ATTITUDE OF STUDENT TEACHERS TOWARDS ONLINE EDUCATION

BY

V.SINDHIYA

REG.NO. 19PED003

UNDER THE GUIDANCE OF

Dr. INDU.H

A THESIS SUBMITTED TO THE

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN,

COIMBATORE- 641043.

IN PARTIAL FULFILLMENT OF THE REQUIRMENTS FOR THE DEGREE OF MASTER OF EDUCATION

JUNE 2021

CERTIFICATE

ATTITUDE OF STUDENT TEACHERS TOWARDS ONLINE EDUCATION

BY

V.SINDHIYA

REG.NO. 19PED003

UNDER THE GUIDANCE OF

Dr. INDU.H

A THESIS SUBMITTED TO THE

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN,

COIMBATORE- 641043.

IN PARTIAL FULFILLMENT OF THE REQUIRMENTS FOR THE DEGREE OF MASTER OF EDUCATION

JUNE 2021

CERTIFIED AS BONAFIDE RESEARCH WORK

SIGNATURE OF THE HEAD OF THE DEPARTMENT

SIGNATURE OF THE GUIDE

DECLARATION

I hereby declare that the matter embodied in the thesis entitled "**ATTITUDE OF STUDENT TEACHERS TOWARDS ONLINE EDUCATION"** is the result of investigation carried out by me in the Department of Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, under the supervision and guidance of Dr. Indu H., Associate Professor, Department of Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore and it has not been submitted for the award of any Degree/ Diploma/ Fellowship of any other University or Institute.

SIGNATURE OF THE HEAD OF THE DEPARTMENT

SIGNATURE OF THEGUIDE

ACKNOWLEDGEMENT

I am obliged much to express my sense of gratitude to the **LORD ALMIGHTY** who has been blessing me.

I would like to place my reverential gratitude to **T.S.AVINASHILINGAM AYYA**, the **founder** and the **First Chancellor** of this esteemed university and Hon. Colonel **RAJAMMAL.P.DEVADAS**, **Former Chancellor**, Avinashilingam University for providing the opportunity and exposure to the world of knowledge.

It is with great pleasure that I record my deep sense of gratitude and indebtedness to **PROF. S.P. THYAGARAJAN**, **Chancellor,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for all amenities provided for this investigation.

I express my boundless gratitude to **Dr. PREMAVATHY VIJAYAN, Vice Chancellor,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for providing all facilities necessary for the study.

I am obligated much to express my sincere thanks to **Dr. S. KOWSALYA, Registrar,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for the constant encouragement and the facilities provided to me by the institution.

I owe my noble indebtedness to the **Dr. T GEETHA**, **Dean, School of Education,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for her constructive criticism, enlightened guidance and support in organizing the study smoothly.

I express my gratitude to **Mrs. S.S. MANIMOZHI**, **Head, Department of Education,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for providing necessary facilities during the conduct of the study.

It is my privilege to express my grateful thanks and sincere appreciations to my respected guided**. Dr. INDU.H** , **Associate Professor , Department of Education**, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for her unflinching and dynamic guidance, heartfelt inspiration, motivation, untiring enthusiasm, undaunted

encouragement, meticulous corrections and comments, valuable suggestions and timely help at each step throughout the process of research which were instrumental in the successful completions of the study.

I express my gratitude to all the staff members of Department of Education and the Librarian of our Department Dr.Mahalakshmi, who gave me all the support and courage to complete the study.

CONTENT

LIST OF TABLE

LIST OF FIGURES

CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION:

Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, morals, beliefs, and habits. Educational methods include teaching, training, storytelling, discussion and directed research. Education frequently takes place under the guidance of educators, however learners can also educate themselves. Education can take place in formal or informal settings and any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational.

Education is the combination of teaching, learning and evaluation. The teaching – learning process can happen in different ways and different modes.

1.2 Modes of Learnings:

There are two basic modes of learning:

1.2.1. Face to Face Learning

1.2.2. Online Learning

Other forms of learning are perhaps the combinations of these two modes of learning.

1.2.1 Face to Face Learning:

F**ace-to-face learning** is an instructional method where course content and learning material are taught in person to a group of students. This allows for a live interaction between a learner and an instructor. It is the most traditional type of teaching-learning process. Learners benefit from a greater level of interaction with their fellow students as well. In face-to-face

learning, students are held accountable for their progress at the class's specific meeting date and time. Face-to-face learning ensures a better understanding and recollection of lesson content and gives class members a chance to bond with one another.

Traditional face-to-face learning is essentially a teacher-centered method of education, and tends to vary widely among cultures. Many modern education systems have largely shifted away from traditional face-to-face forms of educational instruction, in favor of individual students' needs.

1.2.2 Online Learning:

Online learning refers to taking courses online instead of in a physical classroom. With online learning, we can:

- earn a certificate or diploma without setting foot in a physical classroom
- work full-time while we study
- set our own schedule: study in the early morning, during lunch break, or even in the middle of the night
- interact with students from across the world
- get a quality education from different institutions

Online Learning in India:

Online education in India has come a long way with the development of technology. India is one of the nations that is developing at an exponential rate in terms of technology. With the population of more than 1.3 billion, the availability of high-speed internet and smartphones, India has the most number of technologically driven persons. The rise of the internet has changed the way of life in India. People like to do everything online, they shop online, do business online, make friends online and learn online. While Commerce being the most significant online industry, online education and learning stand right next to it. With the ever-increasing information available on the internet and the countless number of online courses many people in India prefer to learn online.

By seeing the potential and immense popularity of digital technology in India, Our Honorable Prime Minister has envisioned transforming our nation and creating opportunities for all citizens by harnessing digital technologies through digital India initiative. The initiative comprises of various projects in various areas relating to health, education, labor, employment etc. As a part of Digital India project, many colleges and universities offer online correspondence courses. Now let's go through some of the interesting facts about online education in India.

1.2.2.1 Resources for Online Learning

In general, when taking an online degree program we might encounter resources like:

- EBooks;
- Journals;
- Videos;
- Recorded lectures;
- Quizzes;
- Discussion forums
- Live Q&A sessions; and
- Interviews.

The resources offered for learning online will depend on the institution where one takes an online program. Some online learning programs may require us to order physical textbooks in advance by in the mail, but these are generally being phased out in favour of eBooks and online-only methods of delivery.

For those institutions that have made the transition to using 100% online resources, students can expect to study using a combination of cutting-edge technological resources with no need to travel to attend lectures, exams or in-person discussion sessions.

Taking an online learning program, one will be an officially registered student in an institution and have access to the same resources as an on-campus student, like the institution's

digital library, learning management system (like Blackboard), student union membership and more. An online degree is similar to taking a degree program on campus, but we have the freedom to direct our own study schedule.

The institution and the course instructor will determine the format for each individual course and will select delivery methods that are best suited to the course or program as the needs amy differ based on the subject.

Online resources

- eBooks, textbooks & journals

These written materials are essential resources in almost every course we take when learning online. Using the reading list for each course, or on the advice of the course instructor, we will need to dedicate the amount of time we need for reading and understanding the topics in the literature. The main advantage of using this medium (particularly eBooks) is the fact that they are completely portable, allowing one to study on the go from our computer, phone or tablet.

- Recorded lectures

An essential way of absorbing a large amount of information in a relatively short amount of time, lectures are a staple of online and campus-based learning. With online learning, we can attend lectures from our own home.

- Interactive sessions

The greatest challenge an online education provider faces is how to replicate the face-to-face interaction and in-person discussions that on-campus institutions can easily provide. The solution for this is - Online degree programs often use a combination of discussion forums and interactive

question-and-answer sessions to facilitate the interaction with other students and with the instructors.

1.2.2.2 The 5 steps in the online learning development process.

1. Identify the building blocks of your course.
2. Outline sections that each have a distinct learning objective.
3. Pick your media, delivery format, and tone.
4. Storyboard or script how you're going to transfer your knowledge.

a. Craft a narrative flow for your content.

b. Apply multimedia principles for managing cognitive load.

c. If you are using video, follow filming guidelines for rapid video development.

d. Provide ways for learners to practice in new contexts.

e. Provide opportunities for interaction with the expert.

f. Check on the progress of your learners by performing regular knowledge checks.

g. Promote community by encouraging students to give feedback to each other.

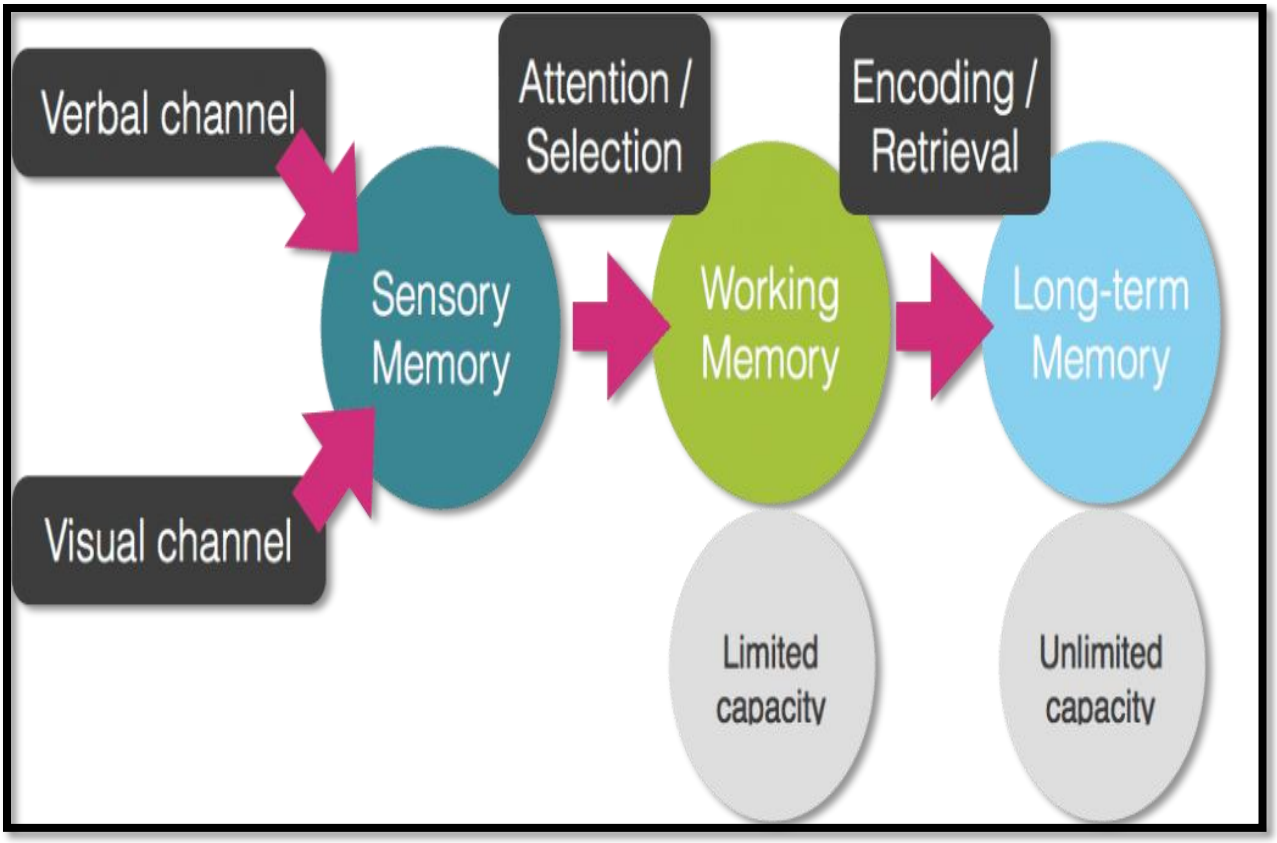
5. Consider how you will reinforce learning after the course.

1.2.2.3 **Differences in perception of the learner towards in-person and online learning.**

There are a few fundamental differences, from the perspective of the learner, between consuming content in-person versus online. This need to be considered carefully before going about creating a great online learning course.

Cognitive Load:

Perhaps the most important area of research to refresh ourselves on is how the human mind processes information. There are three states of memory that we need to consider: sensory memory, working memory, and long-term memory.



Our goal, of course, is to embed knowledge in the long-term memory of our learners, for that we need to keep in mind three things. They are the concepts of dual-channel, limited capacity, and active processing.

- Dual-channel – we have separate channels for processing verbal and visual information.
- Limited capacity – there is only a limited amount of processing capacity available in the verbal and visual channels (working memory).
- Active processing – learning requires the use of both verbal and visual channels to pay attention to presented material, organize it into a structure that makes sense, and integrate it with prior knowledge.

The key is that in a virtual setting, visual and verbal information is originating from the same source: the computer. There is no presenter walking around a room, no flipchart or slideshow to

look at as a break from the presenter. There are no participant questions randomly asked out loud. There is simply one source of information, which is coming to us in both a visual and verbal form, and there is distraction.

Attention

How do we overcome the limited capacity of working memory? The digital content competes with every other piece of digital content out there, from Facebook posts, to YouTube videos, to Instagram images, to tweets.

First, we need to capture the learner's attention. This is essential to be able to stimulate active processing. The most effective way to do this is to connect with someone on an emotional level.

Video has a powerful quality to tap into emotion. The combination of images, music, and sounds can elevate any written text or spoken word into a potent concoction that captivates emotion.

Emotion shapes the information we receive in that when our emotions are aroused, our attention is heightened. Attention is one of the most valuable commodities we possess. With all the competing distractions, as a good teacher we must spend time thinking about how to capture and hold the attention of our learners.

Motivation

Emotional connection produces motivation. For learners to become and remain motivated, digital instruction needs to satisfy four conditions. It must:

- capture and maintain attention,
- hold relevance,
- promote confidence, and
- Deliver satisfaction.

Knowing the prior knowledge levels of our audience will help us keep our content relevant. Promote confidence by including knowledge checks and opportunities for feedback throughout.

And by using entertainment as well as education, we can produce a more satisfying learning experience.

Engagement

Motivated learners engage more with content, finish courses in less time and retain more of the knowledge after the course. Everything from working through problem-solving scenarios, to participating in a facilitated discussion, to pausing and replaying sections of videos helps promote active learning.

1.2.2.4 **Reasons Why Online Learning is the Future of Education:**

The concept of traditional education has changed radically within the last couple of years. Being physically present in a classroom is not the only learning option anymore — not with the rise of the internet and new technologies, at least. Nowadays, we have access to a quality education whenever and wherever we want, as long as we have access to a computer. We are now entering a new era — the revolution of online education.

- **It is flexible.**

Online education enables the teacher and the student to set their own learning pace, and there's the added flexibility of setting a schedule that fits everyone's agenda. As a result, using an online educational platform allows for a better balance of work and studies, so there's no need to give anything up. Studying online teaches you vital time management skills, which makes finding a good work-study balance easier. Having a common agenda between the student and teacher can also prompt both of them to accept new responsibilities and have more autonomy.

- **It offers a wide selection of programs.**

In a space as vast and wide as the internet, there are infinite skills and subjects to teach and learn. A growing number of universities and higher education schools are offering online versions of their programs for various levels and disciplines. From music composition to quantum physics, there are options for every type of student. Studying our program online is also a great option for getting an official certificate, diploma, or degree without going to an institution in-person.

- **Accessibility of Time and Place**

Another advantage of online education is that it allows students to attend classes from any location of their choice. It also allows schools to reach out to a more extensive network of students, instead of being restricted by geographical boundaries. Additionally, online lectures can be recorded, archived, and shared for future reference. This allows students to access the learning material at a time of their comfort. By eliminating logistics like flights, accommodation, meeting space, and presentation technology, we can reach way more people with just a computer and a Zoom or Google meet or Webex or Teams account. Anyone, anywhere in the world, can log in to watch and participate in the learning experience. Thus, online learning offers students the accessibility of time and place in education.

- **It allows for a customized learning experience.**

The flexibility in online education can help us to set our own study pace. But online education is also flexible for each student's individual requirements and level of ability. Online classes tend to be smaller than conventional class size. Most of the time, online learning platforms only allow one student at a time, and in almost all cases, this allows for greater interaction and more feedback between the learner and the tutor. There is often access to very diverse material such as videos, photos, and eBooks online as well, and tutors can also integrate other formats like forums or discussions to improve their lessons. And this extra content is

available at any moment from anywhere, which will offer a more dynamic and tailor-made education.

- **Affordability**

Another advantage of online learning is reduced financial costs. Online education is far more affordable as compared to physical learning. This is because online learning eliminates the cost points of student transportation, student meals and the like. Additionally, all the course or study materials are available online, thus creating a paperless learning environment which is more affordable, while also being beneficial to the environment. **. It's more cost-effective than traditional education.**

- **Efficiency**

Online learning offers teachers an efficient way to deliver lessons to students. Online learning has a number of tools such as videos, PDFs, podcasts, and teachers can use all these tools as part of their lesson plans. By extending the lesson plan beyond traditional textbooks to include online resources, teachers are able to become more efficient educators.

- **Improved Student Attendance**

Since online classes can be taken from home or location of choice, there are fewer chances of students missing out on lessons.

- **Suits a variety of Learning Styles**

Every student has a different learning journey and a different learning style. Some students are visual learners, while some students prefer to learn through audio. Similarly, some students thrive in the classroom, and other students are solo learners who get distracted by large groups. The online learning system, with its range of options and resources, can be personalized in many ways. It is the best way to create a perfect learning environment suited to the needs of each student.

1.3 Scope of the Study

The pandemic Covid-19 has prompted all educational institutions around the globe to relocate traditional classes to online classes. Schools and Higher education institutions are compelled to use the online teaching learning process. Avinashilingam Institute for Home Science and Higher Education was no exception. The institution already had taken initiatives for online learning through MOOCs, SWAYAM platform but were not made compulsory to all students in learning all courses. Due to the pandemic, all the students of the institution were compelled to use online platforms that the institute provided, such as G-Suite to resume their studies. This made the investigator to undertake a study to find out the attitude of student teachers towards Online teaching and learning.

1.4 Statement of the Problem:

The present investigation is entitled as "**Attitude of Student Teachers towards Online Education"** and the key terms are explained**.**

1.4.1 Definition of the Key Terms:

1.4.1.1 Attitude

In psychology, attitude refers to a set of emotions, beliefs, and behaviors toward a particular object, person, thing, or event. Attitudes are often the result of experience or upbringing, and they can have a powerful influence over behavior. While attitudes are enduring, they can also change. In this study attitude refers to the student teachers notion or mental readiness for learning through online mode.

1.4.1.2 Student teachers

Student teacher refers to a college or university student who is pursuing their graduation in education Programme, teaching under the supervision of teacher educators in order to qualify for a degree in education. The degree given to them after completion of their Programme is B.Ed.

1.4.1.3 Online Education

Online education is electronically supported teaching- learning process that depends on the Internet for teacher-student interaction and the distribution of class materials.

1.5 Objectives of the Study

- To compare the difference in the attitude of student teachers towards online teaching based on their age, year of study, locality, and subject specialization.
- To compare the difference in the attitude of student teachers towards online teaching based on availability of computers, gadgets used for online class and the gadget they feel comfortable to use in online teaching –learning process.
- To compare the difference in attitude of student teachers who have undergone other online courses than the regular class taught through online.

1.6 Hypothesis of the study

- There is no significant difference in the attitude of student teachers towards online teaching based on their age, year of study, locality, and subject specialization
- There is no significant difference in the attitude of student teachers based on availability of computers, gadgets used for online class and the gadget they feel comfortable to use in online teaching –learning process
- There is no significant difference of student teachers possess of gadgets used for online class.
- There is no significant difference in the attitude of student teachers who have undergone online classes other than regular class and who have not undergone other online classes.

1.7 Limitations of the Study

The present study is confined to Coimbatore city of Tamil Nadu only. The sample is selected from B.Ed. Programme students from Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamilnadu. Attitude of the student teachers' towards online teaching learning in pandemic (COVID 19) are considered for the investigation.

1.8 Organisation of the Study

This study is organized in five chapters. The chapters are

Chapter 1: Introduction- This chapter gives an introduction on online learning, scope of the study, statement of the problem, definition of key terms, objectives of the study, hypothesis of the study and limitation of the study.

Chapter 2: Review of related literature – This chapter provide more knowledge about the online learning, face to face learning and comparison of face to face and online learning. This chapter provides in-depth knowledge of online teaching and learning process and the related studies conducted in different parts of the world.

Chapter 3: Methodology- This chapter deals with the method of the study, locale of the study, sample selection, tools used for this study, conduct of the study, scoring process and data analysis procedure.

Chapter 4: Result and discussion- This chapter explain the result of the study and briefly discuss the results obtained.

Chapter 5: Summary and conclusion- This chapter deals with the findings of the study, recommendation of the study and suggestion for future research.

CHAPTER-2

REVIEW OF RELATED LITERATURE

Introduction

According to Best (2008), "A summary of previous research provides evidence that the researcher is familiar with what is already known and what is still unknown and untested. This helps to eliminate duplication of what has been done and provides useful hypotheses and helpful suggestions for significant investigations."

The purpose of review of literature here is to determine what has already been done under research and to study the suggestions provided by earlier researchers for further research to avoid the duplications. It is extremely important part of any research as it helps to understand what other researchers have already done and what other researchers are doing contemporarily. Further, it provided the knowledge about the areas to be studied and need of further studies.

2.1 Theoretical Framework on Online Education

2.1.1 A glimpse of Education system in India

Systematic and organized education has its roots to the ancient days in the subcontinent. Take a thorough study of the different periods and we can trace the way that lead to education in modern day India. This section briefly presents education as it was during the different ages in India. The ages has been categorized into ancient, medieval and modern India.

Introduction to Ancient System of Education

Face to face education is an extension of the ancient system of learning. In ancient times before the British rule, one of the systems of learning which was followed was of Gurukula System. The major part of South Asia followed this system of learning.

Gurukula System

No education can be completed successfully without any well-defined aim. Gurukulaa system of learning also was based on certain pre-defined aims around which the whole learning was focused. One of the main aims of Guru Kula was to develop knowledge. They focused on how to achieve discipline. Gurukula system also focused on understanding and nurturing the culture of the society and aimed at growing its root deeper in minds and hearts of the society members. They not only wanted to nurture it but wanted the students to follow it and pass it on to the next generation by sharing their experiences and knowledge. Another important aim of this type of education was to gain wisdom. Since wisdom is the sole thing which separates us and makes us higher and better species compared with other species. Wisdom helps us to make a decision of what is wrong and right. It provides us a sense of discrimination and understanding between good and bad.

Gurukula existed from a really long time. It exists from the Vedic age. One of the key features to note is that students were divided into various categories, for example, Students who gained education up to the age of twenty four (24) were categorized as ‘Vasu’. Similarly those who gained education up to the age of 36 were categorized by ‘Rudra’ and those obtaining education up to the age of 48 were ‘Aaditya’.

Gurukula system was very popular type of school in India. This included students who were known as Shishya. Teachers were called Gurus and relationship which was shared by Guru and Shishya was termed as Parampara. Gurukula means only an extended family of guru. It is combination of the word teacher or master which is called ‘Guru’ in Sanskrit and Extended family which is called ‘Kula’ in Sanskrit. The reason for it being termed like that is because a

Guru does not discriminate between any of its student while imparting knowledge and providing education to any of its students. Every student is treated equally and sheer aim was to provide every Shishya a platform to understand the true value of life and knowledge of how to live their life in true sense.

Medieval Education

During the eighth century Anno Domini (A.D) a huge number of Mohammadian invaded India. Mahmud Ghazni captured India and set up a large number of schools and libraries in the country by the looted wealth. Later Muslim leaders established their permanent empire in India, they brought a new system of education. The ancient education system was drastically changed. The Arabs and the Turks bought some new cultures, traditions, and institutions in India, in that the most remarkable change was the Islamic pattern of education which was different from the Buddhist and Brahmanic education system. The medieval age, education system primarily focused on the Islamic and Mughal System.

Modern Education

In the middle of the medieval age, the British invaded India and started to capture it. The modern education was introduced during the British Empire. In the 1830s Lord Thomas Macaulay introduced the English language. The subjects and the syllabus were limited to some extent, the main aim of modern education of the British was to spread Christianity. As time passed education started to develop and entered into the modern era that is in the twenty-first century, the era of science, technology, and innovations. The objective of modern education was to inculcate values in students such as equality, secularism, education for all, and environmental protection. The student-teacher relations remained the same as it was in ancient and medieval, but students did not live in the teacher's house. As technology is increasing day by day, the education sector is also following the trend of technology by teaching the students through online lectures and Massive Open Online Course (MOOC).

2.1.2 History of Online Education

The 21st century has brought about a massive change in the world of education. Gone are those days when teaching was limited only within the confined walls of a classroom. The internet has brought about a paradigm shift in the fundamental way in which learning is done. It has taken learning beyond the hallowed walls of the universities and into the palms of everyone.

The online teaching in India has got a long history with broadcasting space provided by the All India Radio and the Doordarshan for telecasting recorded educational programmes for not only higher education but also for school-going children. Though many educational agencies including UGC, IGNOU and NCERT using the services provided by All India Radio and Doordarshan still there was a need for interaction from the learners to be fulfilled since all these broadcasting was in recorded form.

In 1994 there was a paradigm shift as the ISRO provided the teleconferencing facility at IGNOU headquarter in New Delhi for the first time. It was a one-way video and two-way audio communication through phone line providing scope of live interaction for the learners. The teleconferencing facility was a booster for a large number of online courses like management studies, computer science and especially for teachers training in India. For several years a large number of educational institutions and various government and private organizations were utilizing the service of teleconferencing provided by ISRO at IGNOU headquarter. In the year 2000, the teleconferencing got the recognition as an official education channel under the Gyandarshan platform. Along with other channels of Gyandarshan it was then made available in the DTH as GD-interactive channel.

There was still the need for two way video communication to be fulfilled. In 2005 an effort was made by ISRO in collaboration with MHRD and IGNOU in this regard with the launching of EDUSAT satellite designed by late APJ Abdul Kalam during his tenure as President of India. Despite all efforts, EDUSAT could not fulfil the need as expected as the communication technology still to be developed to support such an initiative. In 2020 one may find it very easy today. But it is a fact that even 15 years back from today it was a big challenge to establish a two-way video communication between one to many.

Today in 2020 both the teachers and learners must be fortunate to have so many apps developed for two way communication even in mobile. Now the challenge is not with technology but with ideas that how to make the online teaching more useful.

2.1.3 Government Initiatives for Digital Education in India

Information Technology has become an integral part of our day to day life. And with the recent Telecom wars in India, the Internet has got a lot more accessible to the common people of India. The number of people using the internet has significantly increased over the years. Over the years, Letters are replaced by emails and SMS and other messaging services which have led to a decline in people writing letters and have reduced the work of the postman who used to deliver letters.

a) Pradhan MantriGramin Digital SakshartaAbhiyaan

Due to most of India's population resides in the rural areas access to technology is not very high due to which digital literacy rate of India is low. To tackle the problem of low digital literacy rate Pradhan Mantri Gramin Digital Saksharta Abhiyaan was launched. Pradhan Mantri Gramin Digital Saksharta Abhiyaan is an initiative taken by Government of India to spread digital literacy to at least one person per household in the rural areas. The initiative is to empower the citizens in rural areas by providing training to operate a computer or a digital device for sending and receiving e-mails, browsing the Internet, accessing Government services, searching for information, digital payments etc. The initiative aims to bridge the digital gap by specifically targeting the rural households including the marginalized sections of society like the Scheduled Castes / Scheduled Tribes, Minorities, Below Poverty Line, women and differently-abled persons and minorities. Training is available free of cost and one can register to the nearest training center. Each household can nominate one member of the family and the selected family member will get the training.

b) SWAYAM

SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds) is an initiative under the Digital India Campaign which aims at providing free education to individuals over the internet. SWAYAM platform is developed and maintained by Ministry of Human Resource Development and All India Council for Technical Education. SWAYAM offers School, Out-of-School, Under-Graduation and Post Graduation Education. Courses offered through SWAYAM platform are available free for Indian students. However, students wanting to be certified should be registered and a certificate will be offered after successful completion of the course, with a minimum processing fee. All the courses are prepared by the faculties from various institutes like Indian Institute of Technology - Mumbai, Madras, Kanpur, Delhi and Indian Institute of Management -Bangalore, etc. SWAYAM app is available to download for free on Google Play Store on Android and Apple App Store on iOS (Internet Operating System).

c) E-Pathshala:

E-Pathshala is an initiative by the Government of India. E-Pathshala is a platform which provides free access to all educational e-resources which include e-textbooks, audio, video, periodicals and a variety of content through their website. E-Pathshala platform is developed and maintained by National Council of Educational Research and Training.

E-Pathshala platform is very easy to use and navigate and has a Mobile Friendly app. Students, teachers, educators, and parents can access e-books through multiple technology platforms i.e. mobile phones, and tablets and on the web through laptops and desktops. E-Pathshala app is available to download for free on Google Play Store on Android and Apple App Store on iOS.

d) Online Labs

Online labs are an initiative taken by Amrita Center for Research in Advanced Technologies for Education. Online labs are based on an idea that experiments can be taught over the internet. The website is developed and maintained by Amrita Center for Research in

Advanced Technologies for Education and the website is funded by Ministry of Electronics and Information Technology. Online labs host experiments on various topics such as Chemical, Physical and Biological Sciences for the students studying in Standard 9 up to Standard 12. Online labs are a platform with content which is interactive and the curriculum is aligned with to National Council of Educational Research and Training / State and CBSE Board Syllabus. Online labs is free to use and accessible to everyone on registration. Online lab is a platform which is meant to provide a great learning experience and just looking at content and animations.

e) Shaala Darpan KendriyaVidyalayas

Shaala Darpan KendriyaVidyalayasis one of the largest chain of schools in the world with more than 1000 schools throughout the country and has 3 schools abroad. Shaala Darpan is an online platform for all Kendriya Vidyalayas which provide e-Governance services to all Kendriya Vidyalayas in India. The main aim of Shaala Darpan is to improve efficiency in school administration, improve the quality of learning, governance of schools for its various stakeholders such as students, teachers, community, parents and schools. Shaala Darpan is hosted by National Informaics Center.

f) Pradhan Mantri Kaushal Vikas Yojana

Pradhan Mantri Kaushal Vikas Yojana is the initiative taken by the Ministry of Skill Development & Entrepreneurship. The objective of Pradhan Mantri Kaushal VikasYojana is to enable Indian youth to learn an industry-relevant skill that will help individuals to improve their standard of living. Training and assessment fee for the courses are completely paid by the government. This initiative has many Skill training centers throughout the country and offers a variety of skill development courses in various fields like Agriculture, Information Technology Enabled Services, Logistics, etc.

2.2 Review of Related Studies

An attempt had been made to review the related studies conducted in Online learning and face to face and online learning.

2.2.1 Studies related to Online Learning

Harasim (2000) presented a paper titled 'Shift happens: Online Education as a new Paradigm in Learning'. The researcher addresses that paradigmatic shift. It begins by presenting an overview of the history of online education as a context and framework for understanding the state of the art today, especially the use of network technologies for collaborative learning in post-secondary education. Beginning with the innovations of early pioneers as contributing to the paradigmatic shift, it provides a framework for understanding this new field. The article then focuses on the Virtual-U, a Web-based environment especially customized to support advanced educational practices. The Virtual-U research team hosts the largest field trials in post-secondary education in the world with empirical results and insights generated fromover 439 courses taught by 250 faculty to 15,000 students, attesting to what works in online education.

Ibrahim, DaudSilong and Samah (2002)investigated "Readiness and attitude towards online learning among virtual students". In this survey the researcher took 139 students in undergraduate programs from the faculties of Business Administration, Information Technology and Social Science and Humanities in Universiti Tun Adbul Razak (UNITAR) as sample. The researcher used survey method for data collection. The investigators created a questionnaire tool, consisting of three major sections, items related to personal characteristics, items related to attitude and items related to readiness. The study concluded that majority of the students had positive and moderate positive attitude towards online learning.

Joerns, and Leinhardt (2006) studied "Online Education on the topic 'Going the Distance With Online Education". The researcher's charts the promissory notes and concerns related to college level online education as reflected in the educational literature. It is argued that, to appreciate the potential and limitations of online education, we need to trace the issues that bind online

education with distance education. The investigators review the history of distance education through the lenses of three historical themes—democratization, liberal education, and educational quality—and charts the current scene of online education in terms of three educational visions that may inform the development of online initiatives: the presentational view, the performance-tutoring view, and the epistemic-engagement view. The study emphasizes the potential contributions of online education to democratization and the advancement of the scholarship of teaching.

Altun (2007) conducted an investigation to see the 6th, 7th and 8th graders' attitudes towards online homework assignment sites(OHS).The author used general survey design in this study.The researcher selected a total of 737 students in a primary school in a city located in Aegean region of Turkey. The distribution of participants according to their grades and gender is close to each other and the participants ranged in age from 11 to 15. The researcher used "Attitudes towards Online Homework Sites Scale" developed by Arıkan and Altun (2007) in the study. The researcher found that 70% of students had positive attitudes towards OHS. Males tend to use OHS more effectively and practically than females. The differences between the states of utilizing OHS, grades, and age, had an effect on the attitudes towards OHS. Finally, the researcher found the use of internet and OHS frequency to have positive impact on students' attitudes.

Kuo and Song (2007) compared the "effectiveness of Online and Face to Face technology applications skills in Teacher Education". The researcher selected a sample of 62 undergraduate students. The survey method was followed for research where difference between achievement scores of students learning through face to face mode and technology assisted learning mode was compared. In this study 27 students were enrolled in the online technology applications class and the other 35 students were enrolled in the equivalent face to face class. The researcher found that there was no significant difference between the online and face to face classes in terms of students' attitudes toward technology.

Uzunboylu (2007) conducted a study on "Teacher attitudes towards online education following an online in-service program". The investigators selected a sample of 74 teachers male=37, female=37 attended a 6 hour in-service training program organized by the Ministry of Education and culture. The researcher used Attitude towards Online Learning scale for data collection. The researcher found that there is a significant difference in attitude towards online education based upon teaching experience, school location and use of e-mail.

Park (2008) compared "learning outcome in conventional face-to-face lecture with the selected eLearning contents". The researcher selected a sample 54 Korean agricultural high school students who were selected randomly. The investigator conduct a pre-test and post-test. The researcher found that the students performed similarly in animation based and video based e - Learning as well as between face to face learning and eLearning mode.

Beal and Shaw (2009)conducted a study to find out the effectiveness of Online Math Problem Solving System for Middle School Students Who are blind. The researcher used an existing online math word problem solving system which was modified for use by blind students. The investigator used text-to-speech technology to present math word problems in audio format, and to provide audio feedback to students about their answers. The adapted system was evaluated with blind middle school students (N = 11). The researcher found that the blind students' problem solving was comparable to that of sighted students who had worked with the original system.

Gagne and Kelley (2009) conducted "a qualitative study on online teaching Experience". Qualitative studies of educators who teach online are crucial to provide direction for practice and research as they offer an emic perspective. Using a qualitative metasynthesis (QMS) design, this study investigated the experience of online educators at institutions of higher education in the U. S. Discerning what activities online educators could instigate to bridge the gaps between the best practices and the present instructional realities in online teaching. This study provides an interpretive synthesis of the meaning of teaching online as represented by a body of

qualitative literature on online education. The chosen theoretical framework for the study includes the model of critical thinking and community inquiry. The researcher identified nine original qualitative studies involving 203 participants in geographically diverse schools. Close reading of the nine studies identified four key themes that captured the nature and experience of online instructors: (a) work intensity, (b) role changes, (c) teaching strategies, and (d) professional development. Many of these themes were linked to each other and, therefore, contributed to a broader picture of the instructors' experience. The researcher found the results of the study substantiate previous research and can benefit all stakeholders including learners, faculty members, and leaders in colleges and universities that offer online education.

Nguyen and Paschal (2013) studied the "Development of Online Ultrasound Instructional Module and Comparison to Traditional Teaching Methods". A Web-based teaching device was constructed to deliver information on fundamentals of ultrasound imaging to approximately one-half the students in an undergraduate medical imaging course, while the remaining students were taught the same material via traditional lectures and typed notes. The students participating in the study were separated randomly but in such a manner that prior achievement was statistically equivalent for the two groups. After approximately two weeks of instruction, an ultrasound imaging exam was administered. Results indicated no statistically significant difference in scores on homework assigned during the instructional period between the traditional and online groups. Similarly, there was no statistically significant difference in the average exam scores of students in the two groups. The traditional group required significantly more time on learning activities than did the online group. These results indicated that level of understanding was not affected by use of the online device, while efficiency of learning improved dramatically. Reasons reported by the students for the improved efficiency of the online method included flexibility in time usage and ability to cater to the individual, which came with the added responsibility of self-discipline. The traditional teaching method, meanwhile, allowed interaction with and instant feedback from a professor and other students. In this study it was demonstrated that the nature of an online device yields a higher level of efficiency than traditional lectures, despite the inherent drawbacks of the approach. The

effectiveness of this device could potentially be improved by implementing enhancements to increase the level of interaction for the user and to help with discipline and time management.

Wang and Steele (2015) advocated on the "Online Teaching, Change and Critical Theory". While many educators in higher education are using technologies in their teaching, their use of technology is generally restricted to meeting purposes of convenience and efficiency. Rarely are the affordances of technology being exploited by educators in higher education in order to develop teaching strategies that truly engage students, and help students develop self-regulation and the ability to work collaboratively – both of which are important capacities in the information age. It is therefore desirable to encourage educators to make some changes to their online teaching practices. Achieving change in teaching practice is a challenging process. The authors suggest that adopting a critical theory perspective has the potential to empower educators to re-examine their roles, beliefs and assumptions, and ultimately help to reform teaching practice in online environments to the benefit of both educators and their learners. The researcher advocated to encourage educators to re-consider their philosophy of online teaching from the perspective of critical theory.

Khan and Khan (2017)conducted study on "Students' attitude towards online learning at tertiary level". The researcher selected 83 undergraduate students from Peshawar district. The researchers used a self-structured closed questionnaire with five likert scale for data collection. The researchers found that there is no significant relationship between students' interest in computer, usefulness of computer to students and easiness in using online learning at undergraduate level.

DeVaney (2018) studied the "impact of Video Tutorials in an Online Educational Statistics Course". This research describes the evaluation of video tutorials used in a graduate level online statistics course. In this study the researcher focused on evaluation attitudes toward the tutorials and differences in academic performance between online sections that used the tutorials and those that did not. The researcher selected a sample of 78 students based on who completed an online survey and indicated positive perceptions of the tutorials. The researcher found the

quantitative findings were supported by narrative comments that suggested the tutorials were an effective component of the course, comparisons of sections with and without access to the tutorials showed no statistically significant difference with respect to academic performance. The researcher suggested that video presentations used as supplemental materials may provide instructional designers with a tool to create online courses that are as effective as traditional face-to-face courses.

Gupta (2018) conducted a comparative study on online and face to face education for learners and teachers in management. The researcher selected a sample of 500 comprising of 450 student and 50 teachers. The researcher used simple random sampling for the study. The researcher used a self -made questionnaire for teacher and for students and for both teacher and students. The researcher finally found that the online learning is better than face to face learning.

Tannenbaum and Hoof(2018) conducted the study on "Effectiveness of online learning on health researcher capacity to appropriately integrate sex, gender, or both". The analysis compares pre- and post-test scores from 1441 individuals who completed the Canadian Institutes of Health Research Institute of Gender and Health's interactive e-learning modules between February 2016 and May 2017. Of the 543 individuals who completed the basic science module, 62% demonstrated improved knowledge, and 86% increased self-efficacy across all competencies. Gains in knowledge and self-efficacy also occurred among 84% and 77% of completers of the human data collection module (n=463) and among 73% and 82% of those who completed the secondary data analysis module (n=435). In aggregate, 95% of participants reported intent to change their behavior with respect to sex and gender in health research. The researchers found that the online learning combined with feedback and self-assessment results in improved knowledge and self-efficacy for integrating sex and gender in health research.

Atefeldenfria and Hosam (2019) conducted a study on the effectiveness of an online learning system based on aptitude scores. This study examined the effectiveness of an online continuous adaptive mechanism (OCAM) based on changes in learner aptitude scores across learning sessions. The representation of the learning content in these sessions was designed for a low,

medium, and high aptitude individual. The investigators chose the brain activation of 12 students (6 male and 6 female; aged 20–25 years) and examined using an electroencephalogram (EEG). The investigators found the result that OCAM helped learners to understand the content being presented according to their aptitude scores, thus improving their brain activation.

Jackson and Chien (2019) studied the "Impact of Online Learning in K- 12: Effectiveness, Challenges and Limitations for Online Instruction". Online learning capabilities in K-12 education have changed tremendously in the past years and are continually evolving in the traditional classrooms. The overall growth in the total number of high school students currently taking online distance learning courses as well as the importance of distance learning as a solution to educational challenges has increased the need to study more closely the factors that contribute to distance learning outcomes and success rates in K-12. Therefore, the challenge that emerges for educators, researchers, scholars, and advocates for students is to carefully and effectively join the growth and power of K-12 online learning for the benefit of the students involved. This chapter provides an overview of factors that contribute to learning outcomes and success rates for K-12 distance education. Some of the challenges, issues, and considerations affecting implementation of K-12 online education are discussed.

Wong, Allen and Durrani (2019) conducted a study "Evaluating Effectiveness of Online Learning Modules in Pediatric Environmental Health Education". The researcher's main aim of the study was to determine the effectiveness of PEHSU eLearning modules in increasing knowledge about paediatric and reproductive environmental health.The researchers choose sample from retrospective analysis of 994 users who had completed at least one of the 12 PEHSU eLearning modules and its associated pre-test and post-test scores between March 2016 and November 2018. Users who completed modules between March 2016 and April 2018 received a 6-month follow-up survey to assess the impact of the knowledge gained on their clinical practice. The investigators get all users, post-test scores were significantly higher than pre-test scores, with an increase of 30.55% ± 22.37 (paired t-test, $p < 0.0001$), after completion of eLearning modules. PEHSU eLearning modules are effective at increasing environmental health knowledge of clinical and nonclinical professionals.

Konig, Biela & Glutsch (2020) studied on "Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany". As in many countries worldwide, as part of the consequences of the COVID-19 pandemic lockdown schools in Germany closed in March 2020 and only partially re-opened in May. Teachers were confronted with the need to adapt to online teaching. This study presents the results of a survey of early career teachers conducted in May and June 2020. First, the researchers analyzed the extent to which they maintained social contact with students and mastered core teaching challenges. Second, the researchers analyzed potential factors (school computer technology, teacher competence such as their technological pedagogical knowledge, and teacher education learning opportunities pertaining to digital teaching and learning). The researchers found that the regression analyses show that information and communication technologies (ICT) tools, particularly digital teacher competence and teacher education opportunities to learn digital competence, are instrumental in adapting to online teaching during COVID-19 school closures.

2.2.2 Studies related to Face to Face and Online Learning

Liu(2004**)** made a Comparative Study of Learning Styles between Online and Traditional Students. The sample for the study was 19 students in an experimental group (online section) and 25 students in the control group (FtF section) in a graduate course in the fall semester of 2004. Although no significant statistical differences were detected in learning styles at pretest, significant statistical differences were found in many learning style subscales at post test between experimental and control groups. The researcher finally found that there is no significant statistical difference in learning performance between both groups.

DiPietro, Ferdig and Megan (2008) studied on the "Virtual School Teachers. Virtual schools are rising in popularity and presence". Unfortunately, there is a relative dearth of research related to teaching and learning in virtual schools. Although there are numerous handbooks addressing teaching online, there is little research on successful online teaching in the K-12 arena. Much of

the existing research focused on teaching online rooted in face-to face content, not focused on content areas, built upon a post-secondary audience, or fails to use data from the teachers themselves to triangulate findings. This article reports on a study of 16 virtual school teachers from the Michigan Virtual School (MVS). It reports on best-practices from the interviews conducted with MVS teachers; and also provides research triangulation for those practices.

Khatony, Nayery, Ahmadi, Haghani & Julkunen (2009) investigated the effectiveness of web-based and face-to-face continuing education methods on nurses' knowledge about AIDS. The aim of the study was to compare the effectiveness of web-based and face-to-face continuing education methods in improving nurses' knowledge about AIDS. The researchers used a quasi-experimental method with a pre-test and post-test design. In this study 140 nurses with BSc degrees were chosen through a random sampling method and divided into a web-based and a face-to-face group by random allocation. For the former group the intervention consisted of a web-based course on AIDS; the latter received a 3-hour lecture course on the same subject. At the beginning and end of the course in both groups, the nurses' knowledge was measured by a questionnaire. Pre and post-test scores were compared within and between the groups. The researchers got the result that there was no significant difference between the groups in either the pre-test ($t(138) = -1.7$, $p = 0.096$) nor the post-test ($t(138) = -1.4$, $p = 0.163$) scores in the knowledge test. However, there was a significant difference in the pre-test and post-test scores within each group (web-based, $t(69) = 26$, $p < .001$; face-to-face, $t(69) = 24.3$, $p < .001$). The researchers found that the web-based method seems to be as effective as the face-to-face method in the continuing education of nurses.

Paechter(2010) studied on the question Online or face-to-face? Students' experiences and preferences in e-learning was studied .in a sample of 2196 students from 29 Austrian universities. The students completed a questionnaire on their experiences attending an e-learning course, on their perceived achievements, and on their preferences for online or face-to-face learning components. They preferred face-to-face learning for communication purposes in which a shared understanding has to be derived or in which interpersonal relations are to be established. An especially important result concerns students' perceptions of their learning achievements: When conceptual knowledge in the subject matter or skills in the application of one's knowledge are to

be acquired, students prefer face-to-face learning. However, when skills in self-regulated learning are to be acquired, students advocate online learning.

Junfeng, Kremer & Jackson(2018) have done an investigation on the effectiveness differences between in-class and online learning. The researchers compared the student performance when engaged in online learning versus in-class learning and the corresponding implications have yet to be thoroughly investigated especially in STEM education.The case investigated whether there exists a significant statistical difference in the performance of two student groups. In one, 32 students were asked to be physically present in a classroom, to listen to a lecture given by an instructor, and to participate in class discussion prior to taking a quiz. In the other, 32 different students received the same content online and were allowed the same time to study as well as post to an online discussion board before taking an identical quiz. A hypothesis test was then used to analyze the performance difference. The results show that there is no significant learning outcome difference between in-class and online learning modes in engineering drawing content.

Paul and Jefferson(2019)conducted the study on "A Comparative Analysis of Student Performance in an Online vs. Face-to-Face Environmental Science Course From 2009 to 2016" The study was conducted on 548 students, 401 traditional students and 147 online students, in an environmental science class it was seen that a growing number of students opted for online classes as they find the traditional classroom modality restrictive, inflexible, and impractical. In this age of technological advancement, schools are providing effective classroom teaching via the Web. The overarching purpose of this research was to determine which teaching method proved more effective over the 8-year period. The scores of 548 students, in an environmental science class were used to determine which instructional modality generated better student performance. In addition to the overarching objective, the score variabilities between genders and classifications to determine if teaching modality had a greater impact on specific groups were also studied. It was found that there was no significant difference in student performance between online and face-to-face (F2F) learners overall, with respect to gender, or with respect to class rank. These data demonstrate the ability to similarly translate environmental science concepts for non-STEM majors in both traditional and online platforms irrespective of gender or class rank.

Díaz and Entonado(2020**)**conducted the study for highlight some of the possible risks and strengths which may help to improve the role of teachers in both (online and face to face) methods.The researchers selected a sample of number of students participating in the training programme in its online and face-to-face versions was 250 (129 online and 121 face-to-face), plus three teachers who took part in both types of teaching. For the collection of data, a triangulated technique of closed questionnaires, semi-structured interviews, and discussion groups was used. Finally the authors found that no important differences were found between the functions of teachers in the two teaching modes, online and face-to-face.

Foo, Cheung & Chu (2021) conducted a study to compare study regarding distance learning and the conventional face-to-face approach conducted problem-based learning tutorial during the COVID-19 pandemic. The researcher aim was to compare the performance of students using distance learning PBL tutorials using with that of students utilising the conventional face-to-face approach. This study was conducted in a single academic institution. The investigators compared two groups of fourth-year medical students from the same class: one group used distance learning (DL); the other, the face-to-face (FF) method. We used students' baseline performance at the preceding block for one-to-one propensity score matching. Students utilising the PBL tutorial were given grades by their tutors according to a standardised scoring system encompassing five key areas (score range: 0–10). The main outcome was a student's total score (i.e., the sum of the scores from the five key areas, ranging from 0 to 50).the investigators matched 62 students in each group. With four tutorials, there were 490 observations, with 245 in each group. The mean total score for the DL group was 37.5 ± 4.6, which was significantly lower than that of the FF group (39.0 ± 4.4, $p<0.001$). The investigators findings of this study revealed that the performance of students utilising the DL PBL tutorials was lower than that of students participating in the conventional FF approach.

Conclusion

In this review related literature 13 investigator found that the online learning is better than face to face learning. From these 13 journals, the student preferred online learning for their studies. From this 19 investigator found that there is no significant differences between online learning and face to face learning. In these journals, the student have no difference between online learning and face to face learning.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Research is a systematic investigation resulting in some formal record of procedures and the report of conclusions and results. Research has been defined as “a formal systematic and scientific method of analysis”. Research has proved to be an essential and powerful tool in leading the human race towards progress. Research has originally drawn its spirit and pattern from the Physical Sciences-wherein constant efforts were made to understand the physical world around us. Research marks the use of rigorous and structured type of analysis of observed phenomena. The secret of cultural development has been research, pushing back the area of discovering new truths, which in turn lead to better ways of doing things and better products and conveniences to live and enjoy life at large.

3.2 Research methodology:

Research methodology simply refers to the practical “how” of any given piece of research. More specifically, it’s about how a researcher systematically designs a study to ensure valid and reliable results that address the research aims and objectives.

The methodology of the present study is discussed under the following headings.

3.2.1 Method of the study
3.2.2 Locale of the study
3.2.3 Selection of the sample
3.2.4 Tools used for this study
3.2.5 Pilot study

3.2.6 Item analysis

3.2.7 Establishing Validity and Reliability

3.2.8 Conduct of the study

3.2.9 Scoring and tabulation of data

3.2.10 Data analysis procedure

3.2.1 Method of the study:

The method adopted for the present study was survey method. The traditional definition of survey research is a quantitative method for collecting information from a pool of respondents by asking survey questions. This research type includes the selection of sample and collecting information from them and then analyzing and interpreting the data collected.

A survey is a research method used for collecting data from a predefined group of respondents to gain information and insights into various topics of interest. They can have multiple purposes, and researchers can conduct it in many ways depending on the methodology chosen and the study's goal. The data is usually obtained through the use of standardized procedures to ensure that each respondent can answer the questions at a level playing field to avoid biased opinions that could influence the outcome of the research or study. The process involves asking people for information through a questionnaire, or inventories or interviews or rating scales and this could be done either online or offline. However, with the arrival of new technologies, it is common to distribute those using digital media such as social networks, email, QR codes, or URLs. It is useful for researchers who aim at communicating new features or trends to their respondents. In this study the investigator collected the information on attitude of student teachers' towards online teaching and learning through Google forms. The survey was conducted on 262 student teachers in Coimbatore, Tamilnadu.

3.2.2 Locale of the study

This study was undertaken in Coimbatore city, Tamilnadu. Coimbatore is one of the most industrialized cities in Tamil Nadu, known as the textile capital of South India or the

Manchester of the South and is the third largest city of the state Tamilnadu. Coimbatore is also home for many state owned universities like Tamil Nadu Agricultural University (1971), Bharathiar University (1982), Anna University Coimbatore (2007) and private universities like Karunya University (1986), Amrita University (2003) and Karpagam University (2005) and government aided Universities like Avinashilingam University (1964). The present study was conducted in Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamilnadu.

3.2.3 Selection of the Sample

The sample selected for the study consisted of 262 student teachers of Department of Education, Avinashilingam Institute for Home Science and Higher Education for Women. Purposive sampling technique was used for the study. The sample included the I and II year students of B.Ed. Programme. Table 3.1, 3.2 and 3.3 and 3.4 provide the background information about the sample selected for the study. Figures 3.1, 3.2 and 3.3 presents the personal profile of the student teachers selected for the study.

Table 3.1

Sample distribution of student teachers based on subject specialization

S.No	Subject	No. of students teachers	Percentage
1	Mathematics	47	18
2	Science	68	26
3	Humanities	57	22
4	Special Education (HI)	46	17

5	Special Education (VI)	44	17
	Total	**262**	**100**

Table 3.1depicts the student teachers distributed based on their subject specialization. The sample included 18 percent of student teachers specializing mathematics, 26 percent of the student teachers from science. In science group student teachers from physical science, biological science and home science were included. The 22 percentage of Humanities student teachers comprised of student teachers specializing Social science and English. The percentage of special Education student teachers specializing Hearing Impairment was 17%.The percentage of special Education student teachers specializing Visual Impairment was 17%.

Figure 3.1

Sample distribution of student teachers based on subject specialization

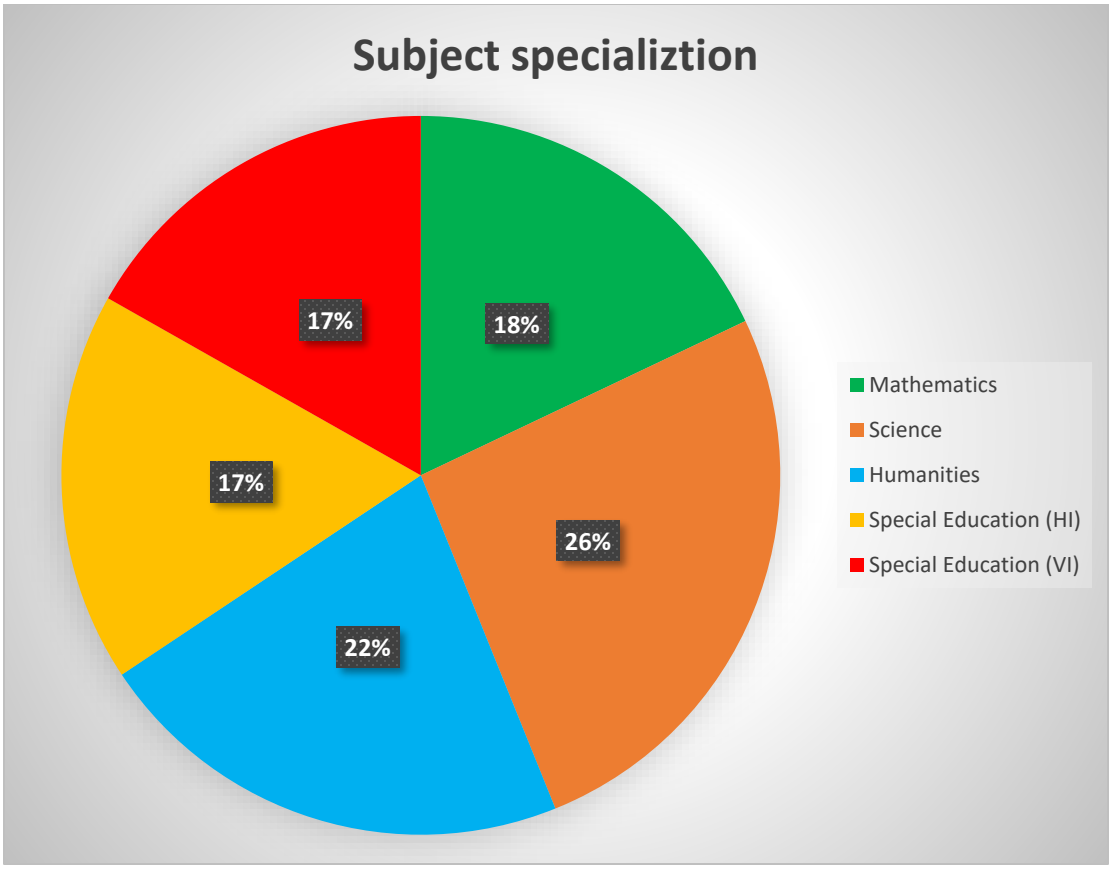


Table 3.2

Distribution of student teachers based on their age

S.No	Age	Number	Percentage
1	20- 24	252	96.18
2	25 & above	10	3.82
	Total	**262**	**100**

Table 3.2depicts the student teachers distributed based on their age group. The sample include 96 percentage of student teachers' belong to the age group of 20 to 24. The 4 percentage of student teachers' are in the age group of 25 and above.

Figure 3.2

Distribution of student teachers based on their age

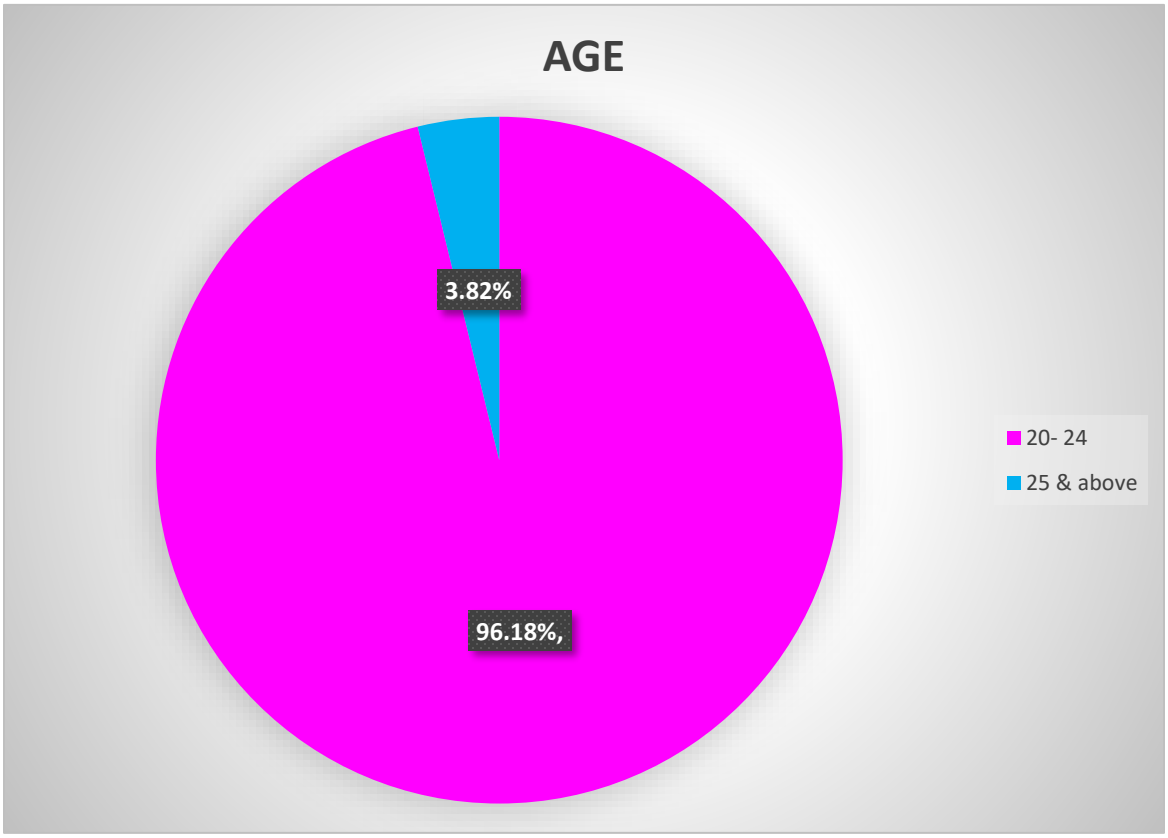


Table 3.3

Sample distribution of student teachers on the basis of year of study

S.No	Age	Number	Percentage
1	I year B.Ed.	132	50.38
2	II year B.Ed.	130	49.62
	Total	**262**	**100**

Table 3.3 depicts the student teachers distributed based on their year group. The sample include 50.38 percentage of student teachers' from I year B.Ed Programme and 49.62 percentage student teachers' from II year B.Ed Programme.

Figure 3.3

Sample distribution of student teachers on the basis of year of study

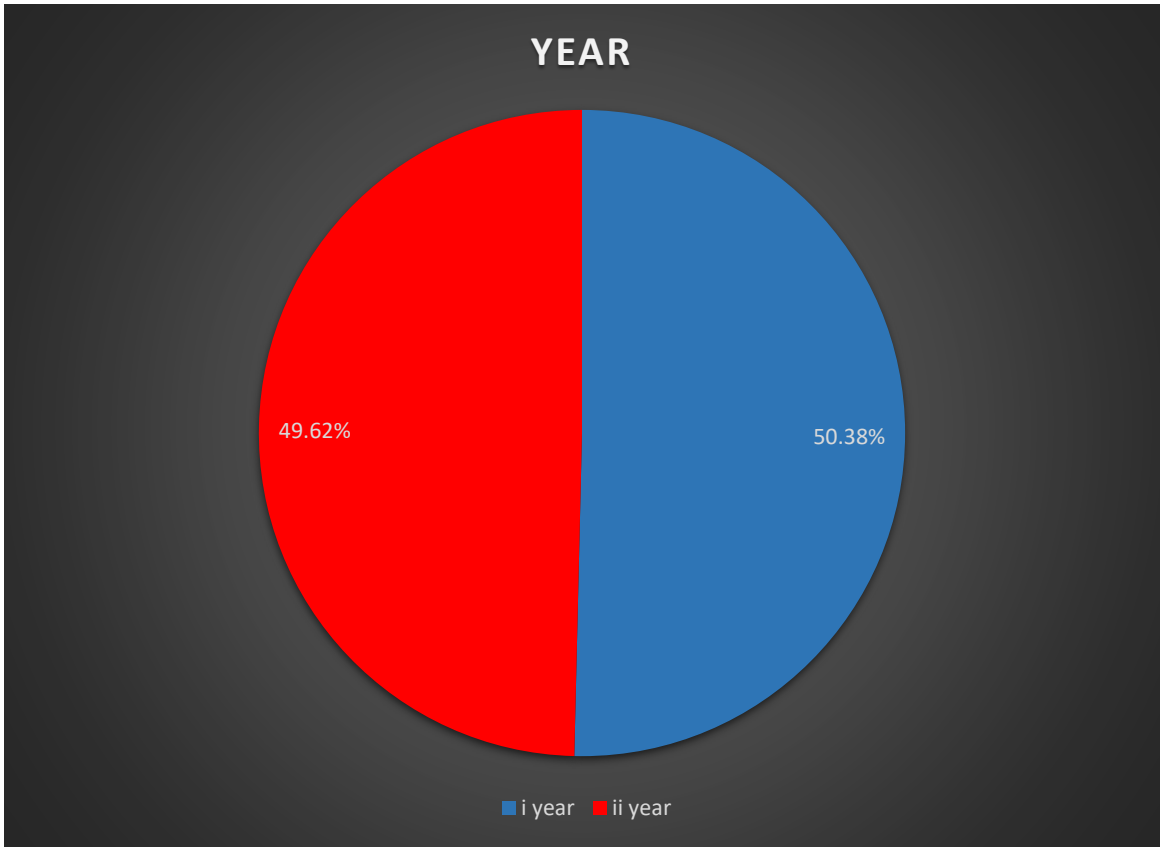


Table 3.4

Sample distribution of student teachers based on their locality

S.No	Locality	Number	Percentage
1	Rural	148	56.49
2	Urban	114	43.51

	Total	**262**	**100**

Table 3.4 depicts the percentage of student teachers distributed based on their locality. The sample includes56 percentage of student teachers' from the rural area and 44 percentage of student teachers' from urban area.

Figure 3.4

Sample distribution of student teachers based on their locality

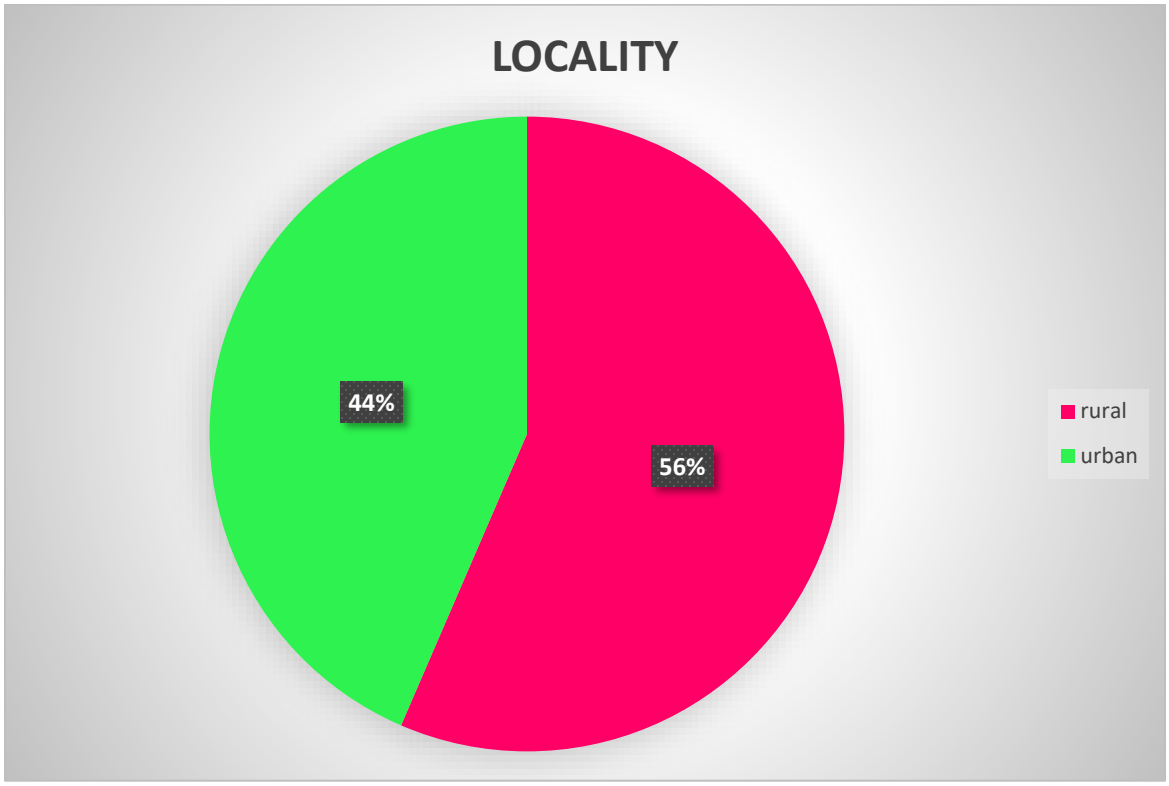


Table 3.5

Sample distribution of student teachers based on the availability of the Computer in their home

S.No	Availability of computer	Number	Percentage
1	Yes	164	62.59
2	No	98	37.40
	Total	**262**	**100**

Table 3.5 depicts the percentage of student teachers based on their availability of computer for their use in their home. The sample distribution shows that 63 percentage of student teachers have computers to use for their leaning and only 37 percentage of student teachers do not have their own computer in their home.

Figure 3.5

Sample distribution of student teachers based on the availability of the Computer in their home

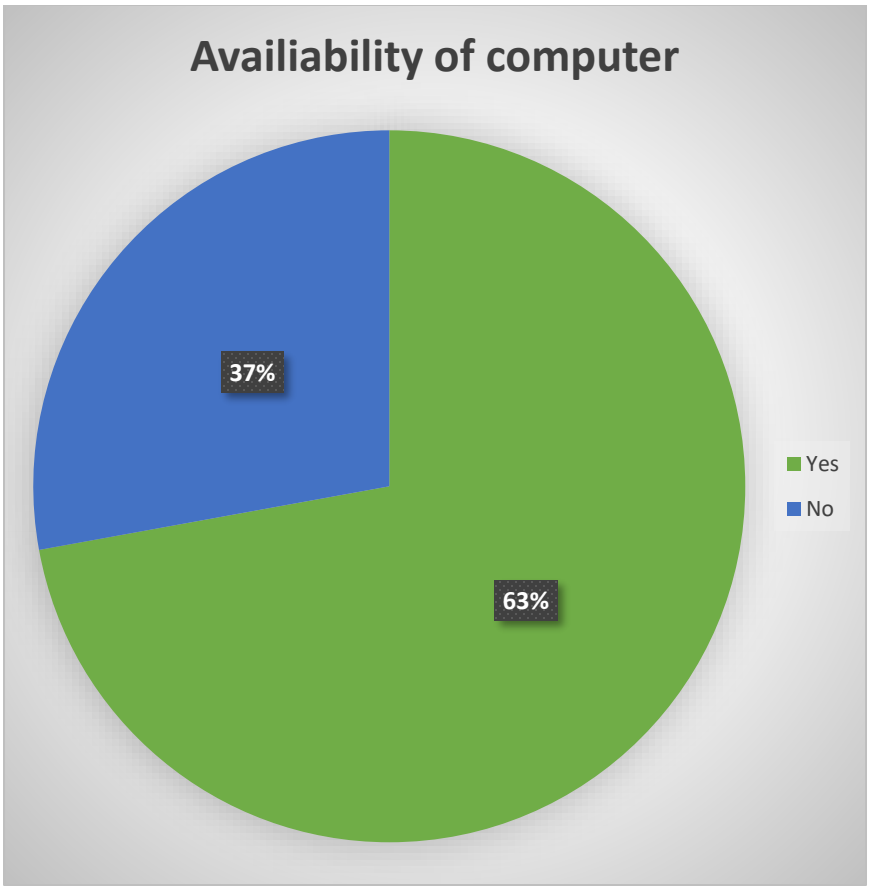


Table 3.6

Sample distribution of student teachers based on the different gadgets they use for online class

S.No	Gadgets	Number	Percentage
1	Mobile	221	84.35
2	Laptop	37	14.21
3	Desktop	4	1.53
	Total	**262**	**100**

Table 3.6 depicts the percentage of student teachers distributed based on the gadgets they use for online class. The sample distribution shows that 84 percentage of student teachers use mobile phone for their online class, 14 percentage of student teachers use laptop for online class and two percentage of student teachers use desktop for online class.

Figure 3.6

Sample distribution of student teachers based on the different gadgets they use for online class

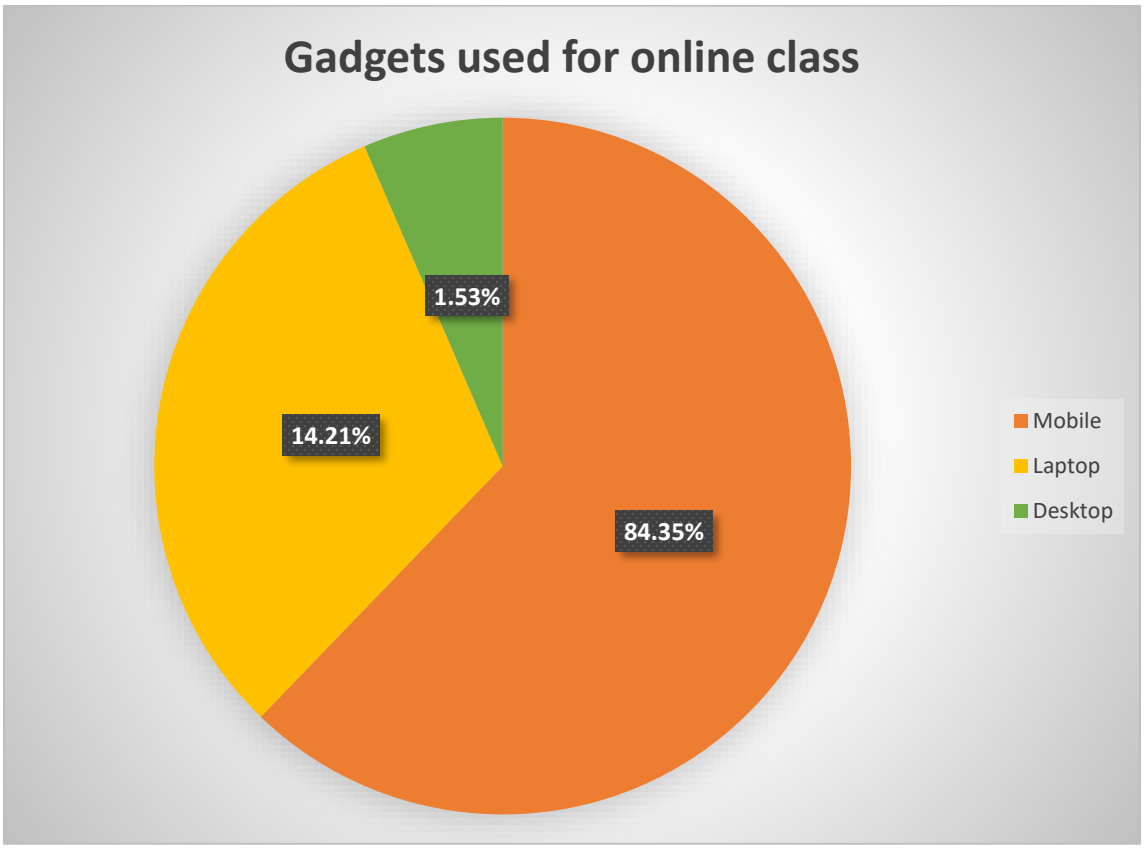


Table 3.7

Sample distribution of student teachers based on the gadgets they are comfortable to use for online class

S.No	Gadgets	Number	Percentage
1	Mobile	163	62.21
2	Laptop	82	31.30
3	Desktop	17	6.49
	Total	**262**	**100**

Table 3.7 depicts the percentage of student teachers distributed based on the gadgets they are comfortable to use for online class. It shows that 62 percentage of student teachers are very comfortable to use mobile phones for their online classes and 31 percentage of student teachers are comfortable to use laptops for online class and 7 percentage of student teachers are comfortable to use desktop for online class.

Figure 3.7

Sample distribution of student teachers based on the gadgets they are comfortable to use for online class

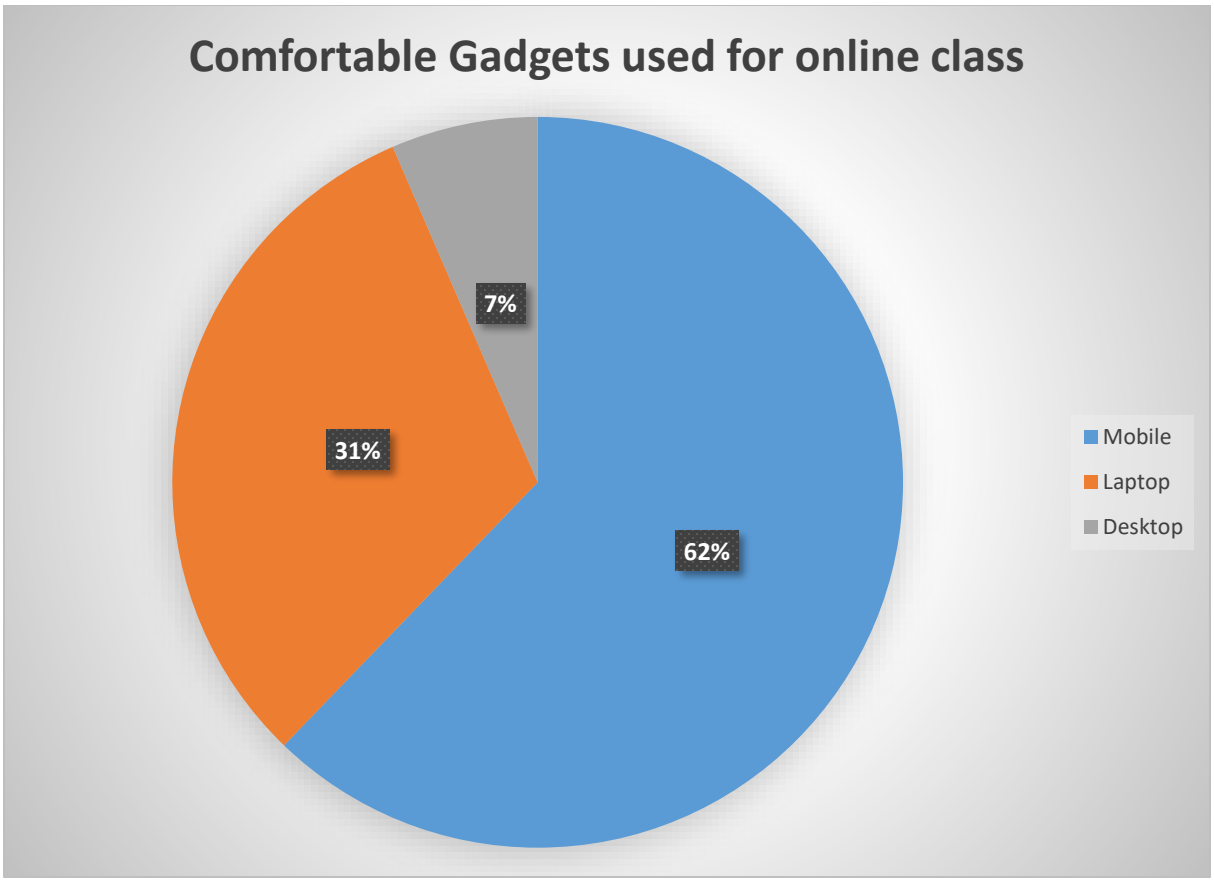


Table 3.8

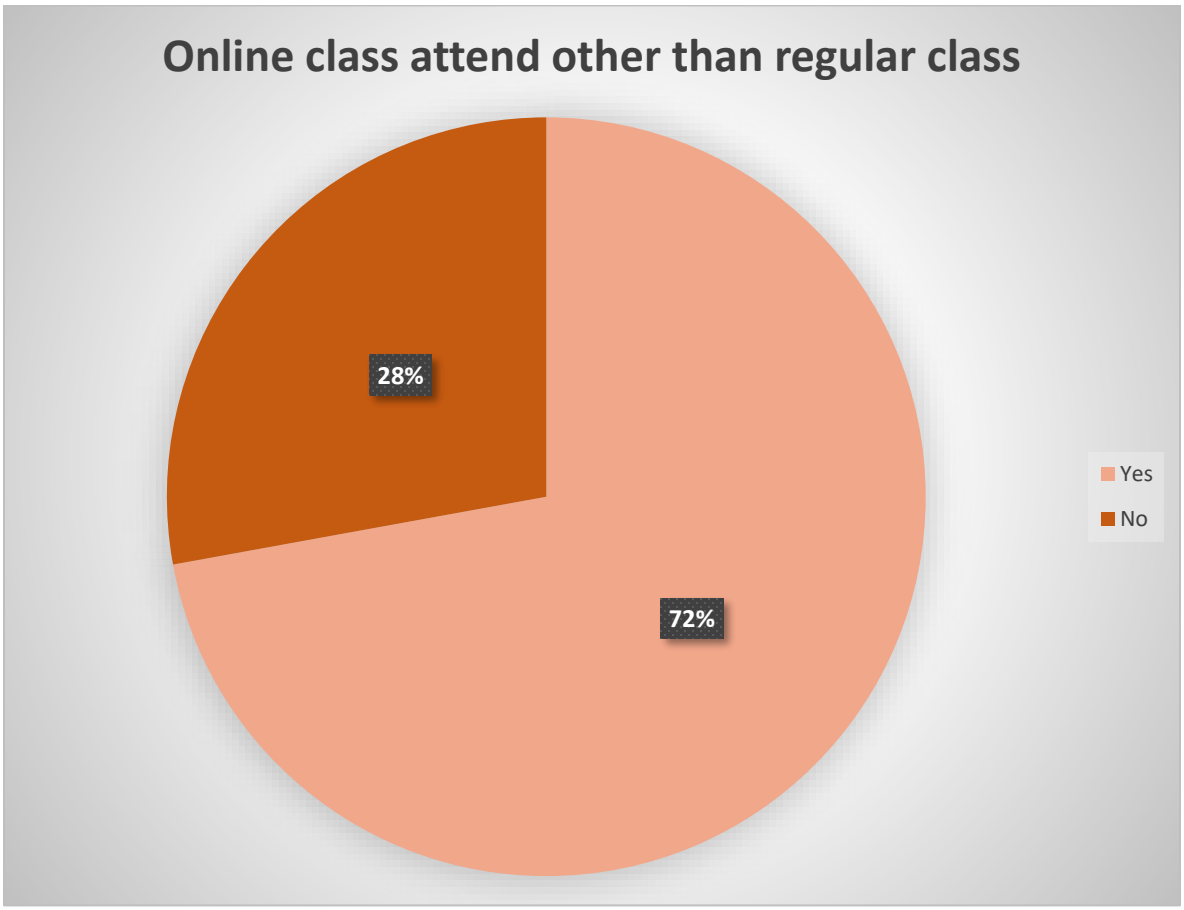
Sample distribution of student teachers based on the online class attended other than regular class

S.No	Response	Number	Percentage
1	Yes	189	72.14
2	No	73	27.86
	Total	**262**	**100**

Table 3.8 depicts the percentage of student teachers distributed based on the online class attended other than regular class. The sample distribution shows that 72 percentage of student teachers' have attended online class other than regular class and 28 percentage of student teachers have not attended online class other than regular class.

Figure 3.8

Sample distribution of student teachers based on the online class attended other than regular class



3.2.4 Tools used for the study

According to Best (2003)"Like the tools in the carpenter's box, each research tool is appropriate in a given situation to accomplish a particular purpose". Each data-gathering device has its own merits and hazards or limitations.

Since the present investigation is related to the collection of information on attitude of student teachers regarding online learning process in Colleges of Education, an Rating scale tool was constructed and administered and to find out the attitude of teacher educators towards the online learning process.

The data collection tools used for the present study were:

3.2.4.1 Personal data sheet (V.Sindhiya & Dr.Indu H., 2021) (Appendix I)

3.2.4.2 Rating scale on Attitude towards Online Education (V.Sindhiya & Dr.Indu H., 2021) (Appendix II)

3.2.4.1 Personal data sheet:

The personal data sheet constructed by the investigator was used for collect information such as

- Age
- Name of the Programme
- Year
- Subject specialization
- Locality
- Access of the computer
- Gadgets used for online class
- Comfortable Gadgets for online class
- Attended online class other than regular class.

These variables were chosen based on the investigator's own idea and some ideas got from review related literature and the supervisor.

3.2.4.2 Construction and validation of Rating scale on Attitude towards Online Education:

The rating scale was constructed with 50 items consisting of both positive items and negative item related to online education.

After constructing the rating scale, the items were written, and it was submitted to expert in the field of education to obtain the feedback regarding the items used in this study to find out the appropriateness of items used in the rating scale. Based on the opinion of the expert 5 items were deleted as it was not appropriate. The draft scale now consisted of 45 items.

In the rating scale, of the 45 items there were 27 positive items and 18 negative items. The five point rating scale was used for this study with options strongly agree, Agree, Neutral, Disagree and Strongly Disagree. For the positive items scoring pattern was for strongly agree-5, agree-4, neutral-3, disagree-2 and strongly disagree-1. And for the negative items scoring pattern was reversed as strongly agree-1, agree-2, neutral-3, disagree-4 and strongly disagree-5. The rating scale was provided in the Google sheet and the URL was sent to the participants of the pilot study and were instructed to read the question carefully and select the response they feel comfortable for them. The subject has to respond to all the items. The total score obtained was taken for the attitude of students towards online education.

3.2.5 Pilot study:

Pilot testing was carried out to improve the items in the draft rating scale. The pilot study was conducted on 25 B.Ed students. The data collected from the pilot study was scored and interpreted. The pilot study helped for testing the item of the study and to know about whether items were appropriate for the participants. Finally it was subjected to the item analysis.

3.2.6 Item analysis:

Item analysis is the set of qualitative and quantitative techniques and procedures used to evaluate the characteristics of items of the test before and after the test development and construction. An item is a basic building block of a test, and its analysis provides information about its performance. Item analysis allows selecting or omitting items from the test, but more important, item analysis is a tool to help the item writer improve an item. The 30 response sheets collected from pilot study were arranged in the descending order of the total scores. Item analysis was carried out by estimating the index of discrimination. The response sheets in the top 27% and bottom 27% were used for comparison. The number of students getting the item correct in the top group (U) and the number of students getting the item correct in the bottom group (L) were identified. The discrimination index of each item was calculated using the formula, U-L/N. The selected items were arranged in the increasing order of difficulty. The difficulty index of the items was calculated using the formula, U+L/2N. From the pilot test four items were deleted and the final scale consisted of 41 items. The final scale with 41 items was used for actual study.

3.2.7 Establishing Validity and Reliability

Validity

Face validity of the scale was established by giving the scale to 2 experts in the field of Education. The scale possess a reasonable degree of construct validity, since the items have been prepared using the theoretical basis used for constructing the scale.

Reliability

The reliability coefficient was calculated using split-half method. The calculated value was found to be 0.68 which shows that the scale is reliable.

3.2.8 Conduct of the study:

Data is collected by the survey method. The study was conducted on 262 student teachers of Department of Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamilnadu. The sample was selected by purposive sampling technique. As due to COVID pandemic the investigator was not able to collect the data in the face to face mode, the investigator prepared a Google form for collecting data related to personal aspects and attitude of student teachers' towards online education. The link for the Google form were send the student teachers' through Whatsapp and the data were collected. The collected data was scored and tabulated for further analysis.

3.2.9 Scoring and tabulation of data

The response sheets were scored automatically. The scores of rating scale consisting of 41 statements were tabled and analyzed. The rating scale consists of 5 options like strongly agree, agree, neutral, disagree and strongly disagree. The 41 question consisted of both positive and negative statements on online education. For the positive items scoring pattern was strongly agree-5, agree-4, neutral-3, disagree-2 and strongly disagree-1. And for the negative items scoring pattern was strongly agree-1, agree-2, neutral-3, disagree-4 and strongly disagree-5. The scores of items obtained were used for further analysis.

3.2.10 Data analysis procedure:

As the present study is more of quantitative in nature, collected data were analyzed using quantitative techniques. Quantitative data were analyzed with the simple statistical techniques. The investigation has been carried out by the descriptive statistical analysis, such as calculating measures of central tendency like Mean, Kurtosis, Skewness and calculating measures of dispersion like Standard Deviation. For interpret the data the pie chart and bar graph were used. For testing the null hypotheses, the t-test and Analysis of Variance have been used by the

investigator. The t test and ANOVA were used to test the null hypotheses stated. The data were coded and analyzed using the Statistical Package for Social Sciences (SPSS).

3.3Conclusion

The methodology chapter explained in detail the design and the description of the study process and the tools constructed and validated. The chapter also mentions about the statistical techniques to be used to derive the results and conclusion. The analysis of the data, its results and discussions are presented in the next chapter.

CHAPTER 4

RESULTS AND DISCUSSION

4.1Introduction

The results and discussion section is an important section as it contains a large amount of scientific data that needs to be presented in a clear and concise fashion. In this the findings of the study based upon the methodology applied is reported. The analysis and interpretation of data represents the application of deductive and inductive logic to the research process. The data collected has been subjected to the statistical treatment as there is no guarantee about the outcomes of objectives only through collection of data or selection of tools. This chapter deals with the different statistical analysis and discussions of the results obtained through analysis. The results obtained for the data collected from 262 student teachers of Department of Education, Avinashilingam Institute for Home Science and Higher Education for Women is analyzed and discussed in this chapter. The analysis includes the descriptive analysis and differential analysis.

4.2 Descriptive Analysis:

It involves computing of measures of central tendency such as the mean and the measures of variability such as standard deviation. The computed values are used to describe the properties of the different sub-samples.

This chapter includes the analysis and the interpretation of data collected from 262student teachers of Department of Education, Avinashilingam Institute for Home Science and Higher Education for Women. The various statistical procedures adopted were as follows:

4.2.1 Descriptive analysis

4.2.2 Differential analysis

4.2.1 Descriptive Analysis

The descriptive analysis was carried out by finding the Mean, Standard deviation, Skewness and Kurtosis for Attitude towards Online teaching of all 262 student teachers involved in the study. The results are presented in Table.4.1

Table 4.1

Descriptive Analysis for Attitude towards Online teaching

Variable	Range	Mean	Standard Deviation	Variance	Skewness	Kurtosis
Attitude towards Online teaching	79.00	1.363	14.26	203.43	-.218	.051

From Table 4.1, the mean score for Attitude towards Online teaching is found to be 79.00 and As the skewness value lies between (-1, +1) and kurtosis within the value of (-3,+3) the statistics indicated a close to normal distribution.

4.2.2 Differential Analysis

Differential analysis was carried out to compare two or more groups. Of the various techniques, t- test and ANOVA were used for the present study.

4.2.2.1 Analysis of Attitude towards online teaching based on the age level of the student teachers

t- test was conducted to compare the difference in attitude of student teachers towards online teaching based on their age level. Two groups of students with age level (20 to 25, and 25 and above) were compared and the results obtained are given in Table 4.2.

Table 4.2

Comparison of attitude of student teachers towards online teaching based on their age level

Attitude towards online teaching	**Attitude scores**				**t-value**	**df**
	Age level(20 to 25 (N=252)		**Age level(25 and above) (N=10)**			
	Mean	**Standard deviation**	**Mean**	**Standard deviation**		
	1.36	14.21	1.35	16.26	.359	260

*Note:*df=degrees of freedom

From Table 4.2, it is seen that there is a no significant difference in the attitude of student teachers towards online teaching based on their age level It is found that the calculated t value (.359) is less than the table value (1.96). Hence the null hypothesis that "There is no significant difference in the attitude scores of student teachers towards online teaching based on their age level" is accepted.

4.2.2.2 Analysis of attitude towards online teaching based on the year of study of the student teachers

t- test was conducted to compare the difference in attitude of student teachers pursuing their I year and II year B.Ed. Programme towards online teaching and the results obtained are given in Table 4.3

Table 4.3

Comparison of attitude of student teachers towards online teaching based on their year of study

Attitude towards online teaching	Attitude scores				t-value	df
	I year (N=130)		II year(N=132)			
	Mean	Standard deviation	Mean	Standard deviation		
	1.35	15.62	1.37	12.74	1.109	260

*Note:*df=degrees of freedom

From Table 4.3, it is seen that there is no significant difference in the attitude scores of student teachers towards online teaching based on their year of study. It is found that the calculated t value (1.109) is less than the table value (1.96). Hence the null hypothesis that "There is no significant difference in the attitude scores of student teachers towards online teaching based on their year of study" is accepted.

4.2.2.3 Analysis of attitude towards online teaching based on the locality of the student teachers

An attempt was made to compare the difference in attitude of student teachers towards online teaching based on their locality. Student teachers belonging rural and urban locality were compared using t test and the results are given in Table 4.4.

Table 4.4

Comparison of attitude of student teachers towards online teaching based on their locality

Attitude towards online teaching	**Attitude scores**				**t-value**	**df**
	Rural (N=148)		**Urban (N=114)**			
	Mean	**Standard deviation**	**Mean**	**Standard deviation**		
	1.36	14.68	1.36	14.16	0.184	260

*Note:*df=degrees of freedom

From Table 4.4, it is seen that there is no significant difference in the attitude scores of student teachers towards online teaching based on their locality. It is found that the calculated t value (0.184) is less than the table value (1.96). Hence the null hypothesis that "There is no significant difference in the attitude scores of student teachers towards online teaching based on their locality" is accepted.

4.2.2.4 Analysis of attitude towards online teaching based on the availability of the computer of the student teachers

t- test was conducted to compare the difference in attitude of student teachers towards online teaching based on the availability of computers with them. Students teachers were divided into two groups namely, student teachers who possess computers and who do not have computers and the t test results obtained are given in Table 4.5.

Table 4.5

Comparison of attitude of student teachers towards online teaching based on availability of the computer

Attitude towards online teaching	**Availability of the computer**				**t-value**	**df**
	Yes (164)		**No (98)**			
	Mean	**Standard deviation**	**Mean**	**Standard deviation**		
	1.364	14.58	1.360	13.78	0.209	260

Note : df=degrees of freedom

From Table 4.5, it is seen that there is no significant difference in the attitude scores of student teachers towards online teaching based on access of the computer. It is found that the calculated t value (0.209) is less than the table value (1.96). Hence the null hypothesis that "There is no significant difference in the attitude scores of student teachers towards online teaching based on availability of computer is accepted".

4.2.2.5 Comparison of attitude towards online teaching of student teachers who have attended the online classes other than regular class and who have not attended the online classes

t- test was conducted to compare the difference in attitude of student teachers towards online teaching based on their exposure to online classes other than the online class conducted in the B.Ed. Programme. The attitude scores obtained by the student teachers who have attended the online classes other than regular class and who have not attended the online classes were compared and the results obtained are given in Table 4.6.

Table 4.6

Comparison of attitude of student teachers towards online teaching based on the online class attended other than regular class

Attitude towards online teaching	**Attended online class other than regular class**				**t-value**	**df**
	Yes(N= 188)		**No(N= 74)**			
	Mean	**Standard deviation**	**Mean**	**Standard deviation**		
	188	1.37	74	1.33	2.116*	260

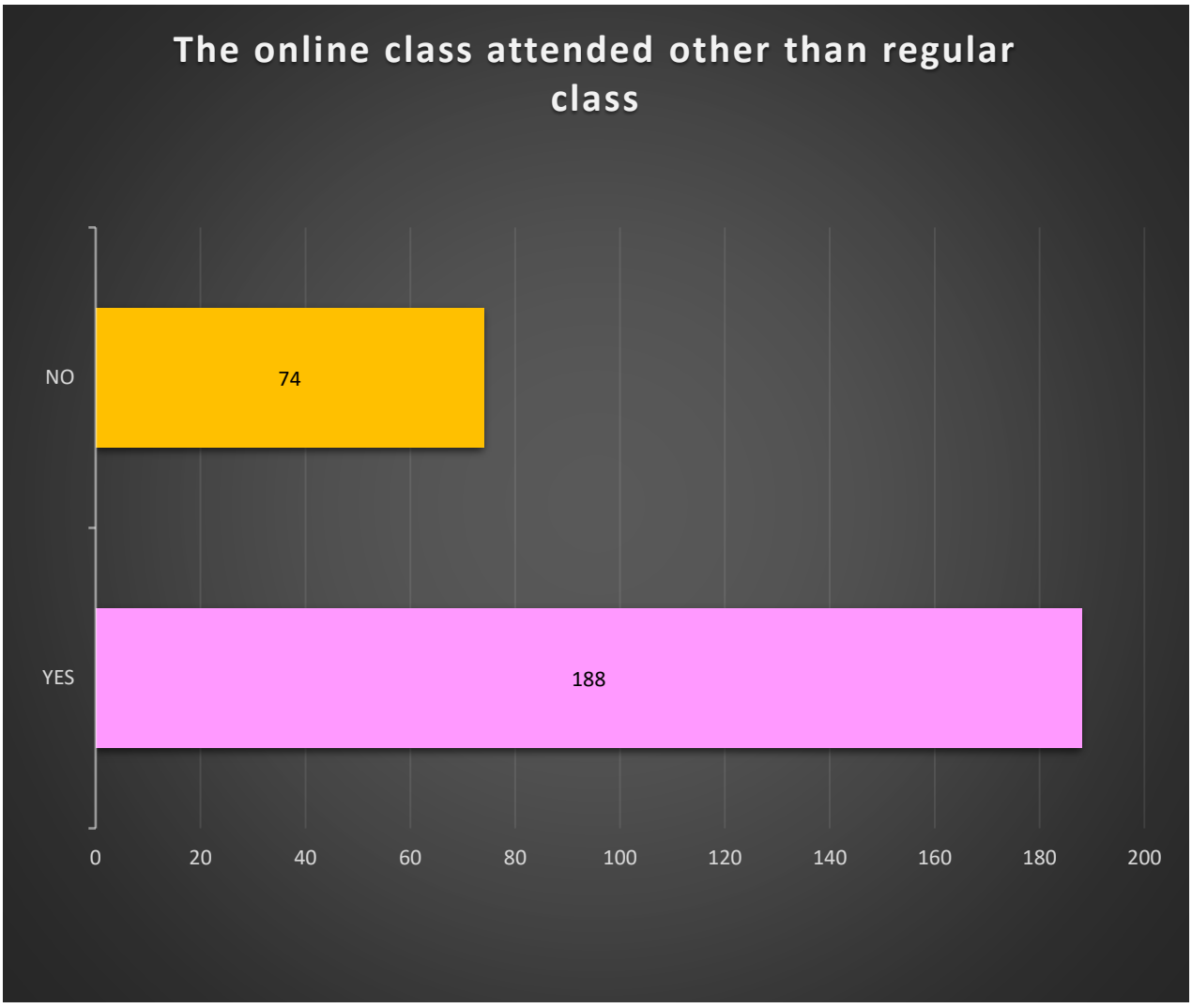
Note:* p< .05 df=degrees of freedom

From Table 4.6, it is seen that there is a significant difference in the attitude scores of student teachers towards online teaching based on whether they have attended the online classes other than regular class**.** It is found that the calculated t value (2.116) is greater than the table value (1.96) indicating a significant difference in the attitude scores. The mean value suggests that the students who have attended the online classes apart from the online classes in the B. Ed Programme possess better attitude towards online teaching. Hence the null hypothesis that

"There is a significant difference in the attitude scores of student teachers towards online teaching based on whether they have exposure to online class other than regular class" is rejected.

Figure 4.1

Attitude of student teachers towards online teaching based on the online class attended other than regular class



4.2.2.6 Analysis of Variance for the Attitude of student teachers towards online teaching based on the subject specialization.

An effort was made to compare attitude of student teachers towards Online teaching on the basis of the subject specialization. The attitude of student teachers specializing in subject like, mathematics, physical science, biological science, home science, history, economics, special English, special education (HI) and special education (VI) were compared using ANOVA and the results obtained are given in Table 4.7

Table 4.7

Comparison of the Attitude of student teachers towards online teaching based on the subject specialization

Attitude of student teachers	Source of Variance	Sum of Square	df	Mean Square	F-ratio
	BG	751.190	4	187.798	.922
	WG	52342.764	257	203.668	
	Total	53093.954	261		

Note : df=degrees of freedom

From the Table 4.7, it is seen that the calculated F value is .922 which is less than table value (2.37) at 0.05 level with df=4/257. It indicates that the F value is not statistically significant and hence the null hypothesis that "There is no significant difference in the attitude of student teachers towards online teaching based on their subject specialization" is accepted.

4.2.2.7 Analysis of Variance for the Attitude of student teachers towards online teaching based on the different gadgets they use for online class.

An effort was made to compare attitude of student teachers towards Online teaching on the basis of the gadget they use to attend the class. The attitude of student teachers possessing gadgets like mobile, laptop and desktop were analyzed and the results obtained for one way ANOVA is given in Table 4.8.

Table 4.8

Comparison of the Attitude of student teachers towards online teaching based on the different gadgets they use for online class

Attitude of student teachers	**Source of Variance**	**Sum of Square**	**df**	**Mean Square**	**F-ratio**
	BG	61.817	2	30.908	.151
	WG	53032.14	259	204.757	
	Total	53093.96	261		

Note : df=degrees of freedom

From the Table 4.8, it is seen that the calculated F value is .151 which is less than table value (2.99) at 0.05 level with df=2/259. It indicates that the F value is not statistically significant andhence the null hypothesisthat “There is no significant difference in the attitude of

student teachers towards online teaching based on the different gadgets they use for online class" is accepted.

4.2.2.8 Analysis of Variance for the Attitude of student teachers towards online teaching based on the gadget they are comfortable to use.

An effort was made to compare attitude of student teachers towards Online teaching on the basis of the gadget they are comfortable to use was done . The attitude of student teachers who were comfortable to use gadgets like mobile, laptop and desktop were compared. The result obtained is given in Table 4.9

Table 4.9

Comparison of the Attitude of student teachers towards online teaching based on the gadget they are comfortable to use

Attitude of student teachers	Source of Variance	Sum of Square	df	Mean Square	F-ratio
	BG	664.998	2	332.499	1.643
	WG	52428.957	259	202.428	
	Total	53093.954	261		

Note : df=degrees of freedom

From the Table 4.9, it is seen that the calculated F value is 1.643 which is less than table value (2.9957) at 0.05 level with df=2/259. It indicates that the F value is not statistically significant and hence the null hypothesis that "There is no significant difference in the attitude of student

teachers towards online teaching based on the gadget they feel comfortable to use for online class" is accepted.

4.3 Discussion

An attempt was made to compare the attitude of student teachers towards online education in this study and different subsamples likeage, year of study, subject specialization, locality, availability of computer, comfortable gadgets for online class, gadgets used for online class and attending other online class in addition to regular class were compared and it was found that there is no significant difference in the attitude scores of student teachers towards online teaching based on their age level, year of study, locality, availability of computer, subject specialization, different gadgets they use for online class and the gadget they feel comfortable to use for online class

But it was seen from the result that when the students were exposed to other online classes other than their regular classes they had a better positive attitude towards online education. As during the pandemic all the students are now exposed to online education it can be concluded that they may develop a positive attitude towards online education in due course of time and will be welcomed as face to face mode of education.

4.4 Conclusion

From the above inferences, comes to the conclusion that there is no significant difference between face to face and online learning for student teachers. This analysis helped the investigator to arrive at the findings and offer the recommendations.

CHAPTER 5

SUMMARY AND CONCLUSION

5.1 Introduction:

A summary is the condensed version of a work. It reduces the work to its core, and reproduces its structure by presenting its main ideas in the same order and proportion. It strictly contains information that is provided in the report-it does not add information that is provided in related works.

The conclusion is intended to help the reader understand why the research should matter to them after they have finished reading the report. A conclusion is not merely a summary of the points or a re-statement of the research problem but a synthesis of key points.

5.2 Objectives of the study:

- To assess the attitude level of the student teachers towards online teaching.
- To compare the difference in the attitude of student teachers towards online teaching based on their age, year of study, locality, and subject specialization.
- To compare the difference in the attitude of student teachers towards online teaching based on availability of computers.
- To compare the difference in the attitude of student teachers towards online teaching based on gadgets used for online class.
- To compare the difference in the attitude of student teachers towards online teaching based on the gadget they feel comfortable to use in online teaching –learning process.
- To compare the difference in attitude of student teachers who have undergone other online courses than the regular class taught through online.

5.3 Hypothesis of the study:

- There is no significant difference in the attitude of student teachers towards online teaching based on their age, year of study, locality, and subject specialization
- There is no significant difference in the attitude of student teachers based on availability of computers,
- There is no significant difference in the attitude of student teachers based on gadgets used for online class.
- There is no significant difference in the attitude of student teachers based on the gadget they feel comfortable to use in online teaching –learning process.
- There is no significant difference of student teachers possess of gadgets used for online class.
- There is no significant difference in the attitude of student teachers who have undergone online classes other than regular class and who have not undergone other online classes.

5.4 Findings of the study

The study was conducted on 262 student teachers from Department of Education of Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamilnadu.

The attitude of student teachers towards online education was assessed using an attitude scale constructed and validated by the investigator. The tool was administered to the sample using Google forms data was collected and analyzed. The analysis of data revealed the following findings.

- When the attitude of student teachers were compared using t test, based on their age level, it was found that there is no significant difference in the attitude scores of student

teachers towards online teaching based on their age level as the t value was found to be 0.359.

- t-test results (t=1.109) revealed that there is no significant difference in the attitude of student teachers towards online teaching based on their year of study.
- t-test results (t=0.184) revealed that there is no significant difference in the attitude of student teachers towards online teaching based on their locality.
- As the t value 0.209 is less than the table value of 1.96 it is concluded that the attitude of student teachers towards online teaching was not significant when compared based on availability of the computer in their home.
- Significant difference was found in attitude of student teachers towards online teaching who have attended the online classes other than regular class as the t value was found to be 2.116 which is greater than the table value of 1.96.
- The mean value suggested that the attitude scores of student teachers who have exposure to online class other than regular class was greater indicating that the attitude of student teachers towards online teaching who have attended the online classes other than regular class was better.
- The ANOVA results indicated that there is no significant difference in the attitude of student teachers towards online teaching based on their subject specialization.
- When the attitude of student teachers towards online teaching based on the different gadgets they use for online class was compared using ANOVA, the results revealed that the ANOVA value is 0.151which is less than the table value of2.99 indicating that there is no significant difference in the attitude of student teachers towards online teaching based on the different gadgets they use like laptop, mobile or desktop for online class.

- The ANOVA results obtained when the attitude of the student teachers' towards online teaching based on the gadgets they are comfortable to use were compared was is 1.643 , which is less than the table value of 2.9957.
- This shows that there is no significant difference in the attitude of student teachers towards online teaching based on the gadget they feel comfortable to use for online class.

5.5 Recommendations:

From this present study, the researcher brings out the following recommendations.

- In online mode other teaching strategies like case-study, debates, discussions, experiential learning, brainstorming sessions, games, drills, can be used to facilitate effective and efficient teaching and learning practices and teaching and learning can be made interesting.
- Network issues need to be taken care of for better online education by the government.
- Immediate response or no feedback from the instructor is often found to be a problem.
- The teachers should take care of this problem and try to have one to one relation with students even in online class.
- Many times the teachers are not able to assist the online learners when they faced technical problems.
- This should be tackled by giving proper training to both teachers and the students.

5.6 Suggestions for future research:

- This study used survey method. Experimental studies could be conducted to find out the effectiveness of online education.
- The study can be replicated to other samples like teacher educators, school students, graduates and post graduates of other subjects.

- This study conducted to one Education College in Coimbatore district. In future conducted the study to all education college in Coimbatore district or all over Tamilnadu.
- The study can be conducted on both gender.

5.7Conclusion

The present study conducted to assess about the student teachers' attitude towards online learning revealed that there is no significant difference in the attitude of student teachers towards online and face to face education. This conclusion indicates that teaching modality may not matter as much as other factors when the attitudes of learners are considered.

REFERENCES

Bagriacik yilmaz & Ayse, (2019). Distance and Face-To-Face Students' Perceptions towards Distance Education: A Comparative Metaphorical Study. *Turkish Online Journal of Distance Education*, 191–207. doi:10.17718/tojde.522705

Baralt, M., & Gurzynski-Weiss, L. (2011). Comparing learners' state anxiety during task-based interaction in computer-mediated and face-to-face communication. *Language Teaching Research, 15*(2), 201–229. https://doi.org/10.1177/0265532210388717

Berger & Jim, (2013). Evaluating the Effectiveness of Instruction Using Principles of Adult Learning. *Assessing and Evaluating Adult Learning in Career and Technical Education*, 173–190. doi:10.4018/978-1-61520-745-9.ch011

Bos-Bonnie & Linda et al, (2017). Effectiveness of an Individual, Online e-Learning Program about Sexually Transmitted Infections: a Prospective Cohort Study. *BMC Family Practice*, vol. 18, no. 1. doi:10.1186/s12875-017-0625-1

"Computer Assisted Instruction (CAI)." *WikiEducator*, wikieducator.org/Computer_Assisted_Instruction_(CAI).

Culbertson, J.D., & D.M. Smith (2006). On-Line Compared with Face-to-Face Introductory Food Science Courses: An Assessment. *Journal of Food Science Education*, vol. 2, no. 1, 13–16. doi:10.1111/j.1541-4329.2003.tb00019.x

Dalal, Dr. Suman, & Ms. Rinku Rani (2013). Effectiveness Of Computer Assisted Instruction (CAI) Improving the Pupil's Language Creativity in English. *International Journal of Engineering Research & Technology*, www.ijert.org/effectiveness-of-computer-assisted-instruction-cai-improving-the-pupils-language-creativity-in-english.

Devi, & Sharmila (2011). Development of CAI (Computer Assisted Instruction) Programme for the Students of VIII Class in the Subject of Mathematics. *Indian Journal of Applied Research*, vol. 3, no. 8,192–194. doi:10.15373/2249555x/aug2013/65.

Dutton, Yvonne, & Margaret Ryznar (2019). Assessing Online Learning in Law Schools: Students Say Online Classes Deliver. doi:10.31228/osf.io/bm8s5

"Education." *Wikipedia*, Wikimedia Foundation, 6 May 2021, en.wikipedia.org/wiki/Education.

Eldenfria, Atef, & Hosam Al-Samarraie (2019). The Effectiveness of an Online Learning System Based on Aptitude Scores: An Effort to Improve Students' Brain Activation. *Education and Information Technologies*, vol. 24, no. 5,2763–2777., doi:10.1007/s10639-019-09895-2.

"Face-to-Face Learning." *What Is Face-to-Face Learning " Colleges*, www.colleges.co.za/face-to-face-learning.

Foo & Chi-chung, et al (2021). A Comparative Study Regarding Distance Learning and the Conventional Face-to-Face Approach Conducted Problem-Based Learning Tutorial during the COVID-19 Pandemic. *BMC Medical Education*, vol. 21, no. 1, doi:10.1186/s12909-021-02575-1.

Fung Chi-yuen, Eddie (2012). The Effectiveness of Computer Assisted Instruction and Teacher Assisted Instruction for Teaching English Words to Mentally Handicapped Children with Autism. doi:10.5353/th_b3196160.

Gautam & Priyanka (2020). Advantages And Disadvantages Of Online Learning. *ELearning Industry*, elearningindustry.com/advantages-and-disadvantages-online-learning.

Gupta, & Deepak R(2004). A Comparative Study of Online and Face to Face Education for Learners and Teachers in Management. *Shodhganga@INFLIBNET: a Comparative Study of Online and Face to Face Education for Learners and Teachers in Management*, Jhunjhunu, shodhganga.inflibnet.ac.in/jspui/handle/10603/257304

Khatony, & Alireza, et al(2009). The Effectiveness of Web-Based and Face-to-Face Continuing Education Methods on Nurses' Knowledge about AIDS: a Comparative Study. *BMC Medical Education*, vol. 9, no. 1, doi:10.1186/1472-6920-9-41

Kılıçkaya, & Ferit (2013). Computer-Based Grammar Instruction in an EFL Context: Improving the Effectiveness of Teaching Adverbial Clauses. *Computer Assisted Language Learning*, vol. 28, no. 4, 325–340. doi:10.1080/09588221.2013.818563

"Know More. Live Brighter." *Verywell Mind*, Verywell Mind, 25 Mar. 2020, www.verywellmind.com/.

Kumar, Ajai, & Lokesh Kumar (2017). The Effectiveness of Computer Assisted Instruction on Science Achievement of Secondary School Students. *Learning Community-An International Journal of Educational and Social Development*, vol. 8, no. 2, 75. doi:10.5958/2231-458x.2017.00012.4

Lens, Willy, & Marleen Decruyenaere (1991). Motivation and De-Motivation in Secondary Education: Student Characteristics. *Learning and Instruction*, vol. 1, no. 2, 145–159., doi:10.1016/0959-4752(91)90024-3

Lewison, Kiera. "Facts: Is Online Learning As Good As Face-To-Face Learning?" *University of the People*, 15 Oct. 2020, www.uopeople.edu/blog/online-learning-good-as-face-to-face-learning/.

Li, & Shuang, et al (2016). Exploring the Effect of Behavioral Engagement on Learning Achievement in Online Learning Environment: Learning Analytics of Non-Degree Online Learning Data. *2016 International Conference on Educational Innovation through Technology (EITT)*, doi:10.1109/eitt.2016.56

Liu, & Yuliang (2007). A Comparative Study of Learning Styles between Online and Traditional Students - Yuliang Liu, 2007. *SAGE Journals*, journals.sagepub.com/doi/10.2190/TJ34-6U66-8L72-2825

Mącznik, & Aleksandra K., et al (2015). Online Technology Use in Physiotherapy Teaching and Learning: a Systematic Review of Effectiveness and Users' Perceptions. *BMC Medical Education*, vol. 15, no. 1, doi:10.1186/s12909-015-0429-8.

Nguyen, Jimmy, & Cynthia B. Paschal (2002). Development of Online Ultrasound Instructional Module and Comparison to Traditional Teaching Methods. *Journal of Engineering Education*, vol. 91, no. 3, 275–283., doi:10.1002/j.2168-9830.2002.tb00704

"Online Learning vs Face to Face Learning." *Kiwi LMS*, startkiwi.com/blog/online-learning-vs-face-to-face-learning/.

Online Vs. Face-to-Face: A Comparison of Student ... - ERIC. files.eric.ed.gov/fulltext/EJ1193426.pdf.

Paechter, Manuela, & Brigitte Maier (2010). Online or Face-to-Face? Students' Experiences and Preferences in e-Learning. *The Internet and Higher Education*, vol. 13, no.292–297. doi:10.1016/j.iheduc.2010.09.004

Paul, Jasmine, & Felicia Jefferson (2019). A Comparative Analysis of Student Performance in an Online vs. Face-to-Face Environmental Science Course From 2009 to 2016.*Frontiers*, www.frontiersin.org/articles/10.3389/fcomp.2019.00007/full

Rubadeau, & Ksan (2020). From Face to Face to Online. *Online Education for Teachers of English as a Global Language*, 135–151. doi:10.4324/9780429264900-9

Russell, & Michael, et al (2019). Face-to-face and online professional development for mathematics teachers: a comparative study. *Online Learning*, vol. 13, no. 2, doi:10.24059/olj.v13i2.1669

Sunder, & Prem (2009). *Education System in India*. KSK Publishers & Distributors.

Tannenbaum, Cara, & Krystle Van Hoof (2018). Effectiveness of Online Learning on Health Researcher Capacity to Appropriately Integrate Sex, Gender, or Both in Grant Proposals. *Biology of Sex Differences*, vol. 9, no. 1. doi:10.1186/s13293-018-0197-3

Taylor, & Helen (2014). Engaging Psychology Students in Online Classes. *PsycEXTRA Dataset*, doi:10.1037/e577852014-003

Vassileva, & Julita (2018). A Classification and Synthesis of Student Modelling Techniques in Intelligent Computer-Assisted Instruction. *Computer Assisted Learning*, 202–213., doi:10.1007/bfb0020881

Wang, & Yu, et al (2018). An Investigation of Effectiveness Differences between in-Class and Online Learning: an Engineering Drawing Case Study.*International Journal on Interactive Design and Manufacturing (IJIDeM)*, vol. 13, no. 1, 89–98., doi:10.1007/s12008-018-0510-8

Xu, S. (2016). Face-to-face Interaction in a Speaking Test: A Corpus-Based Study of Chinese Learners' Basic Spoken Vocabulary. *Assessing Chinese Learners of English*, 85–100. https://doi.org/10.1057/9781137449788_5

Yu, Jieun, & Yongseok Jee (2020). Analysis of Online Classes in Physical Education during the COVID-19 Pandemic. *Education Sciences*, vol. 11, no. 1,3., doi:10.3390/educsci11010003

APPENDIX-I

GENERAL INFORMATION

Name:

Age:

Name of the Programme:

Year of study: I yr ☐ II yr ☐

Subject specialization:

Locality of residence: Rural ☐ Urban ☐

Do you have access to computers –Yes ☐ No ☐

Do you possessLaptop Deskto ☐ Mobile ☐ ☐

Which is comfortable for you to work? Laptop ☐ Desktop M ☐ bile ☐

What are the software you are aware of which is used for online classes?

Which software is comfortable for you?

Have you attended any Online Course or Programme other than regular classes? Yes ☐ No ☐

APPENDIX-II

Rating Scale on Attitude towards Online Education

[(V.Sindhiya, &Dr. Indu H), 2021)

Please select the option that you feel is suitable for you for the statements provided in the rating scale. This is a five point scale with options SA-Strongly Agree, A- Agree, UD-Undecided, DA-Disagree SDA-Strongly Disagree

Item No	Statements	SA	A	N	DA	SDA
1.	Online lectures are similar to face to face class.					
2.	Online lectures have similar discipline and rules as one has in face to face class.					
3.	Online lectures have same popularity as face to face class.					
4.	Online class offers more innovative ways of learning.					
5.	Exam pattern is similar in online and face to face class.					
6.	Face to face class brings in more interaction between students and teachers.					
7.	Students are more active in online class					
8.	Class control is more in Online teaching					

9.	The queries get easily resolved in face to face class.					
10.	The queries get easily resolved in online class.					
11.	There is more competitiveness among the students in face to face class.					
12.	Attention span of students is more in online class.					
13.	Assignments could be done effectively in a face to face class.					
14.	Student attention span is more in face to face class.					
15.	Teachers have more control in face to face class.					
16.	Student participation is more in face to face class.					
17.	Content coverage is more in face to face class.					
18.	Discussion and sharing of idea is more in face to face class					
19.	Online class is more flexible					
20.	Online class are cost effective					
21.	Online class offers the flexibility of doing multitasks.					
22.	Online class has more dynamic content.					
23.	Online class is more student friendly.					
24.	The teachers require the same skills in both online and face to face class.					

25.	Resources of online class have unlimited access.					
26.	Instruction with computer facilities helps the teacher to present the content interestingly.					
27.	Technology assisted teaching reduces the anxiety of the teacher					
28.	Technology assisted teaching –learning reduces the workload of the teacher					
29.	Generally, I am more engaged in my online courses					
30.	Online learning helps me understand course material					
31.	My online experience has increased my opportunity to access and use information					
32.	I am more likely to ask questions in an online course					
33.	Generally, I understand course requirements better in an online course					
34.	I can manage my own learning better in online courses					
35.	Assessment of my academic progress is more accurate in online courses					
36.	Response time from teachers is quicker in online courses					
37.	Presentation of seminar is easy by online mode					
38.	Teaching using online mode is exciting					
39.	It is easy to bunk class in online mode					
40.	The evaluation in online mode is accurate					

41.	There is a lot of chances to copy answers in exam in online mode					
42.	It is better to have face to face interaction for better learning					
43.	Individual attention cannot be provided in the online mode of teaching					
44.	Online mode of teaching makes teacher lazy					
45.	In a computer mediated classroom, the teacher acts as a facilitator than as an instructor					

This appendix convert into Google form and send to the student through link. The link is given below.

https://forms.gle/pQftMbR5Ywquv6zN9