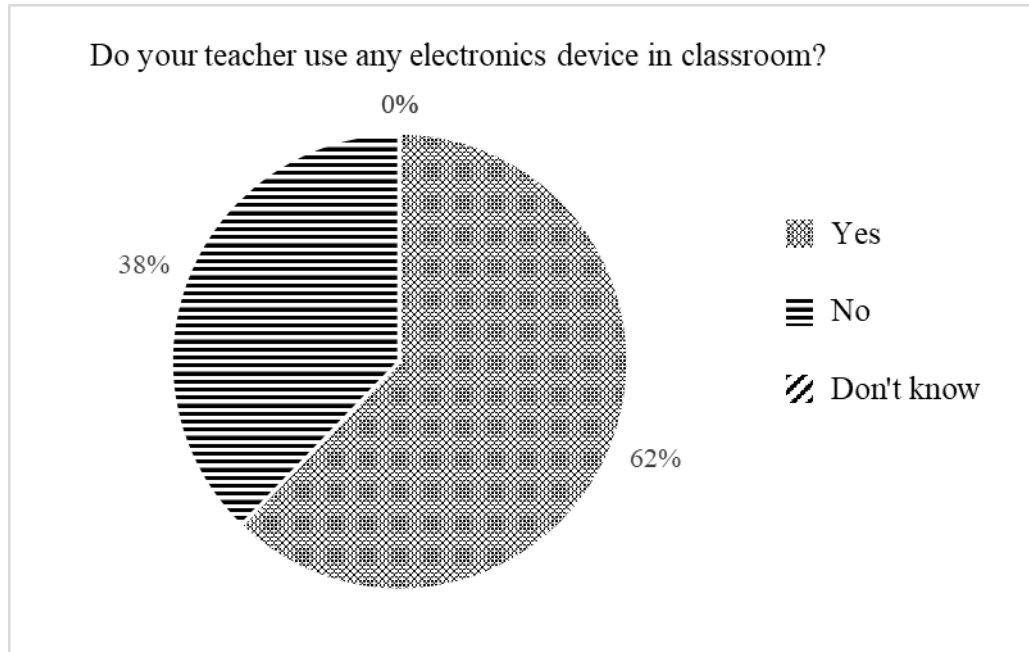


Figure 4.9: Teacher using projector or other digital tools

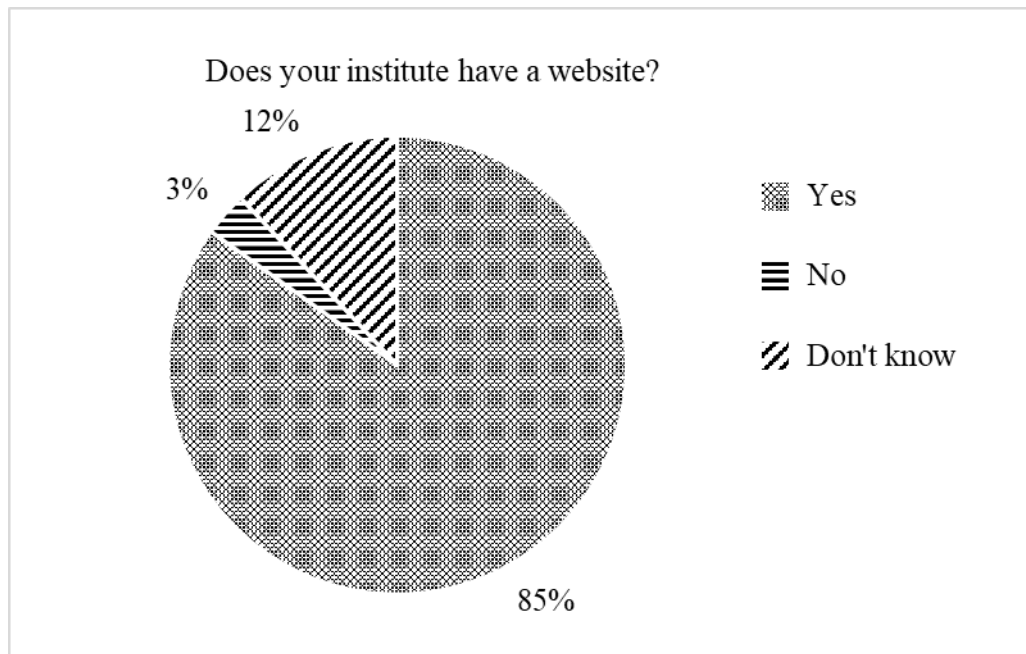


Figure 4.10: Institutions having website

As shown in figure 4.10, 85% of respondents' institution have websites, 12% of them did not know about whether their institution have website or not and 3% their institute have no website.

Likewise, from this research it was found that in 62% of respondents' institution, students were provided with internet facilities, while in 31% of respondents' institution, students were not provided internet facility and 7% of them were found to be unknown about this facility in their institution shown in figure 4.11. Furthermore, figure 4.12 represents that 62% of the respondents' institutions were already experienced in conducting online classes, 32% of respondents' institutions were not experienced in conducting online classes and 6% of them were found to be not sure about online classes if previously conducted by respective institutions.

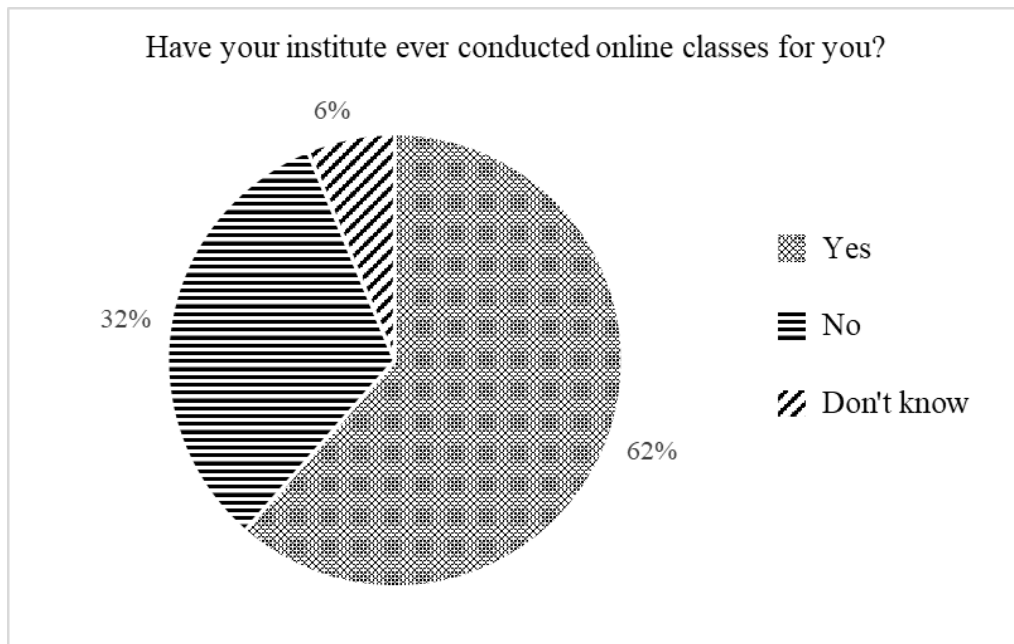


Figure 4.11: Internet facilities available for student

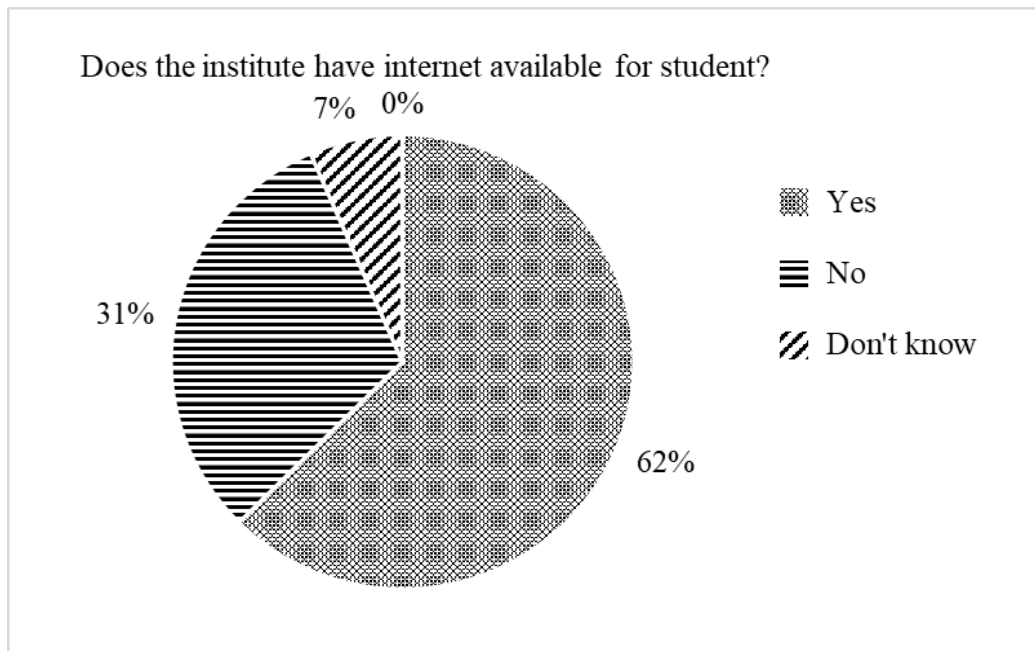


Figure 4.12: Institute experienced in conducting online classes

Figure 4.13 shows the preparedness and practices implemented by the institution where 234 respondents' institution had computer course in their curriculum, whereas 264 respondents' institution had enough computer lab and 229 respondents' teacher encourage them to use computer and digital tools for their study. From this result it is found that, ICT implementation is satisfactory in all aspect except the teachers having good computer skill where only 173 respondents were satisfied with computer skill of their teacher.

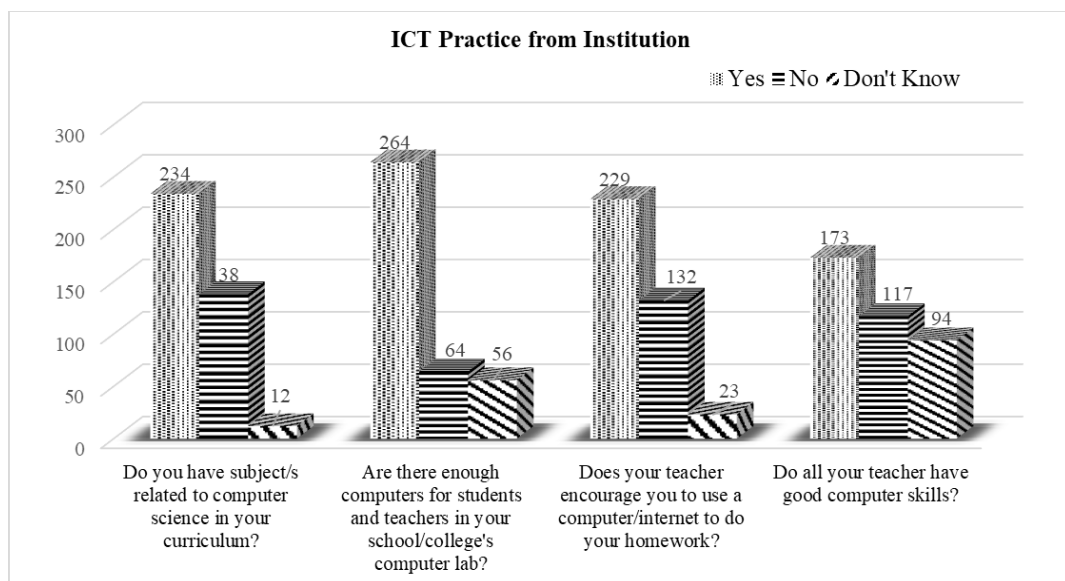


Figure 4.13: ICT infrastructure and practice in institution

### 4.2.3 Obstacles and Challenges on adoption of ICTs in Academic Activities

This section of research tried to identify the major obstacles, problems and challenges faced by students while implementing the ICT tools as a learning instrument. Findings indicates that, slow and unreliable internet was found to be most chosen problem faced by students, while uncertain electricity cut-off rank 2<sup>nd</sup> and lack of training and supervision ranked 3<sup>rd</sup> in main challenges faced while using ICT as learning tools. All statistical description is shown in Table 4.3.

Table 4.3 Problem faced by student while utilising ICT tools

What are the main challenges that you faced while utilising ICT tools? (Select all that apply)	Respondents (N=384)	Percent
Lack of training and supervision	166	43%
Slow and unreliable internet	312	81%
High cost for setup	155	40%
Electricity cut-off/Power backup	274	71%
Quality and Performance Monitoring	87	23%
Resource Sharing	112	29%
Lack of concentration / Distractions	26	7%

### 4.3 Application of TAM

The students' answers coded as 1, 2, 3, 4 and 5, as in a Likert scale of five scales. The 3.41 mean score was defined as the estimated preparation level of the object, where a mean value of 3.41 was calculated after the critical amount was established: 4 intervals/5 groups = 0.8 (Aydın and Taşçı, 2005). The readiness rates were calculated with the meaning as seen in Figure 4.14, utilizing the study.

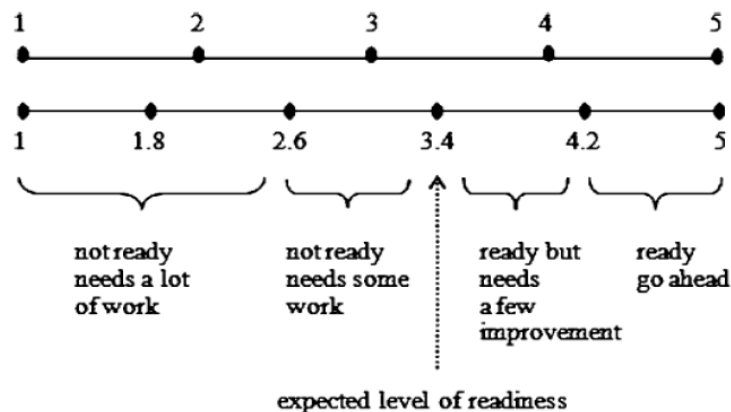


Figure 4.14: E-Readiness assessment model (Aydın and Taşçı, 2005).

Table 4.4 represents the result of survey, comparing the construct mean value with that reference we got computer self-efficacy (4.44), attitude towards use (4.38), enjoyment (4.34) and perceived usefulness (4.33) as ready to ahead. Moreover, actual use (4.08), behavioral intention (4.0), accessibility (3.94), perceived ease of use (3.82) and social influence (3.69) as ready but needs a few improvements, while infrastructure did not meet the expected level of readiness (3.24).

Table 4.4: Mean and standard deviation (SD)

<b>Items</b>	<b>Indicator</b>	<b>Mean</b>	<b>Mean of Construct</b>	<b>SD</b>
Perceived Usefulness	PU_1	4.42	4.33	0.84
	PU_2	4.32		0.80
	PU_3	4.24		0.81
Perceived Ease of Use	PEOU_1	4.05	3.82	1.07
	PEOU_2	3.66		1.07
	PEOU_3	3.74		0.94
Behavioral Intention	BI_1	4.08	4.00	1.08
	BI_2	4.22		0.71
	BI_3	3.72		1.06
Actual Use	AU_1	4.50	4.08	0.72
	AU_2	3.84		0.94
	AU_3	3.89		0.66
Attitude towards use	ATT_1	4.51	4.38	0.69
	ATT_2	4.47		0.74
	ATT_3	4.15		0.84
Social Influence	SOI_1	3.70	3.69	1.01
	SOI_2	3.78		1.00
	SOI_3	3.58		1.02
Accessibility	ACS_1	4.26	3.94	0.85
	ACS_2	3.52		0.94
	ACS_3	4.03		0.81
Computer Self Efficacy	CSE_1	4.38	4.44	0.84
	CSE_2	4.47		0.82
	CSE_3	4.46		0.82
Infrastructure	INF_1	3.17	3.24	1.10
	INF_2	3.25		1.05
	INF_3	3.29		0.98
Enjoyment	ENJ_1	4.31	4.34	0.87
	ENJ_2	4.24		0.96
	ENJ_3	4.47		0.82

Indicators were set on the table as it is from the questionnaire part 4: application of technology acceptance model (TAM) from APPENDIX A which represents the item question.

#### **4.3.1 Reliability**

Data to be qualify to perform the analysis of the model, all variables of the research model have been examined for two tests, they are reliability test and convergent/discriminate validity test. Reliability test measures the internal consistency for each item with in a construct which can be achieved by obtaining Cronbach's Alpha. It assures all the items belong with respective construct were interrelated. A Cronbach Alpha regarded as the most commonly known methodology for estimating instrument reliability and accuracy (Sekaran 2003). The result from computation of reliability is presented in Table 4.5, where in all construct except accessibility meets the requirement for acceptable Cronbach alpha value but all the construct verify the acceptance criteria with composite reliability (CR).

#### **4.3.2 Validity**

Construct validity involves the degree to which measures of a construct's dimensions actually represent the build itself, and more precisely, it relates to cognitive coherence through all the characteristic components' (Hartas, 2010). There are two forms of validities testing required to consider for measuring model, convergent validity and discriminate validity (Chin, 1998), (Joseph et al., 2016).

#### **4.3.3 Convergent Validity**

Cronbach alpha was undertaken to examine the convergent validity and internal reliability of the construct to measure the internal consistency between the indicators of that construct. With the Cronbach alpha value 0.70 or higher consider as allowable. Also, composite reliability (CR) and average variance extracted (AVE) reliability tests were employed to measure the internal consistency on items of each TAM construct. To find out convergent validity, Smart PLS ver. 3.3.2 software was used. Table 4.5 shows the items for every construct, Cronbach's' alpha, composite reliabilities (CR) and average variance extracted (AVE). The result of convergent validity was assumed to be good if the values of Cronbach's' alpha, CR and AVE of each construct are greater

than acceptance scale, i.e. Factor loading, Cronbach's Alpha, composite reliability  $\geq 0.70$  and AVE  $> 0.5$  (Hair et al, 2017).

Table 4.5: Result of constructs' reliability

<b>Construct</b>	<b>Cronbach's Alpha</b>	<b>CR</b>	<b>AVE</b>
Accessibility	0.6768	0.7464	0.5225
Actual Use	0.8288	0.8343	0.6408
Attitude towards Using	0.7987	0.8823	0.7147
Behavioural_Intention	0.7201	0.8426	0.6422
Computer Self-Efficacy	0.8103	0.8827	0.7161
Enjoyment	0.8355	0.8977	0.746
Infrastructure	0.8113	0.8846	0.719
Perceived Ease of Use	0.8204	0.8929	0.7354
Perceived Usefulness	0.7758	0.87	0.6907
Social Influence	0.8262	0.8826	0.7158

#### 4.3.4 Discriminant validity

Discriminant validity implies that the degree to which one construct varies from all other construct in the study model. To determine discriminant validity, the methods that are undertaken are: the Fornell-Larcker scale (also known as square root of AVE), crossloadings, and the Heterotrait-Monotrait ratio of correlations (HTMT) (Chin W. W, 1998) shown in Table 4.6, Table 4.7 and Table 4.8 respectively computed with SmartPLS software. The heterotrait-monotrait ratio (HTMT) of correlations are the new methodology suggested to determine the differential validity of structural equation modeling (PLS-SEM) in the least partial squares, and is an essential criterion for the analysis of the model.

Fornell-Lacker criterion compares the square root of the average variance extracted (AVE) with the relationship of latent variables (Hair et al., 2014). The table 4.6 shows that the computed value of square root of the AVE found to be 0.723 and 0.864 which was above the acceptable criteria being higher than 0.5. The HTMT value being greater above the threshold shows that there is a failed to have of discriminant validity. Some researcher suggested a threshold to be 0.85 (Kline, 2011) and some researcher other suggested a threshold of 0.90 (Teo et al., 2008). In the cross-loading table, the value of

factor loading indicators should above the 0.70 to be valid (Hair, et al.,2014). Out of total 30 items, 28 items qualify the acceptance criteria of loading determinants where ACS\_2 and AU\_3 could not meet.

Table 4.6 Fornell-Larcker scale

	ACS	AU	ATT	BI	CSE	ENJ	INF	PEOU	PU	SOI
ACS	<b>0.723</b>									
AU	-0.071	<b>0.801</b>								
ATT	-0.084	0.415	<b>0.845</b>							
BI	0.037	0.121	0.285	<b>0.801</b>						
CSE	0.146	0.036	0.124	0.059	<b>0.846</b>					
ENJ	-0.062	0.166	0.352	0.095	0.013	<b>0.864</b>				
INF	-0.051	0.128	0.125	0.213	0.038	0.035	<b>0.848</b>			
PEOU	0.172	0.118	0.170	0.155	0.003	0.135	0.210	<b>0.858</b>		
PU	0.267	-0.067	-0.216	0.005	-0.122	-0.126	0.171	-0.105	<b>0.831</b>	
SOI	-0.005	0.074	0.074	-0.068	-0.068	-0.020	-0.104	0.160	-0.180	<b>0.846</b>

Table 4.7 Cross loadings result

	ACS	ATT	AU	BI	CSE	ENJ	INF	PEOU	PU	SOI
ACS_1	<b>0.855</b>	-0.162	-0.093	0.077	0.169	-0.092	0.047	0.094	0.238	-0.085
ACS_2	<b>0.356</b>	0.072	-0.020	0.131	0.003	0.092	-0.063	0.164	-0.166	0.241
ACS_3	<b>0.843</b>	0.038	-0.028	0.010	0.070	0.009	-0.140	0.218	0.165	0.123
ATT_1	0.096	<b>0.793</b>	0.267	0.245	0.016	0.304	0.153	0.242	-0.089	-0.037

ATT_2	-0.138	<b>0.838</b>	0.371	0.203	0.049	0.335	0.070	0.128	-0.218	0.168
ATT_3	-0.163	<b>0.902</b>	0.410	0.272	0.236	0.258	0.093	0.070	-0.236	0.059
AU_1	-0.019	0.375	<b>0.871</b>	0.074	0.022	0.176	0.142	0.074	-0.049	0.033
AU_2	-0.092	0.370	<b>0.953</b>	0.116	0.030	0.140	0.091	0.124	-0.070	0.083
AU_3	-0.021	0.134	<b>0.506</b>	-0.026	-0.029	0.096	0.016	0.026	-0.035	0.002
BI_1	0.030	0.203	0.088	<b>0.833</b>	0.052	0.053	0.072	0.107	-0.077	-0.061
BI_2	0.028	0.272	0.086	<b>0.851</b>	0.130	0.088	0.158	0.145	0.031	-0.030
BI_3	0.033	0.199	0.117	<b>0.713</b>	-0.059	0.083	0.271	0.114	0.040	-0.078
CSE_1	0.130	0.127	0.030	0.007	<b>0.930</b>	0.081	0.010	-0.001	-0.138	-0.073
CSE_2	0.067	0.008	-0.039	0.109	<b>0.795</b>	-0.136	0.043	0.010	-0.085	-0.040
CSE_3	0.201	0.204	0.136	0.069	<b>0.808</b>	0.063	0.069	0.003	-0.058	-0.052
ENJ_1	-0.104	0.358	0.170	0.155	-0.075	<b>0.792</b>	0.086	0.104	-0.030	0.008
ENJ_2	-0.057	0.237	0.121	0.078	0.058	<b>0.884</b>	0.010	0.107	-0.129	-0.013
ENJ_3	-0.026	0.344	0.154	0.052	0.014	<b>0.912</b>	0.020	0.135	-0.134	-0.034
INF_1	-0.056	0.081	0.087	0.221	0.076	-0.008	<b>0.896</b>	0.204	0.196	-0.117
INF_2	-0.016	0.179	0.149	0.203	0.025	0.063	<b>0.829</b>	0.186	0.130	-0.070
INF_3	-0.062	0.043	0.090	0.072	-0.043	0.051	<b>0.817</b>	0.122	0.074	-0.064
PEOU_1	0.123	0.290	0.087	0.032	-0.062	0.152	0.105	<b>0.834</b>	-0.037	0.172
PEOU_2	0.131	0.136	0.184	0.134	0.003	0.109	0.174	<b>0.883</b>	-0.143	0.163

PEOU_3	0.195	-0.013	0.025	0.251	0.079	0.080	0.276	<b>0.855</b>	-0.092	0.068
PU_1	0.217	-0.209	-0.091	0.012	-0.147	-0.103	0.075	-0.084	<b>0.848</b>	-0.089
PU_2	0.283	-0.193	-0.037	-0.074	-0.008	-0.151	0.097	-0.096	<b>0.854</b>	-0.104
PU_3	0.170	-0.140	-0.040	0.068	-0.146	-0.063	0.243	-0.081	<b>0.790</b>	-0.243
SOI_1	0.085	0.023	0.058	-0.048	-0.027	-0.110	-0.041	0.150	-0.220	<b>0.922</b>
SOI_2	-0.035	0.026	-0.044	-0.054	0.008	0.025	-0.098	0.029	-0.045	<b>0.781</b>
SOI_3	-0.127	0.138	0.106	-0.077	-0.128	0.108	-0.163	0.159	-0.096	<b>0.829</b>

Table 4.8: Heterotrait-Monotrait Ratio (HTMT)

	<b>ACS</b>	<b>AU</b>	<b>ATT</b>	<b>BI</b>	<b>CSE</b>	<b>ENJ</b>	<b>INF</b>	<b>PEOU</b>	<b>PU</b>	<b>SOI</b>
<b>ACS</b>										
<b>AU</b>	0.113									
<b>ATT</b>	0.215	0.416								
<b>BI</b>	0.143	0.112	0.368							
<b>CSE</b>	0.205	0.109	0.212	0.146						
<b>ENJ</b>	0.146	0.194	0.445	0.137	0.139					
<b>INF</b>	0.142	0.134	0.165	0.260	0.079	0.083				
<b>PEOU</b>	0.277	0.122	0.254	0.207	0.105	0.158	0.259			
<b>PU</b>	0.335	0.079	0.274	0.123	0.179	0.157	0.205	0.149		
<b>SOI</b>	0.238	0.099	0.120	0.097	0.097	0.122	0.138	0.159	0.250	

After the measurement models have been successfully validated, the structural model can be analyzed to discover the relationship among the connected construct illustrated in figure 4.15.

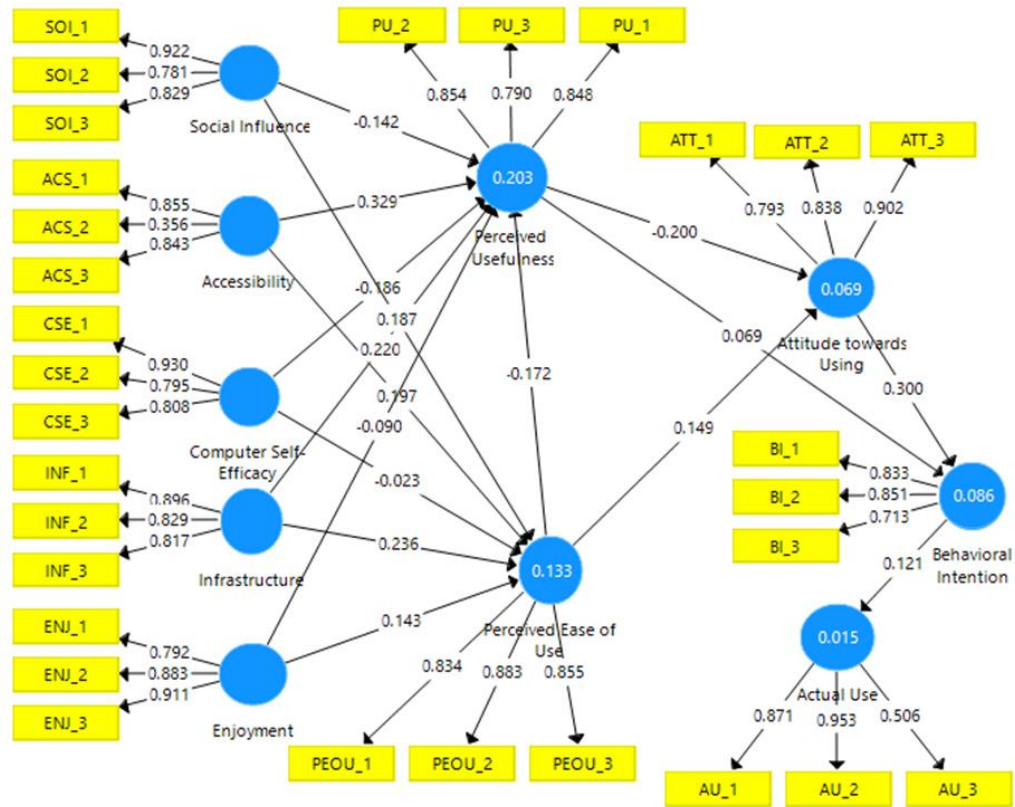


Figure 4.15: Proposed TAM model constructed in SmartPLS software

Figure 4.15 shows the results (path coefficients, crossloadings, and  $R^2$ ) of proposed model using structural equation modelling technique computed on SmartPLS software. The software used graphical symbols such as rectangles to represent indicator, circle to represent variables and regression paths are drawn between the independent and dependent variable which indicates their relationships with arrow. Factor loadings represents the validity between constructs, and coefficient of determinant ( $R^2$ ) on each independent construct represents the predictive power of the model.

#### 4.4 Predictive relevance

The predictive ability of the study model is calculated by the R-square meaning of the dependent variables, while the path coefficients are used to evaluate the potential of the hypothesized relationships (Goldberger, 1991). Result shows moderate and weaker

predictive strength of the proposed model with the value of  $R^2$  ranging from 0.203 to 0.015.  $R^2$  of perceived usefulness found to be 0.203 explains 20.5% of the variance which implies the moderate strength of predicting ability through that latent variable. Except perceived usefulness, other latent variable were found to be weaker. But, Kock (2013) stated that higher  $R^2$  is not evidence in favor of the model and criticized empirical research reports explaining their research as good as having higher value of  $R^2$ .

Table 4.9:  $R^2$  of the endogenous latent variables.

Construct	$R^2$
Perceived usefulness	0.203
Perceived ease of use	0.133
Behavioral intention	0.086
Attitude towards use	0.069
Actual Use	0.015

#### 4.5 Test of the hypotheses - Path coefficient

The path coefficient analysis was utilized to examine the multiple possible correlations within the established model. The model was evaluated by means of a bootstrap, a re-sampling procedure technique to obtain significance in the path. Bootstrapping refers to a non-parametric method to test the degree of importance through the least square partial square estimation (Chin, 1998). Table 4.10 shows the relationship, path coefficient ( $\beta$ ), t- value, p- value and decision. Hypothesis to be significance the 0.05 significance level (i.e.,  $p < 0.05$ ) requires a t-value  $> 1.657$  (Hair et al, 2017).

Table 4.10: Results of path analysis via structural model

H	Relationship	Path ( $\beta$ )	t-value	p-value	Decision
H1a	Social Influence -> Perceived Usefulness	-0.142	3.002	0.003	Supported**
H1b	Social Influence -> Perceived Ease of Use	0.187	5.265	0.000	Supported**
H2a	Accessibility -> Perceived Usefulness	0.329	2.400	0.017	Supported*

H2b	Accessibility -> Perceived Ease of Use	0.197	2.569	0.011	Supported*
H3a	Computer Self-Efficacy -> Perceived Usefulness	-0.186	3.869	0.000	Supported**
H3b	Computer Self-Efficacy -> Perceived Ease of Use	-0.023	0.503	0.615	Not supported
H4a	Infrastructure -> Perceived Usefulness	0.220	5.366	0.000	Supported**
H4b	Infrastructure -> Perceived Ease of Use	0.236	5.164	0.000	Supported**
H5a	Enjoyment -> Perceived Usefulness	-0.090	2.095	0.037	Supported*
H5b	Enjoyment -> Perceived Ease of Use	0.143	2.089	0.037	Supported*
H6	Perceived Ease of Use -> Perceived Usefulness	-0.172	3.015	0.003	Supported**
H7	Perceived Ease of Use -> Attitude towards Using	0.150	1.885	0.060	Not supported
H8	Perceived Usefulness -> Attitude towards Using	-0.200	4.575	0.000	Supported**
H9	Perceived Usefulness -> Behavioral Intention	0.070	1.639	0.102	Not supported
H10	Attitude towards Using -> Behavioral Intention	0.300	5.710	0.000	Supported**
H11	Behavioral Intention -> Actual Use	0.121	1.196	0.232	Not supported

significant at  $p^{**} \leq 0.01$ ,  $p^* < 0.05$

A structural equation model was used for analysis of the proposed model with data response data from 384 participants. A summary of the hypotheses testing results obtained with SmartPLS software is shown in Table 7. Twelve out of sixteen hypotheses were supported. In that, the hypotheses H1a, H1b, H2a, H2b, H3a, H4a,

H4b, H5b, H6, H7, H8, and H10 were supported, while hypotheses H3b, H7, H9, and H11 were found to be not supported from proposed model.

According to the study findings, there was a positive significance of social influence ( $\beta = 0.187$ ,  $P < 0.01$ ), accessibility ( $\beta = 0.197$ ,  $P < 0.05$ ), infrastructure ( $\beta = 0.236$ ,  $P < 0.01$ ) and enjoyment ( $\beta = 0.143$ ,  $P < 0.05$ ) on students' perceived ease of use of digital learning systems. In addition, social influence ( $\beta = -0.142$ ,  $P < 0.01$ ), accessibility ( $\beta = 0.329$ ,  $P < 0.05$ ), computer self-efficacy ( $\beta = -0.186$ ,  $P < 0.01$ ), infrastructure ( $\beta = 0.220$ ,  $P < 0.01$ ) and enjoyment ( $\beta = -0.090$ ,  $P < 0.05$ ) have positively influenced the students' perceived usefulness of digital learning systems. Computer self-efficacy was found to be statistically not significant to ( $\beta = -0.023$ ,  $P = 0.615$ ) perceived ease of use. This indicates that students' own ability to perform the task did not positively impact the degree of ability to use a technology as not challenging. Students' perceived ease of use digital learning has positive significance ( $\beta = -0.172$ ,  $P < 0.01$ ) to the perceived usefulness of digital learning which implies that if the system is easy and friendly to use it helps increasing the effectiveness and performance of learning which directs the result more productive. Although, perceived usefulness has led to influence positively ( $\beta = -0.200$ ,  $P < 0.01$ ) to the students' attitude to use digital learning systems, perceived ease of use failed ( $\beta = 0.150$ ,  $P = 0.060$ ) to impact positively in the attitude towards using digital learning tools. Students' perceived usefulness to use technology in learning has an insignificant positive effect ( $\beta = 0.070$ ,  $P = 0.102$ ) on their behavioral intention to use technology in learning, whereas attitude towards using technology in learning has significant positive effects ( $\beta = 0.300$ ,  $P < 0.01$ ) on behavioral intention to use technology. Students' behavioral intention to use digital learning could not significantly influence ( $\beta = 0.121$ ,  $P = 0.232$ ) actual use of digital learning tools. This may indicate that students' intention to use digital tools in learning could not adequately influence the actual use of technology.

## **CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Conclusions**

The result from the technology acceptance model revealed that social influence, accessibility, computer self-efficacy, infrastructure, and enjoyment have a significant impact on perceived ease of use of the digital learning system and also social influence, accessibility, infrastructure, and enjoyment were found to have a positive influence on the perceived usefulness of the digital learning system. Perceived ease of use has positive impacts on perceived usefulness. Perceived usefulness has positive influence on attitude towards using digital learning and Attitude towards using has positive behavioral Intention to use digital learning tools which supports in promoting the use of digital learning tools. Acceptance of digital learning by students would increase if the students perceive the use of digital learning to be simple and useful. This would further influence their attitude towards digital learning thereby influencing their intention to use digital learning more frequently which raise the actual use of digital learning technology. Therefore, it is important to discover the factors and relationships that affect students' intention to adopt digital learning or e-learning system for successful implementation and execution. Findings of the study present important implications for digital learning practice by students and integration of ICT for teaching learning in educational institutions. It made clear about the key driver (constructs in model) that should be consider while implementing digital learning system and its impact to the students in their adoption of digital learning technology.

97% students are ready to use ICT tools for learning but 46% were only ready to take online class throughout the week. Analyzing different result, we can conclude that this may have happened due lack of basic infrastructure or system though. The study also revealed that most of students were positive with the use of ICT use in educational activities, and they appreciate the use of ICT tools in enhancing teaching and learning.

Most of the educational institutions are sufficiently ready with (62% implemented digital tools, 85% having websites and more than 59% with ICT in curriculum and having proper ICT lab and also, they encourage students to use new technology which help to enhance their performance. ICT tools is enhancing the outcome of education.

Major challenges found to be stability and reliability of the internet (81%) and unexpected power cut (71%) and training to both student and teacher. Concern authority and stakeholder should be responsible to mitigate such problem seriously. Hence, the culture of ICT based digital learning systems should be promoted and developed.

## **5.2 Recommendations**

This research may be expanded further to define external variables that affect TAM and investigate their effect in digital learning and other relevant areas on TAM. Employing purposive sampling limits the participation of students who are away from researchers' focus so the results are difficult to generalize for all academic institutions in Kathmandu, Valley. Hence, future research should reach out students from all area in order to maximize the possibility of results generalization.

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## **PUBLICATION**

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## **APPENDIX I: Questionnaire for Survey**

**TRIBHUVAN UNIVERSITY**

**INSTITUTE OF ENGINEERING**

**PULCHOWK CAMPUS**

### **Department of Mechanical Engineering**

**Questionnaires for the Thesis: “Investigating E-Readiness and Factor Affecting the Acceptance of Digital Learning Among the Students of Kathmandu Valley: An Application of Technology Acceptance Model”**

Dear Participant,

My name is Shankar Bhattarai and I am a master degree student from Institute of Engineering, Pulchowk Campus, Tribhuvan University, Nepal. By answering this questionnaire, you will help me collecting the data to utilize on my thesis work. This survey aims at study is to investigate the e-readiness and factors affecting the digital learning acceptance among the students in Kathmandu, Valley. Thank you for your time and cooperation in this research study.

#### **Part 1: Students’ demographic Information and his/her exposure to ICT tools**

1. Name (Optional):
2. Age:
3. Gender

a. Male

b. Female

4. Educational Level/ Grade/Class:
  - a) Primary Level (up to Grade 5)
  - b) Basic Level (Grade 5 - 8)
  - c) Secondary (Grade 9 - 10)
  - d) Secondary (Grade 11 - 12) / Diploma / PCL
  - e) Bachelor
  - f) Master
  - g) PhD
  - h) Professional Certification (CPA, CA etc.)
  - i) Other:

5. Board of School/ College
  - a) School (upto Class 9)
  - b) Nepal Education Board (NEB), Nepal Government
  - c) Central Board of Secondary Education (CBSE)
  - d) Council for Technical Education and Vocational Training (CTEVT)
  - e) International Baccalaureate (IB)
  - f) Tribhuvan University
  - g) Pokhara University
  - h) Kathmandu University
  - i) Purbanchal University
  - j) Nepal Sanskrit University
  - k) Nepal Open University
  - l) ICAN/ICAI/ACCA
  - m) Lumbini Buddhist University
  - n) Autonomous Institute (Patan Academy of Health Sciences, NAMS Bir Hospital etc.)
  - o) Other University
6. School /Campus located at:
  - a) Kathmandu
  - b) Lalitpur
  - c) Bhaktapur
7. School / Campus Type:
  - a) Government / Community
  - b) Private / Institutional
  - c) International Affiliated
8. Do you have at least a Computer / Smartphone at your home?
  - a) Yes
  - b) No
  - c) Don't know
9. Do you have internet access to your home?
  - a) Yes
  - b) No
  - c) Don't know

- 9.1 If you have internet access, from which source do you use most to get access to the internet?
- a) Mobile Data
  - b) Wired Internet connection from ISP
  - c) Wireless connection from ISP
  - d) I don't know
  - e) Other
10. Select the device/s with which you are familiar with (Select all that apply)
- a) Projector
  - b) Printer
  - c) Scanner
  - d) Digital camera/ webcam
  - e) Audio devices like Microphone, Speaker etc.
  - f) Router
  - g) Pendrive / Hard Drive
  - h) Don't know any
11. Select the operation/s with which you are familiar with (you can select multiple options)
- a) Using Basic Applications (Like Word, PowerPoint, Browser etc.)
  - b) Managing files (Copy, paste, move, delete etc.)
  - c) Downloading Files/Application
  - d) Installing/Uninstalling Application
  - e) Sending Email
  - f) Posting Attachments (files, photos, video etc.) using Internet
  - g) Connect / Disconnect hardware
  - h) Repair Computer
  - i) Don't know any
12. With which social media, you engage the most.
- a) Facebook
  - b) YouTube
  - c) Instagram
  - d) Viber
  - e) Twitter
  - f) WhatsApp

- g) Other
  - h) I don't use any
13. Are you aware of Information Security?
- a) Yes
  - b) No
  - c) Don't know
14. Which app have you used for online class/ conference? (Select all that apply)
- a) Zoom
  - b) Microsoft Team
  - c) Google Classroom
  - d) Moodle Learning Management System
  - e) Google Meet
  - f) Skype
  - g) Other
  - h) I haven't used any
15. Are you ready to take online class for 6 hours a day and 6 days a week with proper breaks?
- a) Yes
  - b) No
  - c) Don't know

**Part 2: Application and Integration of ICTS in Institutions**

1. Do you have subject/s related to computer science in your curriculum?
  - a) Yes
  - b) No
  - c) Don't know
2. Are there enough computers for students and teachers in your school/college's computer lab?
  - a) Yes
  - b) No
  - c) Don't know
3. Do your teacher use any ICT tools on your class (like projector, laptop, other audio-visual devices etc.)

- a) Yes
  - b) No
  - c) Don't know
4. Does your teacher encourage you to use a computer/internet to do your homework?
- a) Yes
  - b) No
  - c) Don't know
5. Do all your teacher have good computer skills?
- a) Yes
  - b) No
  - c) Don't know
6. Does the institution have internet available for students?
- a) Yes
  - b) No
  - c) Don't know
7. Does your institution have a website?
- a) Yes
  - b) No
  - c) Don't know

**Part 3: Challenges to implement ICT tools in learning**

1. What are the main challenges that you faced during the online class/conference?  
(Select all that apply)
- a) Regular disconnecting problem during the class
  - b) Slow Internet speed
  - c) High cost for setup
  - d) Electricity cut-off/Power backup
  - e) Quality and Performance Monitoring
  - f) Resource Sharing
  - g) Lack of concentration / Distractions
  - h) Other

**Part 4: Application of Technology Acceptance Model (TAM)**

Answer the following questions by marking the most appropriate answer.

5= Strongly agree, 4= Agree, 3= Neutral, 2= Disagree, and 1= Strongly disagree.

**Perceived Usefulness (PU)**

Indicator	Question	Scale
PU_1	Using computer will improve my learning performance.	5 4 3 2 1
PU_2	Using digital learning would enhance the effectiveness of my learning	5 4 3 2 1
PU_3	I find computer a useful tool for my digital learning practice.	5 4 3 2 1

**Perceived Ease of Use (PEOU)**

Indicator	Question	Scale
PEOU_1	My interaction with computer and its basic applications are clear and understandable.	5 4 3 2 1
PEOU_2	Interacting with the computer system does not require a lot of my mental effort.	5 4 3 2 1
PEOU_3	I find computer's basic operations are easy to use.	5 4 3 2 1

**Attitude towards Using (ATT)**

Indicator	Question	Scale
ATT_1	I feel positive regarding the utilization of digital applications for my academic activities.	5 4 3 2 1
ATT_2	It is very desirable to use digital learning for academic and related purposes.	5 4 3 2 1
ATT_3	I like using digital technologies in my learning.	5 4 3 2 1

**Behavioral Intention (BI)**

<b>Indicator</b>	<b>Question</b>	<b>Scale</b>				
<b>BI_1</b>	I intend to use ICT tools regularly on my academic activities.	5	4	3	2	1
<b>BI_2</b>	I intend to use the Internet for searching information for my homework/assignment.	5	4	3	2	1
<b>BI_3</b>	I will use ICT tools for learning in the future.	5	4	3	2	1

**Actual Use (AU)**

<b>Indicator</b>	<b>Question</b>	<b>Scale</b>				
<b>AU_1</b>	I use the computer system frequently.	5	4	3	2	1
<b>AU_2</b>	I use the computer on a daily basis.	5	4	3	2	1
<b>AU_3</b>	Overall, to what extent do you use the computer technology in your academic activities?	5	4	3	2	1

**Social Influence (SOI)**

<b>Indicator</b>	<b>Question</b>	<b>Scale</b>				
<b>SOI_1</b>	My teachers think that I should use digital resource for learning activities.	5	4	3	2	1
<b>SOI_2</b>	Other students think that I should use digital resource for learning activities.	5	4	3	2	1
<b>SOI_3</b>	People who influence my opinion thinks that I should use digital resource for learning activities.	5	4	3	2	1

**Accessibility (ACS)**

<b>Indicator</b>	<b>Question</b>	<b>Scale</b>				
<b>ACS_1</b>	I have access to computer/smart phone whenever I need.	5	4	3	2	1
<b>ACS_2</b>	The speed and stability of the internet access is sufficient for my educational activities.	5	4	3	2	1

<b>ACS_3</b>	I can extract study resources using internet without any problems.	5	4	3	2	1
--------------	--------------------------------------------------------------------	---	---	---	---	---

### Computer Self-Efficacy (CSE)

<b>Indicator</b>	<b>Question</b>	<b>Scale</b>				
<b>CSE_1</b>	I have sufficient skills to use the computer system and applications.	5	4	3	2	1
<b>CSE_2</b>	I am able to use web browsers and search engines.	5	4	3	2	1
<b>CSE_3</b>	I feel that I am ready for digital learning.	5	4	3	2	1

### Infrastructure (INF)

<b>Indicator</b>	<b>Question</b>	<b>Scale</b>				
<b>INF_1</b>	My institute have enough computer lab for practical.	5	4	3	2	1
<b>INF_2</b>	I am satisfied with integration of ICT on teaching and learning on my institute.	5	4	3	2	1
<b>INF_3</b>	I am satisfied with the medium by which I get digital resources provided by my Institute.	5	4	3	2	1

### Enjoyment (ENJ)

<b>Indicator</b>	<b>Question</b>	<b>Scale</b>				
<b>ENJ_1</b>	I would feel more interested in study if I could use digital learning tools.	5	4	3	2	1
<b>ENJ_2</b>	I never feel bored using computer to support my learning.	5	4	3	2	1
<b>ENJ_3</b>	Using computer or/and digital tools is fun and enjoyable.	5	4	3	2	1

Thanks for your information and time.

## APPENDIX II: Survey Data Sample

### Response of questionnaire part 1 (Descriptive analysis)

S. no	Age	Gender	Board	Inst_Type	Location	Edu_Lvl	Comp_De	Internet	Internet_t	Info_Sec	Internet_a	School_w	Use_of_IC
1	12	Male	School	Govemnt	Kathmandu	Basic level	Yes	Yes	Wired Int	Don't know	Yes	Yes	Yes
2	17	Male	National I	Private / i	Kathmandu	Secondary	Yes	Yes	Wired Int	No	No	Yes	No
3	17	Female	National I	Private / i	Lalitpur	Secondary	Yes	Yes	Wired Int	Don't know	Yes	Yes	No
4	28	Male	Tribhuvan	Govemnt	Kathmandu	Bachelor	Yes	Yes	Wired Int	Yes	No	Don't know	No
5	20	Male	Tribhuvan	Govemnt	Lalitpur	Bachelor	Yes	Yes	Wired Int	Don't know	Yes	Yes	No
6	25	Female	Tribhuvan	Govemnt	Lalitpur	Masters level	Yes	Yes	Wired Int	Yes	Yes	Yes	No
7	15	Female	National I	Private / i	Kathmandu	Secondary	Yes	Yes	Wired Int	No	No	Yes	No
8	16	Male	National I	Govemnt	Kathmandu	Secondary	Yes	Yes	Wireless i	Yes	Yes	No	Yes
9	12	Male	School	Private / i	Kathmandu	Basic level	Yes	Yes	Wired Int	No	No	Yes	No
10	14	Female	National I	Govemnt	Kathmandu	Secondary	Yes	Yes	Wireless i	No	No	Yes	No
11	31	Male	Tribhuvan	Govemnt	Lalitpur	Masters level	Yes	Yes	Wired Int	Yes	Yes	Yes	Yes
12	28	Male	Tribhuvan	Govemnt	Lalitpur	Masters level	Yes	Yes	Wired Int	Yes	Yes	Yes	Yes
13	16	Female	National I	Govemnt	Kathmandu	Secondary	Yes	Yes	Mobile d	No	No	Yes	No
14	15	Female	Other Uni	Govemnt	Kathmandu	Secondary	Yes	Yes	Don't know	Yes	No	Yes	Yes
15	16	Male	Central B	Govemnt	Kathmandu	Secondary	Yes	Yes	Mobile d	Yes	Yes	Yes	Yes
16	21	Male	Tribhuvan	Private / i	Lalitpur	Bachelor	Yes	Yes	Wired Int	Yes	Yes	Yes	Yes
17	17	Male	Central B	Govemnt	Kathmandu	Secondary	Yes	Yes	Mobile d	Yes	Yes	Yes	Yes
18	14	Male	National I	Private / i	Kathmandu	Secondary	Yes	Yes	Wired Int	Don't know	No	Yes	No
19	15	Female	National I	Govemnt	Bhaktapur	Secondary	Yes	No	Mobile d	No	No	Don't know	No
20	16	Female	National I	Govemnt	Kathmandu	Secondary	Yes	Yes	Mobile d	Yes	Yes	Yes	Yes
21	15	Male	National I	Govemnt	Kathmandu	Secondary	Yes	Yes	Wired Int	No	Don't know	Yes	Yes
22	25	Female	Tribhuvan	Govemnt	Lalitpur	Masters level	Yes	Yes	Wired Int	Yes	Yes	Yes	No
23	20	Male	Tribhuvan	Govemnt	Lalitpur	Bachelor	Yes	Yes	Wired Int	Yes	Yes	Yes	No
24	15	Female	National I	Govemnt	Kathmandu	Secondary	Yes	Yes	Wired Int	Yes	Yes	Don't know	No
25	13	Female	School	Private / i	Kathmandu	Basic level	Yes	Yes	Wired Int	No	Yes	Yes	Yes
26	16	Male	National I	Private / i	Lalitpur	Secondary	Yes	Yes	Wired Int	No	Yes	Yes	No
27	20	Female	Purbanch	Private / i	Lalitpur	Bachelor	Yes	Yes	Wired Int	Yes	Yes	Yes	No
28	26	Other	Internatio	14	Kathmandu	Masters level	Yes	Yes	Wireless i	Yes	Yes	Yes	Yes
29	26	Male	Tribhuvan	Private / i	Kathmandu	Bachelor	Yes	Yes	Wired Int	Yes	Yes	Yes	Yes
30	26	Male	Tribhuvan	Private / i	Bhaktapur	Bachelor	Yes	Yes	Wired Int	Yes	Yes	Yes	No
31	26	Female	Purbanch	Govemnt	Bhaktapur	Bachelor	Yes	Yes	Wireless i	Yes	No	Yes	Yes
32	19	Male	National I	Private / i	Kathmandu	Secondary	Yes	Yes	Wireless i	Yes	No	Don't know	Yes
33	16	Male	National I	Private / i	Kathmandu	Secondary	Yes	Yes	Wireless i	Yes	No	Don't know	Yes
34	15	Male	National I	Private / i	Lalitpur	Secondary	Yes	Yes	Wireless i	Yes	Yes	Yes	Yes
35	25	Female	Kathmandu	Private / i	Lalitpur	Masters level	Yes	Yes	Wireless i	Yes	Yes	Yes	Yes
36	22	Female	Purbanch	Private / i	Kathmandu	Bachelor	Yes	Yes	Wireless i	Yes	Yes	Yes	Yes
37	20	Male	Tribhuvan	Private / i	Lalitpur	Bachelor	Yes	Yes	Wireless i	Yes	Yes	Yes	Yes
38	23	Female	National I	Private / i	Kathmandu	Bachelor	Yes	Yes	Wireless i	Yes	No	Yes	No
39	24	Female	Tribhuvan	Private / i	Kathmandu	Bachelor	Yes	Yes	Wireless i	Yes	Yes	Yes	Yes
40	24	Male	Tribhuvan	Govemnt	Kathmandu	Masters level	Yes	Yes	Wired Int	Yes	No	Yes	Yes
41	15	Male	National I	Private / i	Kathmandu	Secondary	Yes	No	Mobile d	Don't know	Don't know	Yes	No
42	14	Male	National I	Govemnt	Kathmandu	Secondary	Yes	Yes	Wired Int	No	No	Yes	Yes
43	25	Female	Tribhuvan	Private / i	Bhaktapur	Masters level	Yes	Yes	Wireless i	Yes	No	Yes	Yes
44	20	Female	Purbanch	Private / i	Lalitpur	Bachelor	Yes	Yes	Wired Int	Yes	Yes	Yes	No
45	15	Male	Central B	Govemnt	Kathmandu	Secondary	No	Yes	Wireless i	Don't know	Yes	Yes	No
46	16	Male	National I	Private / i	Kathmandu	Secondary	Yes	Yes	Don't know	Yes	Don't know	Don't know	No
47	20	Male	Tribhuvan	Govemnt	Kathmandu	Bachelor	Yes	Yes	Wireless i	Yes	Yes	No	No
48	26	Female	Tribhuvan	Govemnt	Lalitpur	Masters level	Yes	Yes	Wireless i	No	No	Yes	Yes
49	23	Male	Council f	Private / i	Kathmandu	Secondary	Yes	Yes	Wireless i	No	Don't know	Yes	No
50	23	Male	Pokhara U	Private / i	Lalitpur	Bachelor	Yes	Yes	Mobile d	Yes	Yes	Yes	Yes
51	12	Male	National I	Private / i	Bhaktapur	Secondary	Yes	Yes	Wired Int	No	No	Yes	No
52	25	Female	Tribhuvan	Govemnt	Kathmandu	Masters level	Yes	Yes	Wireless i	Yes	No	Yes	Yes
53	13	Male	Other Uni	Private / i	Bhaktapur	Secondary	Yes	Yes	Wireless i	Yes	No	Yes	No
54	27	Male	Tribhuvan	Govemnt	Kathmandu	Masters level	Yes	Yes	Wired Int	Yes	Yes	Yes	Yes
55	27	Female	Tribhuvan	Private / i	Lalitpur	Bachelor	Yes	Yes	Wired Int	Yes	Yes	Yes	Yes
56	23	Female	Purbanch	Private / i	Kathmandu	Bachelor	Yes	Yes	Wired Int	No	Yes	Don't know	Yes
57	18	Male	National I	Govemnt	Kathmandu	Secondary	No	Yes	Mobile d	Don't know	No	No	No
58	26	Female	National I	Private / i	Bhaktapur	Bachelor	Yes	Yes	Wired Int	Yes	Yes	Yes	Yes
59	22	Female	Other Uni	Internatio	Kathmandu	Bachelor	Yes	Yes	Wireless i	Yes	Yes	Yes	Yes



## APPENDIX III: Plagiarism Report

Shankar\_VI

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## APPENDIX IV: Research Paper

### Determining the Factors Affecting on Digital Learning Adoption among the Students in Kathmandu Valley: An Application of Technology Acceptance Model (TAM)

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#### ABSTRACT

This study investigated students' perception towards acceptance of digital transformation in teaching-learning activities studying at different levels in Kathmandu valley (includes 3 districts: Kathmandu, Lalitpur, and Bhaktapur), Nepal. Using the Technology Acceptance Model (TAM) as a research framework to examine the factors affecting how students come to accept and use technology. The literature review indicated that social influence, accessibility, computer self-efficacy, infrastructure, and perceived enjoyment were the most common external factors of TAM. A total of 384 students were participated in the study. Different statistical analyses have been performed in order to test the significance of the considered factors that may affect the digital learning practices of students. The result of the data analysis revealed that social influence, accessibility, computer self-efficacy, infrastructure, and enjoyment have a significant impact on perceived ease of use of the digital learning system. Furthermore, social influence, accessibility, computer self-efficacy, infrastructure, and enjoyment were also found to have a positive influence on the perceived usefulness of the digital learning system. The Digital learning system is changing the traditional practice of learning with technology and innovation. The study support that using digital tools in education makes academic activities more interesting, easy to access, creative, effective, and productive.

**Keywords**— Digital Education Adoption, ICT Integration, Technology Acceptance Model (TAM)

#### I. INTRODUCTION

Digital advancements have penetrated all aspects of human lives. Information and Communication Technology (ICT) has become an integral part which has affected the lives of individuals and their daily activities, observing the state of play using these tools for educational purposes has become a common essential and has brought significant changes in the traditional teaching-learning methods. During this time its usage has grown enormously [39]. Having proper devices, the student can have access to the information what they required from anywhere and

anytime they want, also they can communicate with resource person. They can become digitally proficient only when they receive sufficient opportunities to use technology and to learn and enhance their digital skills in their education. Schools around the world are not utilizing computers or ICT, as a substitution for day to day regulatory work, but have managed to integrate it into core classroom teaching thus bringing in a paradigm shift on traditional teaching-learning procedures. When a learning environment is encouraged with innovations, an advancement is seen within the quality of learning, accessibility, the cost-effectiveness of education can be visualized while the cost of education decreases. Because of these advantages, the integration of ICT in education has gained a lot of importance.

The importance of digitization on education is still underlying in our Nepalese education System. Since information and communication technology adoption in education is still not mature, many of the faculty members and students are not very comfortable in using the new technologies. It is not only changing the way teaching and learning activities but it also builds the skill set to be competitive in the current and future technological age [30]. Now the generation student is seeking the quality education from anywhere they are and at any time they wish which doesn't make a difference in any part of the county they are living; they can join the course and begin learning. With the rapid innovation and technological change, we need to ensure that students and institutions are adequately equipped to utilize technology tools efficiently for educational purposes. There was a need for a comprehensive theoretical model that can fully understand the factors affecting the digital learning adoption among the students of Kathmandu valley, Nepal hence, Technology Acceptance Model (TAM) was employed to analyse and examine students' perception and factor that influence the adoption of technology in their academic activities.

#### II. LITERATURE REVIEW

Digital Transformation is the changes that digital technology such as social media, mobile, analytics or embedded devices causes or influences in all aspects of human life [36]. Digitization in education is educational model used, based on the use of electronic media like computer, mobile devices, the Internet, software applications, and other types of digital technology [34]. It possible to improve the teaching learning process connecting the students and teacher and also wide range of information in an efficient manner using ICT tools.

The Ministry of Education Nepal had prepared the strategies “ICT in Education Master Plan 2013–2017” in which the need for ICT in education had figured out, accordingly they applied efforts in promoting digital literacies and the use of technologies in education in Nepal [14]. Also, Government of Nepal developed a formal ICT policy in 2015 which also includes the steps to integrate technology into education within the entire Nepalese educational system by enhancing its accessibility [15]. The later School Sector Development Plan (SSDP) 2016-2023 target to utilize ICT as a significant tool to improve educational content delivery, maximize access to teaching learning resources and escalate the effectiveness and efficiency of educational activities [16]. However, one must understand the fact that current presence of technology does not satisfy and guarantee the successful implementation of ICT. Research in numerous developing countries like Nepal has revealed that technology integration in academics, infrastructure alone does not satisfy the requirement [18].

Technology Acceptance Model (TAM) was introduced by Devis D. Fred in 1986 A.D. shown in Figure 1, which deals more specifically with the prediction of the acceptability of an information system. It was developed based on the Theory of Reasoned Action (TRA), to test user acceptance and use of information systems. According to the theory, two personal belief perceived ease of use and perceived usefulness are affected by external factors and estimate the significance towards using a technology [20]. The attitude towards using then affects the behavioral intention to use a technology, which ultimately estimates the actual system use [31]. Perceived usefulness (PU) indicates the prospective user's subjective probability that using a specific application system will increase his or her performance within a context. Perceived ease of use (PEOU) refers to the degree to which the prospective user anticipates the target system to be effortlessly [9]. TAM model has become a robust model that is applicable for predicting the acceptance of various technologies [32].

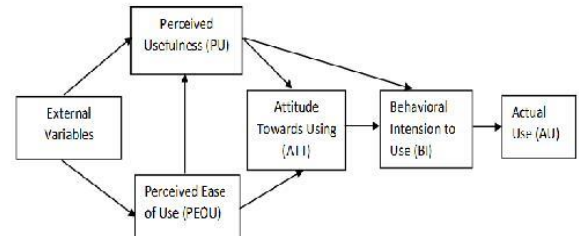


Figure 1: Technology Acceptance Model (TAM) [8]

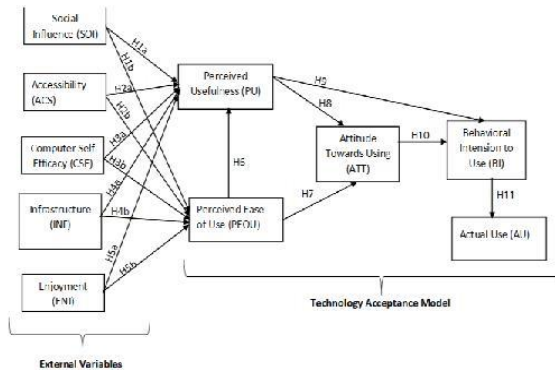
The intention to use technology was explored among the Malaysian student teachers using TAM which supported all the proposed hypotheses found that perceived usefulness, perceived ease of use and attitude towards use of computer are significantly influenced intention to use technology [24].

A study of Social Media for e-Learning in Libyan Higher Education was conducted in which Perceived Ease of Use and Perceived Usefulness of social networking media are considered as the key factors in measuring the students' and teachers' behavioral intention of accepting [3] and using e-learning in Libyan higher education which results use of social networking media plays an important role in the adoption of e-learning in Libyan higher education [10, 11]. As hypothesized, social networking media significantly affects both the Perceived Ease of Use and Perceived Usefulness for both students and teachers.

### III. RESEARCH FRAMEWORK

#### 3.1 Proposed Extension of TAM External Factors, and the Research Hypotheses

TAM has been used extensively to understand technology adoption in the domain of information systems, and it has been accepted as a reliable model to determine individual adoption of a technology. A number of studies had introduced external variables into TAM and investigate whether they affect the core TAM constructs PU, PEOU, ATT, BI and AU and their correlations. Utilizing the original TAM as the core framework, this study proposes an extension of it by introducing five external variables within it. Social Influence (SOI), Accessibility (ACS), Computer Self Efficacy (CSE), Infrastructure (INF) and Enjoyment (ENJ) are integrated in the original TAM as external variables that determine the students' perceptions towards the use of technology for learning. The proposed model is illustrated in Figure 2.



**Figure 2:** Proposed research model for technology acceptance

### 3.1.1 Social Influence (SOI)

The social influence indicates the degree to which an individual perceives that most people who are important to him or her thinks he or she should or should not use the technology [4]. It was identified in previous researches that there is a significant impact of social influence (SOI) on perceived usefulness (PU) and perceived ease of use (PEOU) of digital learning [4, 32]. Therefore, the following hypotheses were formulated:

**H1a:** Social influence (SOI) has a positive effect on perceived usefulness (PU).

**H1b:** Social influence (SOI) has a positive effect on perceived ease of use (PEOU).

### 3.1.2 Accessibility (ACS)

Accessibility (ACS) refers to the degree of ease of how a user have access and can use the tools to extract the required information from the system [1]. It was suggested that the higher the accessibility of the digital learning system, the greater the students perceive the system as easy to use [33]. According to [2], system accessibility provides a direct indication of the perceived ease of use of a website. There is a significant impact of accessibility on perceived ease of use of digital learning system [32]. The results of previous research revealed that there was a significant effect of accessibility on perceived ease of use (PEOU) [5] as well as on perceived usefulness (PU) [6] of digital learning system. Hence, the following hypotheses are suggested:

**H2a:** Accessibility (ACS) has a positive effect on perceived usefulness (PU).

**H2b:** Accessibility (ACS) has a positive effect on perceived ease of use (PEOU).

### 3.1.3 Computer Self-Efficacy (CSE)

Computer self-efficacy is the degree to which an individuals' confidence in their own capacity to perform a specific task using the computer or any digital tools [33]. It

was demonstrated in various empirical studies that computer self-efficacy (CSE) had a significant effect on the perceived usefulness (PU) and perceived ease of use of technology (PEOU) [12, 27]. Therefore, the following hypotheses were formulated:

**H3a:** Computer self-efficacy (CSE) has a positive effect on perceived usefulness (PU).

**H3b:** Computer self-efficacy (CSE) has a positive effect on perceived ease of use (PEOU).

### 3.1.4 Infrastructure (INF)

ICT Infrastructure refers to the Information and communication technology infrastructure encompasses computer system including software, hardware, mobile phones, internet, servers, websites and other technologies [25]. Infrastructure indicates the availability of the related resources i.e. technical help, internet infrastructure, hardware, software, training, online help to work. Previous studies [41, 38] suggested infrastructure is a key belief that influences user adoption of technology. A number of prior studies found infrastructure's significant effects on PU and PEOU [26, 38]. Two hypotheses are made about the relationship with infrastructure:

**H4a:** Infrastructure (INF) has a positive effect on perceived usefulness (PU).

**H4b:** Infrastructure (INF) has a positive effect on perceived ease of use (PEOU).

### 3.5 Enjoyment (ENJ)

Enjoyment indicates that "the extent to which the activity of individual using a particular system (in this research electronics devices as a learning tools) is perceived to be enjoyable and entertained" [40]. Enjoyment is a significant factor that explains the learning adoption or acceptance. It was demonstrated in previous research that Enjoyment has a significant effect on perceived ease of use [10] and perceived usefulness [28] of digital learning. Therefore, the following hypotheses were formulated:

**H5a:** Enjoyment (ENJ) has a positive effect on perceived usefulness (PU).

**H5b:** Enjoyment (ENJ) has a positive effect on perceived ease of use (PEOU).

### 3.1.6 Hypotheses Related to Five Core Technology Acceptance Model (TAM) Constructs

Applying the measuring parameters introduced by TAM [9] focusing to estimate the technology acceptance behavior and considering the prior TAM based researches and their findings.

Perceived usefulness (PU) refers to the degree to which individuals believe that the use of a new technology can improve their work performance where Perceived ease of use (PEOU) refers to the degree to which the student believes that using digital learning tools will be free from mental or physical effort [9, 29]. These two are the main measuring construct of TAM. This research offered the

following core TAM hypotheses for acceptance of digital learning.

**H6:** Perceived ease of use (PEOU) has a significant positive effect on perceived usefulness (PU).

**H7:** Perceived ease of use (PEOU) has a significant positive effect on students attitude towards using (ATT).

**H8:** Perceived usefulness (PU) has a significant positive effect on attitude toward using (ATT).

**H9:** Perceived usefulness (PU) has a significant positive effect on behavioral intention to use (BI).

**H10:** Attitude towards using (ATT) has a significant positive effect on their behavioral intention to use (BI).

**H11:** Behavioral intention to use (BI) has a significant positive effect on their (AU).

#### IV. METHODOLOGY

This study followed a quantitative approach-based data analysis to examine the students' status and acceptance of technology using the TAM framework including external variables. The participants were students at different education levels enrolled at School to University in Kathmandu Valley, Nepal. Data was collected using a questionnaire designed in two parts, a total of 35 questions among which first part consists of 5 questions related to demography and the second part is the main component of the questionnaire which consists of 30 questions to investigate the 10 constructs SOI, ACS, CSE, INF, ENJ, PEOU, PU, ATT, BI, and AU of TAM on a five-point Likert scale ranging from 1 as "Strongly Disagree" to 5 as "Strongly Agree". The measurement scales were adapted from previously studied and validated measures [8, 9, 41]. Appendix illustrates the constructs and their items question. The descriptive and inferential analysis of the obtained data was accomplished with the help of the Statistical Package of Social Science (SPSS) software (version 25.0) from IBM then modeling the structured equation model (SEM) to measure loadings, reliability, validity, path estimation, and hypotheses test was performed resulting significant effects between constructs of TAM with the help of SmartPLS software (version 3.3.2). The association between the indicators and latent construct was measured as described by the measurement model which examines the significance between the variables of the proposed model.

##### 4.1 Data Collection and Sample Size

In this research a structured and self-reported questionnaire was used for collecting data. Since purposive sampling approach was employed when the participants were easily accessible and were ready to be involved in the research [4], employing purposive sampling technique 450 questionnaires were circulated via digital medium (web-based survey using social network, e-mail and messaging application) as well also physically among the students in

Kathmandu valley studying at different level (School to University) having different ages who were part of the study sample. Out of 450 selected participants, 384 participants responded with completely filled valid form giving a response rate of 85.33 percent. Sample size of 384 can be considered to be an acceptable sample size for an approximate population up to 1,000,000 [23].

#### V. RESEARCH FINDINGS

##### 5.1 The Demographic Data

Out of the 384 respondents 221 (57.55%) were male, 163 (42.46%) were female. Most of the respondents 224 (58.33%) were at the age range of 15-24. Among the rest of the respondents, 104 (27.08%) were at age range of 25-34, 38 (9.9%) were at below 14 years and 18 (4.69%) were at above 34 years. 214 (55.7%) of respondents were from Kathmandu district, 129 (33.6%) of respondents were from Lalitpur district and 41 (10.7%) of respondents were from Bhaktapur district. Most of the respondents of the study are university students, 35.68% individuals were at bachelor level, 30.7% were at school level (up to grade 10), 20.05% were at master or higher level, 13.02% were at intermediate level (grade 11-12 or diploma or PCL) while the remaining 0.78% were enrolled for some kinds of professional certification. Table 1 presents the complete demographic data of the respondents.

TABLE 1: Students' Demographics Data of the Study Sample

Characteristics	Answer	Frequency	Percent (%)
Gender	Male	221	57.55
	Female	163	42.46
	Total	384	100
Age	Up to 14	38	9.90
	15-24	224	58.33
	25-34	104	27.08
	Above 34	18	4.69
	Total	384	100
District	Kathmandu	214	55.7
	Lalitpur	129	33.6
	Bhaktapur	41	10.7
	Total	384	100
Level of education	Up to Grade 10	117	30.47
	Grade 11-12/ Diploma/PCL	50	13.02
	Other Professional Certification	3	0.78
	Bachelor	137	35.68

	Master and Higher	77	20.05
	Total	384	100

### 5.2 Reliability

A Cronbach Alpha was considered to be the most common method used for measuring the stability and consistency of the instrument to ensure that all the items in the scale were sufficiently inter-related [35] which is shown in Table-2. In order to examine the data collection instrument, all variables of the research model have been evaluated for reliability, convergent and discriminant validity.

### 5.3 Validity

There are two kinds of validities that are needed for evaluating the measurement model, which are the convergent validity and discriminant validity [7, 19]. The degree to which theoretically similar constructs are related to each other is given by convergent validity, while the degree to which there are differences between two constructs is given by discriminant validity [32].

#### 5.3.1 Convergent Validity

Cronbach alpha was undertaken to test convergent validity and internal reliability of the factors which measures the inter-relatedness of the items used in the test. A Cronbach alpha value of 0.70 or above is considered to be acceptable. Also, composite reliability (CR) and average variance extracted (AVE) reliability tests were employed to measure the internal consistency on items of each TAM construct. To find out convergent validity, Smart PLS ver. 3.3.2 software was used. Table 2 shows the items for every construct, Cronbach's' alpha, composite reliabilities (CR) and average variance extracted (AVE). The internal consistency is satisfactory since the values of Cronbach's' alpha, CR and AVE of each construct are greater than acceptance scale (Factor loading, Cronbach's Alpha, CR  $\geq$  0.70 & AVE  $>$  0.5). In this research, among all of constructs, accessibility lags with small scale in Cronbach's' alpha but valid the CR and AVE shown in Table 2.

TABLE 2: Result of Constructs' Reliability

Construct	Cronbach's Alpha	CR	AVE
Accessibility	0.6768	0.7464	0.5225
Actual Use	0.8288	0.8343	0.6408
Attitude towards Using	0.7987	0.8823	0.7147
Behavioral Intention	0.7201	0.8426	0.6422
Computer Self-Efficacy	0.8103	0.8827	0.7161
Enjoyment	0.8355	0.8977	0.746
Infrastructure	0.8113	0.8846	0.719
Perceived Ease of Use	0.8204	0.8929	0.7354
Perceived Usefulness	0.7758	0.87	0.6907
Social Influence	0.8262	0.8826	0.7158

### 5.3.2 Discriminant Validity

The degree to which one construct differs from all other constructs in the research model refers to discriminant validity. To determine of the discriminant validity, three measures should be taken into account they are: the Fornell-Larcker scale (i.e., the square root of AVE), crossloadings, and the Heterotrait-Monotrait ratio of correlations (HTMT) [7] which are shown in Table 4, Table 5 and Table 6 respectively. The heterotrait-monotrait ratio (HTMT) of correlations is the newer technique put forward to evaluate discriminant validity in partial least squares structural equation modelling (PLS-SEM), which is a significant foundation for examine the model.

Fornell-Lacker criterion compares the square root of the average variance extracted (AVE) with the correlation of latent constructs [17]. The table 4 shows that the square root of the AVE values remains higher as compared to the suggested value of 0.5 by being in the range of 0.723 and 0.864. If the value of the HTMT is higher than this threshold, there is a lack of discriminant validity. Some authors suggest a threshold of 0.85 [21], whereas others propose a value of 0.90 [37]. In the cross-loading table, the value of factor loading indicators should be higher than 0.70 to be valid [17]. Out of total 30, 28 items qualify the acceptance criteria of loading determinants where ACS\_2 and AU\_3 could not meet. After the measurement models have been successfully validated, the structural model can be analyzed to discover the relationship among the connected construct.

### 5.4 Structural Model Evaluation

Figure 3 shows the results from the structural equation modelling which presents all of the constructs and their relationships with standardized path coefficients between model constructs, factor loadings between items and constructs, and coefficient of determinant ( $R^2$ ) for each independent constructs. Table 3 shows the calculated  $R^2$  Square values of the endogenous latent variable of proposed model.

To analyze the various hypothesized associations in the developed model, the path coefficient analysis has been employed. The model was made to run through a bootstrap re-sampling routine to obtain the path significances. Bootstrapping refers to a nonparametric technique to examine the significance level of partial least square estimates [7]. Table-7 shows the relationship, path coefficient ( $\beta$ ), t- value, p- value and decision. Hypothesis to be significance the 0.05 significance level (i.e.,  $p < 0.05$ ) requires a t-value  $>$  1.657.

TABLE 3: R<sup>2</sup> of the Endogenous Latent Variable

Construct	R <sup>2</sup>
Perceived usefulness	0.203
Perceived ease of use	0.133
Behavioral intention	0.086
Attitude towards use	0.069
Actual Use	0.015

The predictive power of the research model is determined by the R-square value of the dependent variables, while the capacity of the hypothesized relations is analyzed using the path coefficients [22]. From the previous researches it was found that most of the developed model had higher value of R<sup>2</sup> but in this model it was found comparatively low ranging 0.203 to 0.015, it signifies that predictive power of this model is moderate or low. But higher R<sup>2</sup> is not evidence in favor of the model and criticized empirical research reports explaining their research model as good as having higher value of R<sup>2</sup> [13].

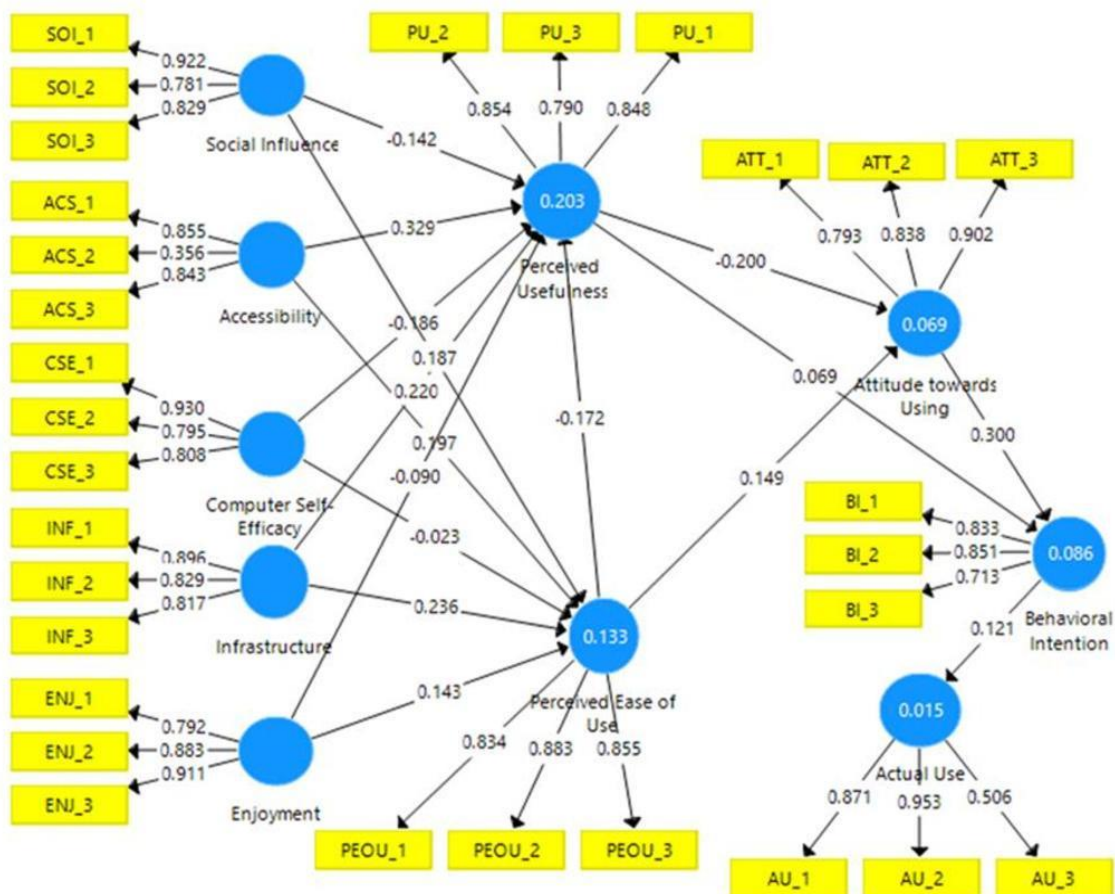


Figure 3: Proposed TAM model constructed in SmartPLS software

## V. DISCUSSION

A structural equation model was used to analyze the data collected from 384 participants. A summary of the hypotheses testing results is shown in Table 7. Twelve out

of sixteen hypotheses were supported. In that, the hypotheses H1a, H1b, H2a, H2b, H3a, H4a, H4b, H5b, H6, H7, H8, and H10 were supported, while hypotheses H3b, H7, H9, and H11 were found to be not supported from proposed model.

TABLE 4: Fornell-Larcker Scale

	ACS	AU	ATT	BI	CSE	ENJ	INF	PEOU	PU	SOI
ACS	0.723									
AU	-0.071	0.801								
ATT	-0.084	0.415	0.845							
BI	0.037	0.121	0.285	0.801						
CSE	0.146	0.036	0.124	0.059	0.846					
ENJ	-0.062	0.166	0.352	0.095	0.013	0.864				
INF	-0.051	0.128	0.125	0.213	0.038	0.035	0.848			
PEOU	0.172	0.118	0.170	0.155	0.003	0.135	0.210	0.858		
PU	0.267	-0.067	-0.216	0.005	-0.122	-0.126	0.171	-0.105	0.831	
SOI	-0.005	0.074	0.074	-0.068	-0.068	-0.020	-0.104	0.160	-0.180	0.846

TABLE 5: Cross-Loading Results

	ACS	ATT	AU	BI	CSE	ENJ	INF	PEOU	PU	SOI
ACS 1	<b>0.855</b>	-0.162	-0.093	0.077	0.169	-0.092	0.047	0.094	0.238	-0.085
ACS 2	<b>0.356</b>	0.072	-0.020	0.131	0.003	0.092	-0.063	0.164	-0.166	0.241
ACS 3	<b>0.843</b>	0.038	-0.028	0.010	0.070	0.009	-0.140	0.218	0.165	0.123
ATT 1	0.096	<b>0.793</b>	0.267	0.245	0.016	0.304	0.153	0.242	-0.089	-0.037
ATT 2	-0.138	<b>0.838</b>	0.371	0.203	0.049	0.335	0.070	0.128	-0.218	0.168
ATT 3	-0.163	<b>0.902</b>	0.410	0.272	0.236	0.258	0.093	0.070	-0.236	0.059
AU 1	-0.019	0.375	<b>0.871</b>	0.074	0.022	0.176	0.142	0.074	-0.049	0.033
AU 2	-0.092	0.370	<b>0.953</b>	0.116	0.030	0.140	0.091	0.124	-0.070	0.083
AU 3	-0.021	0.134	<b>0.506</b>	-0.026	-0.029	0.096	0.016	0.026	-0.035	0.002
BI 1	0.030	0.203	0.088	<b>0.833</b>	0.052	0.053	0.072	0.107	-0.077	-0.061
BI 2	0.028	0.272	0.086	<b>0.851</b>	0.130	0.088	0.158	0.145	0.031	-0.030
BI 3	0.033	0.199	0.117	<b>0.713</b>	-0.059	0.083	0.271	0.114	0.040	-0.078
CSE 1	0.130	0.127	0.030	0.007	<b>0.930</b>	0.081	0.010	-0.001	-0.138	-0.073
CSE 2	0.067	0.008	-0.039	0.109	<b>0.795</b>	-0.136	0.043	0.010	-0.085	-0.040
CSE 3	0.201	0.204	0.136	0.069	<b>0.808</b>	0.063	0.069	0.003	-0.058	-0.052
ENJ 1	-0.104	0.358	0.170	0.155	-0.075	<b>0.792</b>	0.086	0.104	-0.030	0.008
ENJ 2	-0.057	0.237	0.121	0.078	0.058	<b>0.884</b>	0.010	0.107	-0.129	-0.013
ENJ 3	-0.026	0.344	0.154	0.052	0.014	<b>0.912</b>	0.020	0.135	-0.134	-0.034
INF 1	-0.056	0.081	0.087	0.221	0.076	-0.008	<b>0.896</b>	0.204	0.196	-0.117
INF 2	-0.016	0.179	0.149	0.203	0.025	0.063	<b>0.829</b>	0.186	0.130	-0.070
INF 3	-0.062	0.043	0.090	0.072	-0.043	0.051	<b>0.817</b>	0.122	0.074	-0.064
PEOU 1	0.123	0.290	0.087	0.032	-0.062	0.152	0.105	<b>0.834</b>	-0.037	0.172
PEOU 2	0.131	0.136	0.184	0.134	0.003	0.109	0.174	<b>0.883</b>	-0.143	0.163
PEOU 3	0.195	-0.013	0.025	0.251	0.079	0.080	0.276	<b>0.855</b>	-0.092	0.068
PU 1	0.217	-0.209	-0.091	0.012	-0.147	-0.103	0.075	-0.084	<b>0.848</b>	-0.089
PU 2	0.283	-0.193	-0.037	-0.074	-0.008	-0.151	0.097	-0.096	<b>0.854</b>	-0.104
PU 3	0.170	-0.140	-0.040	0.068	-0.146	-0.063	0.243	-0.081	<b>0.790</b>	-0.243
SOI 1	0.085	0.023	0.058	-0.048	-0.027	-0.110	-0.041	0.150	-0.220	<b>0.922</b>
SOI 2	-0.035	0.026	-0.044	-0.054	0.008	0.025	-0.098	0.029	-0.045	<b>0.781</b>
SOI 3	-0.127	0.138	0.106	-0.077	-0.128	0.108	-0.163	0.159	-0.096	<b>0.829</b>

**TABLE 6:** Heterotrait-Monotrait (HTMT) Ratio

	ACS	AU	ATT	BI	CSE	ENJ	INF	PEOU	PU	SOI
ACS										
AU	0.113									
ATT	0.215	0.416								
BI	0.143	0.112	0.368							
CSE	0.205	0.109	0.212	0.146						
ENJ	0.146	0.194	0.445	0.137	0.139					
INF	0.142	0.134	0.165	0.260	0.079	0.083				
PEOU	0.277	0.122	0.254	0.207	0.105	0.158	0.259			
PU	0.335	0.079	0.274	0.123	0.179	0.157	0.205	0.149		
SOI	0.238	0.099	0.120	0.097	0.097	0.122	0.138	0.159	0.250	

**TABLE 7:** Results of Path Analysis via Structural Model

H	Relationship	Path ( $\beta$ )	t-value	p-value	Decision
H1a	Social Influence -> Perceived Usefulness	-0.142	3.002	0.003	Supported**
H1b	Social Influence -> Perceived Ease of Use	0.187	5.265	0.000	Supported**
H2a	Accessibility -> Perceived Usefulness	0.329	2.400	0.017	Supported*
H2b	Accessibility -> Perceived Ease of Use	0.197	2.569	0.011	Supported*
H3a	Computer Self-Efficacy -> Perceived Usefulness	-0.186	3.869	0.000	Supported**
H3b	Computer Self-Efficacy -> Perceived Ease of Use	-0.023	0.503	0.615	Not supported
H4a	Infrastructure -> Perceived Usefulness	0.220	5.366	0.000	Supported**
H4b	Infrastructure -> Perceived Ease of Use	0.236	5.164	0.000	Supported**
H5a	Enjoyment -> Perceived Usefulness	-0.090	2.095	0.037	Supported*
H5b	Enjoyment -> Perceived Ease of Use	0.143	2.089	0.037	Supported*
H6	Perceived Ease of Use -> Perceived Usefulness	-0.172	3.015	0.003	Supported**
H7	Perceived Ease of Use -> Attitude towards Using	0.150	1.885	0.060	Not supported
H8	Perceived Usefulness -> Attitude towards Using	-0.200	4.575	0.000	Supported**
H9	Perceived Usefulness -> Behavioral Intention	0.070	1.639	0.102	Not supported
H10	Attitude towards Using -> Behavioral Intention	0.300	5.710	0.000	Supported**
H11	Behavioral Intention -> Actual Use	0.121	1.196	0.232	Not supported

significant at  $p^{**} \leq 0.01$ ,  $p^* < 0.05$

According to the study findings, there was a positive significance of social influence ( $\beta = 0.187$ ,  $P < 0.01$ ), accessibility ( $\beta = 0.197$ ,  $P < 0.05$ ), infrastructure ( $\beta = 0.236$ ,  $P < 0.01$ ) and enjoyment ( $\beta = 0.143$ ,  $P < 0.05$ ) on students' perceived ease of use of digital learning systems. In addition, social influence ( $\beta = -0.142$ ,  $P < 0.01$ ), accessibility ( $\beta = 0.329$ ,  $P < 0.05$ ), computer self-efficacy ( $\beta = -0.186$ ,  $P < 0.01$ ), infrastructure ( $\beta = 0.220$ ,  $P < 0.01$ ) and enjoyment ( $\beta = -0.090$ ,  $P < 0.05$ ) have positively influenced the students' perceived usefulness of digital learning systems. Computer self-efficacy was found to be statistically not significant to ( $\beta = -0.023$ ,  $P = 0.615$ ) perceived ease of use. This indicates that students' own ability to perform the task did not positively impact the degree to which an individual perceives that the use of a

technology would not be complicated. Students' perceived ease of use digital learning has positive significance ( $\beta = -0.172$ ,  $P < 0.01$ ) to the perceived usefulness of digital learning which implies that if the system is easy and friendly to use it helps increasing the effectiveness and performance of learning which directs the result more productive. Although, perceived usefulness has led to influence positively ( $\beta = -0.200$ ,  $P < 0.01$ ) to the students' attitude to use digital learning systems, perceived ease of use failed ( $\beta = 0.150$ ,  $P = 0.060$ ) to impact positively in the attitude towards using digital learning tools. Students' perceived usefulness to use technology in learning has an insignificant positive effect ( $\beta = 0.070$ ,  $P = 0.102$ ) on their behavioral intention to use technology in learning, whereas attitude towards using technology in learning has significant positive effects ( $\beta = 0.300$ ,  $P < 0.01$ ) on behavioral intention to use technology. Students'

behavioral intention to use digital learning could not significantly influence ( $\beta = 0.121$ ,  $P = 0.232$ ) actual use of digital learning tools. This may indicate that students' intention to use digital tools in learning could not adequately influence the actual use of technology.

Therefore, this research focused finding the factors and their relationship with other factors how they influence the adoption and acceptance of technology in their academic activities among students of Kathmandu valley, Nepal. While the result demonstrated that it is the responsibility of the creator to build a system that is easy, understandable and friendly to use. Development of ICT infrastructure by institution and also by respective sectors to make people accessible to use technology could help students to improve their performance and effectiveness in learning. Perceived usefulness of student about digital learning was found to be not supportive towards the behavioral intention to use the digital learning. Overall, the results and findings have provided supporting evidence for the factors proposed for promoting effective digital learning.

## VI. CONCLUSION

The aim of this research is to investigate the factors that influence students' behavior to use digital learning tool learning in Kathmandu valley. Digital learning system is changing traditional practice of learning with technology and innovation. Using digital tools in education makes academic activities more interesting, easy to access, creative, effective, and productive. ICT tools is enhancing the outcome of education. Based on literature review PU, PEOU, ATT, BI and AU towards digital learning are the factors that were identified as an important determinant of students' acceptance to use digital learning. A conceptual model that extends the Technology Acceptance Model (TAM) to include Social Influence, Accessibility, Computer self-efficacy, Infrastructure and Enjoyment as main determinants was proposed.

Out of the 16 hypothesized associations in the research model, 12 supported hypotheses presented relationships between variables of the model which in turn had an impact on students' acceptance of digital learning systems. Findings of the study present important implications for digital learning practice by students and integration of ICT for teaching learning in educational institutions. It made clear about the key driver (constructs in model) that should be consider while implementing digital learning system and its impact to the students in their adoption of digital learning technology.

Acceptance of digital learning by students would increase if the students perceive the use of digital learning to be simple and useful. This would further influence their attitude towards digital learning thereby influencing their

intention to use digital learning more frequently which raise the actual use of digital learning technology. Therefore, it is important to discover the factors and relationships that affect students' intention to adopt digital learning or e-learning system for successful implementation and execution.

## VII. RECOMMENDATION FOR FUTURE WORK

This study can further be extended to identify external variables influencing TAM and examine their impact on TAM in the digital learning and other related areas. Employing purposive sampling limits the participation of students who are away from researchers' focus so it is difficult to generalize the results to the entire academic institutions in Kathmandu, Valley. Hence, future endeavors should reach out students from all area in order to maximize the possibility of results generalization. To ensure the higher predictive power of model (higher  $R^2$ ), this research suggest to conduct pilot study with small sample is important prior to conduct the final survey to review possible errors. Nevertheless, future work could consider the utilization of qualitative methods (e.g. interviews, discussion with focus groups and observation) to obtain an in-depth understanding of the investigated problem and the participants' attitude.

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## APPENDIX

### Perceived Usefulness (PU)

PU\_1: Using computer will improve my learning performance.

PU\_2: Using digital learning would enhance the effectiveness of my learning

PU\_3: I find computer a useful tool for my digital learning practice.

### Perceived Ease of Use (PEOU)

PEOU\_1: My interaction with computer and its basic applications are clear and understandable.

PEOU\_2: Interacting with the computer system does not require a lot of my mental effort.

PEOU\_3: I find computer's basic operations are easy to use.

### Attitude towards Using (ATT)

ATT\_1: I feel positive regarding the utilization of digital applications for my academic activities.

ATT\_2: It is very desirable to use digital learning for academic and related purposes.

ATT\_3: I like using digital technologies in my learning.

### Behavioral Intention (BI)

BI\_1: I intend to use ICT tools regularly on my academic activities.

BI\_2: I intend to use the Internet for searching information for my homework/assignment.

BI\_3: I will use ICT tools for learning in the future.

### Actual Use (AU)

AU\_1: I use the computer system frequently.

AU\_2: I use the computer on a daily basis.

AU\_3: Overall, to what extent do you use the computer technology in your academic activities?

### Social Influence (SOI)

SOI\_1: My teachers think that I should use digital resource for learning activities.

SOI\_2: Other students think that I should use digital resource for learning activities.

SOI\_3: People who influence my opinion thinks that I should use digital resource for learning activities.

### Accessibility (ACS)

ACS\_1: I have access to computer/smart phone whenever I need.

ACS\_2: The speed and stability of the internet access is sufficient for my educational activities.

ACS\_3: I can extract study resources using internet without any problems.

### Computer Self-Efficacy (CSE)

CSE\_1: I have sufficient skills to use the computer system and applications.

CSE\_2: I am able to use web browsers and search engines.

CSE\_3: I feel that I am ready for digital learning.

### Infrastructure (INF)

INF\_1: My institute have enough computer lab for practical.

INF\_2: I am satisfied with integration of ICT on teaching and learning on my institute.

INF\_3: I am satisfied with the medium by which I get digital resources provided by my Institute.

### Enjoyment (ENJ)

ENJ\_1: I would feel more interested in study if I could use digital learning tools.

ENJ\_2: I never feel bored using computer to support my learning.

ENJ\_3: Using computer or/and digital tools is fun and enjoyable.