



Title: Student acceptance of online learning during the COVID-19 pandemic in Invercargill

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Student Acceptance of online learning during the COVID-19 pandemic in Invercargill.

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By

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This thesis is dedicated of my Loving

Aunt

(Sonali Saksena)

13th December 1970 - 21st April 2021

Whom I lost to the COVID-19 pandemic.

*But she will always remain in my heart and bless me from the
heavens*

Abstract

The current study aims to investigate the student acceptance of online learning, especially during the Covid-19 pandemic. The acceptance is examined based on student's intentions to continue using the online learning systems. The intention is studied based on student's attitude towards online learning and their satisfaction from online learning. The research uses the technology acceptance model to conduct the study. A theoretical model was proposed to study the effect of the perceived usability, perceived ease of use and perceived enjoyment to analyse the attitude and satisfaction of the students towards online learning. The online survey was conducted on 68 tertiary education students, most of whom were forced to shift to online learning due to the Covid-19 induced lockdowns put by the government of New Zealand. The results were generated using PLS-SEM modelling along with descriptive analysis. The study results showed that perceived usefulness, perceived ease of use and perceived enjoyment are significant determinants of attitude towards online learning as well as satisfaction from online learning. Also, attitude towards online learning is an indicator of behavioural intention to continue using online systems. However, the research did not support that satisfaction is an indicator of behavioural intention to continue using online systems.

Furthermore, the study also investigated the challenges faced by students in adopting online learning and the issues faced during online learning. It also compared the benefits and advantages of online learning as reflected through students' responses. Finally, the research also investigates the need for personality-based online learning systems for enhanced user satisfaction.

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Chapter 1

Introduction of Research

1.1 Introduction

"Knowledge is power"-Robert Boyce, all the power in the world emanates from knowledge of a human brain, and learning is the tool to cultivate that power. This can be achieved in various ways, and a standard method known to humanity was textbooks. Textbooks continued to reign the kingdom of learning until the advent of the eLearning concept, and this started the beginning of a whole new revolution in the area of learning. The ease of learning anytime, anywhere and by anyone has created a fluidity that is helping in the growth of both professionals and businesses alike. E-Learning is an umbrella term covering concepts of online learning, mobile learning, and others. Many e-learning systems and online courses are in the market and extensively used by students to extend their learning. Online learning has become an indispensable part of the educational system, be it in schools, universities or out in a business scenario where professionals opt for this concept to choose specific courses and certifications to hone their skills and raise their professional ranks. Online learning got momentum and became a vital learning trend with the development of Information Communication Technology. Online learning offers many courses and learning options with varying styles to suit learners' needs and provide a complete learning experience. It comes with the freedom to choose the right course which matches with user's personalised learning style.

The year 2020 witnessed a significant pandemic hitting the globe and shutting the world down; these unprecedented times drastically changed the style and semantics of many things globally, and education is one of them. Covid-19 practically brought the whole physical education system to a complete halt. Lockdowns and social distancing norms made it impossible for the physical classrooms to be functional anymore. Like many other sectors, the education sector was also severely hit, which is when online education emerged as a saviour of education throughout the

globe. The educational systems worldwide shifted from physical classrooms to virtual classrooms where students had access to schooling from their homes. All the schools, colleges and universities started to conduct classes online to continue the studies. This scenario made many of them utilise their time online; since the pandemic shut down many offices and left people sitting at their homes for extensive durations and with much time in their hands, they had the option to take up courses from educational websites to hone their skills. Therefore, online education witnessed a drastic surge in its consumer base in the form of students from schools or colleges, professionals doing business courses or people choosing to opt for leisure courses to pass and utilise time during the lockdowns. However, since Covid-19 changed online education from an optional to a mandatory source of education, it becomes fascinating and essential to understand the user's perception of the online learning technology. As Davis (1989) pointed out, if users do not accept a technology willingly, it wastes time and money and exhausts the resources without fruitful results. Thus, since this kind of learning was forced on many users, it becomes imperative to understand how willingly they have accepted this change and their attitude towards online education in this scenario. It is essential to know whether the users fully accept the technology or have certain reservations about using it. The willingness of users to use the technology and their interest and enjoyment are a few of many aspects that need to be entirely ascertained to study the overall success of online education systems and highlight the shortcomings and drawbacks that the users faced. Also, it is essential to note that physical education is about knowledge of a particular subject and the overall development of a student. Different personality students adapt themselves in different ways in physical education systems, and each personality has a different level of understanding. Also, each student's learning style is different, and it might be very well possible that the online education system might miss these fundamental yet essential features of physical education. Thus, it also becomes necessary to blend the users' personality traits and to learn styles with the online education curriculum to fit it well.

Since online learning comes with many benefits and advantages, it still has its fair share of drawbacks and limitations. Thus, it becomes imperative to study and understand the user perception about it, especially in these times of pandemic when many users are forced to use this technology irrespective of their choice of medium of education. This study can pave the way for future research on devising methods for bettering online learning and finding out corrective measures to fulfil any shortcomings in online learning systems faced by users. It also finds the

need to merge users' personality traits and learning styles in online education systems to make them more user-friendly and understandable.

1.2 Problem Statement

Online education is one of the fastest-growing industry, and it has proved its potential as a crucial technology during these testing times of pandemic. Online education has gained momentum for a few years, with its many benefits like simplicity and fluidity. The ease of anytime, anywhere, education by anyone has created a significant impact, making online learning the most sought-after technology. Especially in the Covid-19 pandemic hitting the world, online education made the necessary change from physical classrooms to virtual classrooms possible. With students worldwide switching to online classes and more and more individuals opting for online courses to utilise their times and uplift themselves during the lockdowns, online education has catered to all and sundry. The shift from a physical source to online education sources is phenomenal during these pandemic situations and has proved this technology's potential. However, it was observed that although many individuals chose online education as a medium, some of them were forced to choose it due to lockdowns and other social distancing norms during the pandemic. Therefore, to study the overall success and spread of online education technology, it becomes imperative to understand and access the user perception of this technology. The user's attitude and acceptance of the technology will only be an accurate marker of the technology's success and fulfil the gap in the literature around the study of online education. Thus, this study will try to investigate user acceptance and attitude towards online education technology. It will study factors like user's comfort with the technology, usability, ease of Use, enjoyment, and overall satisfaction to calculate the technology's acceptance and perception among its users. Thus, this research will work as a part of growing literature towards a holistic information production regarding the user's needs and help enhance the students' learning experience.

1.3 Research Aim, Objectives, and Questions

1.3.1 Research Aim

This research aims to study Student acceptance of online education while emphasising this acceptance during the covid-19 pandemic in the Southland region of New Zealand. It also studies the levels of satisfaction achieved by the students after doing online learning, as well as it studies the need for customised/personalised online learning. The students' acceptance will be measured by their behavioural intention to continue using online learning, while this behavioural intention will be measured in terms of students' attitude towards the system as well as their satisfaction from the system. Need for customisation will investigate the need for adding different personality types and learning styles in the systems to make them more effective and valuable. The study plans on using the technology acceptance model for investigating the student acceptance of online learning.

1.3.2 Research Objective

The research has the following objectives -

- To investigate the current literature on student acceptance studies on online education. As well as review the existing literature on student's acceptance studies on online education in different parts of the worlds during the covid-19 pandemic.
- To select the best framework among existing models of user acceptance, to study user attitude and satisfaction of online learning among the students and to know their intention to use the systems further. Also to study their acceptance of online learning during the Covid-19 pandemic and their issues during this pandemic along with the need for personality based customised online learning systems for a better user experience.
- To check the consistency of the selected model by user survey via questionnaire.

- To analyse the collected data to identify the user acceptance of online education based on the student's attitude and student satisfaction to finally analyse their intention to continue using online learning systems in the future.

1.3.3 Research Scope

This research primarily focused on accepting online education technology by the students pursuing higher/tertiary education in the southland region of Invercargill, especially those who had to shift to online mode of schooling during the lockdowns imposed by the government due to the covid-19 pandemic. Any responses from outside of this region will not be analysed for this survey. Also, the student acceptance would only be studied based on usability and ease of Use of the online systems keeping in sync the pleasure the students seek in using online systems. Any other variable to study student acceptance is out of the scope of this research.

1.3.4. Research Questions

The objectives of the study will be achieved through the research questions mentioned below: The research has three research questions.

RQ1: What is the student attitude, satisfaction, and intention towards accepting online learning technology in the Southland region of Invercargill?

RQ2: What were the effects of the COVID-19 pandemic on the student acceptance of online learning technology in the Southland region of Invercargill?

RQ3: Is there a need for customised online learning to make the learning experience better?

1.4 Significance of the Research

There is considerable research on the acceptance of online education by users in different parts of the world. With changing times and the evolution of technology, more and more researchers are assessing the students' overall acceptance of these systems. However, the pandemic that has hit the globe over the last year has marked some unprecedented times and completely changed the

dynamics of many things worldwide. Some vital aspects have been rendered useless, while others have gained massive importance. Online education is one such technology that has become massively useful in salvaging the education of individuals all across the globe. Many individuals chose online education to continue their studies during this era of lockdowns and social distancing, which seems to stay for quite some time.

In contrast, others were forced to shift to this technology irrespective of their choice. Due to these reasons, it is imperative to understand what factors drove the users to start or continue using online education and what problems they face in doing so. This mandatory shift to online learning was welcomed by many, while it was not enjoyable for many others. Thus, it becomes necessary to investigate the overall student acceptance of the technology using user attitude and satisfaction. It has been proved that advanced education systems have failed if they did not consider students' involvement and acceptance to provide a flexible and responsive learning experience. Therefore, identifying student acceptance of online learning through student's behavioural intention is imperative. Conceptualising a framework that examines students' behavioural intention to use online learning platforms based on usability, ease of Use, and enjoyment while studying online will provide important information on how students perceive and react to online learning. Thus, such studies, when conducted all around the world, will create an overall picture of the merits, demerits, success, and challenges of online education in these overwhelming times and show a way to policymakers for better management and development of online learning programs. It will create ways to enhance the effectiveness of these systems so that they are adopted more and more by students.

Hence, this study will highlight the student's acceptance of online learning and become a part of growing literature to calibrate the success and failures of online education in times of pandemic. It can be used at present and in the future to understand the functioning of online education systems among users and take significant actions in improving their efficiency with changing times.

1.5 Limitations of the study-

One of the significant limitations of the study is its sample size. Also, the study results may show some bias as the most significant portion of respondents is from a single cluster in SIT, Invercargill. Also, a significant portion of these respondents were the students of information technology course and therefore well equipped with technical knowledge of computers as well as online learning systems, tools, and their concepts. The results could vary if the same survey is conducted on a significant portion of students from non-technical backgrounds. Therefore, the results cannot be generalised to all the students located in the Southland region. The open-ended question was not answered by a few participants therefore the results of the qualitative analysis only cover the opinion of a limited number of participants. Student acceptance of online learning depends on a lot of factors. This research covers only few of those. Also, since complete lockdown was observed for a minimal time in New Zealand compared to other countries, students were not forced to remain using online learning for a longer duration. Thus, user acceptance of online learning during the pandemic time may show variance compared to other parts of the world.

1.6 Thesis Structure

This study is organised in the following six chapters: Introduction, Foundations of study, Literature review, Research methodology, analysis and results, and Discussions and Conclusion. Each chapter is structured to start with a chapter overview, the main content body, and a chapter conclusion.

Chapter 1. Introduction

The introductory chapter presents the introduction to the research; it highlights the problem statement and the background of the research while establishing research aims and objectives and the research questions. It vividly explains the significance of the study while defining its research scope. Limitations of the study are also presented in this chapter. The thesis structure is defined in the chapter, followed by the conclusion.

Chapter 2. Foundations of Study

This chapter provides the foundations of the technologies discussed in this research. It explains in detail the definitions of Online Learning, its evolution, and its current spread. This is followed by types of online learning which are synchronous and asynchronous. This section will discuss the uses, advantages, and disadvantages of synchronous and asynchronous learning in detail while also discussing the most common tools for both. The advantages and limitations of online learning are explained. This is followed by a foundational study about technology acceptance studies. The need for such studies is ascertained, and the discussion of different kinds of models developed to conduct these studies. The chapter also covers the intensity and extent of Covid -19 and the pandemic situation gripping the world.

Chapter 3. Literature review

The Literature Review will cover the investigation of current literature on user acceptance of online systems and their need. It will also ensure the usage of the technology acceptance model as the best possible model to conduct student acceptance of online learning, followed by the usage of technology acceptance in different fields to study its effectiveness in conducting such studies. Various extensions done to these models to cover several aspects of technology acceptance are also studied, along with studying factors that determine the user acceptance of online learning. The chapter also throws light on several pieces of research done to study student acceptance of online learning in the times of the Covid-19 pandemic throughout the world.

Chapter 4. Research methodology

Research methodology chapter presents the research methodology used in this study. The research philosophy, approach, strategy, choice of methodology, time horizon, and other essential aspects are mentioned. This is followed by describing the data collection techniques used in this research which is survey questionnaires. It describes the design and creation of the questionnaire and the sampling technique used. Data analysis methods are presented along with Ethical issues related to the research.

Chapter 5. Findings and analysis

Chapter 5 conducts the data analysis on both quantitative and qualitative data collected through the questionnaire. The findings from the results will be established, and hypothesis tested for significance. Along with this, an effort will be made to prove the consistency of the study's theoretical model with actual technology acceptance models.

Chapter 6. Conclusion and recommendation

This chapter discusses the results achieved from chapter 5 in detail. It relates the results with the actual research questions to check whether suitable research answers are found or not, which are necessary to attain the study's objectives, which help establish the main goals of the study. It will also summarise the overall research process and provide recommendations and scope for future relevant study in this area of research.

1.7 Glossary

Term	Meaning
TAM	Technology Acceptance Model
PU	Perceived Usefulness
PEOU	Perceived ease of Use
PE	Perceived enjoyment
SAT	User's attitude towards Use of online learning.
ATT	Attitude towards use of online learning.
BI	Behavioural Intention to continue using online learning.
System	Online learning systems
User/ learner	Individual pursuing online learning
LVC	Live Virtual Classes
LMS	Learning Management System
SNS	Social Networking Sites
BOL	Blended online learning.
Moodle	Modular Object-Oriented Dynamic Learning Environment

IT	Information Technology
SLR	Structure literature review
PLS-SEM	Partial least square – sequential equation modelling
Respondent/ Participant	Person who took the research survey

1.8 Conclusion

This chapter serves as the backbone of the research as it introduces the fundamental aspects of this research. The chapter discusses in detail the background and the problem that this research aims to deal with. It also highlights the problems statement and the need for this kind of research. This research provides indications of which factors affect students' attitudes and satisfaction to use e-learning tools. This study could assist and guide policymakers who develop, implement, and deliver e-learning systems by providing essential views to improve these systems and thus lead to a better understanding of student participation in the online learning environment. Furthermore, given the growing demand for the Use of online learning, especially in these times of pandemic, the results of this study could be helpful worldwide, especially in New Zealand, where few such studies have been conducted. The Research principles, like its significant aims, objectives, research questions, are developed in this chapter along with the research constructs and the hypothesis. These instruments will further gain valuable results, which would be significant as they will provide greater understanding to the developers and helps them improve their instructional design in encouraging learners to use online learning.

Chapter 2

Foundations of Study

2.1 Introduction:

Growth in technology is a proven factor of improved productivity and effectiveness of any organisation. Due to this reason, all nations, both developed and developing, heavily invest in emergent technologies. Research have undeniably proved that the advantages of any technology can only be achieved after the successful adoption of that technology by its users. Similarly, online education is also an ever-growing area of technology that needs to be continually updated and changed to suit students' needs and understanding and make it successful and highly adopted by students. This chapter throws light on the foundations of technologies covered in this research and explains the need and significance of technology acceptance studies. It is divided into three sub-sections, where section 2.2 talks about the online learning technology and its current status. While section 2.3 emphasises the significance of technology acceptance studies and factors deciding the user adoption of technology. It also discusses in detail a few technologies acceptance models and theories. The last section, 2.4, describes the scenario of the Covid-19 pandemic and its current spread and effects on the world, with particular emphasis on education scenarios across the globe.

2.2 Online Learning –

2.2.1 Overview of Online learning:

Online learning is considered one of the most popular distance-learning methods. The term online learning is one of the most common terms used in the education sector these days, especially in Covid, where flexibility, accessibility, visibility, manageability, and availability provided by online learning have proved to be highly useful. It is the only source of education today when the world is struggling with a deadly pandemic. Online learning has many definitions attached to it, and the term is used for a variety of educational activities. Online learning is any form of learning, and other supporting resources made available through the computer (Carliner, 2004). The terms online, web-based, and e-Learning go together and are very commonly interchanged when describing the learning environment (Moore et al., 2011). Generally, online learning is also called e-learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, computer-assisted learning, web-based learning, and distance learning (Anderson, 2008). Carliner (2004) pointed that online learning is a form of distance learning where distant learning is any educational situation in which the instructor and learner are separated by time or location. At the same time, any form of learning experience from a digital device is part of eLearning. Defining eLearning had been an ardent task for researchers due to its enormous scope and constantly changing features (Carliner, 2004). Sangrà et al. (2012) studied various definitions of eLearning based on different elements like Technology-Driven definitions, which includes definitions from private companies and emphasise the technological aspects of e-learning; Delivery-System-Oriented definitions, which focused on the accessibility of resources through learning, teaching, or training and not the results of any achievements; Communication-Oriented definitions consider e-learning to be a communication, interaction, and collaboration tool and assigns secondary roles to its other aspects and characteristics and lastly Educational-Paradigm-Oriented definitions which define e-learning as a new way of learning or as an improvement on an existing educational paradigm (Sangrà et al., 2012).

After intensive study, a blended definition of eLearning was coined, which defined eLearning as “an approach to teaching and learning, representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training, communication and interaction and that facilitates the adoption of new ways of understanding and developing learning” (Sangrà et al., 2012 p.152). As far as online learning is concerned, different terminologies have been used to define online learning, which has created much confusion in developing a generic definition of online learning. However, online learning can be explained as a learning procedure where the learner is at a distance from the instructor and uses any form of technology like computer, mobile and other such devices to access learning materials and have interactions with his instructor as well as other learners (Anderson, 2008). After analysing definitions from several researchers and syncing them together, Anderson (2008) defined online learning as "the use of the internet to access learning materials to interact with the content, instructor, and other learners and to obtain support during the learning process, in order to acquire knowledge to construct personal meaning and to grow from the learning experience (Anderson, 2008). Carliner (2004) tried to explain the differences in these terms by comparing online learning with E-learning, web-based learning, computer-based learning. He explained that online learning is the broadest form and refers to all learning types via computer. At the same time, eLearning and web-based learning are synonymous and are a form of online learning where the computer is connected to the internet, intranet, or extranet (Carliner, 2004). Also, Face-to-face learning includes courses in which 0% to 29% of the content is delivered online while this category includes both traditional and Web facilitated courses; the remaining alternative, blended (or hybrid) instruction, has between 30% and 80% of the course content delivered online (Simamora, 2020).

2.2.2 History of online learning:

The learning concepts enhance and improve every day, where eLearning can be termed a superset of related learning concepts like distance learning, online learning, web-based learning, virtual learning, and others. At the same time, they represent different expectations and perceptions of learning environments (Moore et al., 2011). The concept of textbooks or the use of the library is the most effective way for learning. However, it has its own set of shortcomings, like, not everyone has access to the library, or even if they have, not everything they want to learn is available in the

library, outdated information and many other such things. These obstacles in learning occur in primary education and universities or corporations. This paves the way for the emergence of online learning. Online learning combines the concept of technology and the internet to create easily understandable and retainable content that can be accessed anywhere, anytime, by anyone and saves time and money. It is readily available, not bound by geographies and can be learnt from any platform. During the late eighties and early nineties, the first form of electronic education was born in CBT – computer-based learning, which played multimedia like a CD-ROM with educational content on a personal computer (Hubackova, 2015). Later, the term eLearning was coined by US teaching guru Elliott Masie in November 1999. When he delivered his speech at the TechLearn Conference, eLearning uses network technology to design, deliver, select, administer, and extend learning (Cross, 2004). People started using home computers since the invention of MAC in the 1980s; it made learning about particular subjects and developing specific skill sets more accessible and within reach of all, while later in the decade, virtual learning environments began to grow with people gaining access to online information and eLearning opportunities (Gogos, 2013). In 2000, the concept of corporate eLearning begins with businesses adopting eLearning techniques to train their employees and enhance their knowledge and skillset while still working (Gogos, 2013).

2.2.3 Types of Online Learning:

There are two primary types of online learning: Synchronous, where learners and instructors are geographically separated but work simultaneously, and Asynchronous, where learners and instructors are geographically and timely separated.

2.2.3.1 Asynchronous Online learning:

This type of learning is facilitated by media technology like email and discussion boards. It does not require the participants like the instructor or the learner to be online simultaneously, thus providing flexibility in learning (Hrastinski, 2008). It is mainly a student-centered teaching approach that promotes learning in different times and spaces, particular to each learner (Brückner, 2015). It provides this flexibility and enhanced communication and collaboration via asynchronous discussions using various tools such as CD-ROMs, streamed prerecorded audio/video web

recordings, and audio podcasts (Skylar, 2009). In this learning, the instructors design and implement a learning path engaged by the student at his own pace. The asynchronous nature of online learning makes it very popular because it helps users combine education with their other life commitments. It gives them the flexibility to log on to an e-learning environment at their comfort and download documents or send messages to teachers or peers (Hrastinski, 2008).

Advantages of Asynchronous online learning

This type of online learning gives a high degree of control to the learner over the time and place to engage with course materials and activities, thus providing immense flexibility to carry on the learning as well as it is highly structured, efficient, and of secure nature (Littlejohn & Pegler, 2007). The management of these systems is learner centric as assignments, grades, course material, and other such features are highly efficient and enable learners' critical thinking through properly structured LMS discussion boards (Littlejohn & Pegler, 2007). Hrastinski (2008) explained how the flexibility that recorded learning material could be ingested by a learner at his own pace, time, and abilities, also provision to re-watch these sessions for better understanding as well as the freedom to initiate or respond to interactions with the instructor and peers at learner's schedule releases the pressure from learning and makes asynchronous online learning highly effective.

Limitations of Asynchronous online learning

In their study on Asynchronous learning, Littlejohn and Pegler (2007) studied the works of various other researchers and explained that these asynchronous learning systems display some weaknesses like attrition which can be explained as an issue that is sometimes attributed to a lack of social and personal engagement. Since this learning does not generate social presence, some innovative online instructors have developed several creative ways of using LMS discussion boards to enable interaction and social connection in potentially impersonal asynchronous learning environments (Hrastinski, 2008). Instructors face additional challenges in handling asynchronous online environments to renovate their delivery content while still keeping it in line with the prescribed classroom format of a lecture which is supported by PowerPoint slides and writing or drawing on a blackboard or whiteboard and thus motivating them to use tools such as video and screen casting to prerecord lectures for asynchronous viewing (Littlejohn & Pegler, 2007).

However, it is noted that due to a lack of immediate feedback from learners, the tutors find prerecording lectures to be uncomfortable or unsatisfying. Also, since the work pressure is less, this type of learning requires a higher level of commitment and independent learning skills from learners (Brückner, 2015). On the other hand, the core drawback in an asynchronous learning environment is the absence of direct face-to-face interaction (Al-Azawei & Lundqvist, 2015). They also compared face-to-face, synchronous, and asynchronous learning modes where they found out that from learners' perspective, traditional tutorials were more preferable, practical, helpful, and satisfying (Al-Azawei & Lundqvist, 2015).

Tools for asynchronous Online Learning:

There are various tools for asynchronous online learning which have also evolved. A few of the most basic and familiar tools for asynchronous online learning are discussed below.

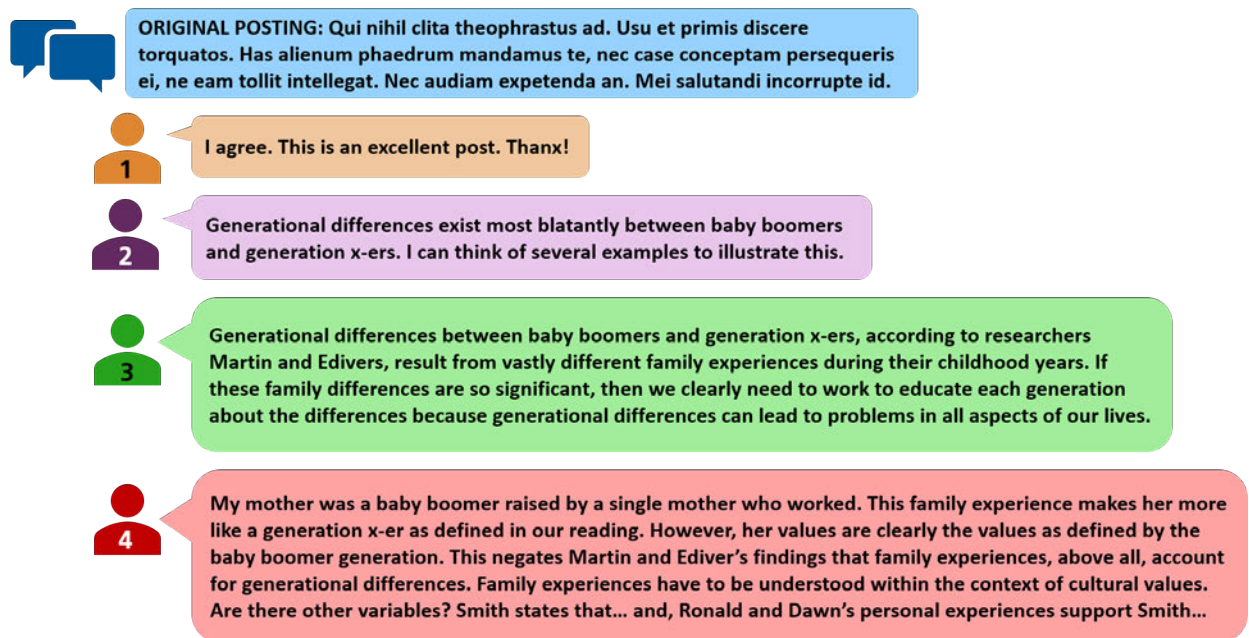
- **CD-ROM** – Now almost obsolete, CD-ROMs were the most cost-efficient and effective instructional media to train a large number of people, especially in remote areas with limited or no internet access. CD-ROM contained a standalone course that students can engage and progress through at their own pace (Skylar et al., 2005).
- **Text-based lectures-** Another fundamental tool for the asynchronous form of online learning are Text-based lectures. Course material is text-based prepared on introductory text-based software like PowerPoint, Html, Word, and reading a chapter in the textbook corresponds with the lecture notes (Skylar et al., 2005).
- **Email:** Email is one of the oldest and most reliable tools that are inexpensive and efficient for private messaging between the instructor and the student (Youn & McLeod, 2007). It can be for communication, announcements, due dates, schedule changes, and several other tasks like feedback on individual assignments and projects and answering students' personal questions. The most significant advantage of an email is that it requires only minimal technical skills and enables private communication between the instructor and student where assignments can be easily attached, immediate feedback from the instructors can be provided to students. It also helps in broadcasting urgent class announcements (Horton, 2006). However, Youn and McLeod (2007) explained that it is essential to set guidelines for email use within the course syllabus. A need to set reasonable reply time is

necessary to avoid discord between students and instructors. Email lists can be used to carry out a discussion outside the confines of an LMS.

- **Discussion Board:** Discussion Boards facilitates the participation of learners in online learning environments. Also called message board (discussion forums), they support collaborative learning tools where two or more learners explore a topic, create a meaningful discussion, and learn something new in the process (Harman & Koochang, 2005). The Discussion Board tool in the Learning Management System (LMS) engages learners in constructive discussion. It allows learners interaction through discussion threads where the instructor posts a topic and learners reply to that, resulting in a discussion. It gives the learners time to research and then provide their responses (Horton, 2011). Harman and Koochang (2005) explained that the discussion board is the best platform to put the learning community and its learning objects on the same page, which helps students emerge and function effectively.

Figure 1

Sample of Discussion Boards



Note. A view of discussion boards. (<https://owl.excelsior.edu/online-writing-and-presentations/discussion-boards/discussion-boards-content/>).

- **Blog:** A blog is an asynchronous learning tool that supports learners by providing current information on a topic where blog entries are longer than the messages in a discussion board and promotes learning and sharing information (Bruns, 2017). The term "blog" describes the entire collection of articles, while individual articles on a blog are called "blog posts," whereas the act of writing and publishing a post, and of maintaining a blog continuously, is known as "blogging"; blog authors are commonly described as "bloggers," and the entirety of all blogs on the Web is known as the "blogosphere" (Bruns, 2017). "Blog" itself is a shortening of the term "weblog" – a format for frequent self-publishing updates on topics of interest to which emerged in the late 1990s and gradually gained popularity over subsequent years. Weblogs themselves shared a common history with earlier computer-mediated communication technologies such as Bulletin Board Systems (BBSs) and early Web-based Content Management Systems (CMSs) and translated some of their underlying principles into the standard blog formats which gradually emerged (Bruns, 2017).
- **Videos:** Videos are a synchronous learning tool which produce learning from audio and visual medium (Horton, 2011). YouTube is the most significant example of this technology which has proven to be a prevalent and efficient medium of learning in the past few years. Videos provide extreme flexibility to their learners as they can watch and listen to lectures from instructors or go through a video tutorial at their own time and convenience. Videos help introduce a new topic or support existing learning and reinforce concepts covered in a training program (Katambur, 2018).
- **Digital Library:** A digital library is a knowledge repository that is a structured and organised set of a gamut of asynchronous learning tools and resources like audio, video, e-learning courses, microlearning nuggets, and eBooks that help to learn and teaching in an asynchronous environment (Fadde & Vu, 2014). They promote learner-centric training by

providing search engine technologies that let new users easily search for information and resources of their needs. The advantages of using a digital library are that they facilitate self-directed learning and improve learner performance while increasing the quality, quantity, and comprehensiveness of learning. Thus, it makes learning resources easy to access and retrieve while being available anywhere, anytime (Horton, 2011).

2.2.3.2 Synchronous Online learning:

Unlike asynchronous online learning, synchronous online learning requires the instructor and learner to be present in the same place, at the same time, in order for learning to take place. This includes instructor-led online classes and lives online meetings where the whole group comes together along with the instructor (Hrastinski, 2008). Therefore, synchronous online learning implies that the instructor and the students engage with the course content and with each other simultaneously, although from different locations (Brückner, 2015). The instructor interacts with students in real-time utilising technology like live stream audio, video, and presentations. Through this format, students participate using the text chat function, voice communication using a microphone, whiteboard tools, and real-time surveys called polling (Carliner, 2004). Synchronous online sessions are often called web-based training, Webinar, virtual meetings, and Web conferencing (Skylar, 2009).

Advantages of Synchronous online learning

Synchronous online learning comes with multiple advantages. The students can ask questions and discuss with their instructors in real-time, increasing their sense of connectivity with the teacher and other peers. Also, instructors can facilitate a workshop and other training style teaching methods and open space for conversations (Hrastinski, 2008). Therefore, the most significant benefit of Synchronous online learning is the connectivity it creates by adding online learning, which enables live, spontaneous interaction between instructor and learners and among learners (Fadde & Vu, 2014).

Limitations of Synchronous online learning

Although synchronous learning has many advantages, the fixed timing requirement makes it inflexible for students who have other life commitments, and many can have accessibility and other technical issues which are difficult to meet at that time (Hrastinski, 2008). Also, conducting a Live Virtual Class can be challenging for instructors because of requirements like proper uploading of materials in the LVC meeting room. Proper configuration of webcam or microphone and participating learner's audio or video must also be tested. There also is a long list of technical requirements like desktop, laptop, tablet, smartphone, camera, microphone, internet connection, and other technical issues that are likely to be susceptible to disruption (Fadde & Vu, 2014).

Tools of Synchronous Online Learning

Modes of synchronous online learning are educational television and videoconferencing. Web conferencing application such as WebEx, GoToMeeting, and Adobe Connect are some of the most famous tools for synchronous online learning. Sometimes educational uses of web conferencing applications are also referred to as Live Virtual Classroom or LVC (Carliner, 2004). LVC class sessions using web conferencing applications typically include numerous features like live video or audio, presentation media (e.g., PowerPoint slides), screen sharing (e.g., software demonstration), whiteboard display, text-based chatting, polling of participants, breakout rooms for small group interaction, and session recording for viewing by learners unable to attend the “live” LVC meeting or for review by those who did attend (Fadde & Vu, 2014). These features enhance communication and instruction greatly and make synchronous learning a very impactful source of online learning (Brückner, 2015). LVC started with ad hoc tools when synchronous communication tools like instant messaging and discussion boards were used for online courses (Hrastinski, 2008). Fadde and Vu (2014) cited various researchers to explain the evolution of LVC from ad hoc environment and web communication tool to online learning solution that integrates LVC into existing LMS—beginning from the use of instant messaging tools and discussion boards to the use of full-featured LVC applications such as Wimba, Elluminate Live! which later incorporated into Blackboard Collaborate and Macromedia Breeze (now Adobe Connect). Some of the tools of asynchronous learning are discussed below.

- **Chat:** Chat is the most common and accessible form of text-based communication, which is synchronous. The chat is used for Real-time question and answer sessions, Brainstorming, troubleshooting, and problem-solving. It allows students and the instructor to meet in “real-time” for conversation, discussion forums, question, and answer sessions (Horton, 2011). They are also used for oral examinations or interviews of learners or researchers. Study groups by experts while students can also engage in team meetings, tutoring sessions and private meetings with the instructor. However, Horton (2006) strongly recommends not conducting lectures using chat. In addition, the instructor should inform students of what is good communication and participation during chat sessions. 'Blackboard' offers this feature, and it also allows the recording of the chat sessions to be viewed later by the instructor or a student if they cannot attend the session. Chat Rooms facilitates immediate interaction and feedback among its participants and therefore help develop a sense of community for the learner. One significant advantage of chat is that it can be conducted over a slow internet connection. However, chatting requires good typing skills. Also, if the chat group has too many participants, the conversation becomes difficult to follow and confusing(Warden et al., 2013).
- **Social Networking Sites:** At the current time, social networking sites (SNSs) are the most popular genres of social software. 2.79 billion people globally use Facebook and its applications (sprout social, 2021). However, primarily used to connect socially with people, social networking sites also have some uses in online learning; for example, they provide a creative outlet for students, and with the help of their profiles, students can display their audio, video, and photographic and other creative talents (Selwyn, 2009). Selwyn (2009) also stated that Facebook also gives students a sense of belonging by allowing them participation in an online community; in addition to that, access to SNS's is free, and these platforms are straightforward to manoeuvre with a provision for a written record of communications. Some educators argue that SNS's have the power and potential to fundamentally alter the educational system by actively engaging and motivating the learner instead of the traditional passive learner as only an observer (Selwyn, 2009). Although SNS have plenty of advantages, they also have their fair share of limitations. Some teachers tend to judge a student based on their Facebook profile which is not the

correct thing. Also, SNS's can be very addictive as students spend time with their virtual friends and relationships, they offer a wide range of games that can consume a lot of student's precious time (Selwyn, 2009).

- **Audio/Video conferencing:** Audio/Video conferencing is a prominent and highly essential institutionally supported instructional delivery mode. These audios/videos are typically narrowcasted from dedicated “studio” classrooms or conference rooms wired for sound, video, and document sharing (Grant & Cheon, 2007). This method is one of the rapidly growing instructional media in synchronous online learning and creates new interaction methods among instructors and students. These conferencing tools simulating face-to-face learning aim at enhancing communication, collaboration, and social presence among instructors and students. However, they are more efficient in emphasizing efficiency than effectiveness (Warden et al., 2013). Videoconference-based classes often involve a technical director switching between cameras covering instructor, learners, and documents, balancing multiple microphone inputs, and assuring connectivity to and from the site to remote sites (Grant & Cheon, 2007).

- **Skype:** is one famous conferencing tool whose free version enables one to make voice calls, video calls, send instant messages or chat, and send SMS (Short Message Service) text messages. Its most significant advantage is that it is free of cost online collaborative tool. It offers secure, encrypted communications and engaging anti-virus software to protect the communications. It is immensely used for learning purposes by instructors as its logs call, instant messaging, and files sent and received help for instructor's records (Skype, n.d.).

Zoom: Zoom is another popular video conferencing software made very popular during the Covid-19 pandemic. Its basic version, which is unrestricted, offers simplified video conferencing and messaging across any device. Its imminent features include quick adoption with meeting capabilities that make it easy to start, join, and collaborate across any device. Zoom Meetings syncs with the system's calendar and delivers streamlined enterprise-grade video conferencing from desktop, mobile and dedicated Zoom for Home

Devices (Zoom, n.d.). It also promises robust security settings to ensure disruption-free meetings. Encryption, role-based security, Passcode protection, Waiting Rooms and seamless collaboration are other features that make Zoom one of the best current video conferencing software (Zoom, n.d.).

- **Blended Online Learning:** Blended learning is not precisely defined; however, it can be explained as individual courses that blend on-campus face to face meetings with Learning Management System based asynchronous online learning (Fadde & Vu, 2014). Defying the standard rules of blended learning, which is a combination of face-to-face classroom instruction and asynchronous online instruction, blended online learning (BOL) is online. It is a combination of asynchronous online learning using a learning management system with web conferencing applications like Adobe Connect, WebEx and WizIQ (Fadde & Vu, 2014). Blended online learning involves studying online with instructors and tutors, emphasising online collaboration in combination with downloading course material and engaging in it at learners' own pace and comfort (Littlejohn & Pegler, 2007). It also involves online multiplayer gaming using extended authentic simulations to explore real-life problems and use a Virtual learning environment to access course material and communicate with the tutor on or off-campus (Littlejohn & Pegler, 2007).

2.2.4 Learning Management System

A Learning management system (LMS) is software used to deliver, track, and manage online learning. It can be used to manage training/educational records, distribute courses over the internet, and offer features for online collaboration (Mahnegar, 2012). It is an effective way by which computer and Internet technologies help in the learning processes. It facilitates communications and interactions among students and teachers, thus offering speed and effectiveness in educational processes (Chung et al., 2013). Some of the key features in a learning management system are usability, availability, security, stability, interoperability, and scalability (Martin, 2008). Learning Management Systems (LMSs) are a complete package and provide all necessary tools and functions for efficient online learning (Chung et al., 2013). An LMS has an interface for teachers as well as students and sometimes parents as well. It comprises features like attendance tracking,

time on task, and student progress for teachers; students use LMS to submit homework and to access the course, syllabus, and lessons. At the same time, parents can log on to the LMS to track their children's grades (Mahnegar, 2012). These days, some prevalent Internet-based Learning Management Systems are Moodle, Blackboard, WebCT, Desire2Learn and many more.

Moodle - Moodle is a free learning management system that provides a platform between instructors and students in online learning. It helps educators conceptualise various courses, course structures and curriculum, which help in facilitating interaction among teacher and online students (Al-Ajlan & Zedan, 2008). Some standard features of moodle include blogs, chats, database activities, glossaries, support systems enabling the functioning in multiple languages, content management, regular examination, and assessment. Moodle can support multiple plug-in options like graphical themes and content filters, enrolment, and authentication processes, as well as resource and question patterns (Al-Ajlan & Zedan, 2008).

Blackboard Learn - Blackboard Learn is one of the leading commercial LMS applications for online teaching, learning, community building, and knowledge sharing (Blackboard Help, n.d.). It is an open, flexible, and student-centered LMS that provides a password -protected environment that facilitates online teaching and learning experience. Studies show that assignments, grade book and course documents are the most significant Blackboard features, where online grade book is one of its most liked features (Martin, 2008). Similarly, the availability of immediate feedback in online quizzes was the most helpful feature of blackboard learn (Martin, 2008).

2.2.5 Benefits of Online Learning

As we have studied in the sections above, online learning comes with a plethora of advantages and benefits. As Chandio (2021) cited several researchers and mentioned that online learning allows easy accessibility of the study material to the learners at all times, plus the low delivery cost constitutes a significant benefit of online learning. It also helps in eliminating the gap between theory and practice. Other benefits include flexibility and comfort of entrée as online learning is not time-bound, and students may access it anytime and anywhere (Hoq, 2020). Hoq (2020) explains that diverse nature plus its availability even in isolated/remote villages is another

significant asset of online learning. Since many learners can be engaged simultaneously, the time required for the program decreases, plus the material, once prepared, is everlasting and can be repeated many times (Hoq, 2020). E-learning assists in-depth knowledge of a subject promotes self-motivation, works incoherence of adult learning values, and allows learners to establish their learning methods while being personalised to learners' needs (Chandio, 2021). More important, as the same material is circulated to all the learners, it induces consistency in related topic and assists in the constant accomplishment of learning goals due to equal accessibility of quality and quantity of materials disseminated (Hoq, 2020).

2.2.6 Challenges of E-learning

Besides its numerous benefits, online learning faces a good set of challenges and limitations as well. As Chandio (2021) states, in technology backward nations, online learning can be a severe challenge due to a lack of appropriate infrastructure. Also, in these nations, poverty, problems like lack of infrastructure, internet issues, availability of digital learning environment, cost issues, lack of ICT skills, rejection of e-learning by faculty members and lack of electricity may hinder students from gaining benefits of online learning (Adarkwah, 2020). The lack of information technology (IT) training and necessary skills can also be a challenge in adopting online learning (Chandio, 2021). Also, limited funding can affect institutions from hosting online learning (Adarkwah, 2020). A further list of minor issues with technology like downloading errors, installation issues, login problems, problems with audio and video, and so on also become problems in the smooth functioning of online systems (Dhawan, 2020). Issues with students' attitude like sometimes student find online teaching to be boring and unengaging. Too much flexibility results in procrastinating students who can never find time to engage in online learning, and students feeling a lack of personal attention are also some limitations of online learning (Dhawan, 2020). Faulty online content, like when it is all theoretical, does not let students practice and learn effectively, additionally, mediocre course content is also a significant issue (Dhawan, 2020). Several studies found problems like lack of community, technical problems, difficulties in understanding instructional goals, balancing work, family, and social lives, and low-level preparedness are some of the major issues found among the students concerning the usage of online learning (Chandio, 2021).

To summarise, it can be stated that online learning has both Hardware and software issues, which become significant hurdles in the successful implementation of online learning. Hardware issues are expenses, shortage of components, and shortage of mechanical expertise, while the software issues are the necessity to gain authorisations, regular updating, Internet connectivity, and adequate bandwidth (Hoq, 2020). Another major challenge in the form of financial issues like the cost for fixing, operating, and maintenance of the e-learning platform and developing the infrastructure and hiring IT experts is the problem faced by institutions in implementing online learning systems (Hoq, 2020). Other problems like protection of personal information, plagiarism, Instructor, and support staff unavailability, maintaining a high standard of e-learning programs, technical support, psychological matters like stress, language obstacles are a few of many other challenges of online learning (Hoq, 2020).

2.3 Technology Acceptance studies

2.3.1 Need and significance of technology acceptance studies

The growth of technology is only possible when it is accepted and, in turn, used by the users. A user acceptance and confidence are essential for further development and the successful implementation of any new technology (Taherdoost et al., 2012). In the context of IT, the term user acceptance is defined as "the verifiable willingness within a group of users to employ IT tools to support the tasks that it is designed to support" (Dillon, 2001, pg.2). Taherdoost (2019) emphasised that a promising technology that is designed and created is not of any use unless accepted by its users, and for the successful implementation of the technology, people must involve with the technology to accept and adopt it. Thus, user acceptance is an essential factor for the success and further implementation of any technology. During the development phase of any technology, it is necessary for the creators to know the issues and feedbacks of the users that can influence its acceptance, and to implement that, several researchers have developed theories and models to describe and analyse user acceptance. These theories work on several different factors and assess the influence of that factor on the user acceptance of the technology (Mathieson, 1991). Thus, implementing a successful technology is impertinent to recognise the end user's needs and acceptance of individuals. It not only increases the level of technology usage but also increases

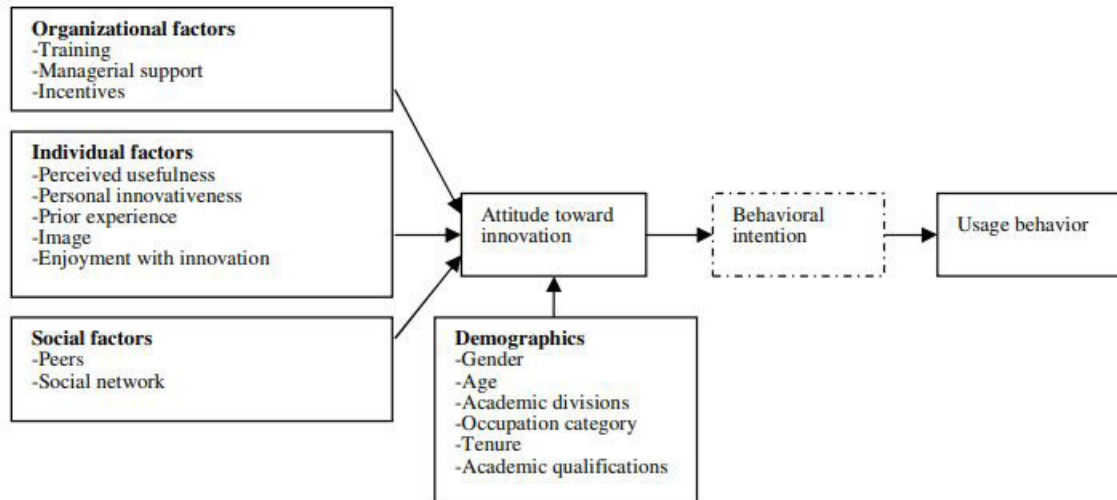
user adoption (Taherdoost, 2019). Thus, studies about factors that can influence user acceptance or rejection should be conducted not only in the beginning phases of development but also to upgrade and modify the technology with changing needs of the user.

2.3.2 Determinants/ Factors of technology acceptance

Over the last few decades, many research studies have been done to investigate the determinants of technology acceptance by its users. Several studies have indicated that there are factors like organisational policies, approaches, and actions that also contribute to an individual's adoption of innovation and just not his attitudes (Peansupap & Walker, 2005). Felicitating conditions provided by the organisation acts as a catalyst to technology adoption by the individual (Mathieson, 1991). Talukder (2012) cited various researchers in explaining that facilitating conditions by organisations to support technology adoption by individuals include training, managerial support, and incentives. While organisational factors play an essential role in an individual's technology adoption, individual factors, including individuals' cognitive interpretations of innovation as studied by Talukder (2012), also play a significant role. Talukder (2012) also noted that perceived usefulness, personal innovativeness, prior experience, image, and enjoyment had a massive influence on an individual's innovation adoption. Also, it was examined that organisational and individual factors were complimented by social factors and acted like determinants in adopting innovation by an individual. Talukder and Quazi (2011) emphasised that members of a social group influence one another's behaviour in adoption. Igbaria (1996, as cited in Talukdar, 2012) explains that sometimes an individual is pressurised by the society he dwells to adopt a specific technology, where society can be anyone whose beliefs and opinions are essential to the individual and could include peers, relatives, friends, or other people who are a part of the social network. Lastly, studies also proved that demographic factors also affect an individual's adoption of technological innovation (Talukder & Quazi, 2011). The determinants of technology adoption are depicted in figure 2.

Figure 2

Determinants of Technology adoption



Note. This figure was the research model proved in the study, from "Factors affecting the adoption of technological innovation by individual employees: An Australian study", by M. Talukder, 2012, *Procedia - Social and Behavioral Sciences*, 40(2012), p. 54.

Wahdain and Ahmed (2014) conducted a literature review to ascertain all kinds of factors investigated to date which affects the user acceptance and, in turn, adoption of any information technology. Their review found that many factors adopted in the previous studies differ in nature, and frequency of occurrence, however, factors like perceived ease of use and perceived usefulness were the most frequent ones (Wahdain & Ahmad, 2014). Their findings have been shown in Figure 3.

Figure 3

Factors of Technology acceptance extracted from previous studies.

No.	Construct	No.	Construct
1	Perceived ease of use(PEOU)	39	Objective usability
2	Perceived usefulness (PU)	40	Voluntariness
3	Behavioral intention (BI)	41	Training
4	Attitud (A)	42	External influence
5	Subjective norm (SN)	43	Interpersonal influence
6	Performance expectancy	44	Peer influence
7	Effort expectancy	45	Teacher influence
8	Social influence	46	Information Quality
9	Perceive enjoyment (PE)	47	Socio-cultural factors
10	Experience(E)	48	Perceived Usefulness towards Professional Status
11	Compatibility	49	Contextual offering
12	Perceived external control (PEC)	50	Security
13	Computer anxiety (CA)	51	Academic Discipline
14	Facilitating conditions	52	Individualism (IDV)
15	Demographic(Age, Gender)	53	Uncertainty Avoidance (UAI):
16	Support/Organisational Support	54	Social presence
17	Results Demonstrability(RD)	55	Involvement
18	Image(I)	56	Learnability
19	Output/system Quality (OQ)	57	User guidance
20	Trust	58	System capability
21	Perceived risk(PR)	59	Library assistance
22	Technological factors/complexity	60	Accessibility
23	Facilitating Condition	61	Interest in publishing
24	Job Relevance(JR)	62	English literacy
25	Knowledge (info. + Awareness+ experience)	63	Influence of strong and weak ties
26	Triability	64	Application Specific Self-Efficacy
27	Awareness	65	Learning Goal Orientation
28	Visibility	66	Customer Satisfaction (CS)
29	Cognitive Absorption	67	Post-Customer Satisfaction (P-CS)
30	End user satisfaction	68	Info. Search
31	User characteristics	69	Usage support
32	Perceived playfulness	70	Customization
33	Task technology Fit	71	Purchase & security
34	Tool functionality	72	Government Support
35	Task characteristic	73	Perceived processing speed
36	User motivation	74	Perceived adaptivity
37	Privacy (P)	75	Orientation
38	Computer playfulness(CP)	76	Perceived credibility

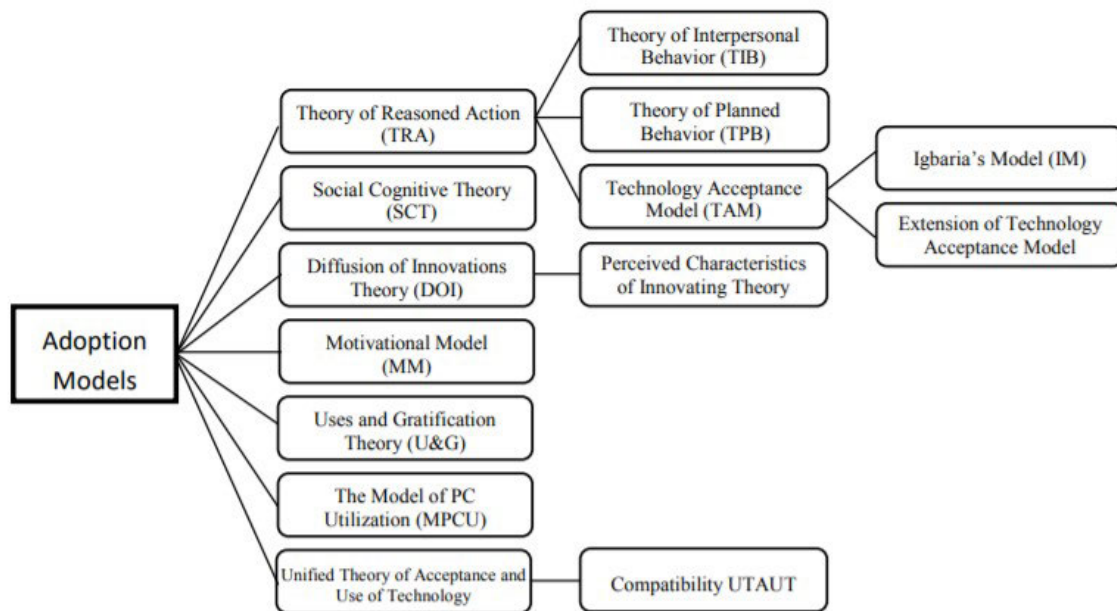
Note. This figure shows the Factors of Technology acceptance extracted from previous studies. From “User Acceptance of Information Technology: Factors, Theories and Applications “, by E. A. Wahdain and & M. N. Ahmad, 2014, Journal of Information Systems Research and Innovation, 6, p. 20.

2.3.3. Technology Acceptance Theories and Models

User attitude, acceptance, and behaviour are considered critical factors towards the increasing adoption of IT tools and technologies. Thus, several models and theories are developed to understand, explain, and predict the user acceptance of new technologies. Technology acceptance models and theories help understand user acceptance of various technologies in a wide variety of system domains. According to Momani and Jamous (2017), any technology acceptance theory aims at measuring the degree of acceptance and satisfaction a user receives in using a technology or information system from different points of view depending on the constructs or determinants. Acceptance studies are expected in health, education, mobile technology, and consumer purchase behaviour (Gunasinghe et al., 2019). Many scholars have developed many such theories and acceptance models. With the help of empirical studies, numerous factors to explain the acceptance of new technologies were identified and validated. Some prominent theories explaining technology acceptance are Theory of Reasoned Action (Fishbein, 1979), Diffusion of Innovation theory (Rogers, 1983), Theory of Planned Behavior (Ajzen, 1985), Social Cognitive Theory (Bandura, 1986), Technology Acceptance Model (Davis, 1986; Davis et al., 1989), Model of PC Utilisation (Thompson et al., 1991), Motivational Model (Davis et al., 1992), Unified Theory of Acceptance and Use of Technology-1 (Venkatesh et al., 2003) UTAUT-2 (Venkatesh et al., 2012), UTAUT-3 (Farooq et al., 2017). These theories/models are mostly refined or extended or combined and applied to study user acceptance of technology in different domains.

Figure 4

Overview of technology acceptance models



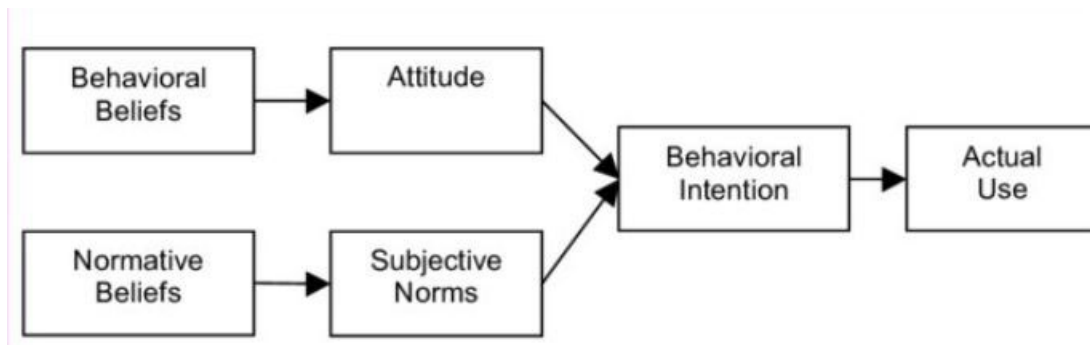
Note. The figure shows different types of adoption/acceptance models. From “A review of technology acceptance and adoption models and theories,” by H. Taherdoost, 2018, *Procedia Manufacturing* 22(2018), p. 962.

2.3.3.1 The Theory of Reasoned Action (TRA)-

TRA is the earliest technology acceptance theory and most fundamental theories of human behaviour (Ajzen & Fishbein, 1975). It was developed in the field of social psychology to study human attitudes and behaviours with their action. It is a general model which is not designed for a specific and is designed to predict, explain, and influence human behaviour (Fishbein & Ajzen, 1975).

Figure 5.

Theory of Reasoned Action



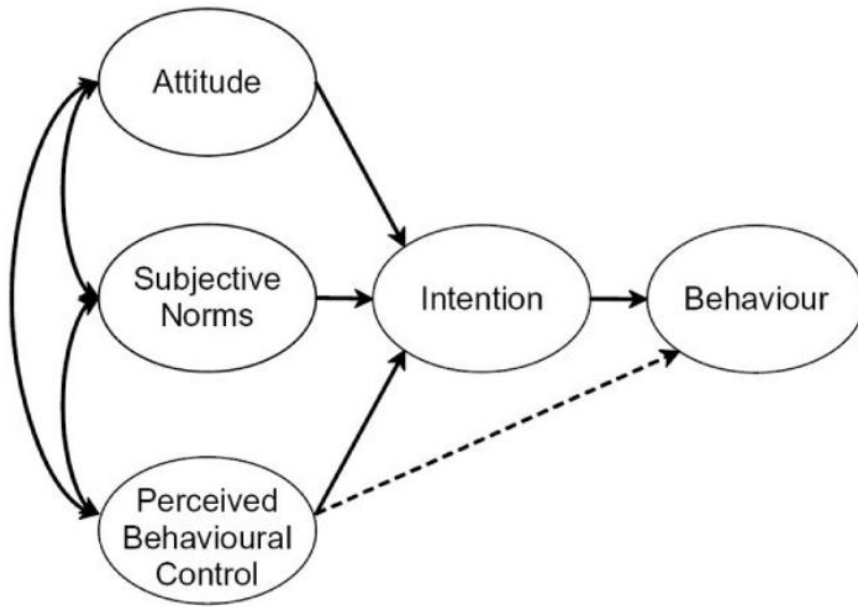
Note. The Figure depicts how the TRA works. From "Understanding attitudes and predicting social behaviour," by I. Ajzen & M. Fishbein, 1980.

2.3.3.2 The Theory of Planned Behaviour (TPB)

Ajzen (1985) added a construct of "perceived behavioural control" to the original Theory of reasoned action. Perceived behavioural control is theorised to be an additional determinant of intention and behavior (Ajzen, 1985). According to Ajzen, some situations or circumstances exist where even when a person has strong intentions, it might not always lead to actual behaviour. In other words, in situations where a person does not have complete control over the behaviour, his behavioural intention does not exclusively lead to the behaviour. TPB has been successfully applied to the understanding of personal acceptance and usage of many different technologies.

Figure 6

Theory of Planned Behaviour



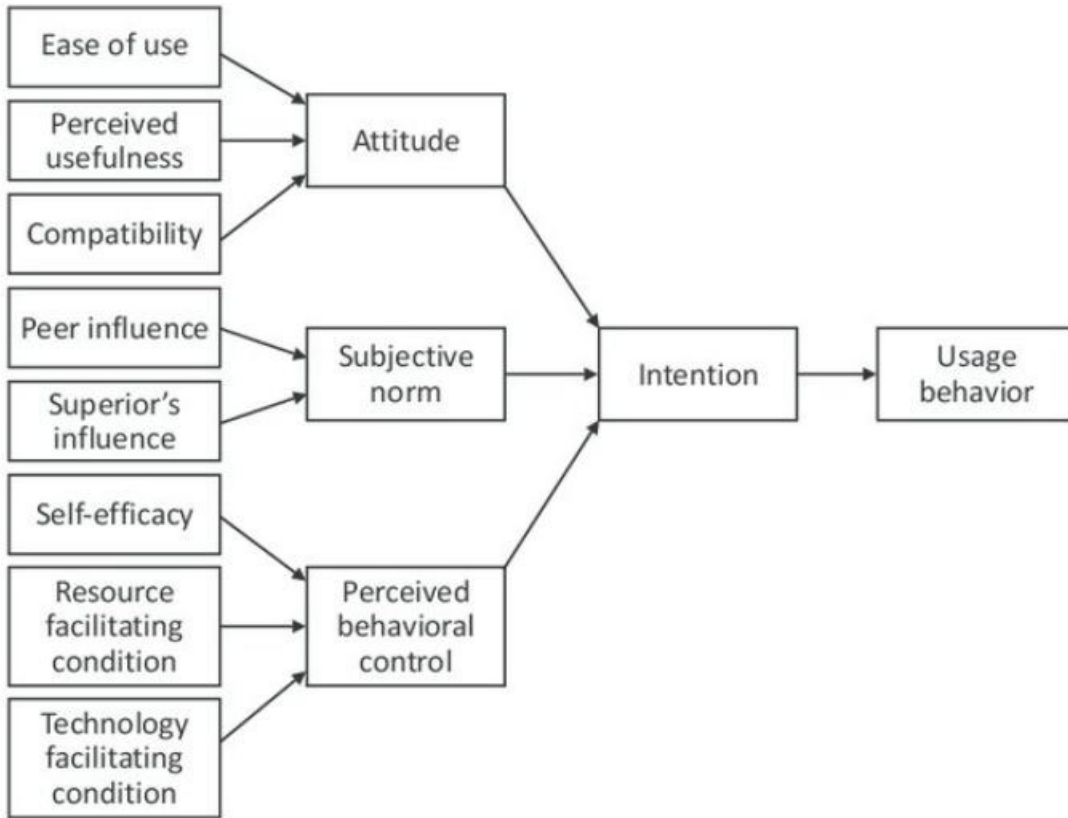
Note. The figure depicts the Theory of Planned Behaviour. From "The theory of planned behaviour", by I. Ajzen, 1985, *Organizational Behavior and Human Decision Processes*, 50(2).

2.3.3.3 Decomposed Theory of Planned Behavior (DTPB)

The DTPB has been discussed two times in separate studies (Taylor & Todd, 1995) and (Ajzen, 2006). Momani et al. (2017) studied several researchers and stated that DTPB decomposes attitude toward behaviour, subjective norm, and perceived behavioural control into multi-dimensional belief constructs within technology adoption contexts. DTPB expanded the TPB by including three factors relative advantage, compatibility, and complexity, where the relative advantage and compatibility were joined together to effect perceived behavioural control (Taylor & Todd, 1995). DTPB has an excellent ability to predict the IT usage behaviour by decomposing the belief structure and adding some factors from TAM (Momani et al., 2017).

Figure 6

Decomposed Theory of Planned Behaviour



Note. The figure depicts the Decomposed Theory of Planned Behaviour. From “Decomposition and crossover effects in the theory of planned behaviour: A study of consumer adoption intentions,” by S. Taylor & P. Todd, 1995, International Journal of Research in Marketing, 12(2).

2.3.3.4 The Innovation Diffusion Theory

IDT is one of the oldest social science theories to study any kind of innovation. Propounded by Rogers (1962), it is a theory that aims to study how, why, and at what rate new ideas or technologies are being disseminated through cultures. Rogers (1962) proposed four significant factors for determining behaviour: Innovation, communication channels, time, and social systems. IDT has been considered a good application for the study of technology adoption, evaluation, and implementation.

2.3.3.5 Perceived characteristics of Innovating Theory (PCIT)

This framework adds three components, namely, innovation characteristics, perceived voluntariness, and actual behaviour to Innovation diffusion theory and extends it to explain the influence of these factors on the actual behaviour of the individuals in accepting or rejecting technology (Carter & Belanger, 2004). Gunasinghe et al. (2019) explain that innovative characteristics depict an image, results from demonstrability and visibility and proves that results demonstrability and visibility are components of observability, and they positively influence the use and acceptance of the technology.

2.3.3.6 The Technology Acceptance Model (TAM)

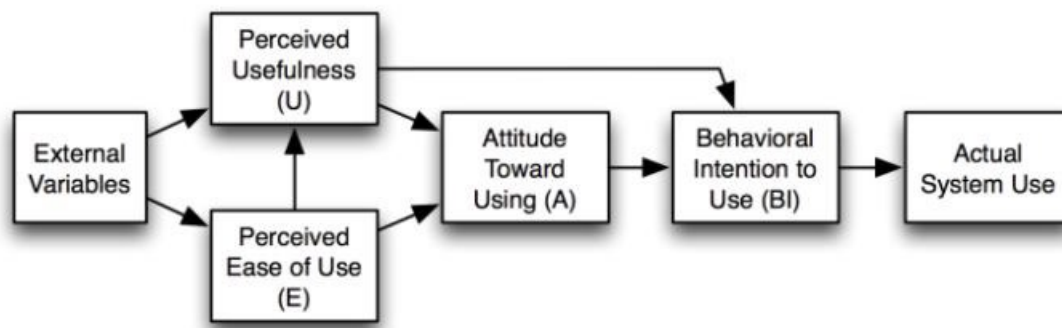
The Technology acceptance model devised by Davis (1989) is one of the most influential models for information systems' theories. It is a simple, predictive, and robust tool to assess the acceptance of IT by users. The TAM was adopted and based on the theory of reasoned action (Ajzen & Fishbein, 1975). TAM does not include TRA's subjective norms in its structure and replaced attitude toward behaviour with two variables to measure technology acceptance: perceived usefulness and perceived ease of use. This theory was generated for modelling and quantifying the acceptance of information systems by their potential users. By studying the acceptance of users, this theory predicts the adoption level of the technology and diagnoses any design problems before the systems are used (Dillon & Morris, 1996). Some studies that critically assessed TAM and made its comparisons with other intention-based models like the theory of reasoned action (TRA), as well as the theory of planned behaviour (TPB), have found that TAM is an efficiently customised model for the study of computer-based technology acceptance with a high research significance in the IS discipline (Lee et al., 2005). They also explained that TAM covers a wide range of technologies and people to demonstrates user acceptance while being very theoretically justified.

TAM model works on several factors which decide the when and how of the usage of technology. These factors are perceived usefulness, Perceived ease-of-use, Behavioural Intention and Attitude. Perceived Usefulness and Perceived Ease of Use constructs are the two most basic and most popular constructs of this model and are most commonly referred to due to their influence in determining user acceptance of technology (Davis et al., 1989). Thus, the core concept on which this TAM model works is that the user's acceptance of technology is determined by an individual's behavioural intention towards that technology which is in turn determined by the individual's PU

and PEU of the technology. Also, TAM suggests that an easy and simple to use technology creates a positive attitude among its users (Lee et al., 2005). Then further TAM suggests that higher levels of PU and PEU predict Positive attitudes, which, in turn, predict intentions to use (Park, 2009). Therefore, the TAM can be summarised when we say that the individual's behavioural intentions directly or indirectly influence an individual's actual use of any technology system, attitude, perceived usefulness of the system, and perceived ease to use the system (Park, 2009).

Figure 7

Technology Acceptance Model



Note. The figure shows the Technology acceptance model. From “User Acceptance of Computer Technology: A Comparison of Two Theoretical Models,” by F.D. Davis, 1989, *Management Science* 35(8), p. 985

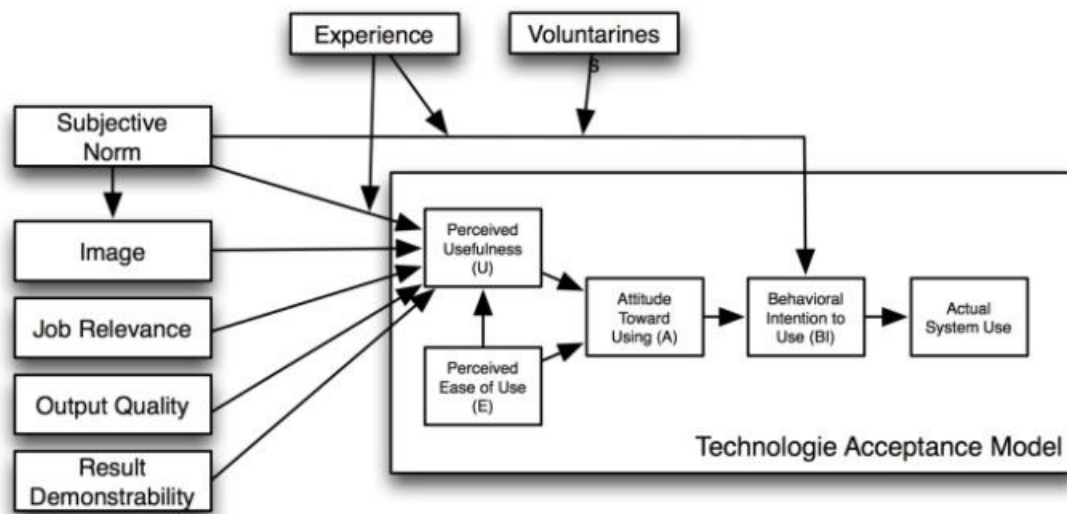
2.3.3.7 Extended Technology Acceptance Model (TAM2)

Much literature has been discussed, modified, updated, and extended the Technology acceptance model several times to empirically verify a few assumptions and suit these contexts and environments. TAM2 was one such model developed in the information technology field by Venkatesh and Davis (2000) by extending the original TAM model to explain perceived usefulness and perceived ease of use by adding the constraint of social influence (Venkatesh & Davis, 2000). Unlike TAM, the subjective norm is used as an additional construct by adopting TRA and TPB models, and it has direct relations with perceived usefulness and intention of use. Extension of TAM to TAM2 was conducted by the inclusion of some constructs from older theories and the

addition of some moderators to perceived usefulness and perceived ease of use, which has effectively enhanced the model's performance.

Figure 8

TAM-2



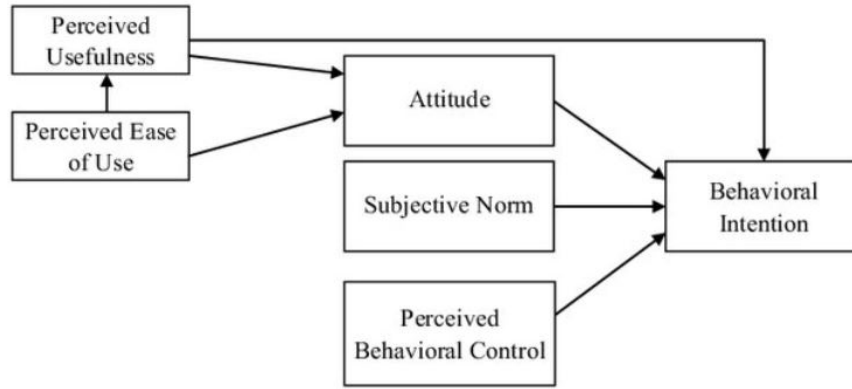
Note. The figure shows different types of adoption/acceptance models. From “A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies,” by V. Venkatesh & F.D. Davis, 2000, *Management Science*, 46(2), p. 188.

2.3.3.8 Combined TAM and TPB (C-TAM-TPB)

Taylor and Todd developed this hybrid model in 1995 by combining the TPB model from the social psychology field with TAM from the information technology field to better use TPB in technology acceptance (Taylor & Todd, 1995). Both TAM and TPB theories believe that behaviour is determined by the intention to perform the behaviour, whereas the attitude towards behaviour determines intention itself. Taylor and Todd (1995) used the hypothesis that perceived ease of use positively influences perceived usefulness, and perceived usefulness and perceived ease of use, both, positively influence attitude. Thus, attitudes, subjective norms, and perceived behaviour control positively influence user behaviours.

Figure 9

C-TAM-TPB



Note. The figure shows the combined TAM-TPB model. From “Understanding Information Technology Usage: A Test of Competing Models,” by S. Taylor & P. Todd, 1995, *Information Systems Research*, 6(2), p. 146.

2.3.3.9 Technology Utilization Theory:

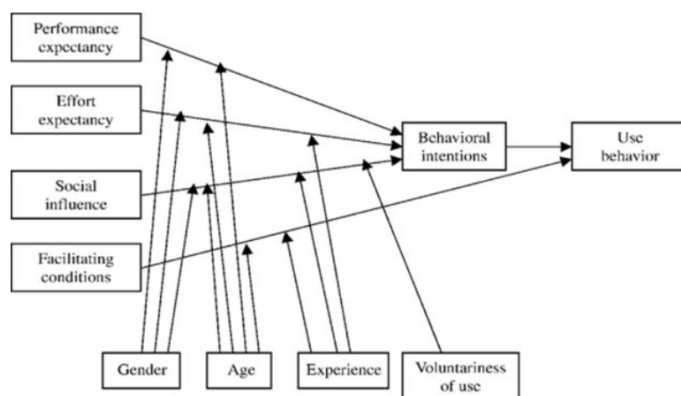
Technology Utilization Theory (TUT) is a new model proposed and developed by Ghapanchi and Talaei-Khoei (2018) to study technology acceptance among users by using three primary constructs (effectiveness, efficiency, utilisation). The model measures the utilisation of new technology by two primary constructs of predictive effectiveness and predictive efficiency, where effectiveness is defined as getting the right things done, and efficiency means doing things in the most economical way (Almaiah et al., 2021). TUT emphasises more on utilisation of technology than acceptance of technology. While the focus of TUT is on the post-acceptance phase, there are, however, two phases before this phase, namely, pre-acceptance and acceptance phases (Ghapanchi & Talaei-Khoei, 2018).

2.3.3.10 The Unified Theory of Acceptance and Use of Technology (UTAUT)

This theory was proposed by Venkatesh et al. (2003), and it has a unified view of user acceptance of technology. This theory integrates components from the eight most prominent models in user acceptance. The theory has four fundamental constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions that play significant determinants of usage intention and subsequent behavior (Venkatesh et al., 2003).

Figure 10

Unified Theory of Acceptance and Use of Technology



Note. The figure shows the model for Unified Theory of Acceptance and Use of Technology. From “User Acceptance of Information Technology: Toward a Unified View,” by V. Venkatesh, G. B. Davis & F. D. Davis, 2003, MIS Quarterly, 27(3).

2.4 COVID-19

The world is gripped in the clutches of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), causing Covid-19, which is one of the most aggressive and deadly infectious diseases, The World Health Organization (WHO) on March 11, 2020, declared COVID-19 as a global pandemic (World Health Organisation, 2020). After originating from the Wuhan district of China,

the virus quickly spread all over the world, and the world witnessed its rapid growth in infected cases all around (World Health Organisation, 2020). Since the virus outbreak was contagious, the WHO requested people to maintain isolation and social distancing, and the world went into partial or complete Lockdowns (WHO, 2020). Reduced social interaction coupled with fear, sadness, uncertainty caused depression and anxiety in people and badly influenced all areas of life. Education was one such central area that was severely influenced, and also, due to social distancing and lockdown, the governments of almost all the countries had to stop physical schooling (CDC, 2020). Since the beginning of the Covid-19 pandemic, approximately two billion learners have been affected due to school closures. Around 192 countries have been reported to implement nationwide closures of schools and universities, impacting about 99.9% of the world student populations. An extended period of school closures can have some adverse effects on students and other education stakeholders (Simamora, 2020). School closures cause an interruption to learning, and extended school closures are also seen as a potential reason for the rise in student drop-out rates (UNESCO, 2020).

In the wake of these activities, the world has found online learning a seemingly promising resort to continuing educational processes during school closures. E-learning provides students with considerable benefits and chances to learn anywhere and anytime. Some universities have chosen asynchronous mode of online learning where instructors prepare assignments or record lectures, and students can complete them at their own pace (Crawford et al., 2020; Hodges et al., 2020), while others chose "synchronous" learning that occurs at a specific time via a specific medium. Since online learning was the only source of education and students were going through all these COVID related stress symptoms, many students have expressed their reservations regarding online learning and difficulties in completing schoolwork. All the factors of covid-19 related stress caused changes in students' daily habits like that of sleeping, eating, watching TV, hanging out and more and adversely affected students' learning process (CDC, 2020). Also, people have limited information processing capacity, and these issues are possible reasons for students' potential cognitive overload, impacting the ability to learn new information sufficiently (UNESCO, 2020). The paradigm shift in education had grave implications for all institutions and students alike. Therefore, understanding students' challenges and preferences are the need of the hour. It is imperative to understand to assist higher education institutions in developing strategies to assist students further during these pandemic times, which shows no signs of finishing anytime soon.

2.5 Conclusion

This chapter served the purpose of providing the foundational concepts of the research. It presented a detailed explanation of tools and technologies which are used in this research. It explained the online learning technology along with its definitions, types, advantages, and limitations. The two types of online learning, synchronous and asynchronous, were described in detail. The state of current online education technology, the need and significance of technology acceptance studies, and the importance of successful implementation of any technology are also discussed in this chapter. This chapter also explained different models to study technology acceptance, and this knowledge will help choose the most suitable model to study the student acceptance of online learning. This chapter also discussed the current pandemic situations across the globe and their effects and repercussions on existing educational scenarios.

Chapter 3

LITERATURE REVIEW

3.1 Introduction

This chapter will provide a systematic literature review of the relevant literature related to the research topic, which is coordinated with the aim, objectives, and research questions of this study. Kitchenham and Charters (2007) emphasised that to perform adequate research, it is impertinent to analyse and understand the studies that have been already conducted in the field of interest. These studies help align the current research to progress towards the ultimate goals of the investigation. The process to achieve this is called a Structured Literature review. A literature review can be defined as a method of reviewing and analysing the literature available related to a particular research topic (Kitchenham & Charters, 2007). Therefore, in this chapter, we perform an SLR to provide a fair assessment of the research subject using a credible and comprehensive methodology, which will be achieved by analysing how students accept online learning.

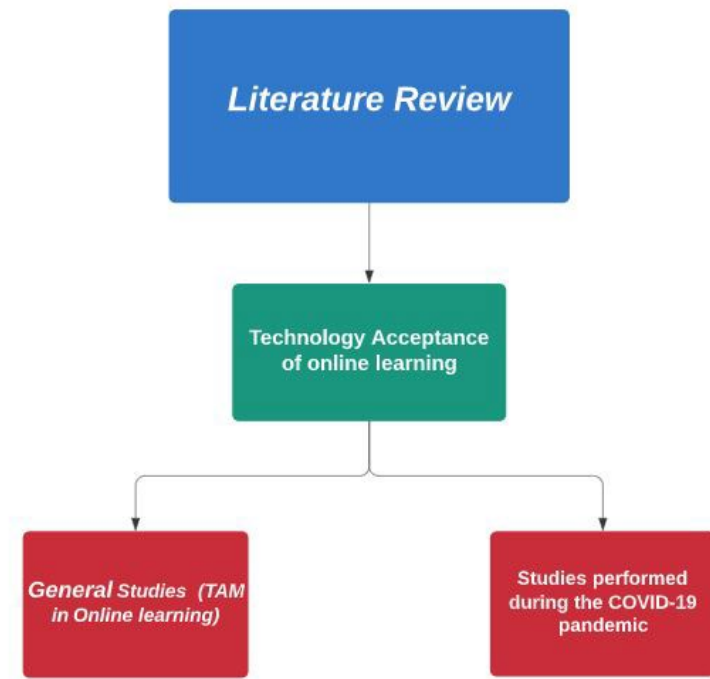
Initially, the methodology used for the literature review will be presented in Section 3.2 of this chapter, which is divided into several subsections to capture multiple steps taken to perform an effective literature review process. Section 3.3 will give us a simple overview of online learning technology and perform technology acceptance studies. In section 3.4, the general studies focusing on different models and variables for user acceptance of online learning will be explored. Several models studied with particular attention to the technology acceptance model and its additional variable will help us investigate the work done in this area and guide us to build our research constructs and hypothesis to help us answer the research questions meticulously and effectively. This will be followed by section 3.4, which will capture the essence of user acceptance studies during the covid -19 pandemic and help us ascertain the knowledge about acceptance of online learning worldwide and help us understand the current scenario of online learning during the covid-19. The chapter will conclude with Section 3.5.

3.2 Introduction and Structure of literature Review:

Online learning is defined as "the use of the Internet to access learning materials to interact with the content, instructor, and other learners and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience" (Ally, 2004, p.5.). Since its advent, online learning has now seen growth in many aspects. User acceptance is studied to bring valuable changes to technology to make it more efficient and user friendly. The year 2020 brought along a massive pandemic that changed the shape of the world in many aspects. Social distancing impacted all the sectors of human lives, and education was not any different. With physical classrooms turning to virtual, online learning played an important role in salvaging education. Online learning has been in the picture for more than the past two decades, but its face is changing every day. With more and more user acceptance studies being continually performed, the acceptance of online learning is recorded, the issues noted and mitigated in the successive models. This makes the user acceptance studies so crucial because it enlightens the policymakers and the developers of the technology about the likings and limitations of the technology and helps them mitigate the issues. Online learning has been following these trends and being continually improved in the process. However, during this Covid-19 pandemic, online learning was forced onto the students, sometimes against their will to accept it. Some institutions were not ready for this significant change and were thus not fully equipped, while many students were also not technically and mentally equipped for this change. This scenario changed the whole technology acceptance scene because it is not following the natural flow of adoption; instead, it is forced. Coordinated with the aim of this research, where we are trying to perform the literature review to investigate the current literature, we will review it in two parts. The first part will study the online learning acceptance among students in general studies, which were performed before the covid-19 pandemic, to understand the natural flow of acceptance of online learning. This part will also help us create our research model and develop our hypothesis to answer our research questions. The second part of the literature review will review the user acceptance studies of online learning during the covid -19 pandemic in different parts of the world to study and compare the difference in adoption and acceptance. It will also help create the bigger picture of the status of online learning acceptance and students attitude towards it in the global setting.

Figure 12

Literature review Structure



3.5 Methodology of literature review

To answer the research questions, this research follows the research strategy proposed by (Kitchenham & Charters, 2007), which is based on the guidelines for carrying out the Systematic Literature Review (SLR). The review process is divided into three phases, as described below, to ensure a complete literature evaluation.

3.5.1 Planning the review

Kitchenham and Charters (2007) stated that during the planning phase of the review, the need to conduct the review is identified. For this research, the need to conduct the review is to gain a

detailed insight into student acceptance of online learning using the technology acceptance model. In addition to that, to answer the second research question, there is a need to extensively investigate the current research being carried out worldwide concerning student acceptance of online learning during the Covid – 19 pandemic. Therefore, the review was planned accordingly.

3.5.1.1 Search process

In this research, a systematic literature review approach was followed according to the guidelines proposed by (Kitchenham & Charters, 2007). Identification of digital libraries and selection of primary studies is performed in this stage.

Digital library: To thoroughly cover a broad spectrum of relevant literature, the search was conducted following widely recognised and extensively used electronic libraries: Google Scholar, ACM Digital Library, IEEE Xplore Digital Library, Science Direct, and Springer Link.

Search String: The keyword strings that were used are:” user acceptance studies,” “user acceptance of online learning,” “user attitude towards online learning,” “Application of Technology acceptance model in online learning,” “model to study online learning acceptance”, "usability and ease of use of online learning", "social influence on online learning", "Student acceptance of fields of the papers to apply the search terms were decided. These strings were searched in the paper title, abstract, and keywords.

3.5.1.2 Inclusion/Exclusion Criteria

As per the inclusion/ exclusion criteria mentioned in Table 1, we confined our search to publications written in the English language. For the content type, we selected only journals and conference papers, along with book chapters. Although our web pages did not qualify the inclusion criteria, we consulted the world health organisation and the CDC website to get the actual numbers for the Covid related items. No restriction was applied to the publication release date to cover the intricacies and fundamentals of the model used. However, latest published papers related to the topic were given priority. Still, to narrow the scope of review, the start date for publication was kept to 2000. However, for the publications related to COVID – 19, all the research was collected from 2020 and 2021.

Table 1

Inclusion/ Exclusion criteria

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> • Peer reviewed • Full-Text • Content-type- Journals, conference papers, book chapters • Published within the selected period (2000-2021) • For papers related to Covid-19 publishing, the date must be (2020-2021) • Published in the above-selected database • In English • Key words: Online learning + user acceptance + user attitude+ user intention + Technology acceptance model 	<ul style="list-style-type: none"> • Uncompleted studies • Non-English • Webpages • Outside the selected timeframe • In other unrelated databases (business, texture, health, and others). • Not academic peer-reviewed articles • Not accessible

3.5.2 Conducting the review

3.5.2.1 Selection of Primary Studies

Our selected digital libraries, namely Google Scholar, ACM Digital Library, IEEE Xplore Digital Library, Science Direct, and Springer Link, were searched with the search string mentioned above and related peer review research articles (including articles in press), conference proceedings, papers, book chapters, review papers, and short surveys were screened according to the criterion mentioned in table 1. Before importing the bibliographic manager, all the non-English articles with missing abstracts, notes and editorials were excluded. Also, all articles before the year 2000 were removed (However, any publication explaining the original research model for kept aside for definitions and model explanation). A total of 213 articles managed to clear our inclusion criteria and were selected. The distribution of articles downloaded from each digital library is provided in table 2

Table 2*Number of papers selected from the digital libraries*

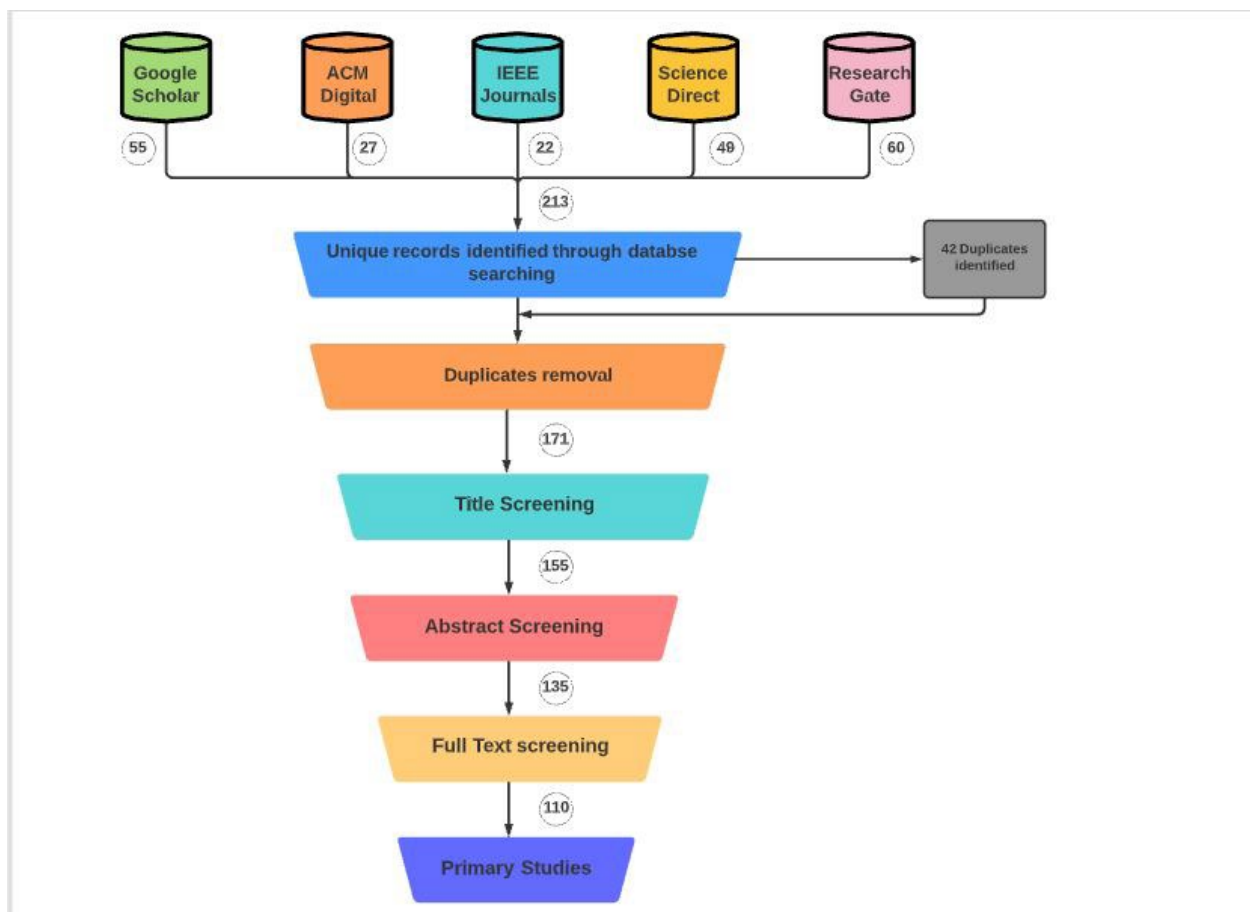
Digital Library	Number of Papers
ACM	27
Science Direct	49
IEEE	22
Research Gate	60
Google Scholar	55
Total	213

All articles selected from these libraries were then checked and 42 articles were found in duplicate, which were removed from the list and reduced our selected articles number to 171. During the manual screening of the article titles, titles which seemed irrelevant to our research and articles related to components other than student acceptance of online systems, were excluded. However, articles related to generic information about online learning and Technology acceptance studies were kept aside for definition and explanation purposes. The above procedure was then repeated by scanning the papers' abstracts. Several studies were excluded because they focused primarily on the technical aspects of online learning or Technology acceptance studies. The articles studying technology acceptance of online learning through Technology acceptance models and its various extensions were only included, while models other than that were also excluded from the list. Studies conducted on faculty, tutors were also excluded, and only student acceptance studies were given importance. Finally, 98 papers made it to the entire reading list, which was then accessed for their quality. Among these articles, the articles with solid methodology and practical approach were finally selected for primary studies, which were 110 in number. These 110 articles were

analysed and examined for our literature review process. The process of the publication selection process is depicted in figure 13

Figure 13

Flow diagram for selection of primary studies for review



3.5.3 Reporting the review

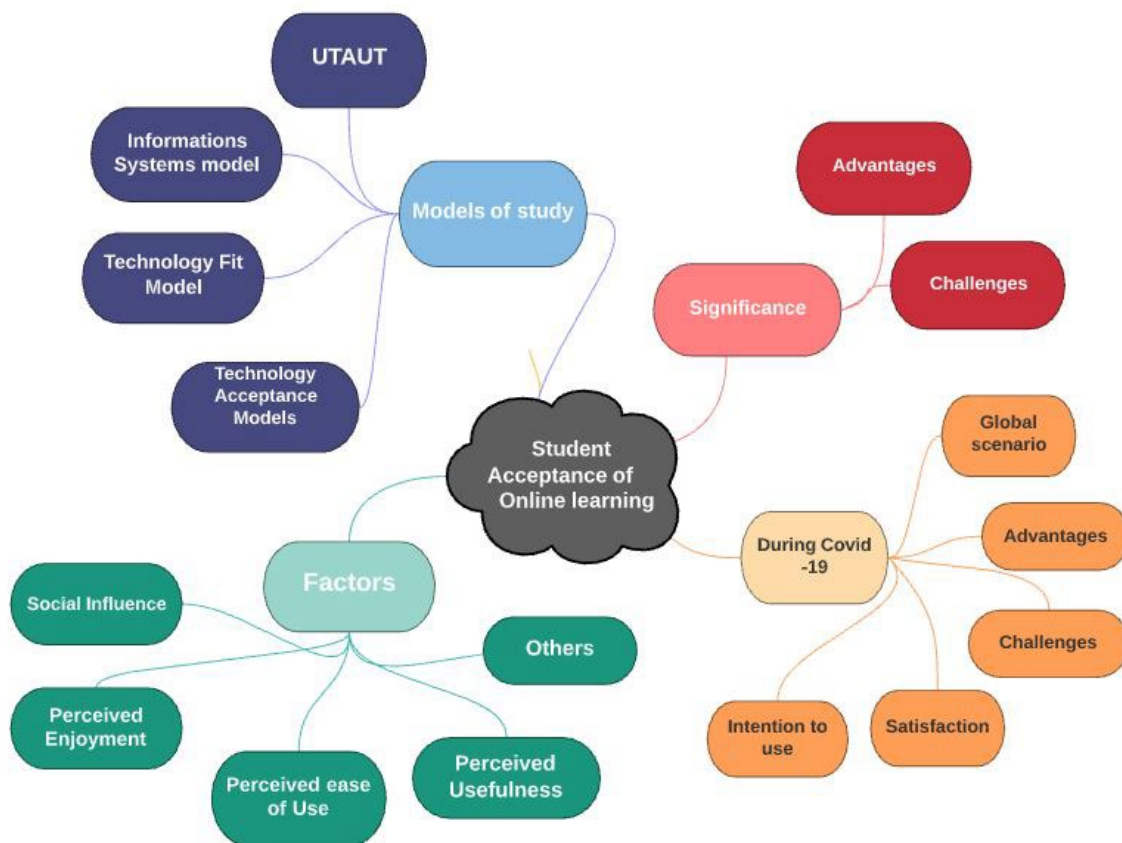
This section generates the data analysis on the data gathered from the review of the articles. Then the analysis is reported to draw inference towards the research questions and help develop a hypothesis for the research.

3.5.3.1 Data Analysis

The literature review was aimed at analysing and summarising the relevant literature, and to identify any research gaps that could be exploited for future research. A mind map was created based on researchers thoughts of proceeding with a review along with knowledge gained from reviewing the works of some other literature reviews (Panigrahi et al., 2018; Momani & Jamous, 2017; Granić & Marangunić, 2019; Marangunić & Granić, 2015) conducted in the same field. A pictorial resenation of the themes is presented using the mind map in figure 14.

Figure 14

Mind Map for conducting the literature review



3.6 Literature Review

3.6.1 Need and significance of the study of User Acceptance of Online learning

The importance of technology acceptance by its user is already discussed in Chapter 2 of this research. In continuation, this section talks about the need and significance of acceptance of online learning by its students.

The significance and use of information technology (IT) in every aspect of lives and its increasing recognition in the education sector can be an undeniable reality in the contemporary era of the scientific age (Chandio, 2021). According to Davis (1986), the efficacy and usefulness of emerging technologies must be determined by user acceptance and actual usage. The need to understand the factors influencing system usage and address the difficulties faced in using that system is crucial for decision-makers to recognise potential user needs and concerns. Gathering this information can help developers address these concerns during a system's development phase (Ibrahim et al., 2021). Thus, researchers are always looking out to understand why people accept or reject new technologies.

Similarly, online education's effectiveness depends on many factors, and the degree of acceptance is one of the most critical aspects (Tarhini et al., 2017). Thus it is impertinent to study the factors affecting the use, adoption, and acceptance of online learning. This makes the students' perceptions of e-learning technologies essential and a necessary step towards the successful integration of these technologies in education (Ozdamli & Uzunboylu, 2015). Effective use of technology can help students and teachers mutually engage and collaborate (Bower, 2019; Gonzalez et al., 2021). As Kemp (2020) studied, the most successful transitions to online learning are majorly influenced by the user's Intention to use that technology and its usefulness. In addition to that, online learning's effectiveness highly depends on the degree of acceptance of the user (Tarhini et al., 2017). Therefore, it becomes indispensable to study and analyse the factors related to the use and acceptance of technology to understand its acceptance by the user to develop better online learning solutions for the students.

3.6.2 Models for the study of acceptance of online learning

As we deliberated on several models for the study of technology acceptance in the previous chapter. The most widely used and accepted models for online learning are the TAM model developed by (Davis et al., 1989), the UTAUT model (Venkatesh et al., 2012) and the GETAMEL model (Abdullah & Ward, 2016). These models' factors are based on different theories related to motivation, PC utilisation, cognitive theory, and adoption of information (Kemp et al., 2019). They design their instruments by adapting the model to the specific technology that they are analysing, and, in many cases, they add new constructs to the models (Park et al., 2012) or propose new models.

3.6.3 Factors responsible for user acceptance of online learning

Different technology acceptance models were analysed by various researchers where Kemp et al. (2019) developed a taxonomy of factors that affect attitudes towards educational technologies by students or educators in higher education institutions. The taxonomy described seven primary categories: a) attitude, affect, and motivation; b) social factors; c) usefulness and visibility; d) instructional attributes; e) perceived behavioural control, f) cognitive engagement, and g) system attributes.

Affect: Measures the user's satisfaction or liking of the behaviour. It also includes the users' emotional state (Hermida et al., 2021).

Motivation: Is defined by intrinsic motivation, where individuals performed an act by themselves, not for any external reward or results. It is focused on the learner's motivation to (Hermida et al., 2021).

Perceived behavioural control: This refers to the user's capability and effort and the environmental conditions. It includes **Ease of use:** The degree to which the user expects an effortless behaviour. It is based on previous use of the technology. **The actual use** has an impact on how it will be used with time. **Self-efficacy:** User's judgment of their capabilities required to complete designated tasks. It is not based on their actual skills but on the belief of what a person considers capable of doing. **Accessibility:** This includes how frequently a user can access e-

learning systems and the ability to use devices without time or place limitations (Hermida et al., 2021).

Cognitive Engagement: This refers to the cognitive processes that allow users to absorb knowledge. It includes the focus, attention, and absorption of materials by the learner.

Learning Engagement is considered a proxy for learning outcomes (Panigrahi et al., 2018)

3.6.4 Technology Acceptance model

3.6.4.1 Overview of TAM

As defined in Chapter 2 of this thesis, the Technology acceptance model explains the determinants of computer acceptance among user populations (Abdullah & Ward, 2016; Kemp et al., 2019). It points out that the critical point of people's acceptance of information technology lies in whether the technology can help them better accomplish their tasks and whether they need to spend more efforts (Zeng, 2020).

TAM is derived from social psychology theory called the theory of reasoned action (Ajzen & Fishbein, 1975), which is a theoretical framework used to examine causal relationships to an individual's actions and applied to a wide range of applications and user populations emerging along with the Theory of Planned Behavior (Ajzen, 1985). Fred Davis adapted these models of TRA and proposed the Technology Acceptance Model (Davis, 1986). Davis (1986) emphasised that since the actual use of a system is a behaviour, therefore TRA would be the most suitable model for explanation and prediction of that behaviour since TRA posits that causal relationships emerge from a system of beliefs that affect attitudes and behaviour, which eventually lead to intentions. According to TAM the motivation of the user can be explained by three factors, which are perceived ease of use, perceived usefulness, and attitude

Perceived Usefulness (PU) - Perceived usefulness is defined as the degree to which an individual believes that specific technology will produce better outcomes (Lee et al., 2005).

Perceived ease-of-use (PEOU)- It explains the user's perception of the effort required to utilise the system (Alrafi, 2009).

Attitude - is explained as positive or negative feelings about an object or performing a behavior by any individual (Fishbein & Ajzen, 1975). Attitude can be significantly influenced by perceived usefulness and perceived ease of use of technology (Davis et al., 1989). Thus, an individual's Attitude towards the technology ends up influencing his or her actual use thereof. Behavioural Intention to use is also influenced by the perceived usefulness of the technology in question. It has been found that users' Attitude towards the acceptance of a new information system (IS) has a critical impact on its success (Davis et al., 1989; Venkatesh & Davis, 1996).

Behavioural Intention (BI) – The TAM model emphasises that the user's acceptance of technology is determined by his behavioural Intention, where the behavioural Intention is determined by his Perceived Usefulness and Perceived Ease of use (Wu & Chen, 2005). If these two variables are positive, they together create a favourable behavioural intention (BI) toward using the technology that consequently affects its actual use (Davis et al., 1989). A strong relation is found between BI and the person's actual behaviour. Thus it can be said that if a person intends to do a particular behaviour, then it is highly likely that he will do it (Farahat, 2012). Moreover, TAM postulates that Behavioural Intention is jointly determined by the person's Attitude towards using the system and his perceived usefulness (Davis et al., 1989). He posited that user behaviour is affected by Behavioral Intention to Use, which has a mediating relationship between Perceived Usefulness and Perceived Ease of Use (Davis et al., 1989; Lanlan et al., 2019).

Actual Use - "One's actual use of a technology system is influenced directly or indirectly by the user's behavioural intentions, attitude, perceived usefulness of the system, and perceived ease to use the system" (Park, 2009, p.151).

Momani and Jamous (2017) noted that development for TAM was conducted in three phases, namely adoption, validation, and extension. They stated that the adoption phase witnessed TAM being tested and adopted through many information system applications whereas, in the validation phase, TAM was validated by different researchers as an accurate model of technology acceptance measurement of the user in different technologies and finally, the third phase called the extension was where the researchers introduced some new variables and relationships between the TAM's constructs. In the extension phase, other components and additional variables were introduced in the TAM model to provide a broader view and a better explanation of IT adoption as well as enhance TAM's predictive power (Sukkar & Hasan, 2005; Davis et al., 1989; Davis et al., 1992)

3.6.4.2 Extensions of TAM –

Many modifications were made to the original TAM theory, and several researchers extended it. For example, Taylor and Todd (1995) proposed the integrated model of TAM and TPB, which studied and equated social influences with the subjective norm and defined them as other people's opinions, superior influence, and peer influence. Venkatesh and Davis (1996) removed the Attitude construct from the original model because they believed that Attitude does not fully mediate the relationship between the two basic constructs (perceived usefulness, perceived ease of use, and behavioural intent). On a similar note, the Actual use construct was dropped from the original model by (Masrom, 2007). Agarwal & Prasad (1998) added the construct of compatibility in the TAM. At the same time, Dishawa & Strong (1998) integrated TAM with Task-technology Fit. Subjective norms were studied in TAM and TAM2 was proposed as a latest version of the TAM by adding social influence to it (Venkatesh & Davis, 2000).

Later, the Unified Theory of Acceptance and Use of Technology was proposed (Venkatesh et al., 2003). Al-Gahtani (2001) in his modification of the TAM, combined behaviour intention to use and the actual system use, into a single variable and called it acceptance or user acceptance. Also, Chau and Hu (2002) integrated peer Influence with TAM. Later trust factor was also added to TAM (Gefen et al., 2003; Wu & Chen, 2005).

On the other hand, (Lee et al., 2005), to examine the impact of perceived Enjoyment a user gets in using technology, included perceived Enjoyment as an intrinsic motivator on the user's Attitude and Intention to use. At the same time, Chiu et al. (2005) added personal innovativeness with TAM. Walczuch et al., 2007 proposed the TRAM (i.e. integration of technology readiness and Technology Acceptance Model). At the same time, few researchers tried to show the influence of different social referral groups on individuals' behaviour towards a technology (Park, 2009). Chang et al. (2012) proposed a Perceived convenience in the combined model of Task-technology fit and TAM. Chen (2008) synthesised the essence of technology readiness, the TAM, and the Theory of Planned Behavior to propose an integrated model for understanding customers' continued use of self-service technologies. Lastly, Lee (2009) united the TAM with TPB, perceived risk, and perceived benefit to understand the adoption of internet banking.

TAM has been widely used in explaining IT adoption and usage. However, this is done primarily from the instrumental perspective (Agarwal & Karahanna, 2000) focusing on functional or extrinsic motivational drivers such as usefulness and ease of use. As argued by ((Davis et al., 1992) the adoption of new technology is determined by extrinsic and intrinsic motivators. Therefore, several researchers (Chung & Tan, 2004; Lin et al., 2007; Chang et al., 2012; Chiu et al., 2005) advocated integrating the TAM with other models and theories that consider not only utilitarian aspects – such as those included in the TAM – but also other intrinsic motivations for individuals – such as flow – regarding technology usage. The results of their work show that models presented in this context have greater explanatory power. Incorporating both into TAM may therefore provide better explanation and prediction. Since there is no single final model of TAM which can be deemed suitable to all situations, often more than one theory is applied as well, as components from various theories are merged to suit the intended purposes (Wahdain & Ahmed, 2014).

3.6.4.3 Applications of Technology Acceptance Model

TAM has been used extensively used for several kinds of user acceptance studies in various areas of technology. Among the wide range of frameworks available, the TAM is still the most common and authentic model of study usage behaviour (Lee et al., 2005). The strength of the initial model and its many different versions are extensively used in numerous studies, emphasising its broad applicability to various technologies and contexts (Al-Smadi, 2012). Some of the TAM areas are discussed below, with special importance to online learning and its variants.

TAM enjoys extensive application from business to health to education TAM is being used everywhere for decades.

Information Technology: Designed for acceptance if Information Systems TAM has very well served its purposes by becoming the framework to study the acceptance of some of the most important IS systems. Moon and Kim (2001) extended the TAM to explain the users' acceptance of the World-Wide-Web. The Usage behaviour and acceptance of email were studied by several scientists like (Serenko, 2008). The acceptance of social media was studied by (Wirtz & Goetel, 2016; Pinho & Soares, 2011). User acceptance of several other essential technologies was also tested using the TAM. Some of the famous examples are Internet banking by (Nasri & Charfeddine, 2012), Wi-fi by (Lu et al., 2003) and hedonic information systems was studied by (Van der Heijden, 2004). Muller-Seitz et al. (2009) use the Technology Acceptance Model and

modified it by adding the constraint of security concern to understand customer acceptance of Radio Frequency Identification (RFID)

Business: In business, TAM was used to study electronic commerce Pavlou (2003). The consumers' acceptance of e-shopping was studied by (Ingham et al., 2015). Šumak et al. (2017) conducted a meta-analysis to study moderator factors in e-business adoption. To study the acceptance of e-stock, Lin et al. (2007) used extended TAM I, which clarified the e-stock users' behavioural intention studies. In comparison, extended TAM was also used by Bontis et al. (2007) to study the mediating effect of organisational reputation on customer loyalty and service recommendation in the banking industry. In a similar vein, Stern et al. (2008) proposed a revised TAM to investigate the consumers' acceptance of online auctions.

Health: The health sector has also considerably benefitted from the TAM as e-health applications acceptance was studied by (Chauhan & Jaiswal, 2017). The study of factors influencing acceptance of technology for ageing was conducted by (Peek et al., 2014).

Education: TAM is the most common ground theory in e-learning acceptance literature. The popularity of TAM is evident based on several number studies conducted by applying, extending, and evaluating the TAM framework for examining several aspects related to user acceptance studies in the educational technology literature (Abdullah & Ward, 2016; Bazelais et al., 2018). Various researches discovered that different versions of TAM could be successfully used to represent a credible model which can facilitate the assessment of diverse learning technologies and widely employed to predict the adoption of certain technologies in education ((Masrom, 2007); (Park, 2009); (Farahat, 2012); Panigrahi et al. 2018). Davis (2000) deliberated that TAM has emerged as a leading scientific paradigm for investigating learning technology by students, teachers and othteachers,holders. Factors that affect Intention to Use an Online Learning Community (Liu et al., 2010). Effect of flow on perceived ease of use, perceived usefulness, and the e-learning environment's actual usage was studied by (Millat et al., 2016).

Masrom (2007) was the first to research e-learning acceptance using TAM for higher education which was later followed by several other researchers (Abdullah & Ward, 2016). Masroom (2007) proved all the original constructs of TAM in relation to online learning except for Attitude Toward Using, which did not significantly affect Behavioral Intention To Use. Alternatively, TAM's research by Farahat (2012) on e-learning acceptance for Egyptian students is in line with the

Original TAM, where she states that Perceived Ease of Use has a significant relationship with Perceived Usefulness, both of which are significant for Attitude toward using E-learning. Tarhini et al. (2013) added several variables like Social, Organisational, and Individual factors that resulted in Perceived Ease of Use and Perceived Usefulness in his research on Web-based Learning Systems acceptance in European Higher Education which had a significant influence on Behavioral Intention. At the same time, Tarhini et al. (2014) measured the moderating effect of gender and age on E-Learning Acceptance.

Meanwhile, Ibrahim et al. (2017) studied the E-Learning acceptance while Ibrahim et al. (2018), through his research on 95 undergraduate students, showed Perceived Usefulness did not significantly affect Behavioral Intention to Use. However, the Perceived Ease of Use has a significant effect on Behavioral Intention. The research also added other factors such as Social Norms, Quality of work-life, Self-efficacy, and Facilitating Conditions variables. Perceived Satisfaction of an Online Learning was studied by (Al-Azawei & Lundqvist, 2015), which showed perceived usefulness as the best predictor of satisfaction from online learning. The Impact of Cultural Dimensions on Online Learning was studied by (Rey et al., 2016). Muhammad et al. (2016) studied Learning path adaptation in online learning systems.

Chen (2008) have emphasised the feasibility of web-based learning with a high possibility to be used as a learning model. While student acceptance of blended learning was studied by Padilla-Meléndez et al. (2013), they combined Perceived playfulness and gender differences to the technology acceptance model in a blended learning scenario. Vo et al. (2020) investigated the effects of blended learning on student learning performance and compared the output of students in hard and soft disciplines. According to their study, students in soft disciplines perform better than their peers in hard disciplines when courses are designed in the blended learning modality. Student acceptance of Virtual learning was studied (Raaij & Schepers, 2008). Students' acceptance and intent to use third-generation learning management systems

Mobile learning: Mobile learning or m-learning is the next emerging branch of e-study and much sought after technology in this pandemic. It has seen remarkable growth through demands and mobility of “new learner” generations, widening opportunities for timing, location, accessibility, and context of learning. Therefore, investigating the critical factors behind users' choices of mobile educational technologies (Park et al., 2011; Bere & Rambe, 2013; Thunibat, 2015; Sánchez Prieto

et al., 2016; Saroia & Gao, 2018) has been proven helpful in providing users with more acceptable mobile learning applications, and therefore has been widely regarded as a vital issue. Al-Emran & Shaalan (2015) employed the TAM to examine students' acceptance of mobile learning. Their results suggested that the students' preference for using mobile learning was most significantly affected by their perception of usefulness and ease of use. Overall, these studies signified the extensive use of TAM in examining students' acceptance of mobile learning and indicated the lack of scholarly attention to the critical role of critical other factors such as perceived Enjoyment, predictive effectiveness, and predictive efficiency students' acceptance of mobile learning applications. Almaiah et al. (2016) used the TAM model to reveal the factors that influence Intention to use mobile learning system among students. They found that learning content quality, content design quality, interactivity, functionality, user interface design, accessibility, personalisation, and responsiveness are among antecedents of mobile learning acceptance. Abramson et al. (2015) have found a relationship between prior use of e-learning and behavioural Intention to use m-learning. Joo et al. (2014) highlighted that the mobile user interface is an essential factor affecting usefulness and ease of use perceived by learners. While Huang et al. (2007) have stressed the importance of perceived mobility value, Chang et al. (2012) showed the importance of perceived convenience in predicting an individual's acceptance of m-learning.

3.6.5 User acceptance of online learning during COVID-19

The covid-19 pandemic started at the beginning of the year 2020 and spread across the globe very rapidly. Being one of the most contagious viruses in human history, Covid-19 forced people to shut themselves in their houses, and the world went into lockdowns. Physical distancing and masks became the new norm. This pandemic affected and changed various scenarios across the globe, and education was one of them. With social distancing, physical contact had to be reduced, and due to this, the possibility of physical education no more existed. The schools, colleges, and universities worldwide had to shut their regular mode of teaching and look for various virtual ways to continue the education process. This was when online education came out and reached every household as a saviour of education. The educational institutions adopted the virtual classrooms methods to continue imparting education to their students, and similarly, students had to adapt to

online learning as the new form of education. Different universities across the world chose different options like few universities chose asynchronous learning where course material was recorded by instructors in the form of assignments or recorded lectures and distributed to complete them at their own pace (Crawford et al., 2020, Hodges et al., 2020).

In contrast, other institutions chose synchronous learning with a fixed time and a fixed medium like zoom classes and other forms of online learning. It is interesting to note that since online education was not a choice of every student but was forced onto them due to this pandemic, many of them had reservations and reluctance towards this kind of education. Although some of them welcomed this new change, some of them did not enjoy this change due to many factors. Therefore, several research types were conducted to study this phenomenon of student acceptance of online education during the pandemic. In this section of our literature review, we will study some of these studies conducted worldwide to investigate the impacts of a sudden transition to online learning and the pattern of student acceptance of online learning in these changing times of Corona. These studies explained the functioning of online learning globally and focused on many aspects of online learning like its factors, challenges, advantages, and worldwide acceptance.

Intending to address the required essentialities of online teaching-learning, (Mishra et al., 2020) conducted research that also investigated and found solutions on utilising existing resources of educational institutions to effectively transform online teaching-learning formal education into online education with the help of virtual classes and other pivotal online tools. Holzer et al. (2021) studied the basic need, satisfaction, self-regulated learning, and well-being of students during the pandemic in relation to online learning. A SWOC (Strengths, Weakness, Opportunities & Challenges) analysis of online learning during the Corona Virus pandemic in India was conducted by (Dhawan, 2020) to explore the growth of EdTech Start-ups and online learning and to give some suggestions and recommendations for the success of online mode of learning during the pandemic. A study done by (Qiao et al., 2021) offered an enhanced understanding of the interaction of technology evolution and technology adoption under unexpected environments like Covid and provided practical insights into how to promote new technology in a way that users will accept and use easily. It studied the interaction of e-learning technology evolution and adoption in the pre and post-Covid -19 era and indicated that the moderating results of technology evolution are

proposed before the COVID-19 outbreak; however, the studies after the COVID-19 pandemic paid more attention to technology efficiency rather than effectiveness. The research also emphasized the infrastructure to reach more users after the outbreak of COVID-19 because e-learning is the only way to continue education. It also proved how COVID-19 fear moderates the relationship between the external factors and the behaviour intention of e-learning users.

Most of the studies showed that the shift to online learning proved beneficial to students like Gonzalez et al. (2020) analysed students' performance during COVID-19 and found that students improved their performance compared to their previous year. The key features of online learning, like quick access to material and increased understanding of data, resulted in better learning outcomes (Simamora, 2020). Also, it is resulting in improved information technology literacy (Agung et al., 2020)

3.6.5.1 Global scenario of online learning acceptance during COVID

The acceptance/ rejection of any technology depends on several environmental, educational, emotional, demographic, and other factors. Various researchers throughout the world discussed several such factors of acceptance of online learning. All these researchers studied together will paint a global picture of the online e-learning scenario in this pandemic. Hermida (2020) conducted research and analysed the Attitude, affect, motivation, perceived behavioural control of 270 college students from the east coast of the United States and found out that motivation, self-efficacy, and cognitive engagement decreased after the transition to online learning, and only the use of technology increased (Hermida, 2020). She also conducted a study on students from four countries of Mexico (323), Peru (299), Turkey (125), and the USA (262) to compare the acceptance of emergency online learning due to pandemic. The study emphasised that a single approach cannot be applied for all cases, and it is a challenge in all countries to provide high-quality education to all students. Also, the technological infrastructure and socio-economic conditions and particular conditions of each student make use and acceptance of online learning different in Mexico, Peru, Turkey, and the USA (Hermida et al., 2021). A study was conducted on the demographic factors affecting online learning acceptance in non-experimental quantitative research to investigate readiness to learn, online learning experiences and Intention to continue using online learning (E. Chung et al., 2020). Chung and Mathew (2020) reported that six in every

ten university student in Malaysia was satisfied with their online learning. They also emphasised that female students, degree students, and students good internet connection are more satisfied with online learning (E. Chung & Mathew, 2020). Although it was found that Online learning satisfaction is a significant predictor of students' Intention to continue with online learning in the future (Chung & Mathew, 2020), more than half of the respondents in Malaysian universities indicated that if given a choice, they do not want to continue with online learning in the future (Chung, 2020 and Chung & Mathew, 2020). While, medical students from Jeddah only moderately accepted e-learning during the Covid-19 Pandemic (Ibrahim et al., 2020). Other factors like student characteristics, internal motivation, instructor characteristics, quality of institutions and services, infrastructure and system quality, quality of courses and information and online learning environment were studied by (Yudiawan et al., 2020) on Islamic higher education students in West Papua, Indonesia. The results showed that all these factors tested did influence online learning success with varying significance. Infrastructure and system quality were the most dominant influences, while factors like interaction in the classroom, student motivation, course structure, instructor knowledge, and facilitation positively influence students' perceived learning outcome and student satisfaction (Baber, 2020). However (Baber, 2020) also noted that institutions' variety and services had no significant impact on the student's learning outcome (6.3%). For students of a university in Indonesia, the overall perception of online learning is good, with few obstacles that require improvement (Surani & Hamidah, 2020). Also, English students of a university in Indonesia found online learning application in English learning effective and efficient in this crisis (Famularsih, 2020). Interestingly, another study in Indonesia conducted on English students from the language Education Study Program at Pamane Talino College of Education by Agung et al. (2020) found that most English students in this university are not ready for this rapid shift in terms of teaching and learning style due to the challenges faced in availability and sustainability of internet connection, accessibility of teaching media, and the compatibility of tools to access the media. Similar sentiments were depicted in Simamora (2020) studies, which showed the performing arts students in Indonesia faced many challenges and preferred face-to-face learning over online learning. Also, the mechanical Engineering students in Indonesia felt that teachers were not managing online learning in line with student expectations. Students felt that online learning did not provide relevant experience and productivity in mastering competencies. However, they feel it provided motivation and ease in their learning and even while they had the

ease of access to resources, they are still reluctant to use them sustainably in the future (Syauqi et al., 2020). Moving towards the Indian subcontinent and its neighbouring countries. The case of distant education students in Pakistan studied by Chandio (2020) found that despite the e-learning system in Pakistan is intensively popular, it is not yet totally adopted by the universities across the country in their propagation and disseminating teaching and learning and requires government support to boost up the literacy rate and prefer the use of information technology (IT) in the way of learning and e-teaching. Similarly, as Abbasi et al. (2020) studied, medical students in Pakistan did not prefer e-teaching over face-to-face teaching during the lockdown situation. The study prompted the administration and faculty members to take necessary measures for improving e-teaching for better learning during the lockdown. While in research in India by (Kamble et al., 2021) to understand the perceptions of university students toward the sudden transition from traditional face-to-face learning to an instructor-led Online learning environment (OLE) due to the pandemic-induced lockdown with relation to accessibility and comfort, Internet connectivity, OLE effectiveness, course content, and interactions between students and instructors showed that learners accepted the transition toward the OLE. While in another research in India by (Khan et al.,2021) to examine the students' perception and readiness about the online-learning system adopted at the university level during the ongoing COVID-19 pandemic revealed students' positive perception towards e-learning and thus acceptance of this new learning system. Alternatively, the findings on university students in Bangladesh on their perception of using mobile phones as a learning system found that most of the students at the university level have a positive perception of m-learning and that m-learning can be proved as an amazingly effective medium to recover the study gap during this COVID-19 pandemic time. Resonating similar views, a study in Ghana by Adarkwah (2021) showed that most interviewed students felt that online learning is the best alternative approach to teaching and learning during this pandemic. However, because of its spontaneous nature and the absence of a proper university and government approach, the results were not what they hoped for. While in a study that talks about the need and span of online learning in education in Saudi Arabia by Haq (2020) focused on how e-learning can solve the disruptions in the education sector due to the pandemic (COVID-19) and verified teachers' preference towards various features of e-learning and depicted that majority of the teachers held positive opinion towards e-learning. While studying satisfaction and continuance preferences of students towards online learning once the universities reopened in Slovenia, Virtic et al. (2020) found that only

attitudes are a strong predictor of Satisfaction, while Organizational Support, Perceived Ease of Use and Learner Attitude toward Online Learning are not. In turn, Satisfaction is a good predictor of Continuance Preferences to use online learning even after the lockdown. Along with all other world countries, China also pondered whether online learning can replace traditional offline teaching. Therefore, Jin et al. (2020) investigated university students in China by questionnaires to discuss this topic with the help of the PUSH-PULL model. The results show that push effects (Perceived security risk, Learning convenience, and Service quality), pull effects (Usefulness, Ease of use, Teacher's Teaching Attitude, Task-technology Fit), and mooring effects (habit) all significantly influenced users' switching intentions from offline to online learning platform. To investigate the impact mechanism of online learning user satisfaction on university students in China from the perspective of cognitive load in the era of COVID-19 and explore ways to optimise cognitive load, optimisation of cognitive load are multi-dimensional. The user's satisfaction with the online learning platform consists of the expected confirmation of the information system and the perceived usefulness.

An interesting longitudinal study was conducted by (Vladova et al., 2020) in four German universities. The students of information systems and music and arts were its subjects, and the study was conducted at four points in time during the spring-summer 2020. It emphasised the students' acceptance of technology-mediated learning and also noted any change in this technology acceptance during the semester. It also studied the differences in acceptance between the students of two disciplines. The study results followed general TAM results where ease of use, usefulness, and Enjoyment were all attributed to positive Attitude.

In contrast, Attitude, Enjoyment, and usefulness also attributed to positive behavioural Intention. Behavioural Intention during the semester for IS student increased over time toward the end of the semester and although the Music & arts students showed similar increased BI over time, a slight decline was identified at the end of the semester. The results also showed that, in general, Music & Arts students have more negative perceptions towards online learning. In a similar vein, Rizun & Strzelecki (2020) research covers the pandemic situation in Poland by analysing governmental ordinances and tracking the gradual extension of restrictions for educational institutions; it also investigated the influence of Experience Enjoyment, Computer Anxiety, and Self-Efficacy on students' acceptance. Although research conducted on Thai people by Chayomchaia et al. (2020)

suggested that in the quarantine period or work from home period, people suffered from moderate to high levels of anxiety or stress, which motivated Thai people to increasingly use online and mobile technology or programs compared to the past. The study revealed four key factors that had significant and positive effects on users' Intention in using online learning: performance expectancy, effort expectancy, trust, and perceived risk. It also indicated that behavioural Intention positively affected the actual use behaviour of technologies during quarantine time.

However, most of these researches were conducted on higher education and university students. Some of them targeted K-12 education as well, like Kusumadewi et al. (2020) studied parents of elementary school students for their behavioural Intention and Attitude towards online learning and Zuo et al. (2021), whose study revealed key findings regarding K-12 students' online learning pattern, experiences, and engagement, as well as the influencing factors. This study employed a large-scale online survey that collected the opinions of Chinese primary and secondary students regarding their online learning experiences. The study aimed to extend the collective understanding of this new norm in education. Its results support the feasibility and usefulness of online learning as a flexible alternative to conventional schooling at the primary and secondary levels and revealed several interesting findings regarding student characteristics, social interaction, motivational beliefs, and online technologies concerning online learning experiences. While a study on Junior High School in Indonesia by (Asvial et al., 2021) which studied the behavioural Intention of performance expectation, effort expectancy, Attitude, facilitating condition, social influence, and cost, showed that the social influence of e-learning has a robust positive relationship with behavioural Intention.

3.6.5.2 Most popular educational platforms during Covid 19 :

Some researchers also discussed the usage and popularity of several online educational platforms and their relevance in online learning during covid -19. (Akour et al., 2021) investigated the use of mobile learning platforms for instruction purposes in the United Arab Emirates higher education institutions and found that teaching and learning could benefit from adopting remote learning systems as educational tools during the COVID-19 pandemic. Also, a study was conducted by (Basir et al., 2020) to know students' opinions about the implementations of asynchronous learning (ScreenCast-O-Matic and Google-Form apps) during Covid-19 in rural areas Indonesia. The study

also identified the advantages and disadvantages of these devices and analysed the students' confidence in using them when implemented in rural area. The results found that Screencast-O-Matic and Google form tools had several benefits like both platforms promoted students' writing skills while software contributes to the students' capabilities on ICT; however, they also had few obstacles. The study of (Chung et al.,2020 on university students in Malaysia showed that most respondents preferred online learning via pre-recorded lectures uploaded to Google Classroom and YouTube. At the same time, Blackboard and Zoom were the most preferred Learning Management Systems (LMS) by medical students in a university in Jeddah, Saudi Arabia (Ibrahim, 2020). The study by (Virtic et al., 2020) in Slovenia proved that all application of distant online learning increased. However, only the use of MS Teams increased significantly.

In contrast, the other applications (email, Moodle, e-textbooks) increased in a range of low to medium in terms of effect sizes, and even nonsignificant for applications such as Padlet and Kahoot. In China, the Impact of the COVID-19 Pandemic on User Experience with Online Education Platforms was studied by Chen et al. (2020). The research constructed an evaluation index system by obtaining user reviews about access speed, reliability, timely transmission technology of video information, course management, communication, and interaction, and learning and technical support on major online education platforms before and after the outbreak COVID-19. Combining the emotional analysis, hot mining technology, and relevant literature found out that during COVID-19, the users of the platforms have different concerns and requirements. There are some similar problems between each platform, such as kartun and flashback.

3.6.5.3 Limitations of Online learning during Covid-19 :

Every technology that has advantages has some challenges, and online learning, especially in times of pandemic, had its own set of limitations. Various such challenges and limitations were highlighted in these researches. For example, several challenges in implementing the eLearning system were observed due to the weak infrastructure of these nations. Also, access to eLearning and students' indifferent Attitude towards online learning posed challenges in its implementation. Although most of the studies did prove that students most often accepted online learning in most countries, there were several challenges faced by the students. Internet connectivity and speed

(Chung et al., 2020; Simamora, 2020; Famularsih, 2020; Agung et al., 2020) was the most common challenge faced by the students, followed by distraction and difficulty in understanding the content of the subject (Chung et al., 2020). Also, economic challenges like purchasing the internet (Simamora, 2020) and purchasing gadgets like smartphones and laptops (Simamora, 2020 and Agung et al., 2020). Several researchers also noted anxiety during online learning in this covid-19 times (Simamora, 2020). Some studies pointed that all teaching material cannot be taught through online learning (Simamora, 2020, Famularsih, 2020), and lack of interaction between lecturer and student was also a big challenge (Famularsih,2020). Few studies also showed that students fear losing data security (Simamora, 2020) and accessibility of teaching media and compatibility of tools to access the media. Agung et al. (2020) also acted as limitations of online learning. Qiao et al. (2020) also deliberated that the lack of financial support on technology evolution will directly weaken the implementation of new technology. While social isolation offers more opportunities for students to engage in e-learning, it slows down the implementation of e-learning because of out-to-date hardware and software. Also, if students lack confidence in the technology, which was observed as another limitation of this technology, then they do not feel a sense of cognitive engagement and social connection, which may negatively affect the students' learning outcomes (Bower, 2019)

3.6.5.4 Steps to overcome challenges in learning during Covid-19:

The study of student acceptance inspired the researchers to suggest several modifications and strategies and help policymakers deal better with the situations and develop efficient solutions to tackle the challenges of online learning more effectively. In developing countries like India, Pakistan, Indonesia, Malaysia and others, government, telecommunication companies and universities are advised to invest more in developing internet infrastructure as online learning will be the new norm soon (Chung et al., 2020).

3.6.5.5 Use of TAM acceptance studies of online learning during Covid-19

Several studies used the technology acceptance theories and extended the original TAM model to study the online acceptance by students during covid all around the world. In one such study conducted in South Korea by Baber (2021), he used perceived ease of use & perceived usefulness

on students' behavioural intention to accept and use e-learning in the future. His model combined factors of both instructor and student along with TAM variables to investigate behavioural Intention. Instructor characteristics included instructor attitude, competency & interaction, whereas student characteristics included student motivation, mindset & collaboration. The study also used 'perceived severity of pandemic COVID-19' as a moderating influence. The results suggested that all factors positively influenced the behavioural Intention to use and accept the e-learning system by the learners during this pandemic. A similar work by (Zeng, 2020) using 431 college students in China, emphasised that perceived usefulness, subjective norms, facilitating conditions and self-efficacy are the significant influence factors of students' online learning acceptance. TAM model on two member schools of a Vietnamese educational institution by Ho et al. (2020). Perceived ease of use and perceived usability were studied to examine students' attitude towards online learning, where self-efficacy, while acting as moderating influence of the research, positively impacted perceived ease of use (PEOU). However, it was noted that PEOU has no significant impact on students' attitudes. The results showed that social Influence could moderately affect Attitude and social factor (SF), directly affecting students' attitudes. On studying perceived Enjoyment and social influence with perceived usefulness and perceived ease of use, it was found that, perceived ease of use and Social Influence significantly influenced students' Behavioral Intention (BI) towards online learning, however, perceived Enjoyment and ease of use did not affect BI (Alajmi et al., 2020).

Contrary to that, Yubaedi et al. (2020) showed that Enjoyment successfully influences both usefulness and perceived ease of use of e-learning. They also found that experience and self-efficacy do not positively affect the perceived usefulness of e-learning. However, it has a positive effect on the perceived ease of use of e-learning. On investigating the influence of Experience, Enjoyment, Computer Anxiety, and Self-Efficacy on students' acceptance of shift to distance learning, it was found that Enjoyment is the best predictor of student's acceptance which is followed by Self-Efficacy (Rizun & Strzelecki, 2020). In contrast, both Perceived Ease of Use and Perceived Usefulness predict student's Attitude Towards Using and Intention to Use (Rizun & Strzelecki, 2020). Sukendro et al. (2020) used TAM-based research to successfully explain factors predicting the use of e-learning among Indonesian sport science students during the pandemic and found significant relationships between facilitating condition, perceived ease of use and perceived

usefulness. Also, significant relationships among core components of TAM were found except for the relationship between perceived usefulness and attitude.

Raza et al. (2021) used UTAUT model with social isolation, performance expectancy, effort expectancy, and facilitating conditions to study students' behavioural Intention towards online learning in Pakistan. They added effects of Corona as a moderating variable for their study. The integration of social cognitive theory, expectation confirmation theory, and DeLone and McLean's IS success model Alzahrani and Seth (2020) conducted a study in the United Kingdom to show that service quality during the pandemic did not influence students' satisfaction. However, both information quality and self-efficacy had significant impacts on satisfaction. The results also revealed that self-efficacy and satisfaction had no impact on personal outcome expectations; however, prior experience and social influence impacted personal outcome expectations. Using the same UTAUT model Qiao et al. (2021) studied the changes of technology evolution and technology adoption of e-learning in pre-and post-COVID-19 based on the Technology System Evaluation Theory (TSET) and technology adoption of e-learning based on the Unified Theory of Acceptance and Use of Technology (UTAUT). The results presented that the moderating results of technology evolution are proposed and evaluated under the UTAUT model before the COVID-19 outbreak; however, the studies after the COVID-19 pandemic paid more attention to technology efficiency than effectiveness. Using the Technology Satisfaction model Jiang et al. (2020) investigated the determinants of university students' satisfaction with online learning platforms in China and found that Chinese university students' satisfaction with online learning platforms is directly and indirectly impacted by their computer self-efficacy and the perceived ease of use and usefulness of the platforms. Wang et al. (2021) used expectation confirmation theory, which was extended using the task-technology fit model to ascertain whether the technical support of promoting online learning helped student's complete course learning tasks during the pandemic. The results revealed that the overall research framework explained continuance intention (Wang et al., 2021). Using the machine learning approach and applying Machine Learning Algorithms to Predict People's Intention to Use Mobile Learning Platform. During COVID-19 Pandemic, Almaiah et al. (2020) attempted to understand the main influencing factors of acceptance of mobile learning applications. They proposed a hybrid model by combining the TAM with new constructs of the TUT model and found that Random Forest and IBK algorithms are the best two algorithms in predicting the main determinants of mobile learning acceptance compared to other machine

learning algorithms with an accuracy of 81.3%. The results of machine learning predictive algorithms showed that perceived Enjoyment, perceived ease of use, perceived usefulness, effectiveness, efficiency, behavioural Intention to use and utilisation could predict the acceptance of mobile learning within an accuracy rate of 87%.

3.8 Study of personality traits and E-learning

The connection between Personality and E-Learning was established by many researchers a long time ago, and the literature is being continuously enriched by the newer works (Siddiquei & Khalid, 2018). Siddiquei and Khalid (2018) established that extraversion was positively related to all four learning styles, whereas neuroticism was negatively related to all four learning styles. They also found that the GPA of the students was positively correlated with three personality traits and was negatively correlated with neuroticism. Similarly, GPA was positively correlated with three learning styles. Their gender had no role to play in significant differences in learning styles and personality traits of e-learners. Whereas, Al-Azawei et al. (2016) investigated the effect of learning styles in a blended e-learning system.

The current study tried to reinforce the same concept and connect it to the need of customised learning environments based on the personality type of learners and how this can enhance the whole learning environment and provide an excellent and wholesome user experience. Some researchers also studied the effect and merger of personality traits on E-learning systems during COVID-19 to explain the scenario. Yu (2021) studied the effects of gender, educational level, and personality on online learning outcomes during the COVID-19 pandemic. They found that learners with strong personality traits such as agreeableness, conscientiousness, and openness to a new experience outperformed those with strong extraversion and neuroticism during the pandemic. Valero et al. (2021) studied individual differences of students in age, gender, personality, and positive psychology on E-learning during the Covid -19 pandemic. Some researchers added personality in the studies, like in the case of Besser et al. (2020), whose cross-sectional study investigated the associations among adaptability to the pandemic, personality, and levels of learning experiences (affective, cognitive, and behavioural). Studied pointed that students had pervasive adverse reactions to the online condition that became necessary due to the pandemic, and adaptability to the pandemic was associated broadly with more positive reactions across

multiple indicators. Personality traits were associated with specific reactions to online learning via their associations with adaptability.

To study Cultural and individual characteristics in adopting computer-supported collaborative learning during the covid-19 outbreak, Fatimah et al. (2021) investigated the impacts of extroversion/ introversion character qualities and collectivism/individualism convictions on students' collaborative learning preferences. They found that student perceptions of computer-supported collaborative learning positively associate with students' personality and cultural beliefs. This proves that although collaborative learning through a digital platform is compulsory during the pandemic, extroversion/introversion on students' attitudes and students' cultural beliefs should be considered to ensure instruction effectiveness. Akour et al. (2021) suggested that the student's emotions play a significant factor in reducing its acceptance as fear of poor grades, stress resulting from family circumstances, and sadness resulting from a loss of friends can hamper it. Accordingly, these issues can only be resolved by evaluating the emotions of students during the pandemic.

3.7 Main findings of the review

The extensive literature review conducted from more than 100 research articles from the pre and post-Covid era on student acceptance of online learning and usage of technology acceptance model revealed a list of issues and findings. The review highlighted the need and significance of the user acceptance studies. The efficacy and usefulness of emerging technologies must be determined by user acceptance and actual usage Davis (1986). The review proved its impertinent to understand user point of view, experience, and perception of technology to make a technology successful and increase its adoption. Then, the review discussed few models of technology acceptance studies and found that the Technology Acceptance Model is the most robust and effective model to study technology acceptance and has been used hundreds of times in online and related learnings. For most assessed and analysed studies, TAM has been a leading scientific paradigm for investigating the acceptance and prediction of the use of any learning technology. The main findings revealed that TAM is a leading scientific paradigm and credible model for facilitating the assessment of

diverse technological deployments in the educational context. In general, TAM's core variables, perceived ease of use and perceived usefulness, have been proven to be antecedent factors that have affected the acceptance of learning with technology. In particular, perceived usefulness has been the most vital determinant for adopting various learning technologies. Besides, usefulness and ease of use perceived by learners increase satisfaction in learning, while usefulness and satisfaction create a positive intention to use.

Many articles were reviewed to study the usage of TAM in different user acceptance studies, while particular emphasis was given to its usage in Online learning. A summary of articles referred to in the review about the usage of TAM to study the acceptance of Online learning is shown in Table 3 below.

Table 3

Summary of articles on student acceptance of online and related learning.

S.no	Authors	Area	Aim
1	Park (2009)	E-Learning	Behavioural Intention to use E-learning
2	Farahat (2012)	E-Learning	Attitude Toward use E-learning
3	Tarhini et al. (2014)	E-Learning	Moderating effect of gender and age
4	Ibrahim et al. (2017),	E-Learning	Acceptance of E-learning
5	Ibrahim et al. (2018),	E-Learning	Role Social Norms, Quality of work-life, Self-efficacy, and Facilitating Conditions variables in acceptance of E-learning
6	Chen (2008)	Web-based Learning	Behavioural Intention to
7	Tarhini et al. (2013)	Web-based Learning Systems	Role of Social, Organisational and Individual Factors in Web-based Learning Systems

8	Liu et al. (2010)	Online Learning	Factors that affect Intention to Use an Online Learning
9	Rey et al. (2016)	Online Learning	The Impact of Cultural Dimensions on Online Learning
10	Saade & Al Sharhan (2015)	Online Learning	Motivations of Students When Using an Online Learning Tool
11	Muhammad (2016)	Online learning	Learning path adaptation in online learning systems
12	Al-Azawei and Lundqvist (2015)	Online Learning	Perceived Satisfaction of an Online Learning
13	Millat et al. (2016)	Online learning environments	Effect of flow on perceived ease of use, perceived usefulness and on the actual usage of the e-learning environment
14	Rajji & Schepers (2008)	Virtual learning	The acceptance and use of a virtual learning
15	Vo et al., 2020	Blended learning	Students' performance in blended learning
16	Padilla-Meléndez et al. (2013)	Blended learning	Role of Perceived playfulness, gender differences in a blended learning scenario
17	Ros et al. 2014	LMS	Students' acceptance and intent to use third-generation learning management systems
18	Park et al. (2011)	Mobile learning	Behavioural Intention to use mobile learning
19	Thibaut (2015)	Mobile learning	Behavioural Intention to use mobile learning
20	Bere & Rambe, 2013	Mobile learning	Student Attitude towards mobile learning
21	Sánchez Prieto et al., 2016	Mobile learning	Student Attitude towards mobile learning

22	Sara & Gao (2018)	Mobile learning	Intention to use mobile learning management
23	Al-Emran & Shaalan (2015)	Mobile learning	Intention to use mobile learning management
24	Almaiah et al. (2016)	Mobile learning	Effects of quality features on mobile learning acceptance
25	Abramson et al. (2015)	Mobile learning	Relationship between prior use of e-learning and behavioural Intention to use m-learning
26	Joo et al. (2014)	Mobile learning	Role of user interface and personal innovativeness in mobile learning
27	Huang et al. (2007)	Mobile learning	user-behaviour of mobile learning through perceived mobility value
28	Chang et al. (2012)	Mobile learning	Perceived convenience

Overall, numerous revised studies revealed that perceived usefulness was the most vital determinant for adopting various technologies in an educational context. It has been shown that usefulness and ease of use perceived by learners increase satisfaction in learning while usefulness and satisfaction in learning create a positive intention to use. Other factors like perceived playfulness, cognitive use, Perceived convenience, gender differences, motivation, cultural differences, and role of other Social, Organisational, and Individual factors in acceptance of online learning were also examined.

While an extensive review was also conducted to study the student acceptance of online learning during the pandemic, when the students were forced to shift to online learning, the studies regarding the needs, factors, challenges, and limitations of online learning as well the overall picture were examined with the help of few articles mentioned in Table 4.

Table 4

Important articles of acceptance of online learning during Covid-19

S.no	Authors	Findings
1	Holzer et al. (2021)	Basic Need, Satisfaction, Self-Regulated Learning, and Well-Being
2	Mishra et al.(2020)	Overall Online teaching-learning scenario
3	Dhawan (2020)	SWOC (Strengths, Weakness, Opportunities & Challenges) analysis of online learning
4	Chung & Mathew (2020)	Role Students' gender, study program, geographical location and internet connection on their online learning satisfaction and Intention to continue
5	Simamora (2020)	The Challenges and Student Perspectives, Positive and negative impacts of online learning
6	Zuo et al. (2021)	User satisfaction from the perspective of cognitive load in the era of COVID-19
7	Qiao et al. (2021)	The Development and Adoption of Online Learning in Pre- and Post-COVID-19
8	Baber(2020)	Determinants of Students' Perceived Learning Outcome and Satisfaction in Online Learning
9	Crawford et al., 2020	COVID-19: 20 countries' higher education intra-period digital pedagogy responses
10	Gonzalez et al. (2020)	Analysed students' performance during COVID-19

Further, a global picture of the acceptance online learning scenario during Covid -19 was examined and summarised with the help of research articles mentioned In Table 5 below.

Table 5

Summary of studies on student acceptance online learning during Covid-19 worldwide.

S.No	Author	Country	Findings
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1	Vlasova et al. (2020)	Germany	Students' Acceptance of Technology-Mediated Teaching
2	Hermeda et al. (2021)	USA, Mexico, Peru, and Turkey	Comparison of students' use and acceptance of emergency online learning.
3	Alzahrani & Seth (2020)	UK	Factors influencing students' satisfaction with continuous use of learning management systems
4	Virtič et al.(2020)	Slovenia	Students' Perception of Online Learning
5	Vlasova et al.(2020)	Germany	Students' Perception of Online Learning
6	Rizun & Strzelecki (2020)	Poland	Students' Perception of Online Learning
7	Baber (2021)	South Korea	Acceptance of e-learning
8	Chung et al. (2020)	Malaysia	Online Learning Readiness Among University Students
9	Zeng (2020)	China	Preference on type of learning
10	Jin et al.(2021)	China	Students' Perception of Online Learning
11	Jiang et al.(2020)	China	Students' Perception of Online Learning
12	Wang et al.(2021)	China	Students' Perception of Online Learning
13	Chen et al.(2020)	China	Students' Perception of Online Learning
14	Ho et al. (2020)	Vietnam	Students' adoption of e-learning
15	Simamora (2020)	Indonesia	Challenges of Online Learning during the COVID-19 Pandemic
16	Agung et al. (2020)	Indonesia	Students' Perception of Online Learning

17	Famularsih (2020)	Indonesia	Acceptance of online learning
18	Hamidah (2020)	Indonesia	Intention to use online learning
19	Siron et al. (2020)	Indonesia	Role of the Student experience, Enjoyment, computer anxiety, perceived self-efficacy
20	Basri et al.(2020)	Indonesia	Acceptance of online learning
21	Syauqi et al.(2020)	Indonesia	Intention to use online learning
22	Sukendro et al.(2020)	Indonesia	Students' Perception of Online Learning
23	Chayomchaia et al.(2020)	Thailand	Students' Perception of Online Learning
24	Khan et al.(2021)	India	Students' Perception of Online Learning
25	Kamble et al. (2021)	India	Learners' Perception of the Transition to Instructor-Led Online Learning Environments
26	Chandio(2020)	Pakistan	Factors Influencing Intentions
27	Abbasi et al.(2020)	Pakistan	Students' Perception of Online Learning
28	Raza et al.(2021)	Pakistan	Social Isolation and Acceptance of the Learning Management System
29	Biswas et al.(2020)	Bangladesh	Students' Perception of Online Learning
30	Ibrahim et al. (2020)	Saudi Arabia	Students' acceptance and perceptions of e-learning
31	Hoq (2020)	Saudi Arabia	Students' Perception of Online Learning
32	AlAjmi et al. (2020)	Oman	Behavioural Intention of Students
33	Besser et al. (2020)	Israel	Adaptability to a Sudden Transition

34	Parkway (2021)	Ghana	Students' Perception of Online Learning
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It was found during the review that most of the students all over the world did accept the online learning scenario and intended to use it further in future; however, they were not ready to fully substitute it to actual physical learning and intend to go back to their actual physical learning when the pandemic conditions ease out. Also, there were many challenges in the proper implementation of online learning as it was found that universities were not equipped for the sudden change from physical to virtual environment. Students were not equipped; some were not in control of technology, while others face difficulties like distraction and the absence of proper gadgets.

To answer the third research question about the merger of personality to online learning systems, few articles were examined, summarised in Table 6.

Table 6

Summary of studies examining the use of personality trait and learning style in online learning

S.no	Authors	Findings
1	Al-Azawei et al. (2016)	Investigating the effect of learning styles in a blended e-learning system
2	Fatimah et al. (2021)	Cultural and individual characteristics in adopting computer-supported collaborative learning
3	Yu (2021)	The effects of gender, educational level, and personality on online learning outcomes during the COVID-19 pandemic
4	Valero et al. (2021)	Individual Differences Facing the COVID-19 Pandemic: The Role of Age, Gender, Personality, and Positive Psychology

It was found that personality and learning style plays a significant part in online learning and should be used strategically to enhance the functionality of online learning.

3.8 Chapter conclusion

The chapter presented an extensive review of 110 articles and created a panacea of vast literature present in online learning. The need and significance of the user acceptance studies were discussed, and extensive literature was examined to understand the usage of Technology acceptance models for conducting the user acceptance study. The critical factors and determinants for the successful research of online learning were discussed, and applications of the TAM in a different area with particular emphasis on online education were examined. The review gave a complete view on conducting a student acceptance study based on TAM. Further enhancing and enriching the knowledge of student acceptance of online learning during COVID-19, some other papers were examined. The studies regarding the needs, factors, challenges, and limitations of online learning during the pandemic were studied to create an overall picture to understand the student acceptance patterns of online learning worldwide.

Chapter 4

Methodology

4.1 Chapter Overview:

This chapter presents the research methodology chosen for this research, which will help answer the research questions and ultimately fulfil the objectives and aims of this research. The research methodology chosen for this research is inspired by research onion theory developed by (Saunders, 2007). All aspects of each layer of the research onion are followed to develop an adequate and effective research methodology. To serve this purpose, the first section 4.2 of this chapter is divided into further subsections, briefly explaining the layers of Research Onion postulated by Saunders (2007). To give an idea and explanation of requirements of each layer which would help map the fundamental research methodology presented below the explanation. Section 4.2.1 will explain the chosen research Philosophy. At the same time, subsection 4.2.2 of this chapter will discuss the chosen Research approach. Sub-section 4.2.3 will emphasise the chosen research strategy. It will be followed by sub-section 4.2.4, which will demonstrate the chosen methodological choice for this research while considering the design and nature of the research. Time Horizon choice is explained in sub-section 4.2.5, and final data collection techniques, sampling and data analysis are explained in section 4.2.6, which will include the questionnaire, population sampling, integrity of the information and other such information. Section 4.3 present Research ethics and other information. The chapter concludes in section 4.4, which summarises the research effort and methodologies.

The research onion was developed by Saunders et al. (2007), and it explains the stages of developing a research strategy. It consists of 6 layers or stages where each layer represents various stages through which a researcher shall pass to develop a practical methodology for their research (figure 15).

Research onion



4.2.1 Layer 1 - Research philosophy :

The very first layer of the onion is the research philosophy which describes the foundation of any study in the form of a set of beliefs the research is built upon. Saunders et al. (2019) explain that to understand individual research philosophy, the researcher first needs to understand differences in the assumptions on which these philosophies are based. These are known as structure and agency assumptions and are often studied in **epistemology, ontology, and Axiology**. Some of the most common research philosophies describe by (Saunders et al., 2019) are **Positivism, Interpretivism and Pragmatism**

4.2.1.1 Philosophy for this Research – Pragmatism

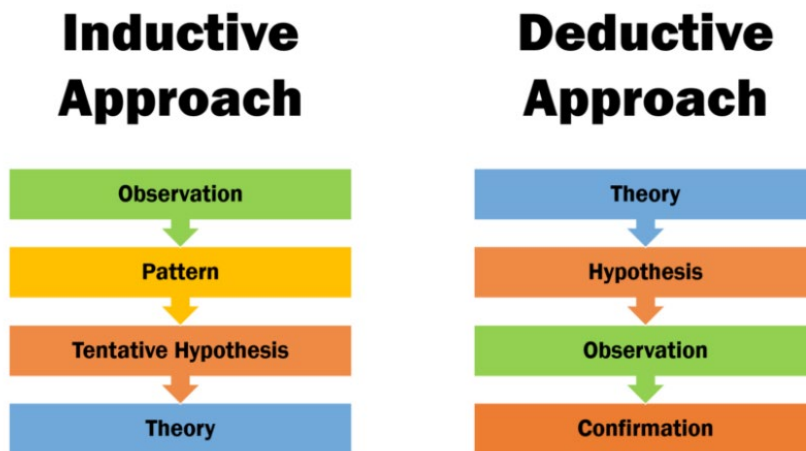
This research uses the Pragmatism research philosophy as described in the research onion. This philosophy centers on the linking of theory and practice. Pragmatism refers to the concept where the data is interpreted in multiple ways and both subjective meanings as well as observations are supported to provide enough knowledge (Saunders et al., 2016). It does this by considering theories, concepts, ideas, hypotheses, research findings not in an abstract form but in terms of the roles they play as instruments of thought and action and their practical consequences in specific contexts (Saunders, 2019). This philosophy best suits this research as this research uses multiple ways of interpreting the result.

4.2.2 Onion Layer 2: Research Approach

As explained by Saunders (2019), three different types of research approaches are **Deductive, Inductive and Abductive**.

Figure 16

Steps of a Deductive and Inductive Research Approach



Note. Inductive and Deductive approach to research. From “How to use the Theoretical Domains” by M. Khan, 2019. <https://medium.com/knowledgenudge/how-to-use-the-theoretical-domains-framework-e26b81d64f0c>

4.2.2.1 Approach for this Research: Deductive

In this research, the deductive approach for theory development will be applied. Steps to perform research through deductive approach are explained by Saunders (2019) are that this kind of research begins with putting forward a tentative idea (hypothesis) to form a theory which is then followed by deducing a testable proposition by using existing literature than by examining the premises and the logic of the argument that produced them as well as comparing this argument with existing theories. Then premises are tested by collecting appropriate data to measure the concepts or variables and analysing them. If the analysis results are not consistent with the premises, the theory must either be rejected or modified. The process must be restarted, or else if the results are consistent with the premises, then the theory is corroborated.

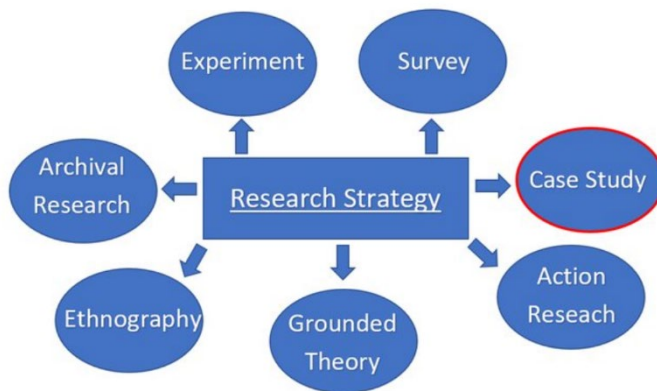
In this research, the relevant hypothesis related to the user acceptance of online learning generated based on the Technology acceptance model which is followed by the verification of the hypothesis through TAM analysis and descriptive analysis.

4.2.3 Layer 3: Research Strategy

The third layer of research onion of (Saunders, 2007) details how research can be conducted based on the study's aims. Few popular strategies are **Experimental research, Action research, Case study research, Ground theory, Ethnography and Archival research.**

Figure 17

Research Strategy



Note. Types of Research strategy. From “The implications of PropTech on the real estate brokerage. The case study of Dubai, United Arab Emirates” by M. Talmatchi, 2020, PropTech implications on Real Estate Brokerage

4.2.3.1 Strategy for this Research: A case study

Based on the explanations presented above, this research is a case study that conducts an in-depth analyses of the understanding of student acceptance of online learning only in the Southland region of Invercargill.

4.2.4 Layer 4: Research Choice

There are three types of methodological choices offered by (Saunders, 2007) in his Research onion.

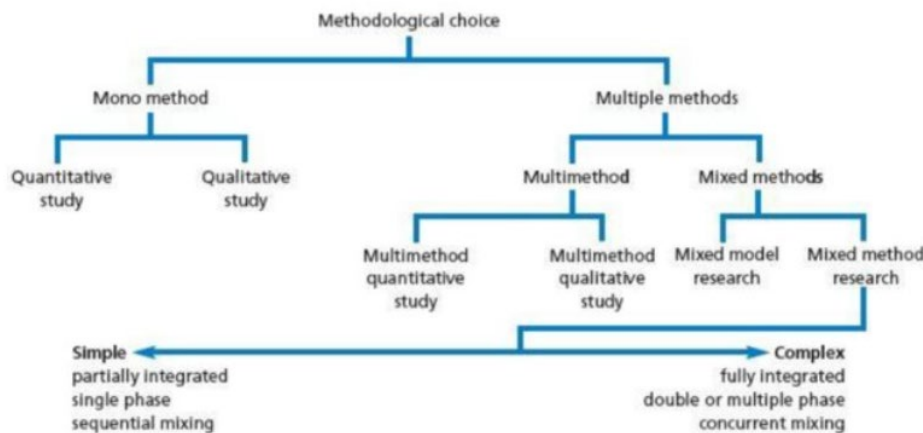
Mono method: which uses of one data type – either qualitative or quantitative.

Mixed-Method: which uses both quantitative and qualitative data.

Multi-method: A multi-method approach would use a broader range of approaches, with more than just one quantitative and qualitative approach.

Figure 18

Methodological Choice



Note. Types of Methodological Choice. Reprinted from Research Methods for Business Students (7th Edition), by Saunders, M., Lewis, P., and Thornhill A., (2016), Pearson.

4.2.3.1 Methodological choice for this Research: Mixed Method

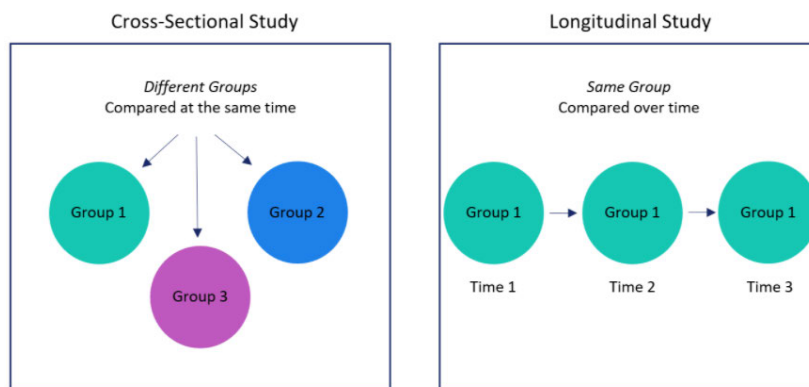
The methodological choice considered for this research process is a mixed-method. As explained above, Mixed methods combine both qualitative and quantitative methods for data collection and analysis.

4.2.5 Onion Layer 5: Time Horizon

The time horizon layer in (Saunders, 2007) theory describes how many data points have to be collected. Two types of researcher are there based on time horizons are specified within the research onion Longitudinal Research & Cross-sectional Research

Figure 19

Cross-sectional & Longitudinal Study



Note. Time Horizons for research. From “What is a cross-sectional study?” by Lauren Thomas., 2021. <https://www.scribbr.com/methodology/cross-sectional-study/>

4.2.5.1 Time Horizon for Research: Cross-sectional

This research is a cross-sectional study because, as explained above, it talks about the student acceptance of online learning only through when New Zealand went into Lockdown due to the Covid-19 pandemic.

4.2.6 Onion Layer 6: Techniques & Procedures

The last layer or the center of the onion refers to **techniques and procedures**. This layer explains how the data used in the research is collected and analysed as well as it explains the source of data collected, the research design, the sample and its size, the research reliability and validity and research ethics.

4.2.6.1 Data Type

This research heavily relies on the primary data collected to answer most of its research questions. The primary data for this research is collected through the research survey. While some secondary data collected through the Literature review is also used for analysis and answering the research question 2 and 3 of this research.

4.2.6.2 Data collection tools and procedures:

The data is the most important aspect of the research and its type depends on the chosen methodology of research (Bryman, 2012). The data collected could be primary data or secondary data. Primary data is direct data obtained directly from the source, while Secondary data is the indirect data which is opposite of primary data (Bryman, 2012). The d. is collected based on the type of data used for research. Some of the most common data collection tools are Surveys, interviews, Observation, document reviews, etc.

Surveys: Surveys or questionnaires play a pivotal role in data collection, be it quantitative or qualitative research. It is a process where some information is collected from a sample of individuals who agree to give their responses to a set of questions (Check & Schutt, 2012). This research uses the questionnaire techniques for data collection. The questionnaire is a method of data collection where participants are required to answer a set of questions in a predetermined order (Afolayan, 2019). Afolayan (2019) also stated that Questionnaires offer anonymity to the participant and helps in eliminating any bias created due contact between the researcher and the participant.

4.2.6.3 The Medium of the Questionnaire Distribution

This research uses a survey method using an online questionnaire that can be accessed by the respondents using a web browser as it will be distributed online by sharing the Google form link to the targeted respondents. As stated by Ilieva et al. (2002), the online survey can reach more prominent participants than traditional methods. Also, the response time is less, and it gives the respondent the advantage of completing it at his convenience and the easy retrieval process of the results. The Internet-based questionnaire is an economical method of data collection (Ilieva et al., 2002). Also, due to the Covid-19 outbreak, an online survey was deemed the most feasible option to maintain social distancing. This survey was conducted online and shared mostly among Southern Institute of Technology, Invercargill, Southland, New Zealand, from 1st April 2021 to 7th May 2021.

4.2.6.4 Design of the Questionnaire:

The online survey questionnaire was designed and had a large number of close ended questions for quantitative data collection. However it has one open question and few questions were provided an “other option” to collect any extra information from the participant in addition to the choices given. Therefore, the final questionnaire has both Open-ended questions and Closed-ended questions where Closed-ended questions were of following types of List questions, Category questions and Rating questions. The 5-point Likert-style rating is used in the rating questions with options that include Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree (Saunders et al., 2016a).

The questionnaire contains 48 questions that will help the researcher gain a practical understanding of the student’s perception of online systems. The questionnaire deployed is divided into six main sections; the first section is the introduction followed by validation on location of user, then section 3 collects the user's demographic data like age, gender, educational qualification, and other related information. This is followed by section 4, where the questions are based on the six research constructs used to collect data to follow the technology acceptance model. The six research constructs are Perceived Ease of use, Perceived usability, perceived enjoyment, attitude, satisfaction, and behavioural intention. Section 5 of the questionnaire collects the user response on their learning during the COVID-19 pandemic. The questions focus on the challenges they face,

usability and quality of online learning during the pandemic, their intention to use it further, etc. While the last section of the questionnaire collects the thoughts of the user on the need for personalised online learning

- **Section 1** is the introduction to the questionnaire that contains a brief description of the research.
- **Section 2** of the questionnaire has just one question, which asks the location of the user. Since this research is a case study based only in the Southland region of New Zealand, respondents who answer this question are allowed to answer the rest of the survey. Otherwise, they are made to submit the survey without being able to answer the rest of it.
- **Section 3** of the questionnaire has 6 items to collect data about the user profile like age, gender, educational qualification, internet usage for educational activities and current education that the students are pursuing.
- **Section 4** of the questionnaire collects data 6 research constructs which are Perceived Ease of use (6 items), Perceived usability(7 Items), perceived enjoyment (4 items), attitude(4 items), Satisfaction (4 items) and behavioural intention(3 items). All these questions form the data to prove our technology acceptance model, which will be used to examine our first research question and find students accepting online learning in the form of attitude and Satisfaction and further investigate their behavioural intention to continue using the online systems.
- **Section 5** – is constituted of 7 items to gather user responses for the learning experience during the COVID-19 pandemic. The pandemic put a full stop to any physical learning due to its lockdowns and social distancing norms. These times student was forced to switch to online learning mode. Some did it happily while some not do much; therefore, the section has six questions: a mix of open and close-ended questions to collect user response regarding this experience.
- **Section 6** will study the need to add personality types and learning styles to online learning to create a personalised online environment. These environments can have all the settings based on users need, which can create a more effective and wholesome learning experience for the user. Section 6 contains 5 items to study students need for different aspects that contribute to a whole personality based learning environment for the user.

(Survey Questionnaire attached in appendices 1)

4.2.6.6 Research Population:

This research aims at analysing the acceptance of online education by students of higher education in the Southland region of New Zealand. The participants of this research process would be the students pursuing any form of tertiary education in the southland region of Invercargill, especially those who shifted to online learning during covid-19 pandemic infused lockdowns. The research population included students at the Southern Institute of Technology or students at other institutes or Universities in the Southland Region of New Zealand, between 18-45 years of age, who are doing or looking to pursue their studies in the future and do some online educational learning.

4.2.6.7 Sample size:

A sample size of 50-80 participants is selected for the research, according to Delice (2010). In survey research, 100 samples should be identified for each significant sub-group in the population. The survey will be distributed via social networks and personal contacts of the researcher using WhatsApp, Facebook and other messenger platforms, and several LinkedIn groups of professionals in various fields and students in various academic courses. Initial respondents will also be requested to share the survey within their professional and personal network.

4.2.6.8 Sampling:

There are various sampling techniques. In this research, the questionnaire was distributed online, and snowball sampling techniques were administered. A Snowball sampling technique in which initial participants will choose the initial participants. Then the further participants will be selected by the initial sample, and the process will repeat (Saunders et al., 2016).

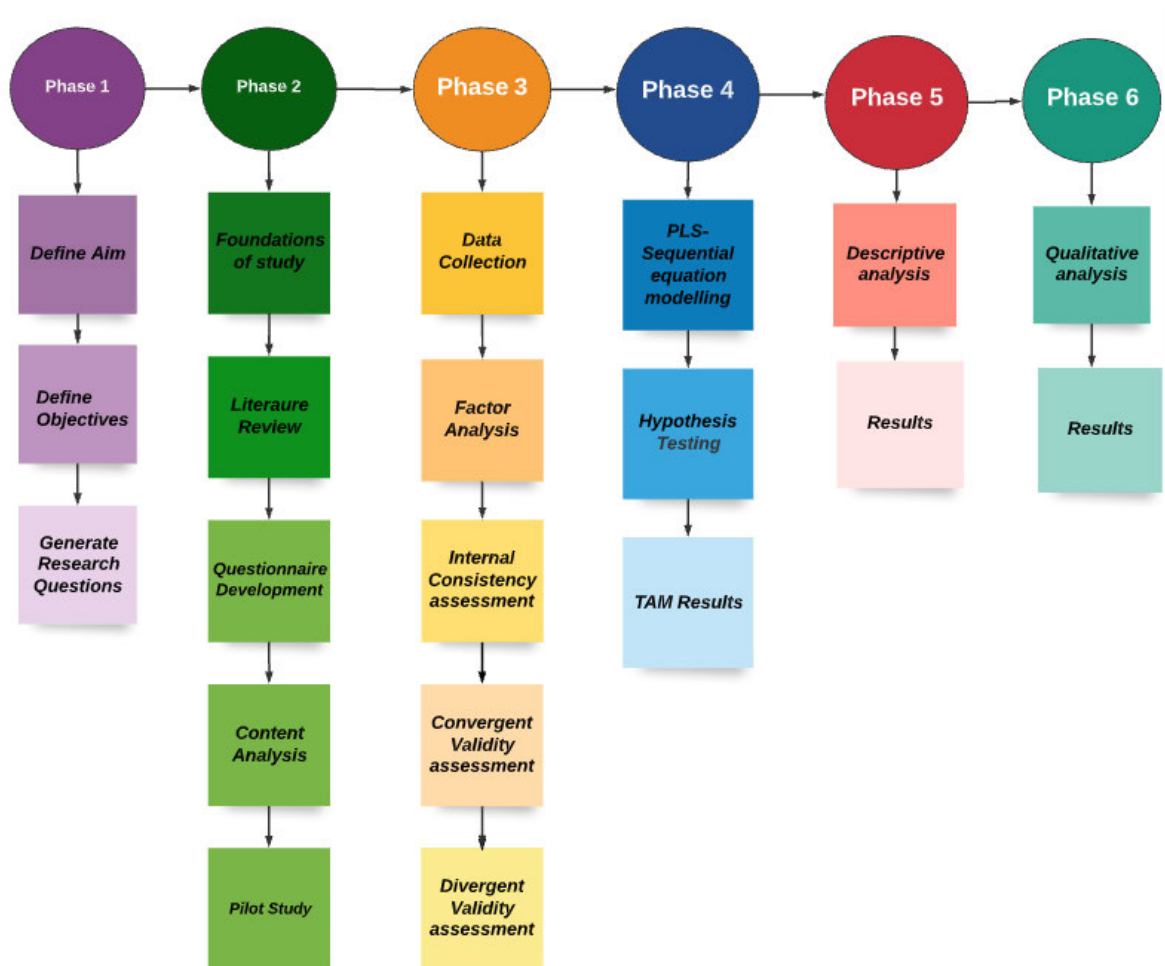
A total of 71 students answered the survey, out of which 5 (7.9%) belonged to the North Island of New Zealand, which is out of the scope of the study, and therefore their responses were not included in the study. Thus, a total of Only 68 (92.1%) responses are used for the analysis. There were 46 % male respondents while 54% were female and the mean age of all participants was 31.9 years.

4.3 Study Phases:

The whole research has been divided into 6 phases, where each phase was dedicated to specific tasks. The first stage of the study was when the study was conceptualised, the problem was identified, and the research aim, objective, and questions were developed. The significance of the study was established. In the second phase, foundational concepts like online learning and technology acceptance studies also studied the pandemic. In the third phase, a literature review was conducted to investigate the current literature on the topic, what work has been done, the research gaps, what future studies are needed, and the methodologies deployed by other researchers. The review also studied the scenario of online learning worldwide during the covid - 19; this was followed by the questionnaire's development, followed by its content analysis and the pilot study. The data collection was conducted in the next stage, followed by factor analysis and reliability and validity studies. In the fourth section, data analysis was conducted on the questionnaire to check its quality and validity. In the next phase, the PLS-Sequential equation modelling was conducted in section 1 of the questionnaire. The results helped in the hypothesis testing, and the next phase conducted descriptive statistical analysis on the rest of the quantitative data. The last phase conducted the qualitative analysis on the open-ended question. Figure 4.6 explains the various phases of the research.

Figure 20

Phases of study



4.4 Conceptual Model for the study

To achieve the aims and objectives of the study, several research questions were developed. To gain the answers to these research questions, the researchers conducted an extensive literature review. This literature review helped us create the conceptual model of our research and develop

the needed hypothesis, which will help in deducing the answers to our research questions and ultimately attaining the goals of this research.

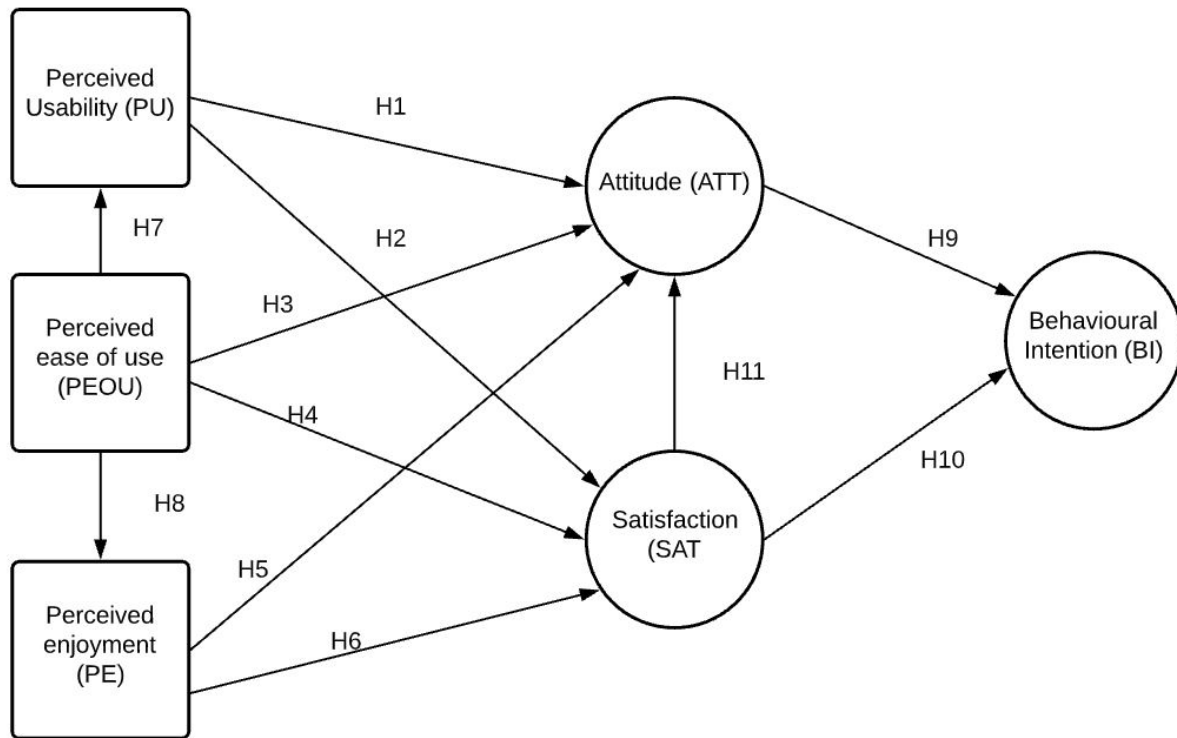
As stated in section 1.2 of this chapter. The first Research question investigates

RQ1: What is the student acceptance of online learning technology in the Southland region of Invercargill?

To answer this question, this research studied various models helpful in conducting technology acceptance studies and found out the Technology acceptance model generated by (Davis, 1989) is the most robust and accurate model for conducting any kind of technology acceptance study. Studying the application of TAM made it clear that TAM is successfully used numerous times in investigating student acceptance of online learning throughout the world by many researchers. Section (1.5) of this chapter also justifies using TAM as the primary model for this study. Further literature review revealed that TAM is being modified several times by various researchers to cover different factors and limitations. Thus this research chooses to follow the extended TAM version of (Lee et al., 2005), which incorporates the factor of perceived enjoyment in studying the student acceptance of online learning was modified to add student satisfaction to answer the research question. The model is shown in the figure.

Figure 21

The Conceptual model of the study



Lee et al. (2005) included perceived enjoyment as an intrinsic motivator into TAM to examine the impact of perceived enjoyment on both students' attitude and intention to use. The survey of TAM by (Legris et al., 2003) stated that to provide a broader view and a better explanation of IT adoption, there is a need to include factors related to human and social change processes. T. inspired studies that included motivational perspectives to TAM to provide more effective acceptance study (Davis et al., 1992) (Venkatesh et al., 2002) where they redefined TAM within a motivational framework.

Lee et al. (2005) deliberated that behaviour is influenced by the feeling of pleasure, joy, and fun from the perspective of intrinsic motivation. Perceived enjoyment is stated as an intrinsic motivator

and defined as the extent to which any activity regarding a use computer is found enjoyable while not including any performance consequences (Venkatesh, 2000).

Using this variable in the study, we want to understand whether the enjoyment felt when students learn in a self-paced, interactive way while feeling more playful and challenging, as in online learning, influences their behaviour towards the use of online learning. (Mohtar et al., 2012) defined Satisfaction as a person's feelings of pleasure or disappointment, which results from a comparison between a product's outcome with user's expectations. (Mohtar et al., 2012) further explained that user satisfaction is defined as a cognitive and affective evaluation, where some comparison standard is compared to the actual perceived performance. Similarly, in this research, the student's satisfaction is analysed by learning how he felt after comparing the actual outcomes of online learning with their expectation from it.

The research model was created using PU, PEOU, PE as an independent variable, while Attitude and Satisfaction are latent variables.

H1. There is a significant relationship between perceived usefulness and student attitude towards online learning.

H2. There is a significant relationship between perceived usefulness and student satisfaction towards online learning.

H3. There is a significant relationship between perceived Ease of use and student attitude towards online learning.

H4. There is a significant relationship between perceived Ease of use and student satisfaction towards online learning.

H5. There is a significant relationship between perceived enjoyment and student attitude towards online learning.

H6. There is a significant relationship between perceived enjoyment and student satisfaction towards online learning.

H7: There is a significant relationship between perceived ease of use and perceived usability

H8: There is a significant relationship between perceived ease of use and perceived enjoyment

H9: There is a significant relationship between the attitude of the student and his behavioural intention to continue using the system.

H10: There is a positive relationship between the satisfaction of the student and his behavioural intention to continue using the system.

H11: There is a positive relationship between the satisfaction of the student and his intention to continue using the system.

4.4.1 Justification of Usage of Technology Acceptance Model

Extensive empirical studies on TAM with different sample sizes and users across various applications, organisations, and populations suggested that the model overall is valid, parsimonious, and robust (Davis & Venkatesh 1996; Venkatesh & Davis 2000). Davis (1986) first developed and validated the TAM scale and found the Cronbach's alpha reliability to exceed .9; similar results were later confirmed across many other empirical studies. As previously confirmed by Davis and Venkatesh (1996), many of the empirical studies since then, including this study, confirm that the TAM scales to be highly reliable. TAM remains one of the most reliable and robust scales that predict and explain information technology acceptance and usage across various applications and user populations. The validity of the TAM is already corroborated by many studies on the adoption of highly diverse technological innovations. Though TAM was designed to study technology acceptance decisions across different organisational settings and users' population, research on TAM's application in education was limited in the past (Teo et al., 2008). The study examined the effect of two external variables on the four original TAM constructs.

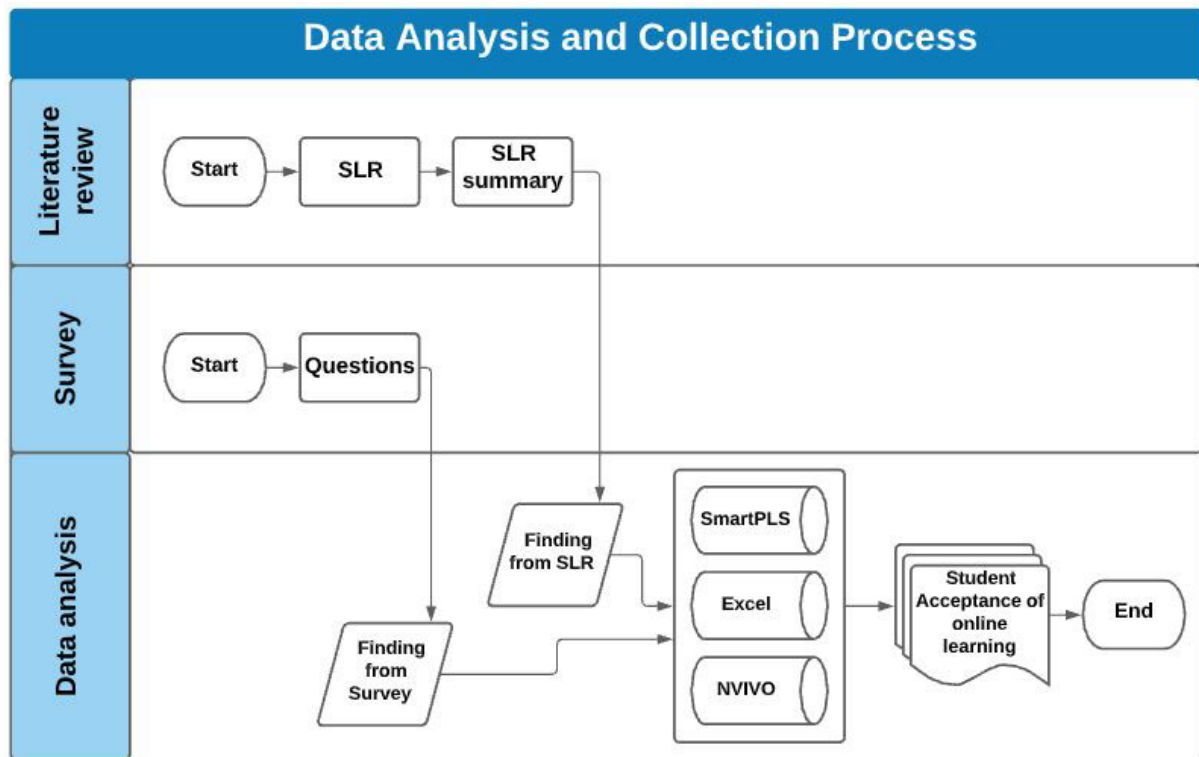
4.5 Analysis and results

4.5.1 Data analysis process:

Data analysis is a critical step in the research process where the data collected to solve the research problem is processed and analysed using the best suitable methods and techniques. This research study collects both quantitative and qualitative forms of data through the questionnaire from its participants. Also, the study utilises a model (Technology Acceptance Model) to study student acceptance and is created to answer the research question1 of this research. The analysis would be conducted in 3 parts. The first part of the demographic data would be analysed and presented to create participants' profiles like the gender of participants, age, etc. While in the second part, PLS sequential equation modelling is conducted to prove the consistency of the research model. Regression analysis and path coefficients would be calculated for hypothesis testing and significance, which would eventually help in answering RQ1. In part 3, the descriptive analysis will be performed on quantitative data of section 5, 6 of the survey, which assists in answering RQ 2 & 3.

Figure 22

Data and Analysis Process



4.5.2 Quantitative Analysis

The quantitative data collected for this study will be analysed using two techniques. Partial Least Square-Sequential Equation Modelling (PLS-SEM) would be used to analyse the research construct based on the TAM model collected in section 1 of the survey. The software package used for this purpose is Smart-PLS.

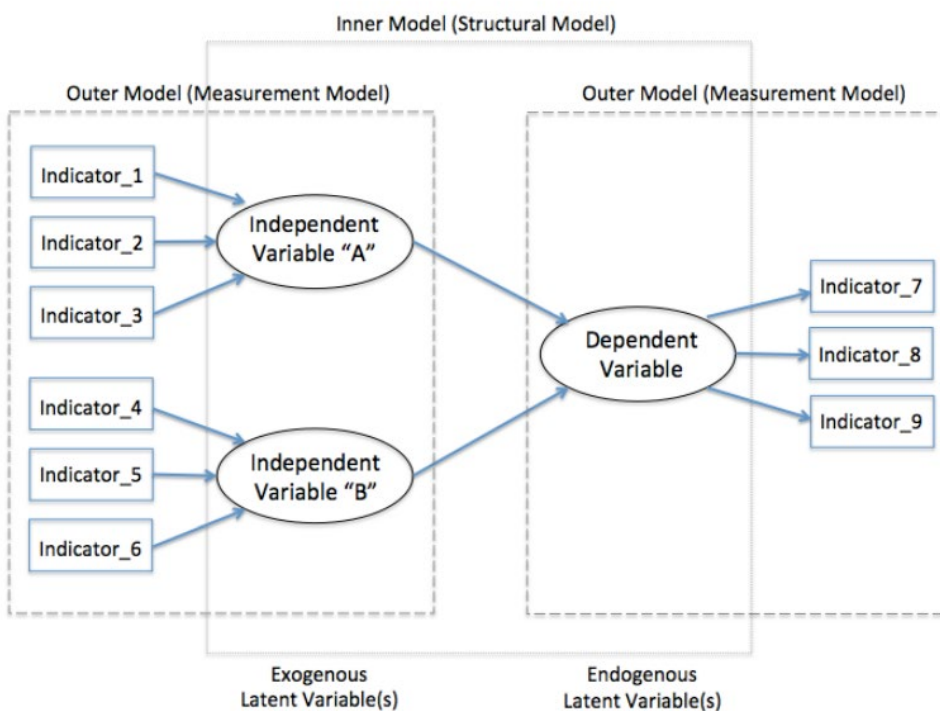
4.5.2.1 Structural Equation Modeling (SEM)

SEM is a second-generation multivariate data analysis method used in marketing research because it can test theoretically supported linear and additive causal models (Wong, 2013). SEM enables visualizations of relationships between variables and is highly efficient in determining unobservable, hard-to-measure latent variables. The SEM model contains two sub-models; the inner model specifies the relationships between the independent and dependent latent variables.

The outer model specifies the relationships between the latent variables and their observed indicators (see Figure 23).

Figure 23

SEM Model



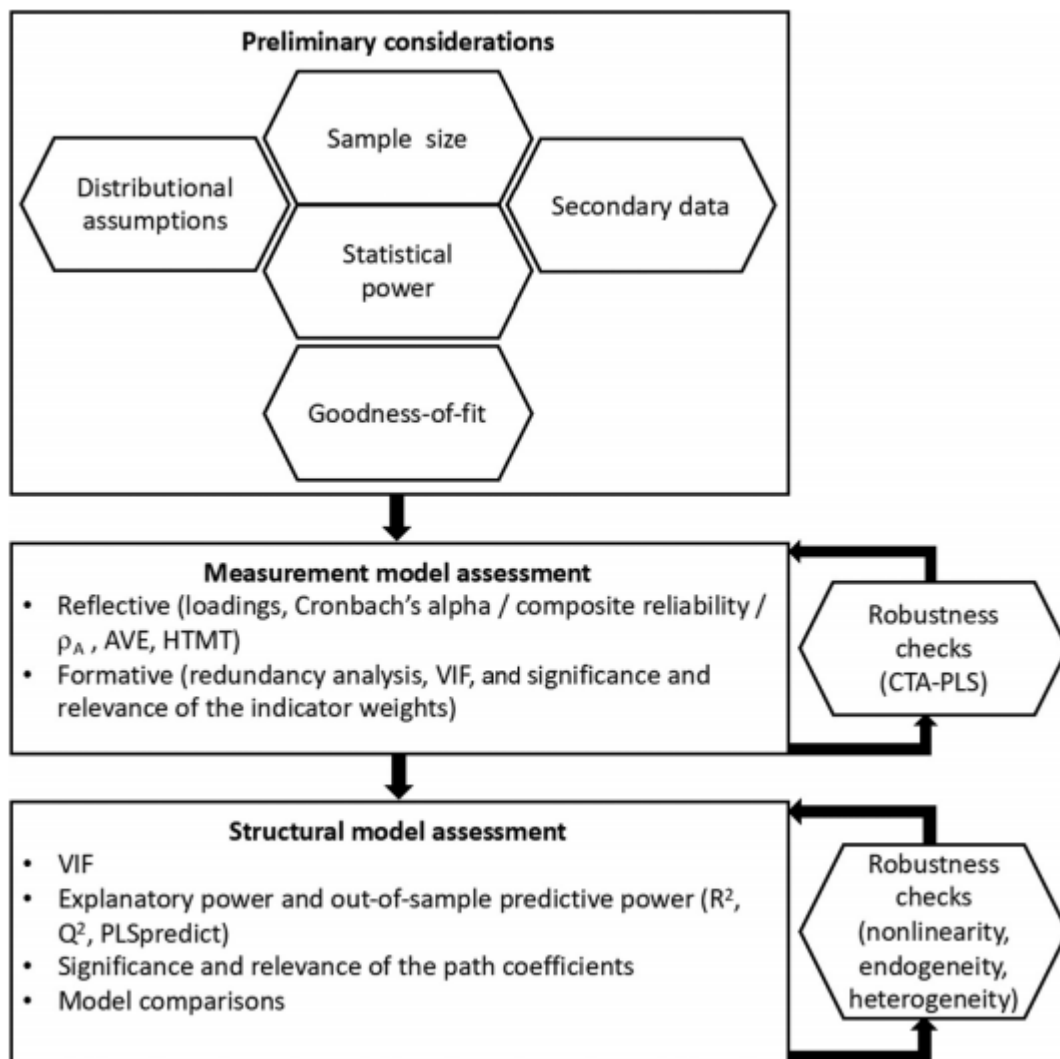
Note. Structure of SEM model. From “Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques Using SmartPLS” by K. Kay Wong, 2013, Marketing Bulletin, 24.

Moreover, it has two kinds of variables; exogenous or endogenous, where an exogenous variable has path arrows pointing outwards and none leading to it. Meanwhile, an endogenous variable has at least one path leading to it and represents other variables (s) (Wong, 2013). In Data Analysis following Anderson and Gerbing’s (1988) recommendations, there is a two-step approach for Structural Equation Modeling (SEM). At the first step, a Confirmatory Factor Analysis (CFA) is conducted to develop the measurement model, whereas to examine the causal relationships among all constructs, the proposed structural model is tested using SEM. SEM follows three different kinds of approaches; the first approach is called Covariance-based SEM (CB-SEM). While, the

second approach is called Partial Least Squares (PLS), which focuses on the analysis of variance. The third approach is a component-based SEM known as Generalised Structured Component Analysis (GSCA). The steps undertaken to perform PLS-SEM are explained in figure 24 below.

Figure 24

PLS-SEM Modelling



Note. Aspects and statistics to consider in a PLS-SEM analysis. From "When to use and how to report the results of PLS-SEM, by Hair et al., 2019, European Business Review 31(1), p. 4.

Smart PLS software is used for this analysis. SmartPLS is one of the prominent software applications for Partial Least Squares Structural Equation Modeling (PLS-SEM) and was developed by Ringle et al. (2005). The software has a 30-day trial version with almost complete functionality available to academics and researchers. This software is becoming extremely successful because of its friendly user interface and advanced reporting features.

4.5.2.2 Descriptive Statistical Analysis

While the rest of the quantitative data would be analysed using the best suitable descriptive statistical analysis techniques for assistance in answering the rest of the research questions.

MS-EXCEL: For this, the MS-Excel application will be used.

4.5.3 Qualitative Analysis

Qualitative data analysis techniques determine the relation between research questions based on pattern generated which are identified, examined, and interpreted to create themes in the textual data collected (M. Saunders et al., 2016). The analysis is done using NVIVO software, and the result is obtained to answer the designated research question.

4.5.4 Correlation of Research Questions and Survey Question

The questionnaire was designed to answer the research questions, and the survey questions are correlated to the research question in the following way.

Table 8

Correlation of research question with survey question and type of analysis

Research question	Question naire section	No. of items	Type of data	Data analysis type	Software used
What is the student acceptance of online learning technology in the Southland region of Invercargill?	4	29	Quantitative	PLS- Structural Equation Modelling	Smart-PLS
What were the effects of the COVID-19 pandemic on the student acceptance of online learning technology in the Southland region of Invercargill?	5	7	6 – Quantitative questions	Descriptive Statistical Analysis	MS-Excel & SPSS
			1 – Qualitative Question	Qualitative analysis	NVIVO
Is there a need for customised online learning to make the learning experience better?	6	5	Quantitative	Descriptive Statistical Analysis	MS-Excel & SPSS

4.6 Quality of the study

The quality of the study is assessed by the measures taken to ensure high standards of research. The validity and reliability of the instrument of data collection serve as significant quality parameter.

4.6.1 Pilot Study

A pilot study was conducted to measure the validity of the questionnaire. Gorard (2001) advocates the need for a pilot study to be conducted under real-life conditions where the questionnaire is a review by experts, or even friends, to obtain constructive feedback. The pilot study aimed to ensure the clarity of the instructions, items, language used, means of responding, and the time required to complete the questionnaire. The pilot survey was conducted with seven students from the IT department of Southern Institute of Technology, Invercargill, New Zealand. Their inputs were used to refine, format, and improve the structure and flow of the questionnaire. Also, the feedback led to changing some items of the questionnaire and eliminating three items. The final questionnaire items used to measure each construct are presented in Table 7

4.6.2 Questionnaire Reliability

Johnson and Christensen (2008) highlighted that the degree of reliability refers to a scale being applied to the same sample under similar conditions, but at another point in time, to repeat the results (Hartas, 2010).

4.6.2.1 Indicator loadings and Internal Consistency reliability (Cronbach Alpha)

Indicator loading indicates the construct percentage of the indicator's variance, thus providing acceptable item reliability (Joe F. Hair et al., 2011). Loadings above 0.70 are recommended. The term 'internal consistency' indicates the consistency of items when measuring a single construct (Johnson & Christensen, 2014). In the same context, Hartas (2010, p. 73) refers to internal consistency as the 'conceptual coherence across all items that constitute a characteristic'. Therefore, it is concerned with the consistency of individual performance from one item to another and across the whole scale. Thus, through internal consistency, the homogeneity of an instrument can be determined (Gray, 2009). Internal consistency among the items was estimated using Cronbach's alpha coefficient, which depends on the concept of internal links between items. There are different reports about the acceptable values of alpha, ranging from 0.70 to 0.95. Additionally, George and Mallery (2003) suggest a tiered approach consisting of the following: “ $\geq .9$ – Excellent, $\geq .8$ – Good, $\geq .7$ – Acceptable, $\geq .6$ – Questionable, $\geq .5$ – Poor, and $\leq .5$ – Unacceptable” (p. 231). Both the reliability studies were conducted to check the reliability of the survey (For reliability results, please check chapter 6)

4.6.3 Questionnaire Validity

Validity refers to the capacity of an instrument to measure what it is supposed to measure (Kumar, 2011). With this technique, researchers concentrate on how far the measurement tools they are developing or using are truthful and meaningful indicators of the construct being evaluated (Kumar, 2011). Covert and divergent validity tests are carried out to check the instrument validity.

Reflective measurement models' validity assessment focuses on **convergent validity** and discriminant validity (Hair et al., 2011). Convergent validity checks the convergence of all given items towards the associated variable. Convergent validity is the extent to which the construct converges to explain the variance of its items (Hair et al., 2011). For convergent validity, researchers need to **Discriminant validity**, which is the extent to which a construct is empirically distinct from other constructs in the structural model (Hair et al., 2019). Fornell and Larcker (1981) proposed the traditional metric. They suggested that each construct's AVE should be compared to the squared inter-construct correlation (as a measure of shared variance) of that same construct.

All other reflectively measured constructs in the structural model. Examine the average variance extracted (AVE).

4.7 Ethics

Research Ethics are a crucial aspect of research and should be strictly adhered to. (Resnik, 2015) highlighted that research ethics aim at promoting truth, avoidance of error, and knowledge as well as promote the values like mutual respect, accountability, and fairness that are essential aspect for collaborative work. All the ethical aspects considered in the study are planned and mentioned.

4.7.1 Data Integrity

The researcher's integrity is a significant factor in the integrity of any research and includes avoiding deception, dishonesty, misrepresentation of data and findings, or false assurances (Saunders et al., 2016). This research assures absence of any fraudulent means of data collection or analysis and no unachievable commitments. The data collected will be analysed and presented without modification under the guidance of the supervisor.

4.7.2 Informed Consent

Informed consent is a way to inform participants whether they want to share their opinions and belief in survey or not. The participants are provided with complete details of the research like its purpose, aims, procedures and everything else. They are allowed to leave any non-mandatory question and also allowed to withdraw anytime that they want from the survey. Informed consent gives participants the confidence regarding the usage of information that they provide and how that information will help the research (Shilton & Sayles, 2016).

In this research, prior consent will be taken from all the participants to use data provided by them. The informed consent will be provided at the beginning of the online survey where respondents are informed that their participation is voluntary, and they can withdraw from the survey at any time they want. They are only allowed to proceed with participating in the survey after agreeing to the informed consent.

4.7.3 Privacy and Confidentiality

Privacy refers to the right of the individual that limits the access of others to themselves. The individual seeking privacy will control the extent, circumstances, and timing of sharing the information with others. The privacy of the individual is protected through confidentiality. Confidentiality is the expectation of the participants that the information provided by them for the research purposes will not be revealed to others without permission (Shilton & Sayles, 2016). In this research, the participants will provide data for the research only after providing the necessary consent. The data required for the research purposes is only collected. Also, the data collected from the participants will be accessed only by the researcher, supervisor, and examiner and will be used only for the said research purpose.

4.7.4 Harm to the participants and the researcher

There is a probable chance that any intentional or unintentional harm could be caused the participants in the form of stress, discomfort, embarrassment, conflict, or pain also, harm to the participant can be caused to confidentiality and privacy violation or an intrusive research method (Shilton & Sayles, 2016). This study adheres to strictest ways to undertake appropriate measures to protect the confidentiality of the participants. The research will cause no harm of any form to its participants.

4.8 Chapter conclusion

This chapter brings helped to create a practical methodology for the current research. The philosophical assumptions of the research were generated based on Research onion. The step-like research philosophy, approach, strategy, and methodological choice were selected. The data collection tools were finalised, and the design of the questionnaire was generated based on the research answers to be generated. The research selected the combined use of qualitative and quantitative mixed methods to generate the results. It also extends the discussion about research strategy focused on understanding a problem using qualitative and quantitative methods. The data

analysis tools were selected for both qualitative and quantitative techniques. The plan for the implementation was chalked out in this chapter which will help conduct effective research.

Chapter 5

Data Analysis & Results

5.1 Introduction

Data analysis is the most awaited chapter of any research as this where all the effort culminates in giving the results. It is impertinent to choose correct and efficient analysis techniques to give reliable results. Since the major part of the data collected through the questionnaire in this research was quantitative with a few open-ended questions, the statistical analysis is conducted to analyse this research. Section 3.2 will explain the analysis tools used in the results. In contrast, section 3.3 will represent the demographic data collected through the questionnaire and will throw light on the demographic details like the gender of respondents, their age and educational status. Section 3.4 will conduct a PLS-SEM analysis to check whether the analysis results on the data collected through Section 2 of the survey is consistent with the Technology acceptance model. These inferential techniques of data analysis will help to find out the significance of the developed hypothesis of the research, which will, in turn, assist in answering the research question1. The following section will conduct descriptive analysis on section 3 and section 4 of the questionnaire and help gain a view of the situation of COVID on online learning and the need for personalised online learning to answer the research question 2 and 3. The chapter will finally be concluded with the inferences drawn from the analysis.

5.2 Data Preparation

Before any form of analysis can be performed on the collected data, the data must prepare to get relevant results. The following steps were taken to perform the data for analysis. As mentioned in the previous chapter, snowball sampling techniques were used, resulting in 71 students answering the research survey. Out of these three respondents were from the North Island; since North Island is out of the scope of this research, their responses were not considered the research sample and were not included in the study. Microsoft Excel was used to tabulate survey text data into multiple table records and graphically summarise the data.

Cleaning: A lookout was performed to check any sort of incomplete, inconsistent, and ambiguous answers and blanks where the respondent did not reply to a particular question. The data was cleaned for inconsistencies and missing values.

Coding: Since most of the data used the Likert style, it needed to be coded and numeric values assigned to perform any analysis. Suitable coding techniques were used for coding the data into a numeric value. The final data ready for analysis is shown in figure 25

Figure 25

Cleaned & Coded Data in MS-Excel

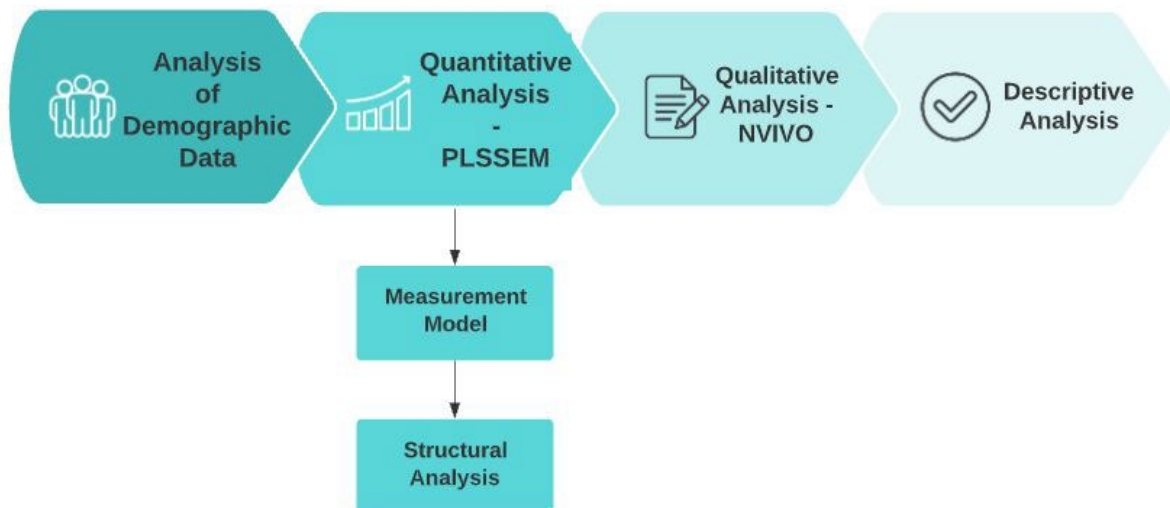
CASE	PEOU1	PEOU2	PEOU3	PEOU4	PEOU5	PEOU6	PU1	PU3	PU4	PU5	PU6	PU7	PU8	PU9	PE1	PE2	PE3	PE4	ATT1	ATT2	ATT3	ATT4	ATT5	SAT1	SAT2	SAT3	SAT4	SB1	SB2	SB3	
1	2	2	4	5	4	4	4	4	4	4	4	4	4	4	4	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	
2	4	1	4	4	2	5	2	4	2	3	5	5	5	5	4	4	5	4	4	4	4	4	4	5	5	5	4	2	4	5	
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39	3	4	3	2	4	5	3	2	3	3	5	4	3	4	3	4	3	3	3	4	3	4	2	4	3	4	3	3	4	5	4
40	3	4	2	3	4	3	2	3	4	4	4	4	4	4	4	3	4	4	4	3	4	4	4	4	4	4	3	2	3	5	4
41	4	2	4	4	4	5	4	5	5	4	3	2	4	4	5	4	4	3	2	4	5	2	4	4	4	4	4	4	4	4	4
42	4	4	4	5	4	4	5	4	5	2	4	5	4	4	5	4	3	3	2	4	5	2	4	4	4	4	4	4	4	4	5

5.3 Data Analysis

After the cleaning and coding, the data was now ready for further analysis. The data analysis was carried out in three phases. In phases 1, the demographic data was analysed to create the respondent's profile. In the second phase, the data collected through section 2 of the questionnaire were analysed. This data was majorly Quantitative but had two Qualitative responses as well. The quantitative data was analysed first using the PLS-SEM technique. SmartPLS software, as well as MS-Excel, were used for this purpose. Based on SEM results, the proposed hypothesis was checked for significance, and the final results will help answer the Research Question 1 of the research. In the third phase, a descriptive analysis will be performed on the data collected through section 3 of the questionnaire and provide the answers for Research question 2 and 3, respectively.

Figure 26

Phases of Data Analysis



3.3.1 Demographic Profile of study sample.

The statistical analysis was conducted on the demographic data collected through section 1 of the survey. This data was used to create respondent profiles for demographical purposes. The following table represents the demographic data collected through the distributed online survey.

Table 9

Demographic data distribution

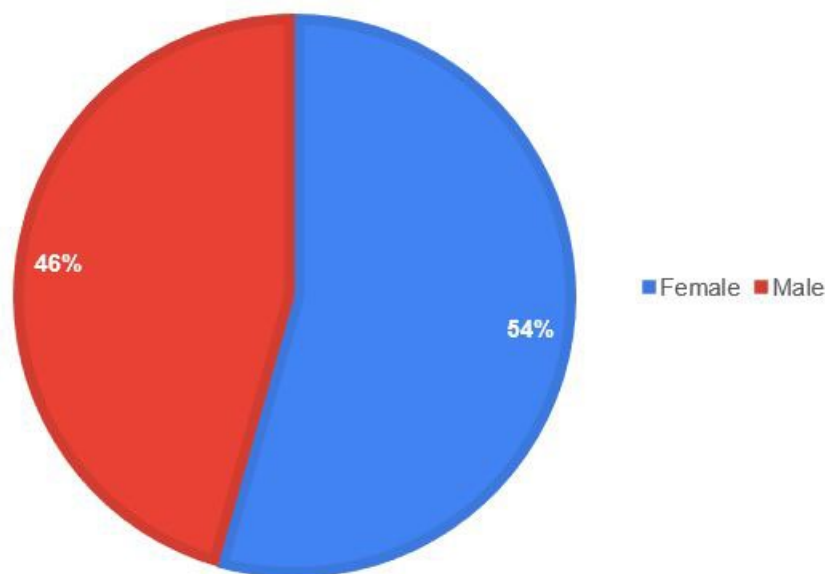
Item	Variables	Frequency	Percentage
Gender	Male	31	46%
	Female	37	54%
	Gender Diverse	0	-
	Prefer not to say	0	-
Age	18-20 years	3	4%
	21-30 years	27	40%
	31-40 years	30	44%
	41-50 years	7	10%
	More than 50 years	1	2%
Maximum Educational Qualification	PhD. (Doctorate)	0	-
	Post Graduate	41	60%
	Graduate	18	26%
	Under Graduate	8	12%
	Other	1	2%
	Less than 1 hour	11	19%

Internet usage per day(For educational purposes)	1-3	29	51%
	More than 3 hours	17	30%

Gender: The questionnaire provided four different categories under gender: Male, Female, Gender Diverse and Prefer Not to say. The fourth option was included to accommodate participants who did not want to reveal their gender identity. The result shows that more females (54%) participated in the survey than males (46%). While none of the respondents was gender diverse, and all of them disclosed their gender. A total of 37 females responded to the survey as compared to 31 males.

Figure 27

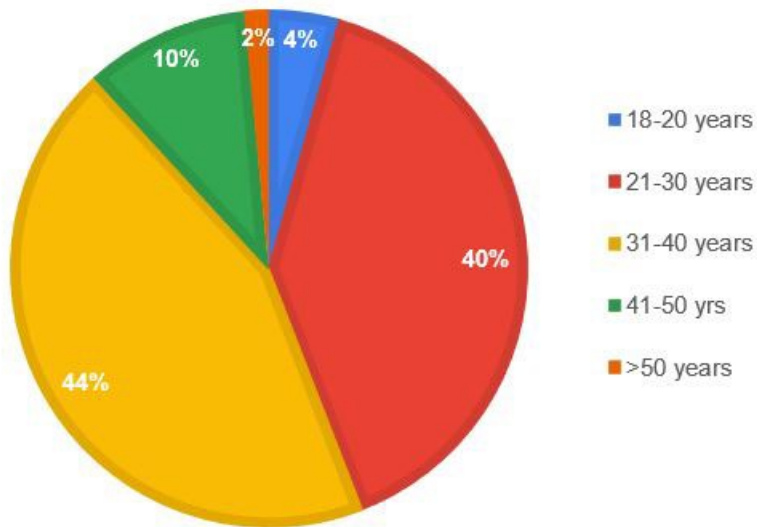
Gender Distribution of the Participants



Age: Figure 5.4 shows the age distribution of the participants of the survey. The results describe that a significant portion of the participants (30) were in the age range of 31-40 years old, while participants in the age range from 21-30 were the second significant respondents (27). (7) participants were aged between 41-50 years, whereas the survey was filled by only one person more than 50 years old. (3) participants were in the age range of 18-20.

Figure 28

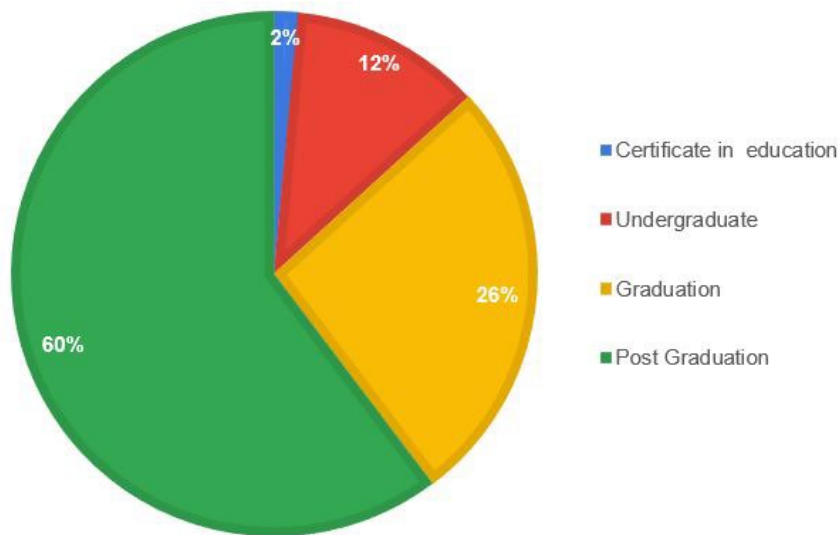
Age of Participants



Highest Educational Qualification: Since the survey was aimed at the students, the highest education level was obtained as data to understand the educational proficiency of the recipients. It was observed that a significant portion of the sample population (60%) was postgraduate while 26% were Graduates. 12% had completed their undergraduate studies, while 1 participant has obtained certification. None of the participants has obtained a doctoral degree.

Figure 29

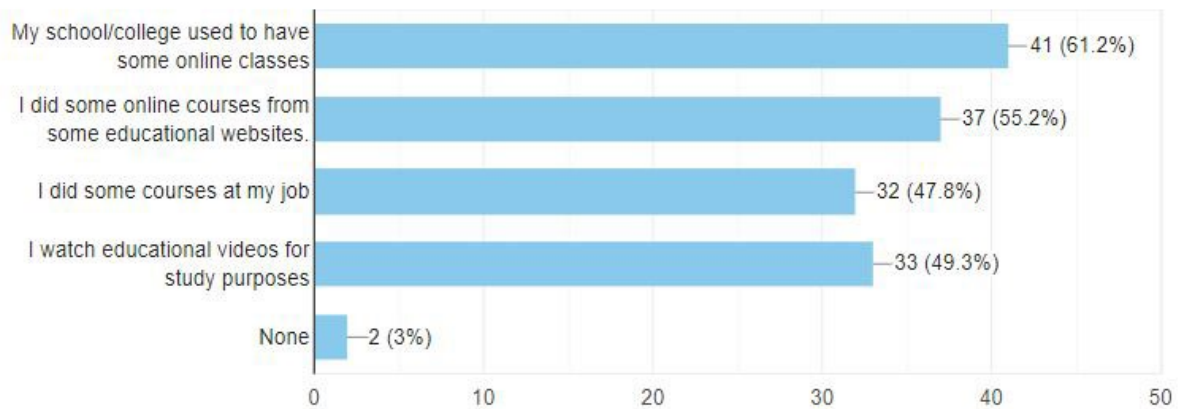
Highest Qualification of participants



Level of online learning: Since this survey was about the student acceptance of online learning, it was imperative to understand the student's interaction with online learning. With this aim, this question collected data about the acquaintance of participants with online learning has options to understand whether the participants got acquainted with online learning through their school/college or did some online learning from educational websites, or whether they were asked to some online courses at any jobs that they did. They were also given an option to know whether they engage in viewing online videos for educational purposes. Since this was a list question, they were allowed to choose as many options suited best for them. The results show that a maximum number of students were given online lessons at schools; also, many students engage in online courses from educational websites. Some of them also did courses from their jobs, while most of them watch online videos online. Oddly enough, two responses stated that they never engaged in any online learning.

Figure 30

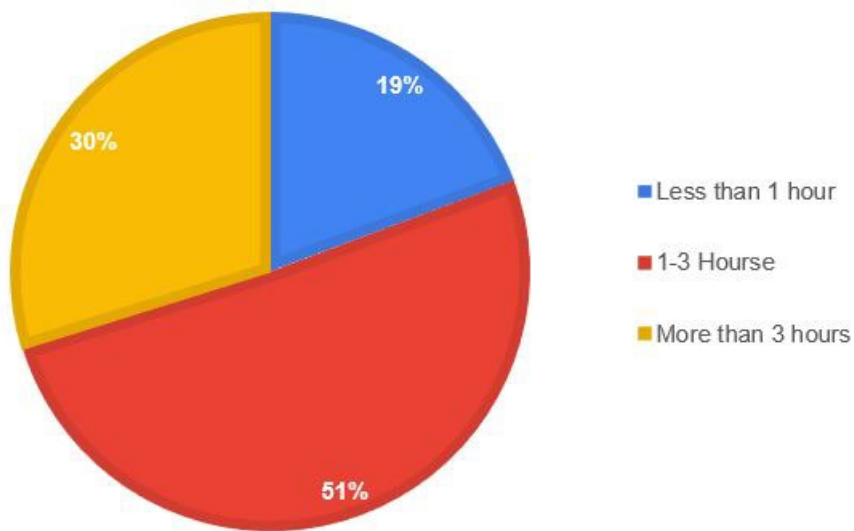
Level of online interaction



Usage of the internet for educational purposes: Since the respondents were students involved in some active tertiary courses. It was assumed that they are involved in some other sort of online learning. The student was asked the number of hours they spend per day on the internet for educational purposes only. The results of this question were overwhelming as more than 50% of students spent 1-3 hrs. per day on the internet for educational purposes. While 30% spent more than 3 hours. This shows the massive extent of the effect of online learning on their lives. Only 19% claimed they spend less than an hour for studies on the internet.

Figure 31

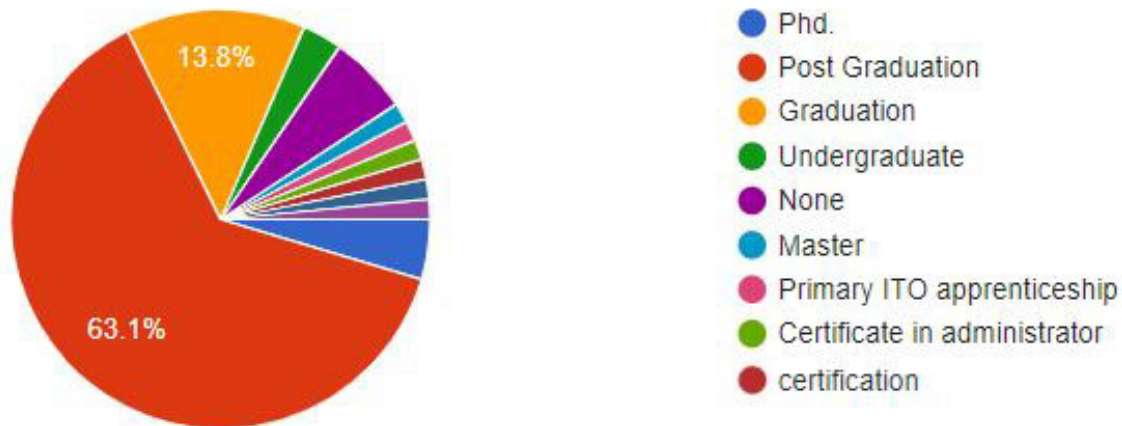
Usage of the internet for educational purposes:



Current educational qualification: The next question collected data about the current educational qualification of the student. It was found that a significant chunk of the respondents were post-graduation students (63.1), while the second-largest portion of participants followed by undergraduates. The question also had an open-ended option where students mentioned their courses as certifications, apprenticeship, health, and well-being, etc., which shows that our respondents were pursuing varied educational levels.

Figure 32

Current educational qualification of the participant.



5.3.2 Quantitative Data Analysis

As described in Chapter 4. Two different statistical techniques analysed the quantitative data. Section 2 of the questionnaire collected only quantitative data regarding research constructs generated to investigate student acceptance in the technology acceptance model. The statistical analysis was performed on this data, followed by Inferential statistical techniques where hypothesis testing will be performed. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to measure and assess the proposed model. The use of SmartPLS software performs this modelling. While the quantitative data in section 3 is analysed using Bivariate Descriptive statistics and the results are comprehended, draw associations and patterns from the data.

Table 10*Statistical analysis*

Variable	Item	Mean	SD
Perceived Ease of use	PEOU1	3.79	0.87
	PEOU2	3.19	0.97
	PEOU3	3.82	0.68
	PEOU4	4.04	0.78
	PEOU5	3.51	0.98
	PEOU6	3.68	0.44
Perceived Usefulness	PU1	3.22	1.12
	PU2	3.69	0.94
	PU3	3.32	0.96
	PU4	3.90	0.94
	PU5	3.40	0.89
	PU6	4.09	0.68
	PU7	3.94	0.86
	PU8	4.04	0.83
	PU9	3.87	0.80
Perceived Enjoyment	PE1	3.54	1.08
	PE2	3.94	0.73
	PE3	3.56	1.01
	PE4	3.29	1.27
Attitude	ATT1	3.91	0.84
	ATT2	3.75	0.83
	ATT3	3.49	0.93
	ATT4	3.87	0.87
Satisfaction	SAT1	3.88	0.78
	SAT2	4.01	0.88
	SAT3	3.47	0.88

	SAT4	3.71	0.64
BI	BI1	3.82	0.84
	BI2	3.79	0.88
	BI3	3.56	0.91

5.3.3 Qualitative Data Analysis

The qualitative analysis is done using NVIVO software, and the result is obtained to answer the part of research question 2

5.4 Sequential Equational Modelling

As described in detail in chapter 4, PLS-SEM is conducted on the data.

5.4.1 Measurement Model

The first step in evaluating PLS-SEM results involves examining the measurement models (Hair et al., 2011). The measurement model refers to the evaluation procedures to test the measures' reliability and validity. Three measurements were addressed; 1) indicator loadings and internal consistency reliability, 2) convergent validity, and 3) discriminant validity (Joseph F. Hair et al., 2019). All these measurements were conducted on the collected data of this research. The results are in figure 12

5.4.1.1. Reliability assessment - Indicator loadings and Internal Consistency reliability

Indicator loadings

Examining the indicator loadings is the first step in measurement model assessment. Loadings above 0.70 are recommended, as they indicate that the construct explains more than 50 per cent of

the indicator's variance which can be termed as acceptable item reliability (Hair et al., 2011). Although, Composite reliability values of 0.60 to 0.70 are considered satisfactory in exploratory research. However, there has been a debate among, and factor loading of 0.5 has also been termed acceptable by researchers. Thompson et al. (1994) stated that all indicator factor load should exceed 0.50. Generally, indicators with loadings between 0.40 and 0.70 should only be considered for removal from the scale if deleting this indicator leads to an increase in composite reliability above the suggested threshold value (Hair et al., 2011). Among all the factor loading done, three factors have loading less than 6.0, which were deleted as of a result, there was a considerable increase in composite reliability. The f. or loading after removing the weak constructs are shown in table 11 below.

Table 11

Factor loadings

	Attitude toward...	Behavioural Inte...	Perceived Enjoyment(...	Perceived ease of use (P...	Perceived usability (...	Satisfaction From ...
ATT 1	0.748					
ATT 2	0.693					
ATT 3	0.834					
ATT 4	0.764					
ATT5	0.853					
BI 1		0.813				
BI 2		0.850				
BI 3		0.854				
PE 1			0.854			
PE 2			0.759			
PE 3			0.843			
PE 4			0.809			
PEOU 1				0.675		
PEOU 3				0.880		
PEOU 4				0.730		
PEOU 6				0.678		
PU 1					0.717	
PU 2					0.733	
PU 3					0.709	
PU 4					0.620	
PU 6					0.790	
PU 7					0.748	
SAT 1						0.792
SAT 2						0.690
SAT 3						0.829
SAT 4						0.733

As shown in Table 5.2, several items show very effective and very reliable factor loadings of more than 0.800. at the same time, most of them are above the significant value of 0.700. However, few are less than 0.7 but greater than 0.62, but all these indicators have been considered valid because they are greater than 0.600.

Internal Consistency reliability

Internal consistency reliability examines the statistical consistency across indicators in the evaluation findings. According to Hair et al. (2019) internal consistency reliability should be reported through Cronbach's alpha (α) and Composite Reliability (CR). The values of α and CR in this study implemented the threshold set by Hair et al. (2019); α should be $>.700$, and CR should be $>.708$. Cronbach's alpha over 0.9 is excellent, alpha between 0.8 and 0.9 is good, alpha between 0.8 and 0.7 is acceptable, alpha between 0.7 and 0.6 is questionable, alpha between 0.6 and 0.5 is poor, and alpha lower than 0.5 is unacceptable (George & Mallery, 2018). Both the value is shown in Table 12

Table 12

Internal Consistency reliability values

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Attitude towards online learnin...	0.839	0.850	0.886	0.609
Behavioural Intention	0.791	0.794	0.877	0.705
Perceived Enjoyment(PE)	0.834	0.837	0.889	0.668
Perceived ease of use (PEOU)	0.734	0.774	0.832	0.555
Perceived usability (PU)	0.814	0.818	0.866	0.520
Satisfaction From onlinelearnin...	0.760	0.777	0.847	0.582

The α and CR values for all construct show very good internal consistencies, the reliability ranges from .730 to .839 for the α and .832 to .889 for the CR. Therefore the measurement model analysis results suggested a positive indication of the robustness of the constructs' measures represented by their internal consistency reliabilities established by their composite reliabilities.

5.4.1.2 Validity assessment (Convergent & Discriminant Validity)

Reflective measurement models' validity assessment focuses on convergent validity and discriminant validity (Hair et al., 2011).

Convergent validity is the extent to which the construct converges to explain the variance of its items (Hair et al., 2011). For convergent validity, researchers need to examine the average variance extracted (AVE). An AVE value of 0.50 and higher indicates a sufficient degree of convergent validity, meaning that the latent variable explains more than half of its indicators' variance (Joseph F. Hair et al., 2019). The A. values of the data are presented in Table 5.3, which shows that the AVE value of all the constructs is greater than 0.5 and are significant.

Discriminant validity is the extent to which a construct is empirically distinct from other constructs in the structural model (Hair et al., 2019). Fornell and Larcker (1981) proposed the traditional metric and suggested that in the structural model, each construct's AVE should be compared to the squared inter-construct correlation of that same construct. The constructs Ave should also be compared to all other reflectively measured constructs. The shared variance for all model constructs should not be more significant than their AVEs (Hair et al., 2019). The discriminant validity shows the extent to which a construct is different from other constructs and thus reflects that there is no operational similarity between the indicators (Hair et al., 2019). By implementing the Fornell Larcker criterion, the AVE scores of a construct should be lower than the shared variance for all model constructs. Therefore, always the first value of any column in a Fornell and Larker metric that shows the correlation of the latent variable against itself should be the highest number in the column compared to the other values in the column, which show a correlation of the latent variable against others. The value in every column highlighted in yellow is largest than other values in that column. Therefore, the discriminant validity was established based on the evaluation of the Fornell Larcker criterion.

Table 13

Fornell and Larcker metric of the model (Discriminant validity).

	(ATT) Attitu...	(BI) Behavi...	(PE) Perceiv...	(PEOU) Perc...	(PU) Perceiv...	(SAT) Satisf...
(ATT) Attitu...	0.781					
(BI) Behavi...	0.564	0.840				
(PE) Perceiv...	0.764	0.424	0.817			
(PEOU) Perc...	0.734	0.557	0.512	0.745		
(PU) Perceiv...	0.763	0.546	0.704	0.586	0.721	
(SAT) Satisf...	0.756	0.522	0.782	0.665	0.820	0.763

Further, discriminant validity can also be evaluated through the examination of cross-loadings. To establish discriminant validity, a loading value on a construct should be bigger than those of all of its cross-loading values on the other constructs (Hair et al., 2019). Table 13 shows that all indicators' values (highlighted in yellow) of the outer loading of every construct with its own were above the values of all their cross-loadings on the other constructs. Thus, discriminant validity emerged from the cross-loading value examination.

Table 14*Cross Loadings of the constructs (Discriminant Validity)*

	(ATT) Attitu...	(BI) Behavi...	(PE) Perceiv...	(PEOU) Perc...	(PU) Perceiv...	(SAT) Satisf...
ATT 1	0.748	0.556	0.530	0.625	0.555	0.606
ATT 2	0.693	0.310	0.406	0.579	0.407	0.406
ATT 3	0.834	0.541	0.727	0.551	0.768	0.708
ATT 4	0.764	0.310	0.624	0.584	0.589	0.660
ATT5	0.853	0.443	0.646	0.546	0.603	0.526
BI 1	0.462	0.813	0.412	0.482	0.375	0.471
BI 2	0.447	0.850	0.262	0.489	0.418	0.366
BI 3	0.506	0.854	0.379	0.435	0.571	0.466
PE 1	0.713	0.386	0.854	0.595	0.638	0.664
PE 2	0.592	0.272	0.759	0.488	0.455	0.586
PE 3	0.575	0.280	0.843	0.217	0.517	0.627
PE 4	0.607	0.434	0.809	0.356	0.676	0.674
PEOU 1	0.418	0.344	0.181	0.675	0.277	0.313
PEOU 3	0.720	0.480	0.526	0.880	0.499	0.629
PEOU 4	0.454	0.378	0.232	0.730	0.402	0.429
PEOU 6	0.525	0.436	0.483	0.678	0.523	0.537
PU 1	0.609	0.370	0.578	0.369	0.717	0.595
PU 2	0.610	0.509	0.613	0.437	0.733	0.660
PU 3	0.450	0.391	0.414	0.417	0.709	0.595
PU 4	0.460	0.308	0.335	0.530	0.620	0.549
PU 6	0.583	0.329	0.586	0.441	0.790	0.630
PU 7	0.566	0.444	0.476	0.354	0.748	0.506
SAT 1	0.634	0.504	0.739	0.555	0.594	0.792
SAT 2	0.452	0.241	0.550	0.371	0.468	0.690
SAT 3	0.670	0.455	0.626	0.561	0.754	0.829
SAT 4	0.519	0.348	0.449	0.516	0.662	0.733

5.3.2 Structural Model Assessment

Assessing the structural model is the next step in structural modelling which is conducted after getting satisfactory results from measurement model assessment. The structural model assessment consists of the following steps. The calculation of the coefficient of determination (R^2), the

blindfolding-based cross-validated redundancy measure (Q^2), and the statistical significance and relevance of the path coefficients (Hair et al., 2019).

5.3.2.1 Coefficient of Determination (R^2)

Hair et al. (2019) cited various literature to state that the R^2 measures the variance explained in each endogenous construct and measures the model's explanatory power. It shows the effect of independent variables on dependent variables. The model's goodness is determined by the strength of each structural path determined by the R^2 value for the dependent variable. The Value of R^2 ranges from 0 to 1, with higher values indicating a greater explanatory power. As a guideline, R^2 values of 0.75, 0.50 and 0.25 can be considered substantial, moderate, and weak (Hair et al., 2011).

Table 15

Coefficient of Determination (R^2)

	R Square	R Square Adjusted
(ATT) Attitude towards online learning ...	0.775	0.761
(BI) Behavioural Intention	0.339	0.319
(PE) Perceived Enjoyment	0.280	0.270
(PU) Perceived usability	0.355	0.345
(SAT) Satisfaction From onlinelearning	0.787	0.777

Table 15 represents the R^2 values of the data. Since all the R^2 values are >0.1 , they are significant, and the model's predictive power is established. Thus in this study, we can say that with an R^2 value of 0.355, 35.5% change in PU is attributed to the PEOU of online learning. Similarly, with an R^2 value of 0.280, it can be stated that a 28% change in perceived enjoyment can be attributed to the PEOU of online learning. Both these values show a weak influence of perceived Ease of use on PU and PEOU, respectively. Although, Attitude towards online learning with an R^2 value of 0.776, which is substantial, meaning 77.6% change in Attitude of the students can be attributed to perceived usability, perceived Ease of use and perceived enjoyment. In contrast, the rest is attributed to the variable outside this study. Similarly, Satisfaction from online learning, which has a substantial R^2 value of 0.788, shows that 78.8% change in Satisfaction can be attributed to

perceived usability, perceived Ease of use and perceived enjoyment, while the variable outside this study attributes the rest. However, Behavioural intention towards online learning at R^2 of 0.340 is weakly influenced by these variables.

5.3.2.2 Blindfolding-based cross-validated redundancy measure (Q^2)

The next stage to structural model assessment is assessing blindfolding-based cross-validated redundancy measure (Q^2) (Hair, 2019). Table 16 represent the (Q^2) values.

Table 16

Blindfolding-based cross-validated redundancy measure (Q^2)

	SSO	SSE	$Q^2 (=1-SSE/SS\ldots)$
(ATT) Attitude towards online learn...	340.000	186.945	0.450
(BI) Behavioural Intention	204.000	162.264	0.205
(PE) Perceived Enjoyment	272.000	227.497	0.164
(PEOU) Perceived ease of use	272.000	272.000	
(PU) Perceived usability	408.000	335.575	0.178
(SAT) Satisfaction From onlinelearn...	272.000	153.594	0.435

Q^2 value assess the PLS path model's predictive accuracy (Hair, 2019). As such, the Q^2 is not a measure of out-of-sample prediction but rather combines aspects of out-of-sample prediction and in-sample explanatory power (Shmueli et al., 2016). Q^2 values larger than zero for a specific endogenous construct are considered suitable to indicate the predictive accuracy of the structural model for that construct (Hair, 2019). As mentioned in table 16, as all-out Q^2 value are >0.0 , the model's predictive power is established.

5.3.2.3 Statistical significance and relevance of the path coefficients

In the next stage for significance testing of both the inner and outer model, SmartPLS software generates T-statistics using a procedure called bootstrapping. In this procedure, many subsamples (e.g., 5000) are taken from the original sample to give approximate T-values for significance

testing of the structural path (Wong, 2013). Therefore to assess the path coefficient between outer and inner research constructs, the sample was bootstrapped through 5,000 sub-sampling. The results are depicted in Table 17 while the analysed research model is presented in figure 18

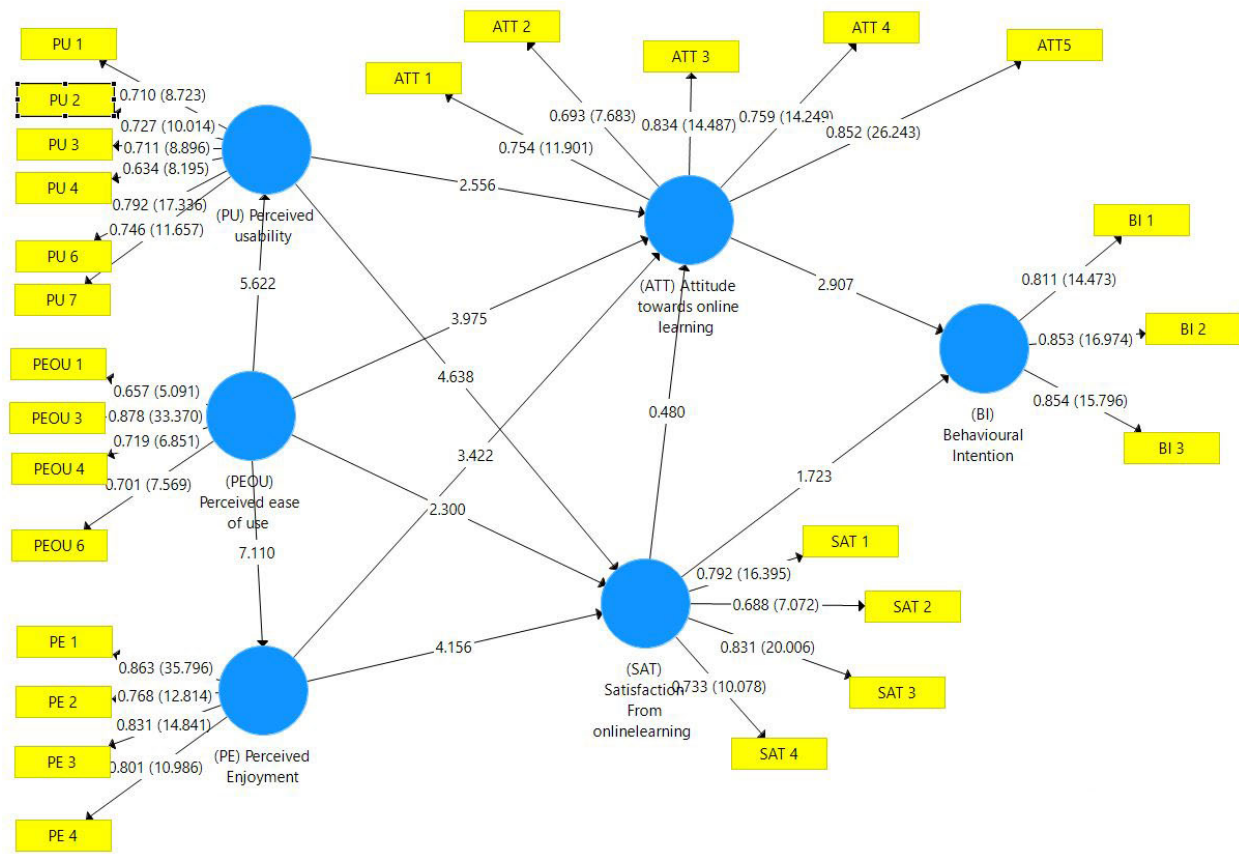
Table 17

T- value and p-value results from Smart PLS

	Original Sa...	Sample Me...	Standard D...	T Statistics (...)	P Values
(ATT) Attitude towards online learning ____ -> (BI) Behavioural Inten...	0.401	0.402	0.138	2.907	0.004
(PE) Perceived Enjoyment -> (ATT) Attitude towards online learning...	0.399	0.391	0.116	3.422	0.001
(PE) Perceived Enjoyment -> (SAT) Satisfaction From onlinelearning	0.358	0.355	0.086	4.156	0.000
(PEOU) Perceived ease of use -> (ATT) Attitude towards online lear...	0.388	0.398	0.098	3.975	0.000
(PEOU) Perceived ease of use -> (PE) Perceived Enjoyment	0.529	0.551	0.074	7.110	0.000
(PEOU) Perceived ease of use -> (PU) Perceived usability	0.596	0.613	0.106	5.622	0.000
(PEOU) Perceived ease of use -> (SAT) Satisfaction From onlinelear...	0.218	0.216	0.095	2.300	0.022
(PU) Perceived usability -> (ATT) Attitude towards online learning _...	0.306	0.314	0.120	2.556	0.011
(PU) Perceived usability -> (SAT) Satisfaction From onlinelearning	0.441	0.443	0.095	4.638	0.000
(SAT) Satisfaction From onlinelearning -> (ATT) Attitude towards o...	-0.067	-0.082	0.140	0.480	0.631
(SAT) Satisfaction From onlinelearning -> (BI) Behavioural Intention	0.219	0.230	0.127	1.723	0.085

Figure 18

Research Model with path coefficients, factor loadings and t-value



Note – The inner path (from one variable to another) mentions the t-values, while the outer path (from variable to indicator) mentions path loadings and t-values.

The T-value indicates whether the significant effect of the independent variable on the dependent variable. According to Hair et al. (2011) a T-value greater than 1.96 shows a significant relationship and supports the hypothesis.

P-values closer to zero indicates a significant meaning while the greater the p value the significance decrease and any p- value closer to 1 are considered insignificant (Hair, 2019). In general, the

hypothesis proposed through the research model is adopted when the P-value is lower than 0.05 or 0.01 (Hair, 2019). .

In the further assessment of the structural model, the hypothesis is tested to ascertain the significance of relationships. As mentioned in table 5.8 and figure 5.9, we get the β value, t value and p values to establish the significance of our hypothesis.

H1 evaluates whether PU has a significant relationship with ATT. The results revealed that the Perceived Usefulness of online learning has a significant relationship with the student's Attitude towards it ($\beta = 0.306$, $t = 2.556$, $p = 0.011$). Hence, H1 is supported.

H2 evaluates whether PU has a significant relationship with SAT. The results revealed that the Perceived Usefulness of online learning has a significant relationship with Satisfaction from online learning ($\beta = 0.441$, $t = 4.638$, $p = 0.000$). Hence, H2 is supported.

H3 evaluates whether PEOU has a significant relationship with ATT. The results revealed that Perceived Ease of use of online learning has a significant relationship with the student's attitude towards it ($\beta = 0.388$, $t = 3.975$, $p = 0.000$). Hence, H3 is supported.

H4 evaluates whether PEOU has a significant relationship with SAT. The results revealed that Perceived Ease of use of online learning has a significant relationship with Satisfaction from online learning ($\beta = 0.218$, $t = 2.300$, $p = 0.022$). Hence, H4 is supported.

H5 evaluates whether PE has a significant relationship with ATT. The results revealed that Perceived enjoyment from online learning has a significant relationship with the student's attitude towards it ($\beta = 0.399$, $t = 3.422$, $p = 0.001$). Hence, H5 is supported.

H6 evaluates whether PE has a significant relationship with SAT. The results revealed that Perceived enjoyment from online learning has a significant relationship with Satisfaction from online learning ($\beta = 0.358$, $t = 4.156$, $p = 0.000$). Hence, H6 is supported.

H7 evaluates whether PEOU has a significant relationship with PU. The results revealed that Perceived Ease of use of online learning has a significant relationship with Perceived Usefulness of online learning ($\beta = 0.596$, $t = 5.622$, $p = 0.000$). Hence, H7 is supported.

H8 evaluates whether PEOU has a significant relationship with PE. The results revealed that Perceived Ease of use of online learning has a significant relationship with Perceived enjoyment from online learning ($\beta = 0.529$, $t = 7.110$, $p = 0.000$). Hence, H8 is supported.

H9 evaluates whether ATT has a significant relationship with BI. The results revealed that the student's attitude towards online learning has a significant relationship with the student's behavioural intention to continue using online learning ($\beta = 0.401$, $t = 2.907$, $p = 0.004$). Hence, H9 is supported.

H10 evaluates whether SAT has a significant relationship with BI. The results revealed that Satisfaction from online learning has an insignificant relationship with the student's behavioural intention to continue using online learning ($\beta = 0.067$, $t = 0.480$, $p = 0.631$). Hence, H10 is not supported.

H11 evaluates whether SAT has a significant relationship with ATT. The results revealed that Satisfaction from online learning has an insignificant relationship with the student's attitude towards online learning ($\beta = 0.219$, $t = 1.723$, $p = 0.085$). Hence, H11 is not supported.

The hypothesis test results are summarised in Table 5.9 below

Table 19

Hypothesis and their values

Hypothesis	Path	t-value	P-Value	Significance	Support
H1	PU \rightarrow ATT	2.556	0.011*	Significant	Supported
H2	PU \rightarrow SAT	4.638	0.000**	Significant	Supported
H3	PEOU \rightarrow ATT	3.975	0.000**	Significant	Supported
H4	PEOU \rightarrow SAT	2.300	0.022*	Significant	Supported
H5	PE \rightarrow ATT	3.422	0.001*	Significant	Supported
H6	PE \rightarrow SAT	4.156	0.000**	Significant	Supported
H7	PEOU \rightarrow PU	5.622	0.000**	Significant	Supported

H8	PEOU → PE	7.110	0.000**	Significant	Supported
H9	ATT → BI	2.907	0.004*	Significant	Supported
H10	SAT → BI	0.480	0.631	Not Significant	Not Supported
H11	SAT → ATT	1.723	0.085	Not Significant	Not Supported

Significance *P = <.01, **P= <.001 and t > 1.96

Therefore, the results were found consistent with the results of the Technology Acceptance Model (Davis,1989) and (Lee, 2005). Where PU, PEOU and PE significantly influence the student's attitude, which in turn significantly influences the student's behavioural intention to continue to use online learning. As well as PEOU also significantly influences PU and PE. Moreover, all these results depict strong consistency with original TAM models. However, the extension tested by the study by the addition of the variable of Satisfaction is not fully supported by the study. As a result, satisfaction from online learning does not influence the student's attitude and does not influence the behavioural intention of the student to continue with it.

5.5 Descriptive Analysis

To answer research question 2, which was related to the effects of Covid-19 on the online acceptance of students. Students' experience with online learning during Covid-19 was recorded with five closed-ended and one open-ended answer. A bivariate descriptive statistical analysis was conducted on the quantitative data while the qualitative data was analysed using NVivo software.

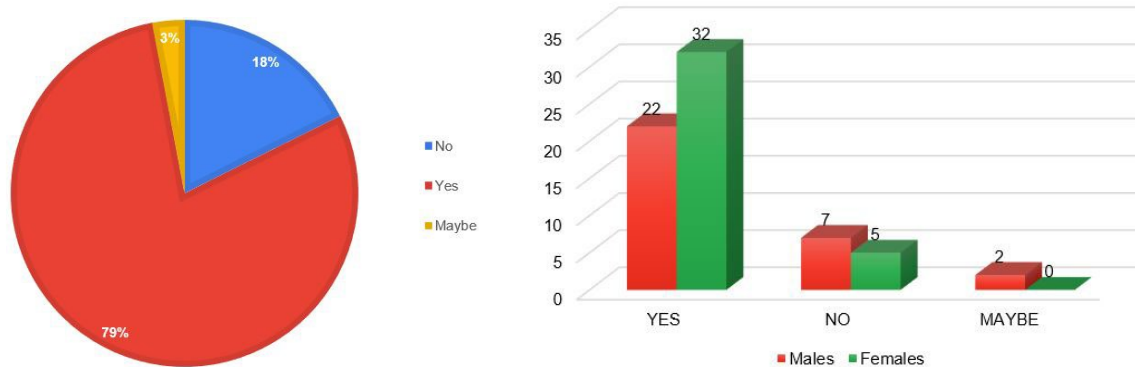
Survey Question no. 42 - Did you shift to online education anytime during the covid 19 pandemic?

- 54 out of 68 students (79%) who answered this question accepted that they had shifted to any form of online learning during the covid-19 pandemic, while 2 of them were not sure whether the shift to online learning was covid induced or not and answered with a maybe. 12 (18%) students did not shift to online learning due to various reasons. Since a bivariate analysis was conducted on this data, we can observe that more females (32) than males

(22) shifted to online learning during the covid- 19. In comparison, more males were either unsure or did not shift to online learning systems during those times.

Figure 32

Shift to online learning during Covid -19



Survey Question – 43 - “Online classes prove to be very useful during the covid -19 outbreak”?

- Further, the students were asked whether “Online classes prove to be very useful during the covid -19 outbreak”? Their responses were measured on a Likert scale, and it was found that participants. It was found that a total of 6 (5 females and one male) students found it to be extremely useful, while the majority of 35 students (21 female and 14 males) found it to be useful. Eighteen students were indifferent and were not sure of the usefulness of online learning during covid-19. While 9 (4 females and five male) thought online learning was not very useful. However, none of them thought that online learning was not at all useful during a pandemic.

Figure 33

The usefulness of Online Learning during Covid-19

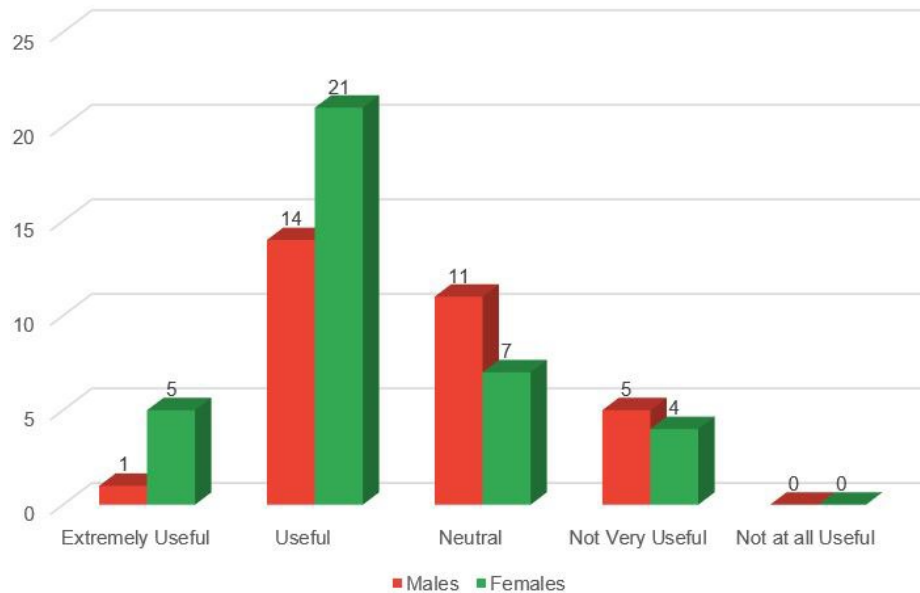


Figure 34

The usefulness of Online Learning during Covid-19 (Male / Female Percentage)

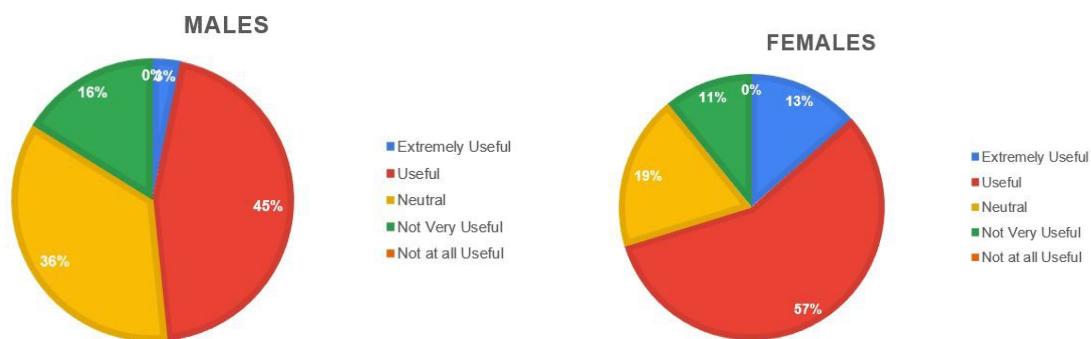


Figure 5.12 compares the percentage of the male population to the percentage of the female population about the usefulness of covid -19. It is visible from the results that more females (57%) think that online learning was more useful than males (45%). In comparison, most males (36%)

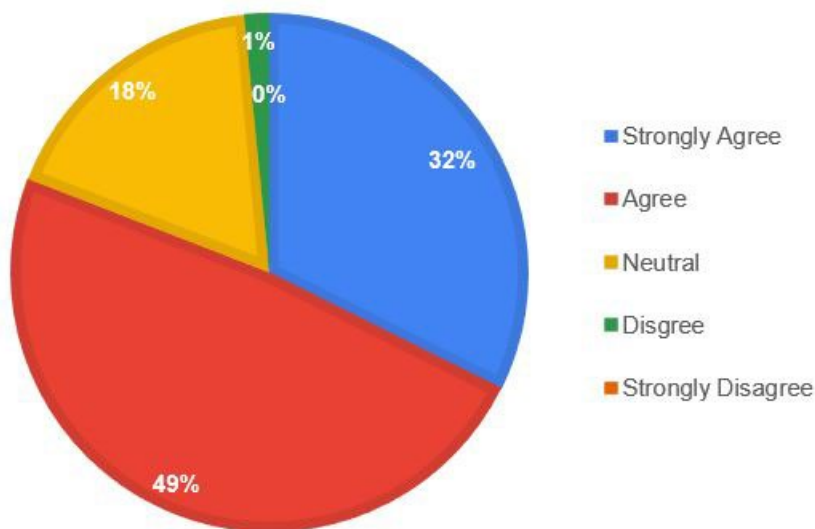
were unsure of the usefulness of online learning. A vast difference is observed where only 3% of males think that online learning was beneficial; however, 13% of females think the same.

Survey Question. 44 – Online learning provides the much needed safe and secure environment during pandemic without hampering our ongoing studies.

In these times of contagious outbreak and pandemic, lockdowns and social distancing was a great need. They need to feel safe and secure was critical. The physical proximity of any kind, like even sitting in one class, was hazardous and could have made a person infected. Therefore, to continue with education, people stay away from each other and maintain social distancing. In this setting, participants were asked whether they appreciate that online learning provided them with the most needed safety and security and still helped them continue their studies. The question was Likert style, and people had to agree or disagree. The results are demonstrated in fig 35 & figure 36

Figure 35

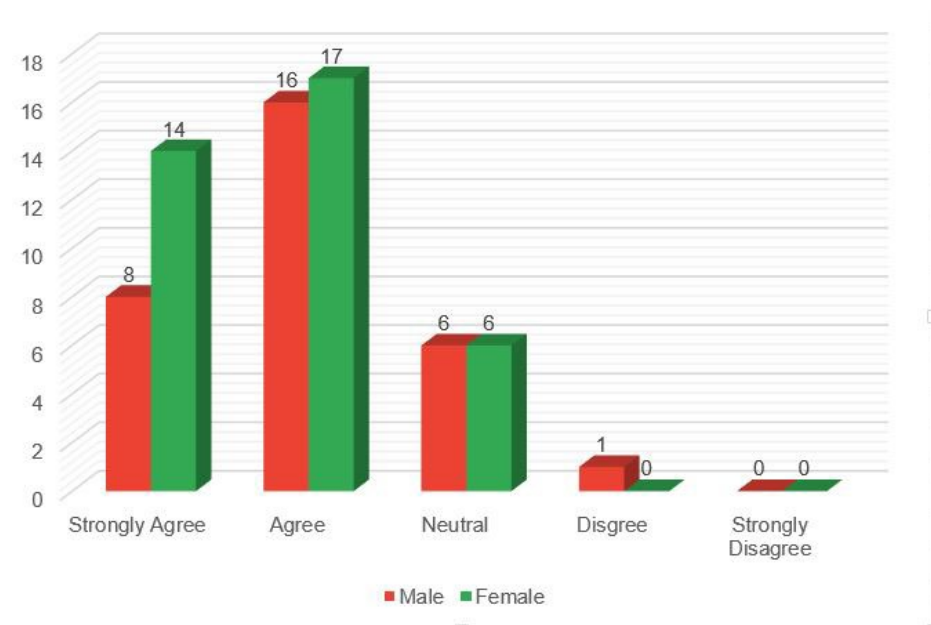
Safety & security provided by Online Learning during Covid-19 (overall percentage)



The results indicate that 81% of the participants think that online learning provided a safe and secure environment, which was required during a pandemic, while 18% were not sure. However, only one candidate disagreed with the thought.

Figure 36

Safety & security provided by Online Learning during Covid-19 (Gender distribution)



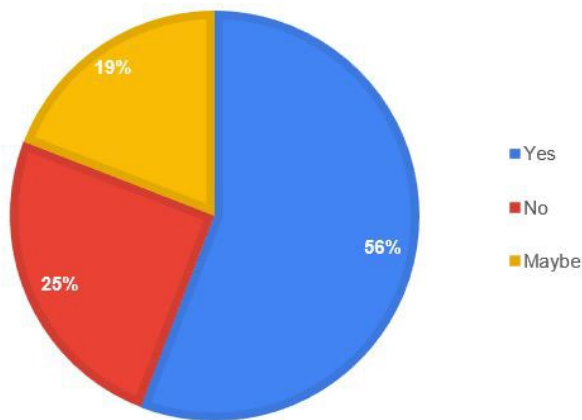
A total of 31 women out of 37 total women participants agreed or strongly agreed that online learning provided the much need safe and secure environment which was required during a pandemic. And a total of 24 out of 31 boys through the same. Equal males and females (6) were unsure, while the only male thought otherwise.

Survey Question. 45 – Online learning provides the much needed safe and secure environment during pandemic without hampering our ongoing studies.

The users were asked about their intention to continue using online learning even after the pandemic ends. The results of this question were as follows in fig 5.12. A majority of 56% of respondents want to continue using online learning platforms, while 25% are no more interested. 19% of them are confused about whether they want to continue or not.

Figure 37

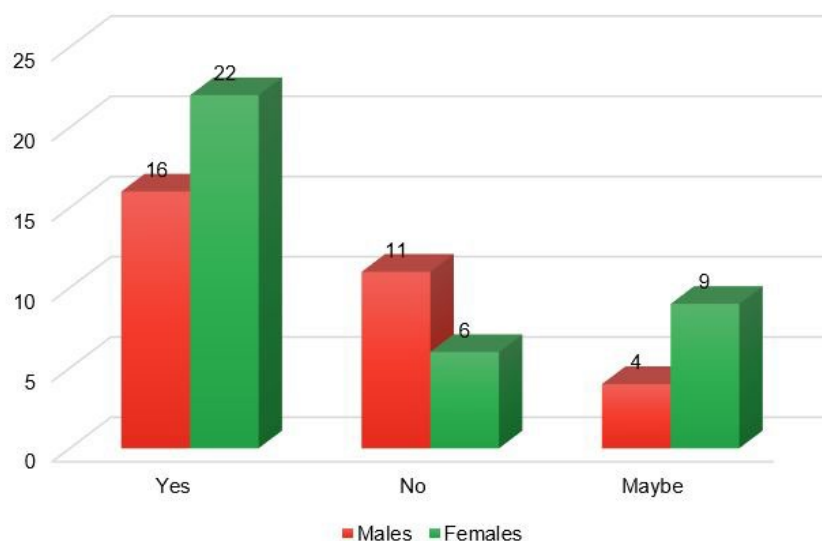
Intention to continue using Online Learning after pandemic (Percentage)



Among those who wanted to continue are 22 females and 16 males. Eleven males do not want to continue, while four are unsure. On the other hand, six females do not want to continue with online learning, while 9 of them are unsure.

Figure 38

Intention to continue using Online Learning after pandemic (Gender distribution)

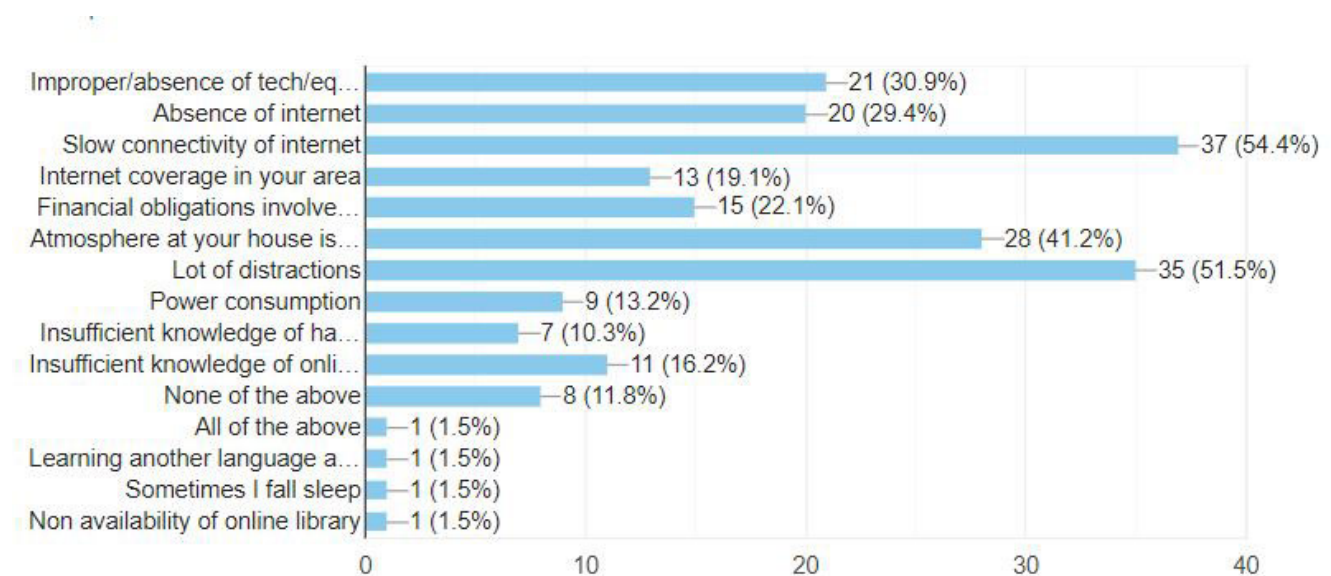


Survey Question: Please select the difficulties faced by you in setting up your online education during the covid 19 pandemic (Select all that apply)

As studied in the literature review, various studies conducted worldwide around online learning during COVID-19 stated a plethora of problems students had to face in shifting from physical to online learning. Keeping in mind those challenges, our questionnaire also asked students the problems they faced while trying to shift to online learning during the lockdowns. It was a list of questions with multiple options like improper/absence of tech/equipment required, absence of internet, slow connectivity of the internet, internet coverage in the area, financial obligations involved in buying tech or internet, the atmosphere at your house does not study friendly, Other distractions, power consumption, insufficient knowledge of handling tech required, insufficient knowledge of online education systems. None of the above and all of the above was also provided, along with an open option of “other” for students to tell about challenges that were not mentioned in the list. The responses are depicted in figure 39

Figure 39

Challenges faced in shifting to online learning



This question highlighted the issues faced by the students in shifting to complete online learning during the pandemic.

Slow connectivity of the Internet was the most major challenge, which was responded to by 54.5% of the total sample population. It was followed by lots of different type of distractions at home. Since schools and colleges are building specially meant to impart teaching, they ensure that the students are not distracted, and several kinds of disciplines are maintained. However, the house's atmosphere is different, and there can be lots of different types of distractions like TV, food, siblings, mobile phones, too many family members, guests, and the list is never-ending. 51.5% of respondents cited these as challenges in the successful implementation of online learning. The next on the list of challenges was that the students admitted that the atmosphere at their house is not conducive for studies. There could be problems with family members, family issues, disease or crowd or anything like that. Improper / Absence of technology and Absence of internet were the following two challenges which were almost identical at 30.9% and 29.4% responses, respectively. 22.1% of students faced financial problems buying the tech and gadgets required for online learning like Home PC, Laptops, Smartphones, and others. Some students (19.1%) also faced the problem of internet coverage in their area. Insufficient knowledge of online systems was faced by 16.2 % of students, and around 10.3% of students had a problem handling high tech gadgets like laptops and PCs. Too much power consumption and costs attached to it was 13.2% students while 1 student claimed to have all these problems. Around 11.8% of students also assured that their transition to online be pretty smooth, and they face no such challenges and problems shifting to online learning. Since there was an open-ended option to add any other challenge, people responded like the non-availability of a good online library for reference study material as a potential problem he faced in online learning from home. While other mentioned that since he was trying to learn a language, it was challenging to do that online while being home alone. 1 respondent also mentions that he fell asleep while he is doing online learning, notifying that online learning needs much self-motivation and can be difficult for people lacking.

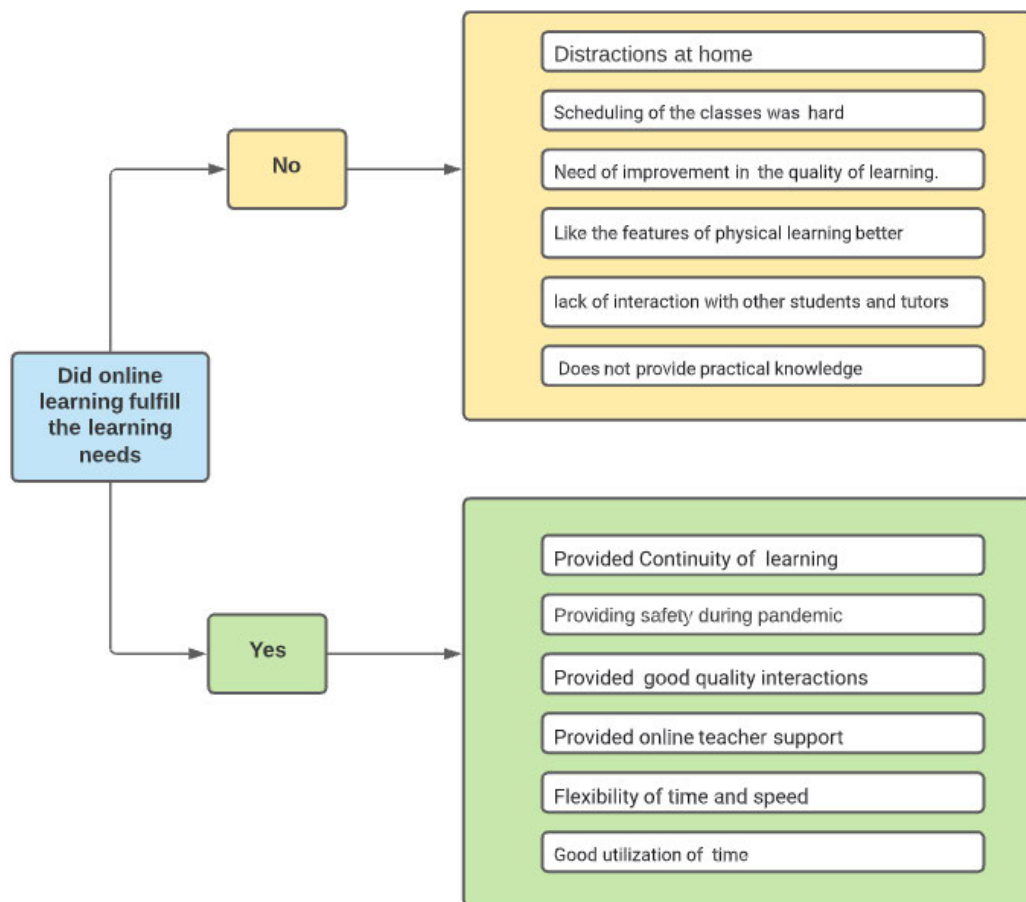
Survey Question: Did Online learning systems fully satisfied your personal learning needs (during Covid-19)? How?

The participants were asked in an open question format whether the Online learning systems fully satisfied their personal learning needs during Covid-19 or not. They were also asked to write in detail as to how online learning satisfied their need for learning. 47 out of 68 respondents replied

to this question. Out of which nine respondents said that online learning did not satisfy their learning needs. In comparison, 15 others said yes but to a certain extent. However, the respondents were satisfied with how online learning fulfilled their education needs during the covid – 19 pandemic. The answers were divided into common themes on which the answer was based. The theme for the answers is represented in figure 40 given below.

Figure 40

Satisfaction from online learning for educational needs during Covid-19



The most common reasons for the participants not being satisfied were that they think online learning lacks the basic advantages of physical learning and the lecture quality is less than physical learning. They also think online learning did not provide the much needed practical knowledge,

and it is all theoretical. Also, they faced distractions at home, which did not allow them to concentrate, and they felt a lack of interaction with their teachers and peers.

While for the people who were satisfied with online learning think that the best part about online learning was that it provided much-needed safety and security and provided the continuance of studies that could not have been possible otherwise. They like the quality of interactions and also felt satisfied with the teacher support. They thought that online learning provides a good utilisation of their time by engaging them in good quality education in the safe environment of their homes.

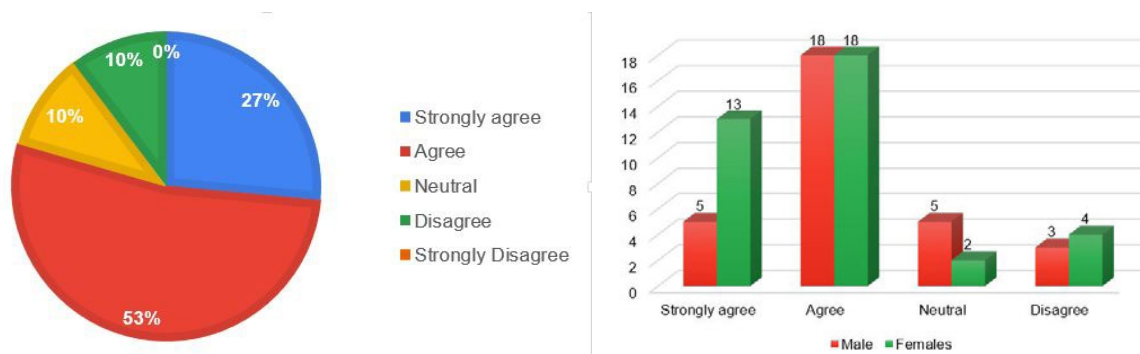
5.5 Need of Personalised learning environments:

It is generally observed that online courses are factory-made and do not cater to any specific customer needs of the learner. Every person has a different personality, and each individual supports a different style of learning. The factory made courses do not cater to these specific learning needs of the individuals and thus may not be equally effective to everyone. Therefore, an excessive need for a personalised learning environment that adapts according to learners needs to provide maximum efficiency of learning systems is required. It may enhance user satisfaction and experience. In order to have an idea of students notion of the need for personality-based online learning further to answer research question 3 of the research, which deals with identifying the need for personalised online learning, 5 questions were asked to the respondents. Descriptive analysis was performed on these responses to observe the results.

Survey Question: Online courses should be broad enough to accommodate more students with different personalities. This question was asked to know whether students feel there is a need for online learning to cater to different personality types. In response to this question, 68 replies were recorded. Out of that, a total of 54 respondents feel the need to add personalities, of which 36 agree, while 18 (27%) agree strongly, in which 5 were males, and 13 were female. Whereas out of 36 (53%) who agree, 18 were male and 18 were female. 7 (10%) respondents (5 male & 2 females) were not the same number 10% disagree with the need for personality. However, no one strongly disagrees with it.

Figure 41

Need for the accommodation of more students with different personalities.

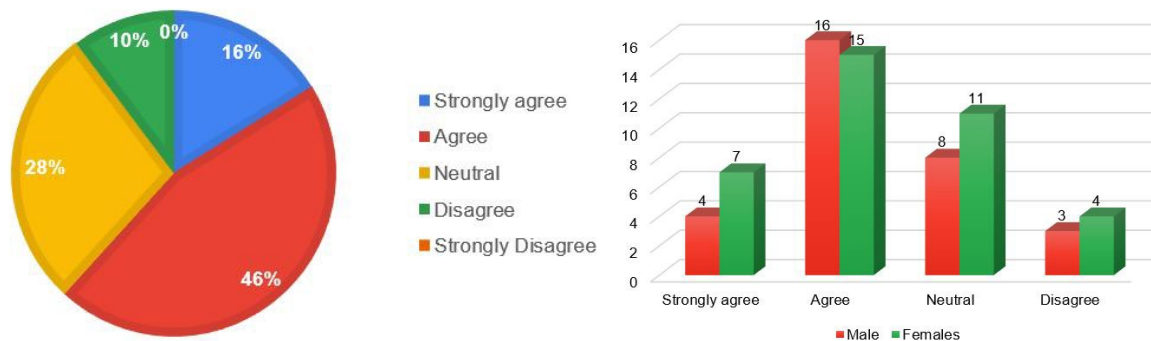


Survey Question 16: Learners' personality types should be identified using standardised personality tests before joining any online learning system.

A personality test provides knowledge about a user's personality, enabling a system to generate results that could be more effective in his learning. It has been proved how personalised learning can provide effective results; thus, respondents were asked if they feel that a personality test before joining any online learning system should assess user personality. 16% (11) people strongly agreed to that, in which four were male, and the rest were females. While 46% of people, which is 31 people, agreed with the need for the personality test to be conducted at the beginning of any online learning system. 28% of respondents were neutral to this question, while 7 disagreed, in which 3 were males, and 4 were females.

Figure 42

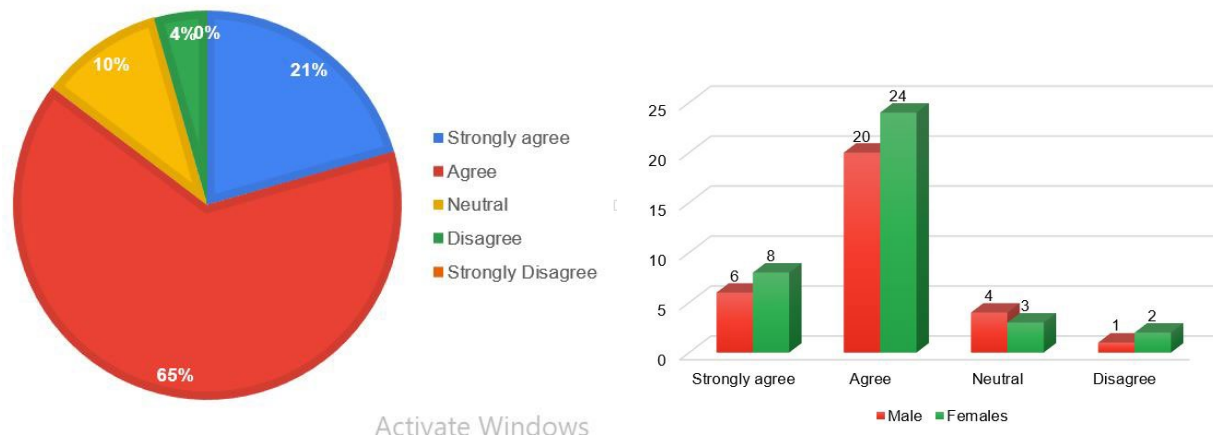
Need for personality test



The respondents were then asked whether Online courses should incorporate an adaptive learning model to best match courses with a learner's personality types. Since the learners learning style highly depends on his personality, it becomes necessary that a personalised online learning environment provides an adaptive learning model instead of providing all learners with a similar learning model. Because what can work for one personality might not be equally effective for another. In response to this question, all 68 people responded, out of which a considerable amount of people (86%) strongly agreed (21%) or agreed (65%). 24 females and 20 males agreed, while 8 females and 6 males strongly agreed on the need for adaptive learning models to be incorporated. 10% of people were neutral to this, though, while a tiny 4% disagreed.

Figure 43

Need for adaptive learning model

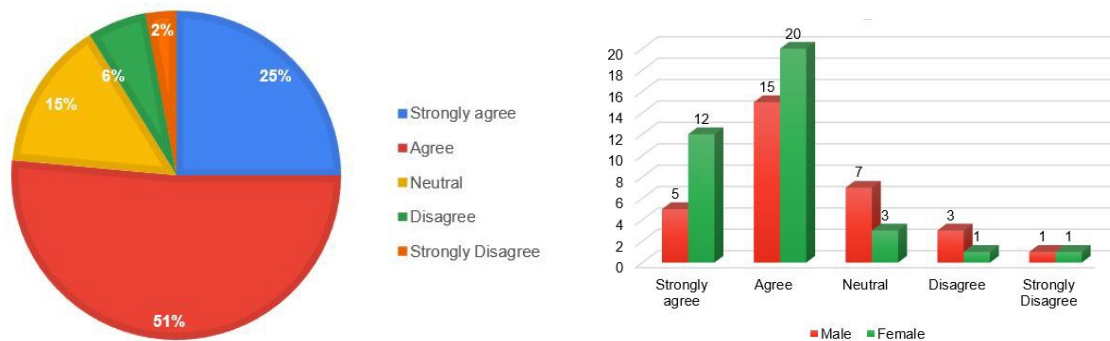


SQ 47. Online classes should give me more freedom to choose the learning style which suits my personality the most (, e.g. Audio, visual, etc.)

The respondents were then asked whether they need more options to choose from the learning style. The courses for online study are generally designed in a specific way. Some are audio course, while others are text-based. Some put more importance on graphics, while some are instructor-led. In a personalised online learning scenario, the learner should learn the same course in a style that suits him the most concerning his personality. The participants of the survey were asked to know their thoughts on this requirement.

Figure 44

Need for courses in different learning style based on learner's personality



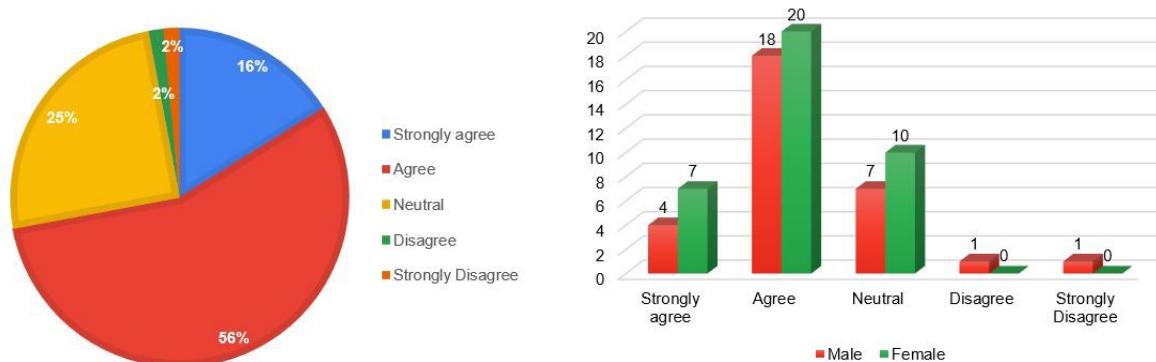
A total of 76% of respondents agreed to have different learning styles that suit their personality. Most out of this, 25% (17) strongly agreed to the need for courses in different learning styles based on the learner's personality. In comparison, 51% (35) agreed. Out of 17 who strongly agreed, 12 were female, while 5 were males. While 20 females agreed as compared to 15 males who agreed. 10 people (7 females and 3 males) were unsure, and learning style did not matter to them, while 8% did not feel the need for courses in different learning styles. Out of this, 8%, 6% disagreed, while 2% strongly disagreed. 3 males and 1 female disagreed, while 1 male and 1 female strongly agreed to the idea.

SQ 48: I feel the need for a customised online learning experience

Finally, the participants were asked one last question on whether they feel the need for a whole customised learning experience or not. A customised learning experience can be a wholesome experience where a learner's personality is picked up via a personality quiz at the beginning of a learning environment. Then the rest of the settings are just changed according to that from background colours of the system to the font to the style of courses and learning material and many other such features all customised based on learners personality which would be intrinsically picked from the personality quiz. Participants were asked whether they would need something like this for a more wholesome learning experience or not.

Figure 45

Need for the customised online learning experience



A total of 72% of respondents agreed to require the customised online learning experience. 16% (11) strongly agreed to the notion, while 56% (38) agreed. Out of 16 who strongly agreed, 7 were female while 4 were males. While 20 females agreed as compared to 18 males who agreed. 17 people (10 females and 7 males) were unsure whether there was a need for an online learning experience or not, while 2 males were not favouring this notion where 1 disagreed and 1 strongly disagreed.

5.6 Conclusion

This research process aims to understand the student acceptance and intention to use online learning systems. Students Attitude and Satisfaction are studied to examine and analyse their behavioural patterns regarding such systems. The research also aims to cover the impact of COVID-19 on the student acceptance of online learning and the challenges faced by them during the shift to complete virtual learning during the lockdowns. The survey method was adopted for the data collection to gather the results in this direction. The online survey was considered the best option of data collection during these times of pandemic, keeping in view, the social distancing norms are other such directives. The technology acceptance model was used to examine student acceptance. TAM has been considered one of the most robust models in studying the user

acceptance of several technologies. Due to its immense benefits and Ease of use, this model was selected for the study. PLS-SEM analysis was conducted on the TAM model, and the results were found inconsistent with the original TAM. The study examined usability, Ease of use and enjoyment factor to analyse the student attitude and Satisfaction from online learning systems. Both of them were then studied to examine the behavioural intention of the student. The studies found that all three factors PU, PEOU and PE, were significantly and positively related to both Attitude and Satisfaction of students. An increase in one will cause an increase in the other. Also, students' behavioural intention was found to be based on the students' Attitude, and the more positive the Attitude of students, the more are the chances of students continuing with the online learning. However, the students' satisfaction from online learning was not linked to their behavioural intention to continue using it. Although the students are satisfied with online learning, there could be several reasons why they do not think it is a substitute for actual physical learning. If given a choice, they will switch to physical learning over online learning. Also, no significant relationship was developed between Satisfaction and Attitude of the student as a student even if satisfied with how the online learning in itself does not have a positive attitude due to other challenges that he faces in switching to online learning systems. Therefore, the study revealed that usability, Ease of use and enjoyment do influence the Attitude towards and Satisfaction from online learning. Nevertheless, only a positive attitude leads to a positive behavioural intention, and Satisfaction has nothing to do with it.

Descriptive analysis was also performed on some survey questions which could not be fitted to the TAM model. Moreover, it was done to study the student's perspective of online systems during COVID-19 and their need for personalised online learning systems. The results revealed that students were satisfied with online learning during COVID and agreed that online learning was beneficial and valuable in making them continue their study by providing them with a safe and secure atmosphere. Still, they do not find it as a substitute for actual physical learning. They also highlighted several factors like problems with the internet and distractions in stating the limitations of online learning. Also, students felt a need for personalised learning systems to enhance user experience and more wholesome learning.

Overall, the study indicated that online learning is valuable and helpful, especially in times of pandemic. However, students are very willing to shift to online learning completely, and it can never fully substitute the physical learning scenarios.

Chapter 6

Discussion and Conclusion

6.1 Chapter Overview

This research study aimed to analyse the student acceptance and intention to continue using online learning systems based on their attitude and satisfaction from online learning. The study used the Technological model to extend satisfaction as a dependent variable to understand the acceptance and intention to continue using online learning systems. The study also studied the student perception of online learning during the times the Covid-19. It studied student's attitude towards online learning during the pandemic when they had no choice but to undertake online learning to continue their studies. IT also throws light on the challenges faced in the adoption of online learning during the pandemic.

Moreover, the study also examined the need for personality-based online learning systems to make student interaction and experience with online learning more effective. This chapter will summarise the research findings based on the research aim and research questions of this study. We will also recommend reasonable best practices associated with adopting online learning and measures needed to make it more effective. The scope for future study is also provided.

6.2 Research Findings

The primary purpose of this research study is to analyse the student acceptance and intention to continue using online learning systems based on their attitude and satisfaction from online learning in the Southland region of New Zealand. The study also examined the student's perception of online learning during the COVID-19 pandemic. Also, it established the need for personality-based online learning systems in the Southland region of New Zealand.

In order to achieve the aims and objectives of this research, some research questions were developed. These questions were worked upon in multiple ways to deduce the research answers, which will help the research attain its objective and final aim.

To answer these research questions, the research objectives were completed one by one.

Objective 1: Literature review: The literature review was conducted to investigate the current literature based on the current research. The review was conducted in two parts; the first part aimed to study the technology acceptance studies and investigate a suitable model. The second part studied student acceptance of online learning during the pandemic. In the first part of the review, the best model from the several models discussed in chapter 2 was chosen based on the findings. In the second part of the literature review, the literature on student acceptance of online learning during the COVID-19 pandemic was investigated. Studies conducted worldwide on student perception of online learning were selected to study the features like a factor of student acceptance of online learning, attitude, intent to use, satisfaction, adoption challenges, platforms and technologies used and many such things. One portion of the literature review also focused on the need for personality-based online learning systems.

Objective 2: Select the best framework for the study:

Based on the findings from the Literature review, which was conducted to find out find a Technology Acceptance Model (Davis, 1989) was selected. Extensive empirical studies conducted on TAM with different sample sizes and users across various applications, organisations, and populations suggested that the model overall is valid, parsimonious, and robust (Davis and Venkatesh 1996; Venkatesh and Davis 2000). Our review showed how various extensions are done

to original TAM provided a more varied view and methods to explain different factors which influence the user acceptance of online learning after much deliberation on these factors. The fundamental factors to the TAM model of perceived usability and perceived ease of use were selected along with perceived enjoyment, as was introduced by (Lee et al., 2005). These three variables were used to study their influence on the attitude of the student. Another mediating variable of satisfaction from online learning was induced in the study and inspired by the model of (Mohtar et al., 2012). Satisfaction and attitude were used as mediating variables to study the students' behavioural intention on continuing to use online learning. To implement this model, six research constructs were developed: perceived usefulness, perceived ease of use, perceived enjoyment, attitude, satisfaction, and behavioural intention.

Objective 3: Test the consistency of the research model with the model.

Once all the literature review was finished, the next step involved developing a good survey aimed at collecting all the required data to obtain the aims of the research. The questions were designed by Google forms application. They were based on the six research constructs developed during the review and the data needed to answer the remaining two research questions of our study. A total of 48 questions were finalised, which covered data regarding the demographic profile of the user, usability of online learning systems, ease of use of online learning systems, enjoyment gained by using online learning systems, the attitude of the user towards online learning systems, the satisfaction gained from online learning systems and behavioural intention towards of online learning systems. In another section of the survey, data regarding student perception of online learning systems during COVID-19, like the usability of online learning systems, benefits, challenges, adoption issues and other such issues, was collected. The last section of the survey gathered data regarding the need for personality-based online learning systems. After completing the questionnaire designing, the content validity of the questionnaire was established, and a pilot study was conducted. Based on the feedback, minor changes were made to the survey, which was then sent for approval from the ethics committee. After gaining approval, the survey was distributed via email, Facebook, and WhatsApp of the researchers to its contacts that fit the research population of the study and then snowball sampling was used to gather more and more responses.

Objective 4: Analysis of collected data

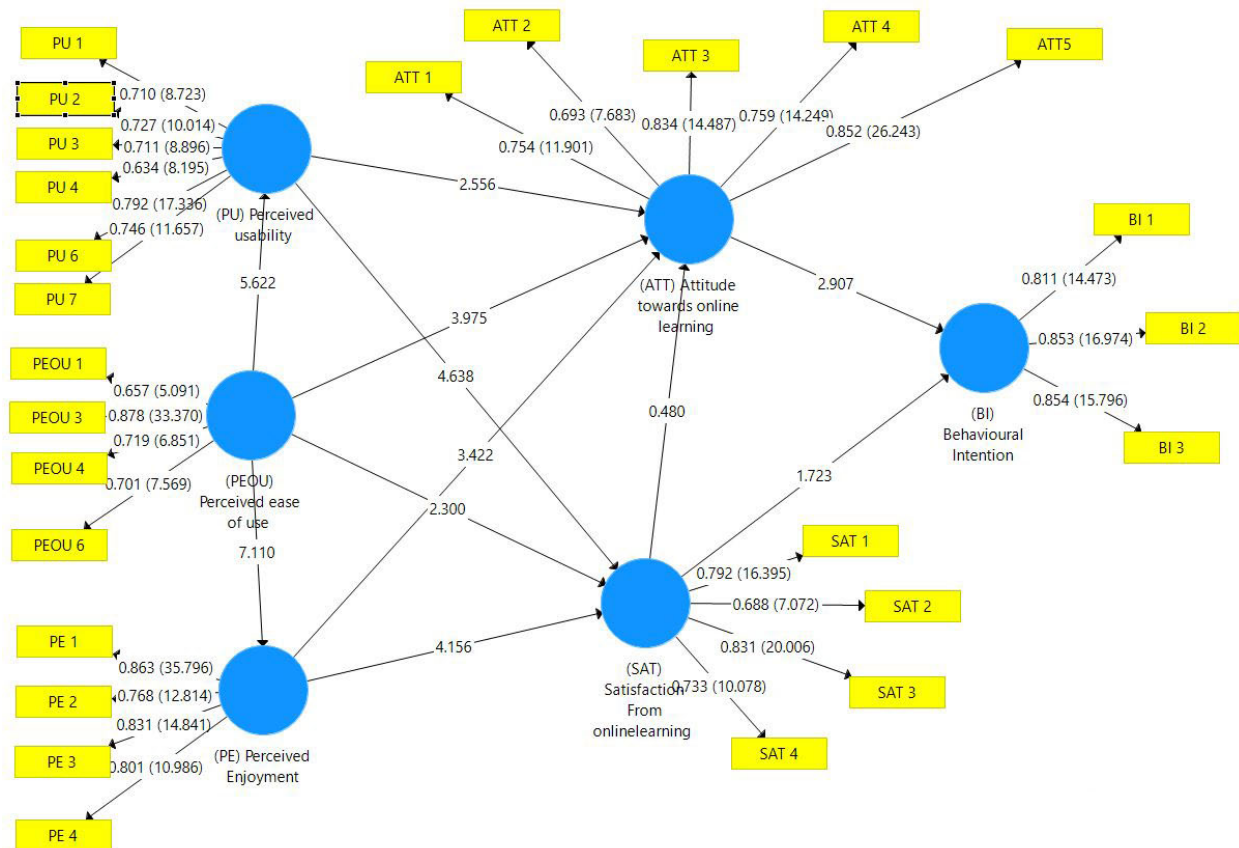
After the successful completion of the data collection, the data was analysed to get meaningful results. On the data collected through section 2 of the questionnaire, which had data regarding the 6 research constructs, PLS-SEM analysis was conducted. SmartPLS software was used to conduct this analysis, and the results were reported and analysed to check their consistency with the selected TAM model. The rest of the data was analysed by descriptive statistical techniques.

6.2.1 Results of the PLS-SEM Analysis

The results of SEM analysis is summarised in the figure 46

Figure 46

Final Results of SEM analysis



Note – The inner path (from one variable to another) mentions the t-values, while the outer path (from variable to indicator) mentions path loadings and t-values.

The research findings supported 9 out of 11 hypotheses developed in the study. A strong consistency was found in the study model with the original TAM model used. The results of the hypothesis are

H1: Perceived Usefulness of online learning has a significant relationship with the student's attitude towards it. This finding implies a causal relationship between the attitude of the student towards online learning and its perceived usefulness. The usefulness of any technology creates a positive attitude of the user towards it. The more valuable a technology, the more confident and good a user feels about the technology. It was concluded that most students had high ratings for their belief in the usefulness of online learning in their daily lives and to facilitate their learning. The results reflected that many students were convinced and conscious of the role of online learning in enhancing the learning process and providing opportunities to become more independent within it. Their ability to learn at their own pace, options of various subjects, freedom of time and place and other such factors made students feel that their productivity, retention power, and knowledge is are enhancing, and they felt positive about the online learning systems. Thus the usefulness of online learning over traditional learning was a factor that strongly influenced the student's attitude towards online learning. This result is consistent with (Davis 1989) that perceived usability has a significant relationship with the user's attitude.

H2: Perceived Usefulness of online learning has a significant relationship with satisfaction from online learning. This finding implies that there is a causal relationship between the satisfaction of student from online learning and the perceived usefulness of it. The useful features of online learning gave satisfaction to the users, and students were happy and content about it. Thus perceived usefulness was a factor that strongly influenced the student's satisfaction from online learning.

H3: The results revealed that Perceived ease of use of online learning has a significant relationship with the student's attitude towards it. This finding confirms that perceived ease of use is essential for configuring positive attitudes following perceived usefulness. The technology these days is not

only advancing but becoming simpler to use and more and more user friendly. Similarly, most online learning tools, as discussed in chapter 2 of the study) are highly user friendly and straightforward to use, and they do not consume much time or effort but rather speed up learning. Most students found online learning easy to use, which positively influenced their attitude towards the online learning systems, and this was reflected as PEOU was the strongest predictor of attitude. These results supported this hypothesis. Another primary reason for this is that online learning systems do not require any specific skills in ICT, and students can quickly gain sufficient skills for using them and even become adept. Thus, these issues positively affect students' feelings towards online learning and lead to favourable attitudes towards them. Thus, ease of use is considered one factor that would encourage students to use online learning in the future. The result suggests that students tend to use online learning if they believe that it assists them in enhancing their performance and effectiveness in their learning, with less effort required. The findings for the current study correspond to those of prior studies (Davis et al., 1989; Masrom, 2007; Park, 2009)

H4: The results revealed that Perceived ease of use of online learning has a significant relationship with satisfaction gained from online learning. If a student is confident in using a system and can manoeuvre it efficiently, this enhances his satisfaction gained from using that technology. The ease of online learning creates a sense of ease and confidence among students about online learning and makes s students more satisfied with online learning outcomes. However, the relationship between PEOU and Satisfactions was not very strong, and PU and PE were better predictors of satisfaction than PEOU.

H5: The results revealed that Perceived enjoyment from online learning has a significant relationship with the user's attitude towards online learning. The students found online learning more enjoyable than online learning. The use of graphics, videos, audios, and other multimedia made student enjoys the learning process. The student also enjoys the fact that online learning provides a non-competitive atmosphere than physical classrooms. These acts another point to their perceived enjoyment which in turn creates a positive attitude towards online learning. The findings for the current study correspond to those of prior studies (Davis et al., 1989; Lee et al., 2005)

H6: The results revealed that Perceived enjoyment from online learning has a significant relationship with satisfaction gained from online learning. According to the results, PE was the highest indicators of satisfaction. The enjoyment gained through online learning makes the

learning experience more pleasurable and less stressful. Innovative interface, graphics, and multimedia use make learning fun compared to boring classroom scenarios, which can be overwhelming to some students. This feeling of pleasure creates more satisfaction towards learning outcomes as compared to traditional learning.

H7: The results revealed that Perceived ease of use of online learning has a significant relationship with the Perceived Usefulness of online learning. The findings also reveal that perceived ease of use is considered an influential factor in influencing the perceived usefulness of online learning. A possible explanation for the positive result between ease of use and perceived usefulness is that the students found online learning tools to have a simple user interface, which is easy to use and navigate. They, therefore, quickly became familiar with learning systems, and it enables them to get maximum out of the learning experience. In addition, it might be due to the tools for interaction being clear and easy to understand, so students become skillful in using online learning. Lu et al. (2005) consider perceived ease of use to be an essential factor in evaluating the system's usefulness. This relationship should not be passed over when designing the course content or developing an e-learning system based on the significant result between perceived ease of use and perceived usefulness. It should consider that 'usefulness can be enhanced by providing enhanced e-learning services without increasing the complexity of the e-learning process' (Lee et al., 2009, p. 1325). This result is consistent with numerous empirical studies that demonstrate actual TAM Model results, such as for Davis (1989), who has more specifically examined the causal link between perceived ease of use and the perceived usefulness of e-learning. There are also significant results derived from others (Chen et al., 2007; Raaji and Schepers, 2008; Lee et al., 2009)

H8: The results revealed that Perceived ease of use of online learning has a significant relationship with Perceived enjoyment from online learning. The results show that PEOU strongly influenced online learning, as supported by (Lee et al., 2005b). This can be that if a person is comfortable using technology, they enjoy using it. The students who were acquainted with the technology enjoyed their online learning experience.

H9: The results revealed that the student's attitude towards online learning has a significant relationship with the student's behavioural intention to continue using online learning. A positive attitude towards online learning determines the intention towards continual use of it. This was consistent with the TAM results of (Davis et al., 1989). This could be easily explained as a positive

attitude and feeling towards any technology that motivates the user to start or continue using the technology.

H10: The results revealed that satisfaction from online learning has an insignificant relationship with the student's behavioural intention to continue using online learning. This relationship was insignificant, meaning a positive satisfaction from technology might not lead to the behavioural intention of using the technology. The possible reason for this result is then even if students are satisfied with the online learning, they do not intend to continue using it due to other factors. The factors could be that they find physical learning much better than online learning. Online learning gives them enough satisfaction from the technology itself. However, it does not motivate enough to continue using because this survey was conducted when students were forced to do online learning, and physical learning was not possible. This might lead participants to shift to physical learning to stop fully or partially using online learning.

H11: The results revealed that satisfaction from online learning has an insignificant relationship with the student's attitude towards online learning. This result signifies that even when students are satisfied with online learning, they do not feel positive about it because they were forced to choose this medium of learning and that compulsion causes the repel attitude.

6.2.1 Research Answers

RQ1: What is the student attitude and intention towards accepting online learning technology in the Southland region of Invercargill?

Results from all these hypotheses helped in answering research question 1. The results signify that the usefulness of online learning, ease of using online learning and enjoyment gained from using online learning systems motivate students to use online learning and have a positive attitude towards it. Moreover, this variable also leads to students being fully satisfied with online learning. Also, the positive attitude towards online learning leads them to continue using online learning further. However, the study proved that satisfaction from learning might not necessarily lead to the continuance of online learning.

RQ2: What were the effects of the COVID-19 pandemic on the student acceptance of online learning technology in the Southland region of Invercargill?

Some fascinating results gathered from the study reveal that most students liked and were satisfied with the online learning systems. They feel that online learning provided the much needed safe and secure environment for them to continue their education even in lockdown. They liked that they could manage their studies even with colleges closed and flexibility to education provided their time with their other life commitments. They were happy they could utilise their time and enhance their knowledge in the security of their homes without the fear of Covid-19. Most of them were satisfied with their online learning. However, they did encounter some difficulties in shifting to online learning. Challenges like problems with the internet, Slow connectivity, coverage, or complete absence of the internet was a significant deterrent in smooth functioning of online learning. The Second major deterrent was distractions at home. Even though online learning proved a bridge and helped the continuance of studies at home, they were marred by the absence of a proper atmosphere in schools and colleges. People faced a lack of concentration and focus and felt that the quality of education was not at par with physical learning. Some also encountered financial problems with buying gadgets and handling gadgets and the knowledge about online learning tools. Self-motivation to keep going without the pressure was also a significant factor. Finally, the results suggest that although most of the students were satisfied and happy with their online learning outcomes, they do not intend to completely substitute it with their physical learning once the pandemic restrictions are over. They feel that online learning can complement education but not fully eradicate the physical learning setup as physical learning do have significant advantages over online learning.

RQ3: Is there a need for personality-based customised online learning to make the learning experience better?

In response to this answer, most students feel that there is a need for personality-based learning environments that can be fully customised to provide a complete learning experience. They feel that online learning systems should conduct a personality quiz at the beginning to gain the user's personality and then customise the whole environment accordingly. The user's learning style should be picked, and then the lectures and courses should be delivered based on that learning

style. Also, other system settings should be customised according to the likes and personality of the user to provide maximum satisfaction and a wholesome learning experience.

6. 3 Recommendations from the current study

The current study results revealed the student acceptance of online learning, their attitude and satisfaction and intention to continue using online learning even after the pandemic ends. After reviewing and discussing the results of the current study in the researcher's attempt to interpret them, some recommendations have resulted from the current study that may help policymakers in the Southland region of New Zealand to apply and develop online learning.

1. The perceptions amongst students of online learning and self-learning must be enhanced through university or governmental workshops and seminars.
2. The use of online learning has a significant role in the future; therefore, students, especially those not studying technology-related subjects, should be given proper guidance on online learning usage about online learning like LMS and online learning tools. They need to be educated about online learning and be enlightened about its objectives, importance, potential, the required skills, and how to take advantage of it and their physical study routines.
3. More support from specialists at the university or colleges, on an ongoing basis, must be provided to students in order to encourage them to engage in online learning.
4. The curriculum should include specific online learning modules and physical classes to keep the student's interest in it and help them gain practical expertise.

6.4 Scope for Future Study

Based on the results and the limitations of the current study, the following can be the future scope of the study.

1. The current study may be applied to a larger sample of students to include students from different colleges all over the Southland region of New Zealand. Also. Student from all backgrounds, technical and non-technical, should be engaged in the study for more authentic results. Therefore, the results could then be more widely generalised.

2. Studies may be conducted that address the most critical learning impediments encountered by students in adapting to complete online learning or using various online learning tools and concerning what hinders their usage of these environments.

4. Further studies should be conducted to address the effect of factors not included in this study to ascertain the student attitude and intentions to use online learning. Moreover, other models may be proposed to investigate factors affecting students' use of e-learning environments.

5. Surveys could be carried out on the attitudes of faculty members to e-learning and learning environments and the investigation of students' attitudes to e-learning at the universities.

6. Attention could be focused on various stakeholders and policymakers regarding the most important factors affecting students' usage of online learnings systems while working to strengthen these factors to the advantage of the students.

6.5 Conclusion

The study emphasised the need for student acceptance of online learning to have more effective and efficient online learning systems. These times of pandemic have proved the importance of online learning and its future scope. Therefore efforts should be made to strengthen more concrete

and practical online learning infrastructure to create simple yet effective online learning solutions. In this attempt, the study conducted the student acceptance of online learning in the Southland region of New Zealand to examine how students perceived the change in their learning semantics which was a result of the pandemic induced lockdowns and social distancing norms. Students were asked questions related to the research constructs of the study, which were perceived usefulness from online learning, students ease in using online learning systems, the enjoyment they achieved in engaging with online learning. These three factors were studied using sequential equation modelling to analyse the attitude and satisfaction of the students, which acted as a moderating factor to examine the intention to continue using online learning after the pandemic. They were also asked specific questions about their experience with online learning during the lockdown when they forced to shift to online learning. The study also included the need for personality style based customised online learning environments for enhanced user experience.

The results suggested that students' attitude and satisfaction are significantly influenced by usefulness, ease of use, and enjoyment. Moreover, ease of use is a strong influencer of the usefulness of systems and an enjoyment determinant. The study further revealed that student's attitude towards online learning influenced their behavioural intention to continue using the systems; however, satisfaction might not have a significant positive relationship with intention to continue using online learning. The fundamental reason for that can be that even if the students were satisfied with online learning, they would prefer physical learning to online learning. Therefore, they might not want to continue using online learning once the pandemic lockdowns are over. The study also highlighted the issues students face in adopting online learning and how they feel that online learning has a fair share of advantages over online learning, especially during these pandemic times. However, it is not a substitute for physical learning. Students might want to continue with online learning in parallel with physical learning but would not solely prefer online learning for their educational needs.

References

- Abbasi, S., Ayoob, T., Malik, A., & Memon, S. I. (2020). Perceptions of students regarding E-learning during Covid-19 at a private medical college. *Pakistan Journal of Medical Sciences*, 36(COVID19-S4). <https://doi.org/10.12669/pjms.36.COVID19-S4.2766>
- Abdullah, F., & Ward, R. (2016). Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors. *Computers in Human Behavior*, 56, 238–256. <https://doi.org/10.1016/j.chb.2015.11.036>
- Abramson, J., Dawson, M., & Stevens, J. (2015). An Examination of the Prior Use of E-Learning Within an Extended Technology Acceptance Model and the Factors That Influence the Behavioral Intention of Users to Use M-Learning. *SAGE Open*, 5. <https://doi.org/10.1177/2158244015621114>
- Adarkwah, M. A. (2020). “I’m not against online teaching, but what about us?”: ICT in Ghana post Covid-19. *Education and Information Technologies*, 1–21. <https://doi.org/10.1007/s10639-020-10331-z>
- Agarwal, R., & Karahanna, E. (2000). Time Flies When You’re Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage. *MIS Quarterly*, 24, 665–694. <https://doi.org/10.2307/3250951>
- Agarwal, R., & Prasad, J. (1998). A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology. *Information Systems Research*, 9(2), 204–215. <https://doi.org/10.1287/isre.9.2.204>

- Aguilera-Hermida, A. P., Quiroga-Garza, A., Gómez-Mendoza, S., Del Río Villanueva, C. A., Avolio
Alecchi, B., & Avci, D. (2021). Comparison of students' use and acceptance of emergency
online learning due to COVID-19 in the USA, Mexico, Peru, and Turkey. *Education and
Information Technologies*. <https://doi.org/10.1007/s10639-021-10473-8>
- Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In J. Kuhl & J.
Beckmann (Eds.), *Action Control: From Cognition to Behavior* (pp. 11–39). Springer.
https://doi.org/10.1007/978-3-642-69746-3_2
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision
Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ajzen, I. (2006). *Behavioral Interventions Based on the Theory of Planned Behavior*. 5.
- Ajzen, I., & Fishbein, M. (1975). *A Bayesian analysis of attribution processes*. 82(2), 261–277.
<https://doi.org/10.1037/h0076477>
- Akour, I., Alshurideh, M., Al Kurdi, B., Al Ali, A., & Salloum, S. (2021). Using Machine Learning
Algorithms to Predict People's Intention to Use Mobile Learning Platforms During the COVID-
19 Pandemic: Machine Learning Approach. *JMIR Medical Education*, 7(1), e24032.
<https://doi.org/10.2196/24032>
- Al-Ajlan, A., & Zedan, H. (2008). Why Moodle. *2008 12th IEEE International Workshop on Future
Trends of Distributed Computing Systems*, 58–64. <https://doi.org/10.1109/FTDCS.2008.22>
- Al-Azawei, A., & Lundqvist, K. (2015). Learner Differences in Perceived Satisfaction of an Online
Learning: An Extension to the Technology Acceptance Model in an Arabic Sample. *Electronic
Journal of E-Learning*, 13, 408–426.

- Al-Azawei, A., Parslow, P., & Lundqvist, K. (2016). Investigating the effect of learning styles in a blended e-learning system: An extension of the technology acceptance model (TAM). *Australasian Journal of Educational Technology*, 2017, 1–23. <https://doi.org/10.14742/ajet.2758>
- Al-Emran, M., & Shaalan, K. (2015). Attitudes Towards the Use of Mobile Learning: A Case Study from the Gulf Region. *International Journal of Interactive Mobile Technologies (IJIM)*, 9, 75–78. <https://doi.org/10.3991/ijim.v9i3.4596>
- Al-Gahtani, S. (2001). The Applicability of TAM Outside North America: An Empirical Test in the United Kingdom. *IRMJ*, 14, 37–46. <https://doi.org/10.4018/irmj.2001070104>
- Alhumaid, K., & Ali, S. (2020). *COVID-19 & Elearning: Perceptions & Attitudes Of Teachers Towards E-Learning Acceptance in The Developing Countries*. <https://doi.org/10.5281/ZENODO.4060121>
- Ali, W. (2020). Online and Remote Learning in Higher Education Institutes: A Necessity in light of COVID-19 Pandemic. *Higher Education Studies*, 10(3), 16. <https://doi.org/10.5539/hes.v10n3p16>
- Ally, M. (2004). *Foundations of educational theory for online learning*. Athabasca University Press.
- Almaiah, M., Jalil, M., & Man, M. (2016). Extending the TAM to examine the effects of quality features on mobile learning acceptance. *Journal of Computers in Education*, 3. <https://doi.org/10.1007/s40692-016-0074-1>
- Alrafi, A. (2009). *Information Systems Adoption: A Study of the Technology Acceptance Model*.
- Al-Smadi, D. M. O. (2012). *Factors Affecting Adoption of Electronic Banking: An Analysis of the Perspectives of Banks' Customers*. 3(17), 16.

- Alzahrani, L., & Seth, K. P. (2021). Factors influencing students' satisfaction with continuous use of learning management systems during the COVID-19 pandemic: An empirical study. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-021-10492-5>
- Anderson, T. (2008). *The Theory and Practice of Online Learning*. Athabasca University Press.
- Asvial, M., Mayangsari, J., & Yudistriansyah, A. (2021). Behavioral Intention of e-Learning: A Case Study of Distance Learning at a Junior High School in Indonesia due to the COVID-19 Pandemic. *International Journal of Technology*, 12(1), 54. <https://doi.org/10.14716/ijtech.v12i1.4281>
- Baber, H. (2020). Determinants of Students' Perceived Learning Outcome and Satisfaction in Online Learning during the Pandemic of COVID19. *Journal of Education and E-Learning Research*, 7(3), 285–292. <https://doi.org/10.20448/journal.509.2020.73.285.292>
- Baber, H. (2021). Modelling the acceptance of e-learning during the pandemic of COVID-19-A study of South Korea. *The International Journal of Management Education*, 19(2), 100503. <https://doi.org/10.1016/j.ijme.2021.100503>
- Bandura, A. (n.d.). *Social cognitive theory of personality*. 81.
- Basri, M., Husain, B., & Modayama, W. (2021). University Students' Perceptions in Implementing Asynchronous Learning during Covid-19 Era. *Metathesis: Journal of English Language, Literature, and Teaching*, 4(3), 263. <https://doi.org/10.31002/metathesis.v4i3.2734>
- Bazelais, P., Doleck, T., & Lemay, D. J. (2018). Investigating the predictive power of TAM: A case study of CEGEP students' intentions to use online learning technologies. *Education and Information Technologies*, 23(1), 93–111. <https://doi.org/10.1007/s10639-017-9587-0>

- Bere, A., & Rambe, P. (2013). Extending technology acceptance model in mobile learning adoption: South African university of technology students' perspectives. *Proceedings of the International Conference on E-Learning, ICEL*, 52–60.
- Besser, A., Flett, G. L., & Zeigler-Hill, V. (2020). Adaptability to a sudden transition to online learning during the COVID-19 pandemic: Understanding the challenges for students. *Scholarship of Teaching and Learning in Psychology*. <https://doi.org/10.1037/stl0000198>
- Biswas, B., Roy, S. K., & Roy, F. (2020). Students Perception of Mobile Learning during COVID-19 in Bangladesh: University Student Perspective. *Aquademia*, 4(2), ep20023. <https://doi.org/10.29333/aquademia/8443>
- Bower, M. (2019). Technology-mediated learning theory. *British Journal of Educational Technology*, 50(3), 1035–1048. <https://doi.org/10.1111/bjet.12771>
- Bradshaw, M. B., & Stratford, E. (2010). *Qualitative research design and rigour*. http://www.oup.com.au/titles/higher_ed/geography/9780195430158
- Brückner, M. (2015). *Educational Technology*. <https://doi.org/10.13140/2.1.2180.9449>
- Bruns, A. (2017). Blog. In *The Wiley-Blackwell Encyclopedia of Social Theory* (pp. 1–3). American Cancer Society. <https://doi.org/10.1002/9781118430873.est0578>
- Carliner, S. (2004). *An Overview of Online Learning*. Human Resource Development.
- Carter, L., & Belanger, F. (2004). *The Influence of Perceived Characteristics of Innovating on e-Government Adoption*. 2(1), 10.
- CDC. (2020). *Health Care Access, Telemedicine, and Mental Health*. <https://www.cdc.gov/nchs/covid19/health-care-access-and-mental-health.htm>

- Chandio, A. (2021). *Factors Influencing Intentions to use Digital Learning during COVID-19 Outbreak in Sindh: An Empirical Study. Volume VI*, 83 50 95.
<https://doi.org/10.36261/10.36261/ijdeel.2020.05.02.01>
- Chandio, A. R. (2020). *Factors Influencing Intentions to use Digital Learning during COVID-19 Outbreak in Sindh: An Empirical Study*. 13.
- Chang, C.-C., Yan, C.-F., & Tseng, J.-S. (2012a). Perceived convenience in an extended technology acceptance model: Mobile technology and English learning for college students. *Australasian Journal of Educational Technology*, 28(5), 809–826. <https://doi.org/10.14742/ajet.818>
- Chau, P., & Hu, P. (2002). Examining a Model of Information Technology Acceptance by Individual Professionals: An Exploratory Study. *Journal of Management Information Systems*, 18, 191–229.
- Chauhan, S., & Jaiswal, M. (2017). A meta-analysis of e-health applications acceptance: Moderating impact of user types and e-health application types. *Journal of Enterprise Information Management*, 30. <https://doi.org/10.1108/JEIM-08-2015-0078>
- Chauhan, V., Choudhary, V., & Mathur, S. (2016). Demographic Influences on Technology Adoption Behavior: A Study of E-Banking Services in India. *Prabandhan: Indian Journal of Management*, 9, 45. <https://doi.org/10.17010/pijom/2016/v9i5/92571>
- Chayomchai, A., Phonsiri, W., Junjit, A., Boongapim, R., & Suwannaputit, U. (2020). Factors affecting acceptance and use of online technology in Thai people during COVID-19 quarantine time. *Management Science Letters*, 3009–3016. <https://doi.org/10.5267/j.msl.2020.5.024>

- Chen, S.-C., Liu, M.-L., & Lin, C.-P. (2013). Integrating Technology Readiness into the Expectation-Confirmation Model: An Empirical Study of Mobile Services. *Cyberpsychology, Behavior and Social Networking*, 16. <https://doi.org/10.1089/cyber.2012.0606>
- Chen, T., Peng, L., Jing, B., Wu, C., Yang, J., & Cong, G. (2020). The Impact of the COVID-19 Pandemic on User Experience with Online Education Platforms in China. *Sustainability*, 12(18), 7329. <https://doi.org/10.3390/su12187329>
- Chiu, C.-M., Hsu, M.-H., Sun, S.-Y., Lin, T.-C., & Sun, P.-C. (2005). Usability, quality, value and e-learning continuance decisions. *Computers & Education*, 45, 399–416. <https://doi.org/10.1016/j.compedu.2004.06.001>
- Chung, chih-hung, Pasquini, L., & Koh, C. (2013). Web-based Learning Management System Considerations for Higher Education. *Learning and Performance Quarterly*, 1, 24–37.
- Chung, E., & Mathew, V. (2020). Satisfied with Online Learning Amidst COVID-19, but do you Intend to Continue Using it? *International Journal of Academic Research in Progressive Education and Development*, 9, 67–77. <https://doi.org/10.6007/IJARPED/v9-i4/8177>
- Chung, E., Subramaniam, G., & Christ Dass, L. (2020). Online Learning Readiness Among University Students in Malaysia Amidst Covid-19. *Asian Journal of University Education*, 16(2), 45. <https://doi.org/10.24191/ajue.v16i2.10294>
- Chung, J., & Tan, F. (2004). Antecedents of perceived playfulness: An exploratory study on user acceptance of general information-searching websites. *Undefined*. [/paper/Antecedents-of-perceived-playfulness%3A-an-study-on-Chung-Tan/c616863434f1acc2265a5bce4243283469e451d1](https://doi.org/10.1016/j.chbs.2004.06.001)

- Crawford, J., Butler-Henderson, K., Jurgen, R., Malkawi, B. H., Glowatz, M., Burton, R., Magni, P., & Lam, S. (2020). COVID-19: 20 countries' higher education intra-period digital pedagogy responses. *Journal of Applied Learning & Teaching*, 3. <https://doi.org/10.37074/jalt.2020.3.1.7>
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed). Sage Publications.
- Cross, J. (2004). An informal history of eLearning. *On The Horizon*, 12, 103–110.
<https://doi.org/10.1108/10748120410555340>
- Davis, F. D. (1986). *A technology acceptance model for empirically testing new end-user information systems: theory and results*.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35(8), 982–1003.
<https://doi.org/10.1287/mnsc.35.8.982>
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace¹. *Journal of Applied Social Psychology*, 22(14), 1111–1132.
<https://doi.org/10.1111/j.1559-1816.1992.tb00945.x>
- Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems*. <https://doi.org/10.1177/0047239520934018>
- Dillon, A. (2001). *User acceptance of information technology*. London: Taylor and Francis.
<https://repository.arizona.edu/handle/10150/105880>

- Dillon, A., & Morris, M. G. (1996). User Acceptance of Information Technology: Theories and Models. *Annual Review of Information Science and Technology (ARIST)*, 31, 3–32.
<https://www.learntechlib.org/p/82513/>
- Dishawa, M. T., & Strong, D. M. (1998). *Research Extending the technology acceptance model with task–technology fit constructs*.
- Esteban-Millat, I., Martínez-López, F. J., Pujol-Jover, M., Gázquez-Abad, J. C., & Alegret, A. (2018a). An extension of the technology acceptance model for online learning environments. *Interactive Learning Environments*, 26(7), 895–910.
<https://doi.org/10.1080/10494820.2017.1421560>
- Fadde, P., & Vu, P. (2014). *Blended online learning: Misconceptions, benefits, and challenges*. 33–48.
- Famularsih, S. (2020). *Students' Experiences in Using Online Learning Applications Due to COVID-19 in English Classroom*. 1(2), 112–121. <https://doi.org/DOI:10.46627/silet.v1i2.40>
- Farahat, T. (2012). Applying the Technology Acceptance Model to Online Learning in the Egyptian Universities. *Procedia - Social and Behavioral Sciences*, 64, 95–104.
<https://doi.org/10.1016/j.sbspro.2012.11.012>
- Farooq, M. S., Salam, M., Jaafar, N., Fayolle, A., Ayupp, K., Radovic-Markovic, M., & Sajid, A. (2017). Acceptance and use of lecture capture system (LCS) in executive business studies: Extending UTAUT2. *Interactive Technology and Smart Education*, 14(4), 329–348.
<https://doi.org/10.1108/ITSE-06-2016-0015>

- Fathema, N., Shannon, D., & Ross, M. (2015). Expanding The Technology Acceptance Model (TAM) to Examine Faculty Use of Learning Management Systems (LMSs) In Higher Education Institutions. *MERLOT Journal of Online Learning and Teaching*, 11(2), 210–232.
- Fatimah, F., Rajiani, S. I., & Abbas, E. W. (2021). Cultural and individual characteristics in adopting computer-supported collaborative learning during covid-19 outbreak: Willingness or obligatory to accept technology? *Management Science Letters*, 373–378.
<https://doi.org/10.5267/j.msl.2020.9.032>
- Fishbein, M. (1979). A theory of reasoned action: Some applications and implications. *Nebraska Symposium on Motivation*, 27, 65–116.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behaviour: An Introduction to Theory and Research*. MA: Addison-Wesley.
- Gefen, D., Karahanna, E., & Straub, D. (2003). Trust and TAM in Online Shopping: An Integrated Model. *MIS Quarterly*, 27, 51–90. <https://doi.org/10.2307/30036519>
- Ghapanchi, A. H., & Talaei-Khoei, A. (2018). Rethinking Technology Acceptance: Towards a Theory of Technology Utilization. *AMCIS 2018 Proceedings*.
<https://aisel.aisnet.org/amcis2018/AdoptionDiff/Presentations/13>
- Gogos, R. (2013, August 15). *A brief history of elearning (infographic)*. EFront Blog.
<https://www.efrontlearning.com/blog/2013/08/a-brief-history-of-elearning-infographic.html>
- Gómez-Rey, P., Barbera, E., & Fernández-Navarro, F. (2016). The Impact of Cultural Dimensions on Online Learning. *Journal of Educational Technology & Society*, 19(4), 225–238.
<https://www.jstor.org/stable/jeductechsoci.19.4.225>

- Gonzalez, T., Rubia, M. A. de la, Hincz, K. P., Comas-Lopez, M., Subirats, L., Fort, S., & Sacha, G. M. (2020). Influence of COVID-19 confinement on students' performance in higher education. *PLOS ONE*, 15(10), e0239490. <https://doi.org/10.1371/journal.pone.0239490>
- Gonzalez-Ramirez, J., Mulqueen, K., Zealand, R., Silverstein, S., Mulqueen, C., & BuShell, S. (2021). Emergency Online Learning: College Students' Perceptions During the COVID-19 Pandemic. *College Student Journal*, 55(1), 29–46.
- Grant, M., & Cheon, J. (2007). The Value of Using Synchronous Conferencing for Instruction and Students. *Journal of Interactive Online Learning*, 6.
- Gregar, J. (n.d.). Research Design (Qualitative, Quantitative and Mixed Methods Approaches). *Research Design*, 8.
- Gunasinghe, A., Hamid, J., Khatibi, A., & Azam, S. (2019). Academicians' Acceptance of Online Learning Environments: A Review of Information System Theories and Models. *Global Journal of Computer Science and Technology*, 31–39. <https://doi.org/10.34257/GJCSTHVOL19IS1PG31>
- Hamidah, D. S. (2020). Students Perceptions in Online Class Learning During the Covid-19 Pandemic. 3(3).
- Harman, K., & Koohang, A. (2005). Discussion Board: A Learning Object. *Interdisciplinary Journal of E-Learning and Learning Objects*, 1(1), 67–77. <https://www.learntechlib.org/p/44867/>
- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, M. (2020). *The Difference Between Emergency Remote Teaching and Online Learning*.
- Holzer, J., Lüftenegger, M., Korlat, S., Pelikan, E., Salmela-Aro, K., Spiel, C., & Schober, B. (2021). Higher Education in Times of COVID-19: University Students' Basic Need Satisfaction, Self-

Regulated Learning, and Well-Being. *AERA Open*, 7, 23328584211003164.

<https://doi.org/10.1177/23328584211003164>

Hoq, M. Z. (2020). E-Learning During the Period of Pandemic (COVID-19) in the Kingdom of Saudi Arabia: An Empirical Study. *American Journal of Educational Research*, 8.

Horton, W. K. (2006). *E-learning by design*. Pfeiffer.

Hrastinski, S. (2008). Asynchronous and synchronous e-learning. *Educause Quarterly*, 4.

Huang, J.-H., Lin, Y.-R., & Chuang, S.-T. (2007). Elucidating user behavior of mobile learning: A perspective of the extended technology acceptance model. *The Electronic Library*, 25, 586–599.
<https://doi.org/10.1108/02640470710829569>

Hubackova, S. (2015). History and Perspectives of Elearning. *Procedia - Social and Behavioral Sciences*, 191, 1187–1190. <https://doi.org/10.1016/j.sbspro.2015.04.594>

Ibrahim, N. K., Al Raddadi, R., AlDarmasi, M., Al Ghamdi, A., Gaddoury, M., AlBar, H. M., & Ramadan, I. K. (2021). Medical students' acceptance and perceptions of e-learning during the Covid-19 closure time in King Abdulaziz University, Jeddah. *Journal of Infection and Public Health*, 14(1), 17–23. <https://doi.org/10.1016/j.jiph.2020.11.007>

Ibrahim, R., Leng, N. S., Yusoff, R. C. M., & Samy, G. N. (2018). *E-LEARNING ACCEPTANCE BASED ON TECHNOLOGY ACCEPTANCE MODEL (TAM)*.

Ibrahim, R., Leng, N. S., Yusoff, R. C. M., Samy, G. N., Masrom, S., & Rizman, Z. I. (2017). E-learning acceptance based on technology acceptance model (TAM). *Journal of Fundamental and Applied Sciences*, 9(4S), 871–889. <https://doi.org/10.4314/jfas.v9i4S.50>

- Ingham, J., Cadieux, J., & Berrada, A. (2014). E-Shopping Acceptance: A Qualitative and Meta-Analytic Review. *Information & Management*, 52. <https://doi.org/10.1016/j.im.2014.10.002>
- Jiang, H., Islam, A. Y. M. A., Gu, X., & Spector, J. M. (2021). Online learning satisfaction in higher education during the COVID-19 pandemic: A regional comparison between Eastern and Western Chinese universities. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-021-10519-x>
- Jin, Y. Q., Lin, C.-L., Zhao, Q., Yu, S.-W., & Su, Y.-S. (2021). A Study on Traditional Teaching Method Transferring to E-Learning Under the Covid-19 Pandemic: From Chinese Students' Perspectives. *Frontiers in Psychology*, 12, 632787. <https://doi.org/10.3389/fpsyg.2021.632787>
- Kabir, S. M. (2016). *METHODS OF DATA COLLECTION* (pp. 201–275).
- Kamble, A., Gauba, R., Desai, S., & Golhar, D. (2021). Learners' Perception of the Transition to Instructor-Led Online Learning Environments: Facilitators and Barriers During the COVID-19 Pandemic. *The International Review of Research in Open and Distributed Learning*, 22(1), 199–215. <https://doi.org/10.19173/irrodl.v22i1.4971>
- Katambur, D. (2018, March 13). 5 Proven Online Tools that Support Asynchronous Learning. *Rapid ELearning Blogs – CommLab India*. <https://blog.commlabindia.com/elearning-development/online-tools-for-asynchronous-learning-support>
- Kemp, A., Palmer, E., & Strelan, P. (2019). A taxonomy of factors affecting attitudes towards educational technologies for use with technology acceptance models. *British Journal of Educational Technology*, 50(5), 2394–2413. <https://doi.org/10.1111/bjet.12833>

- Khan, M. A., Vivek, V., Nabi, M. K., Khojah, M., & Tahir, M. (2020). Students' Perception towards E-Learning during COVID-19 Pandemic in India: An Empirical Study. *Sustainability*, 13(1), 57. <https://doi.org/10.3390/su13010057>
- Kitchenham, B., & Charters, S. (2007). *Guidelines for performing Systematic Literature Reviews in Software Engineering*.
- Kotler, P., & Keller, K. (2006). Marketing Management. *Upper Saddle River, New Jersey*.
- Kumar, R. (1996). *Research Methodology: A step by step guide for beginners* (5th ed.). Sage publications.
- Lanlan, Z., Ahmi, A., & Popoola, O. M. J. (2019). *Perceived Ease of Use, Perceived Usefulness and the Usage of Computerized Accounting Systems: A Performance of Micro and Small Enterprises (MSEs) in China*. 8, 324–331. <https://doi.org/10.35940/ijrte.B1056.0782S219>
- Lee, M. K. O., Cheung, C. M. K., & Chen, Z. (2005). Acceptance of Internet-based learning medium: The role of extrinsic and intrinsic motivation. *Information & Management*, 42(8), 1095–1104. <https://doi.org/10.1016/j.im.2003.10.007>
- Lee, M.-C. (2009). Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit. *Electronic Commerce Research and Applications*, 8(3), 130–141. <https://doi.org/10.1016/j.elerap.2008.11.006>
- Legris, P., Ingham, J., & Colletette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management*, 40, 191–204. [https://doi.org/10.1016/S0378-7206\(01\)00143-4](https://doi.org/10.1016/S0378-7206(01)00143-4)

- Lin, C.-H., Shih, H.-Y., & Sher, P. J. (2007). Integrating technology readiness into technology acceptance: The TRAM model. *Psychology & Marketing*, 24(7), 641–657.
<https://doi.org/10.1002/mar.20177>
- Littlejohn, A., & Pegler, C. (2007). *Preparing for Blended E-learning*. Routledge.
- Liu, I.-F., Chen, M., Sun, Y., Wible, D., & Kuo, C.-H. (2010). Extending the TAM model to explore the factors that affect Intention to Use an Online Learning Community. *Computers & Education*, 54, 600–610. <https://doi.org/10.1016/j.compedu.2009.09.009>
- Lowhorn, G. L. (2007). *Qualitative and Quantitative Research: How to Choose the Best Design* (SSRN Scholarly Paper ID 2235986). Social Science Research Network.
<https://papers.ssrn.com/abstract=2235986>
- Lu, J., Yao, J., & Yu, C.-S. (2005). Personal Innovativeness, Social Influences and Adoption of Wireless Internet Services via Mobile Technology. *The Journal of Strategic Information Systems*, 14, 245–268. <https://doi.org/10.1016/j.jsis.2005.07.003>
- Lu, J., Yu, C.-S., Liu, C., & Yao, J. (2003). Technology acceptance model of wireless Internet. *Internet Research*, 13, 206–222. <https://doi.org/10.1108/10662240310478222>
- Mahnegar, F. (2012). *Learning Management System*. 3(12), 7.
- Martin, F. (2008). Blackboard as the Learning Management System of a Computer Literacy Course. *Journal of Online Learning and Teaching*, 4.
- Masrom, M. (2007). Technology Acceptance Model and E-learning. In *12th International Conference on Education*, Sultan Hassanah Bolkih Institute of Education Universiti, Brunei Darussalam, 21–24.

- Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information Systems Research*, 2(3), 173–191.
<https://doi.org/10.1287/isre.2.3.173>
- Md Yunus, M., Ang, W. S., & Hashim, H. (2021). Factors Affecting Teaching English as a Second Language (TESL) Postgraduate Students' Behavioural Intention for Online Learning during the COVID-19 Pandemic. *Sustainability*, 13(6), 3524. <https://doi.org/10.3390/su13063524>
- Mohtar, S., Hassan, M. G., & Hasnan, N. (2012). A study on customer interface satisfaction by using TAM and SERVQUAL dimension on the use of technology job search website in Malaysia: A case study. *Journal of Technology and Operations Management*, 7(2), 39–54.
<http://jtom.stmlportal.net/uncategorized/volume-7-number-2-december-2012/>
- Momani, A., & Jamous, M. (2017). The Evolution of Technology Acceptance Theories. *International Journal of Contemporary Computer Research (IJCCR)*, 1, 50–58.
- Momani, A., Jamous, M., & Hilles, S. M. (2017). Technology Acceptance Theories: Review and Classification. *International Journal of Cyber Behavior, Psychology and Learning*, 7, 1–14.
<https://doi.org/10.4018/IJCBPL.2017040101>
- Moodle—Open-source learning platform | Moodle.org. (n.d.). Retrieved May 10, 2021, from <https://moodle.org/>
- Moon, J.-W., & Kim, Y.-G. (2001). Extending the TAM for a World-Wide-Web context. *Information & Management*, 38, 217–230. [https://doi.org/10.1016/S0378-7206\(00\)00061-6](https://doi.org/10.1016/S0378-7206(00)00061-6)

- Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education*, 14(2), 129–135. <https://doi.org/10.1016/j.iheduc.2010.10.001>
- Muhammad, A., Zhou, Q., Beydoun, G., Xu, D., & Shen, J. (2016). Learning path adaptation in online learning systems. *2016 IEEE 20th International Conference on Computer Supported Cooperative Work in Design (CSCWD)*, 421–426. <https://doi.org/10.1109/CSCWD.2016.7566026>
- Müller-Seitz, G., Dautzenberg, K., Creusen, U., & Stromereder, C. (2009). Customer acceptance of RFID technology: Evidence from the German electronic retail sector. *Journal of Retailing and Consumer Services*, 16, 31–39. <https://doi.org/10.1016/j.jretconser.2008.08.002>
- Nasri, W. (2012). Factors affecting the adoption of Internet banking in Tunisia: An integration theory of acceptance model and theory of planned behavior. *The Journal of High Technology Management Research*, 23, 1–14. <https://doi.org/10.1016/j.hitech.2012.03.001>
- Ozdamli, F., & Uzunboylu, H. (2015). M-learning adequacy and perceptions of students and teachers in secondary schools. *British Journal of Educational Technology*, 46(1), 159–172. <https://doi.org/10.1111/bjet.12136>
- Padilla-Meléndez, A., Del Aguila-Obra, A. R., & Garrido-Moreno, A. (2013). Perceived playfulness, gender differences and technology acceptance model in a blended learning scenario. *Computers & Education*, 63, 306–317. <https://doi.org/10.1016/j.compedu.2012.12.014>
- Panigrahi, R., Srivastava, P. R., & Sharma, D. (2018). Online learning: Adoption, continuance, and learning outcome—A review of literature. *International Journal of Information Management*, 43, 1–14. <https://doi.org/10.1016/j.ijinfomgt.2018.05.005>

- Park, S. Y. (2009). An Analysis of the Technology Acceptance Model in Understanding University Students' Behavioral Intention to Use e-Learning. *Journal of Educational Technology & Society*, 12(3), 150–162. <https://www.jstor.org/stable/jeductechsoci.12.3.150>
- Patricia Aguilera-Hermida, A. (2020). College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open*, 1, 100011. <https://doi.org/10.1016/j.ijedro.2020.100011>
- Pavlou, P. A. (2003). Consumer Acceptance of Electronic Commerce: Integrating Trust and Risk with the Technology Acceptance Model. *International Journal of Electronic Commerce*, 7(3), 101–134. <https://doi.org/10.1080/10864415.2003.11044275>
- Peansupap, V., & Walker, D. (2005). Factors affecting ICT diffusion: A case study of three large Australian construction contractors. *Engineering, Construction and Architectural Management*, 12(1), 21–37. <https://doi.org/10.1108/09699980510576871>
- Peek, S. T. M., Wouters, E. J. M., van Hoof, J., Luijkx, K. G., Boeije, H. R., & Vrijhoef, H. J. M. (2014). Factors influencing acceptance of technology for aging in place: A systematic review. *International Journal of Medical Informatics*, 83(4), 235–248. <https://doi.org/10.1016/j.ijmedinf.2014.01.004>
- Pinho, José, & Soares, A. (2011). Examining the technology acceptance model in the adoption of social networks. *Journal of Research in Interactive Marketing*, 5, 116–129. <https://doi.org/10.1108/17505931111187767>
- Ploj, M. (2021). Changes in Online Distance Learning Behaviour of University Students during the Coronavirus Disease 2019 Outbreak, and development of the Model of Forced Distance Online

Learning Preferences. *European Journal of Educational Research*, 10(1), 393–411.

<https://doi.org/10.12973/eu-jer.10.1.393>

Qiao, P., Zhu, X., Guo, Y., Sun, Y., & Qin, C. (2021). The Development and Adoption of Online Learning in Pre- and Post-COVID-19: Combination of Technological System Evolution Theory and Unified Theory of Acceptance and Use of Technology. *Journal of Risk and Financial Management*, 14(4), 162. <https://doi.org/10.3390/jrfm14040162>

Quazi, A., & Talukder, M. (2011). Demographic Determinants of Adoption of Technological Innovation. *Journal of Computer Information Systems*, 52(1), 34–42.

<https://doi.org/10.1080/08874417.2011.11645520>

Raza, S. A., Qazi, W., Khan, K. A., & Salam, J. (2021). Social Isolation and Acceptance of the Learning Management System (LMS) in the time of COVID-19 Pandemic: An Expansion of the UTAUT Model. *Journal of Educational Computing Research*, 59(2), 183–208.

<https://doi.org/10.1177/0735633120960421>

Rizun, M., & Strzelecki, A. (2020). Students' Acceptance of the COVID-19 Impact on Shifting Higher Education to Distance Learning in Poland. *International Journal of Environmental Research and Public Health*, 17(18), 6468. <https://doi.org/10.3390/ijerph17186468>

Rogers, Everett. M. (1983). *Diffusion of Innovations* (4th ed., pp. 160–203). Free Press.

Rogers' Innovation Diffusion Theory (1962, 1995): Library & Information Science Book Chapter | IGI Global. (n.d.). Retrieved May 29, 2021, from <https://www.igi-global.com/chapter/rogers-innovation-diffusion-theory-1962-1995/127136>

- Ros, S., Hernandez, R., Caminero, A., Robles-Gómez, A., Barbero-García, I., Macia, A., & Holgado-Tello, F. (2014). On the use of extended TAM to assess students' acceptance and intent to use third-generation learning management systems. *British Journal of Educational Technology*, 46. <https://doi.org/10.1111/bjet.12199>
- Saade, R. G., & Al Sharhan, J. (2015). *Discovering the Motivations of Students When Using an Online Learning Tool*.
- Sánchez-Prieto, J., Olmos, S., & García-Peñalvo, F. (2016). *Do mobile technologies have a place in universities? The TAM model in higher education* (pp. 25–52). <https://doi.org/10.4018/978-1-5225-0256-2.ch002>
- Sangrà, A., Vlachopoulos, D., & Cabrera, N. (2012). Building an inclusive definition of e-learning: An approach to the conceptual framework. *The International Review of Research in Open and Distributed Learning*, 13(2), 145–159. <https://doi.org/10.19173/irrodl.v13i2.1161>
- Saroia, A. I., & Gao, S. (2019). Investigating university students' intention to use mobile learning management systems in Sweden. *Innovations in Education and Teaching International*, 56(5), 569–580. <https://doi.org/10.1080/14703297.2018.1557068>
- Selwyn, N. (2009). Faceworking: Exploring students' education-related use of Facebook. *Learning, Media and Technology*, 34(2), 157–174. <https://doi.org/10.1080/17439880902923622>
- Serenko, A. (2008). A model of user adoption of interface agents for email notification. *Interacting with Computers*, 20(4–5), 461–472. <https://doi.org/10.1016/j.intcom.2008.04.004>
- Setiawan, B., & Iasha, V. (2020). *Covid-19 pandemic: the influence of full-online learning for elementary school in rural areas*. 6(2), 10.

- Shen, D., Laffey, J., Lin, Y., & Huang, X. (2006). *Social Influence for Perceived Usefulness and Ease-of-Use of Course Delivery Systems*. 5.
- Siddiquei, N. L., & Khalid, D. R. (2018). The relationship between Personality Traits, Learning Styles and Academic Performance of E-Learners. *Open Praxis*, 10(3), 249.
<https://doi.org/10.5944/openpraxis.10.3.870>
- Simamora, R. M. (2020). The Challenges of Online Learning during the COVID-19 Pandemic: An Essay Analysis of Performing Arts Education Students. *Studies in Learning and Teaching*, 1(2), 86–103. <https://doi.org/10.46627/silet>
- Siron, Y., Wibowo, A., & Narmaditya, B. S. (2020). Factors affecting the adoption of e-learning in Indonesia: Lesson from Covid-19. *Journal of Technology and Science Education*, 10(2), 282.
<https://doi.org/10.3926/jotse.1025>
- Skylar, A. A. (2009). *A Comparison of Asynchronous Online Text-Based Lectures and Synchronous Interactive Web Conferencing Lectures*. 18(2), 16.
- Skylar, A. A., Higgins, K., Boone, R., Jones, P., Pierce, T., & Gelfer, J. (2005). Distance Education: An Exploration of Alternative Methods and Types of Instructional Media in Teacher Education. *Journal of Special Education Technology*, 20(3), 25–33.
<https://doi.org/10.1177/016264340502000303>
- Skype. (n.d.). Skype. Retrieved May 9, 2021, from <https://www.skype.com/en/>
- Stern, B., Royne, M., Stafford, T., & Bienstock, C. (2008). Consumer acceptance of online auctions: An extension and revision of the TAM. *Psychology and Marketing*, 25, 619–636.
<https://doi.org/10.1002/mar.20228>

- Students' Perception of Online Learning during COVID-19 Pandemic: A Case Study on the English Students of STKIP Pamane Talino | Soshum: Jurnal Sosial dan Humaniora.* (n.d.). Retrieved May 30, 2021, from <http://ojs.pnb.ac.id/index.php/SOSHUM/article/view/1316>
- Sukamolson, S. (2007). *Fundamentals of quantitative research*. Sukendro, S., Habibi, A., Khaeruddin, K., Indrayana, B., Syahrudin, S., Makadada, F. A., & Hakim, H. (2020). Using an extended Technology Acceptance Model to understand students' use of e-learning during Covid-19: Indonesian sport science education context. *Heliyon*, 6(11), e05410. <https://doi.org/10.1016/j.heliyon.2020.e05410>
- Sukkar, A. A., & Hasan, H. (2005). Toward a model for the acceptance of Internet banking in developing countries. *Information Technology for Development*, 11(4), 381–398. <https://doi.org/10.1002/itdj.20026>
- Syauqi, K., Munadi, S., & Triyono, M. B. (2020). Students' perceptions toward vocational education on online learning during the COVID-19 pandemic. *International Journal of Evaluation and Research in Education (IJERE)*, 9(4), 881. <https://doi.org/10.11591/ijere.v9i4.20766>
- Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. *Procedia Manufacturing*, 22, 960–967. <https://doi.org/10.1016/j.promfg.2018.03.137>
- Taherdoost, H. (2019). *Importance of Technology Acceptance Assessment for Successful Implementation and Development of New Technologies* (SSRN Scholarly Paper ID 3313984). Social Science Research Network. <https://papers.ssrn.com/abstract=3313984>
- Taherdoost, H., Sahibuddin, S., Ibrahim, S., Kalantari, A., Jalaliyoon, N., & Ameri, S. (2012). Examination of Electronic Service Definitions. In *Proceedings—2012 International Conference*

on *Advanced Computer Science Applications and Technologies, ACSAT 2012* (p. 77).

<https://doi.org/10.1109/ACSAT.2012.51>

Talukder, M. (2012). Factors affecting the adoption of technological innovation by individual employees: An Australian study. *Procedia - Social and Behavioral Sciences*, 40, 52–57.

<https://doi.org/10.1016/j.sbspro.2012.03.160>

Talukder, M., & Quazi, A. (2011). The Impact of Social Influence on Individuals' Adoption of Innovation. *Journal of Organizational Computing and Electronic Commerce*, 21(2), 111–135.

<https://doi.org/10.1080/10919392.2011.564483>

Tarhini, A., Hone, K., Liu, X., & Tarhini, T. (2017). Examining the moderating effect of individual-level cultural values on users' acceptance of E-learning in developing countries: A structural equation modeling of an extended technology acceptance model. *Interactive Learning Environments*, 25(3), 306–328.

<https://doi.org/10.1080/10494820.2015.1122635>

Taylor, S., & Todd, P. (1995a). Decomposition and crossover effects in the theory of planned behavior: A study of consumer adoption intentions. *International Journal of Research in Marketing*, 12(2), 137–155.

[https://doi.org/10.1016/0167-8116\(94\)00019-K](https://doi.org/10.1016/0167-8116(94)00019-K)

Taylor, S., & Todd, P. A. (1995b). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, 6(2), 144–176.

<https://doi.org/10.1287/isre.6.2.144>

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly*, 15(1), 125–143.

<https://doi.org/10.2307/249443>

UNESCO. (2020). *COVID-19 Educational Disruption and Response*.

<http://www.iiep.unesco.org/en/covid-19-educational-disruption-and-response-13363>

Van der Heijden, H. (2004). User Acceptance of Hedonic Information Systems. *MIS Quarterly*, 28(4), 695–704. <https://doi.org/10.2307/25148660>

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46(2), 186–204.
<https://doi.org/10.1287/mnsc.46.2.186.11926>

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27(3), 425–478.
<https://doi.org/10.2307/30036540>

Venkatesh, V., Speier, C., & Morris, M. (2002). User Acceptance Enablers in Individual Decision Making About Technology: Toward an Integrated Model. *Decision Sciences - DECISION SCI*, 33, 297–316. <https://doi.org/10.1111/j.1540-5915.2002.tb01646.x>

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly*, 36(1), 157–178. <https://doi.org/10.2307/41410412>

Vijayasarathy, L. (2004). Predicting consumer intentions to use on-line shopping: The case for an augmented technology acceptance model. *Information & Management*, 41, 747–762.
<https://doi.org/10.1016/j.im.2003.08.011>

- Vladova, G., Ullrich, A., Bender, B., & Gronau, N. (2021a). Students' Acceptance of Technology-Mediated Teaching – How It Was Influenced During the COVID-19 Pandemic in 2020: A Study From Germany. *Frontiers in Psychology, 12*. <https://doi.org/10.3389/fpsyg.2021.636086>
- Vo, M. H., Zhu, C., & Diep, A. (2020). *Students' performance in blended learning: Disciplinary difference and instructional design factors*. 7. <https://doi.org/10.1007/s40692-020-00164-7>
- Wahdain, E., & Ahmad, M. (2014). User Acceptance of Information Technology: Factors, Theories and Applications. *Journal of Information Systems Research and Innovation, 6*, 17–25.
- Walczuch, R., Lemmink, J., & Streukens, S. (2007). The effect of service employees' technology readiness on technology acceptance. *Information & Management, 44*(2), 206–215. <https://doi.org/10.1016/j.im.2006.12.005>
- Wang, T., Lin, C.-L., & Su, Y.-S. (2021). Continuance Intention of University Students and Online Learning during the COVID-19 Pandemic: A Modified Expectation Confirmation Model Perspective. *Sustainability, 13*(8), 4586. <https://doi.org/10.3390/su13084586>
- Warden, C. A., Stanworth, J. O., Ren, J. B., & Warden, A. R. (2013). Synchronous learning best practices: An action research study. *Computers & Education, 63*, 197–207. <https://doi.org/10.1016/j.compedu.2012.11.010>
- What Is Blackboard Learn? | Blackboard Help*. (n.d.). Retrieved May 10, 2021, from https://help.blackboard.com/Learn/Instructor/Getting_Started/What_Is_Blackboard_Learn
- WHO. (2020, October 13). *Impact of COVID-19 on people's livelihoods, their health and our food systems*. <https://www.who.int/news/item/13-10-2020-impact-of-covid-19-on-people's-livelihoods-their-health-and-our-food-systems>

- Wirtz, B. W., & Göttel, V. (2016). *Technology acceptance in social media: review, synthesis and directions for future empirical research*. 17(2), 19.
- World Health Organisation. (2020, March). *WHO Director-General's opening remarks at the media briefing on COVID-19—11 March 2020*. <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
- Wu, I.-L., & Chen, J.-L. (2005). An extension of Trust and TAM model with TPB in the initial adoption of on-line tax: An empirical study. *International Journal of Human-Computer Studies*, 62, 784–808. <https://doi.org/10.1016/j.ijhcs.2005.03.003>
- Youn, S., & McLeod, D. (2007). A Comparative Study for Email Classification. In K. Elleithy (Ed.), *Advances and Innovations in Systems, Computing Sciences and Software Engineering* (pp. 387–391). Springer Netherlands. https://doi.org/10.1007/978-1-4020-6264-3_67
- Yu, Z. (2021). The effects of gender, educational level, and personality on online learning outcomes during the COVID-19 pandemic. *International Journal of Educational Technology in Higher Education*, 18(1), 14. <https://doi.org/10.1186/s41239-021-00252-3>
- Yudiawan, A., Sunarso, B., Suharmoko, S., Sari, F., & Ahmadi, A. (2021). Successful online learning factors in COVID-19 era: Study of Islamic higher education in West Papua, Indonesia. *International Journal of Evaluation and Research in Education (IJERE)*, 10(1), 193. <https://doi.org/10.11591/ijere.v10i1.21036>
- Zeng, L. (2020a). Which Kind of Learning Form Do Students Want in China during COVID-19 Outbreak. *2020 The 4th International Conference on Education and Multimedia Technology*, 51–56. <https://doi.org/10.1145/3416797.3416811>

Zoom. (n.d.). Zoom for Education. *Zoom*. <https://zoom.us/education>

Zuo, M., Ma, Y., Hu, Y., & Luo, H. (2021). K-12 Students' Online Learning Experiences during COVID-19: Lessons from China. *Frontiers of Education in China*, 16(1), 1–30.
<https://doi.org/10.1007/s11516-021-0001-8>

Zuo, Y., Cheng, X., Bao, Y., & Zarifis, A. (2021). *Investigating user satisfaction of university online learning courses during the COVID-19 epidemic period*. Hawaii International Conference on System Sciences. <https://doi.org/10.24251/HICSS.2021.139>

Appendices – 1

Survey Questionnaire

User Attitude and Acceptance of Online Education during the COVID-19 pandemic in Invercargill

Kia Ora!!

My name is Preeti Agarwal and I am a student at the Southern Institute of Technology in Invercargill studying Master's Degree in Information Technology.

As part of my thesis, I am trying to analyse the learner's attitude and acceptance of online education using the Technology acceptance model. Especially, during this covid 19 pandemic, when, lockdowns and social distancing brought the physical education system to a complete halt and physical classrooms are being converted into digital ones lots of students are forced to adopt online education. Therefore, my research aims at studying the Learner's attitude and acceptance of online education to access their interest and comfort in using this technology and their behavioural intention towards it in the future.

This questionnaire is aimed at students who are taking up any kind of higher/tertiary education in Southland region of New Zealand. It will take about 15 to 20 minutes of your time, and your answers will remain confidential and anonymous.

These unprecedented times when the world is suffering from a global pandemic, online education is of utmost importance and how these online education systems can be improved more and more to suit the learner's need will always be a topic of research. This research with its well-defined methodology can make its way to fill the essential gap in the literature regarding the user attitude and acceptance of online education systems especially when it is forced upon the learners in these pandemic situations.

The results will be written and presented in a written thesis that is assessed as a part of my programme of study.

If you do complete the questionnaire, then you are agreeing for your answers to be used in the research project. The completed questionnaires will be stored in a locked filing cabinet for a period of 5 years, and then destroyed.

If you have any questions please contact my supervisor, Dr. Oras Baker, email ID-

[REDACTED]

This research has been approved by the Human Research Ethics Committee at SIT. If you have concerns about the ethical conduct of this research or the researchers, please write to the following:

The Secretary of the Human Research Ethics Committee
Southern Institute of Technology
133 Tay St
INVERCARGILL 9840 NZ
Tel: 03 211 2699

I want to thank you and your organisation for your participation in this questionnaire and I look forward to reading your views.

Preeti Agarwal

***Required**

Questionnaire

1. Please enter your current location *

South Island

USer profile (section 1)

2. Which gender you identify with

Female

Male

Gender Diverse

Prefer not to say

Other:

3. Please select the correct age group which represents your age.

18-20 years

21-30 years

31-40 years

41-50 years

51 or older

4. Please select your highest Educational Qualification?

Phd

Post Graduation

Graduation

Undergraduate

Other:

5. What kind of online education have you taken ? (Select all that apply)

My school/college used to have some online classes

I did some online courses from some educational websites.

I did some courses at my job

I watch educational videos for study purposes

None

Other:

6. How much time do you spend using the internet per day for educational purposes?

Between 1-3 hours

Less than 1 hour

More than 3 hours

7. What educational qualification are you currently pursuing ?

Phd.

Post Graduation

Graduation

Undergraduate

Other:

Acceptance of Online learning (Section 2)

8. How do you find online Learning

Very easy

Easy

Neither Easy nor Difficult

Difficult

Very Difficult

9. Your interaction with online learning systems is clear and understandable.

Strongly agree

Agree

Neutral

Disagree

Strongly Disagree

10. Online education platforms are Predictable and easy to use

Strongly agree

Agree

Neutral

Disagree

Strongly Disagree

11. It is difficult to understand online learning without getting acquainted with appropriate guidance.

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

12. How easy is it to find the courses/material that you need to learn in online education system.

Very Easy
Easy
Neither Easy or Difficult
Difficult
Very Difficult

13. Online classes enables to take a subject/course of my choice without the compulsion of any prior knowledge about it.

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

14. Online learning can give me the same quality of knowledge and skills as face to face learning.

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

15. Online classes gives me the better understanding of the subject I choose.

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

16. Online classes have improved my retention power of the subjects I study

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

17. Online learning is economic in terms of time for students and teachers.

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree
Other:

18. Online education is more economical/pocket friendly than traditional education.

Strongly agree

Agree

Neutral

Disagree

Strongly Disagree

19. Online courses are flexible and can be done multiple times to attain more control over the subject

Strongly agree

Agree

Neutral

Disagree

Strongly Disagree

20. Quality of teaching and learning can be increased through Online learning because it integrates various types of media.

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

Other:

21. It's more fun to study on computer/mobile/tablets instead of books and other conventional methods of learning.

Strongly agree

Agree

Neutral

Disagree

Strongly Disagree

22. I enjoy the videos/ Graphics used to teach in online courses.

Strongly agree

Agree

Neutral

Disagree

Strongly Disagree

23. I enjoy the non competitive environment provided by online teaching

Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

24. I enjoy attending Virtual classes more than attending physical classrooms

Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

25. I feel positive about using online learning to further my skills and knowledge?

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

26. I feel confident as I fully understand the content that is taught during online classes

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

27. I feel the course content in online education is Trustworthy

Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

28. I feel Online learning improves my course performance

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

29. I feel online learning enhances my productivity by strengthening my educational concepts.

Strongly Agree
Agree

Neutral
Disagree
Strongly Disagree

30. I'm fully satisfatied by the freedom I get to the course/ subject of study in online education

Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

31. Im fully satisfatied by the freedom I get to the choose my time and place of study in online education

Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

32. Im fully satisfatied by the quality of education I get in online education.

Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

33. Im fully satisfied by the overall interaction I have with the online education

Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

34. Do you intend to continue online education in future.

Yes
No
Maybe
Other:

35. Do you recommend online learning to your family and friends.

Yes
No

Maybe

Other:

36. Do you feel the urge to participate in more online learning activities.

Yes

No

Maybe

Other:

Learning during Covid-19 (Section 3)

37. Did you shift to online education anytime during the covid 19 pandemic ?

Yes

No

Maybe

38. Please select the difficulties faced by you in setting up your online education during covid 19 pandemic (Select all that apply)

Improper/absence of tech/equipment required

Absence of internet

Slow connectivity of internet

Internet coverage in your area

Financial obligations involved in buying tech or internet

Atmosphere at your house is not study friendly

Lot of distractions

Power consumption

Insufficient knowledge of handling tech required

Insufficient knowledge of online education systems

None of the above

All of the above

Other:

39. Online learning helped me in saving my education during covid 19 pandemic.

Yes

No

May be

Other:

40. I liked the Safety and secure environment online courses provided during pandemic without hampering our ongoing studies.

Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

41. Online classes proved to be very useful during Covid

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

42. In case you were made to shift to online education during pandemic, do you wish to continue it even after Pandemic ends.

Yes
No
Maybe
Other:

43. Did Online learning systems fully satisfied your personal learning needs (during Covid-19)? How?

Personalised Online learning (Section 4)

44. Online courses should be broad enough to accommodate more students with different personalities.

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

45. Learners' personality types should be identified using standardised personality tests before joining any online learning system.

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

46. Online courses should incorporate an adaptive learning model, in order to best match courses with a learner's personality types.

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

47. Online classes should gives more freedom to choose the learning style which suits my personality the most (for eg. Audio, visual, etc.)

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

48. I feel the need for customized online learning experience

Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

Thank you very much for your contribution to this research.