THE IMPACT OF THE PANDEMIC ON E-LEARNING AND ITS EVOLUTION: A MIXED-METHODS STUDY

By

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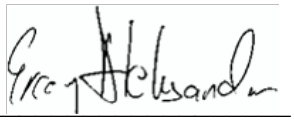
APPROVED BY 

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ABSTRACT

THE IMPACT OF THE PANDEMIC ON E-LEARNING AND ITS EVOLUTION: A MIXED-METHODS STUDY

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In the past few years, technology has significantly transformed countries across the world. Technology has affected our lives in many aspects, particularly in terms of learning methods. E-learning provides the globalization of education, allowing learners from various parts of the world to access education regardless of location with an internet connection. The education sector has experienced a drastic change with the emergence of e-learning as a major part of the modern education system. The occurrence of the pandemic has affected the world severely, including the education system. Online learning offers many advantages to students in regulating their education in crisis time. The present study executes mixed method research methodology where quantitative analysis utilizes the SPSS version 23 software package. A structured questionnaire survey technique is utilized to gather the data from students and teachers. Qualitative analysis was conducted using the interview technique. Purposive sampling strategy has been adopted for analysis. The objective behind the technique is to gather data relating to the perception of students and teachers regarding e-learning and its growth in the time of the pandemic. Descriptive statistics, Independent sample T-test, ANOVA, Regression, correlation, and frequency

tests are performed in research. The outcomes of the study revealed that there is a significant impact of a pandemic on e-learning in higher education, and online learning has evolved due to the pandemic, and there is an implication for the future of higher education.

Furthermore, the study also indicates the prevalence of challenges and opportunities for e-learning in the context of the pandemic. The current study concludes that the effectiveness and the value of e-learning impact the perception of students and faculty. As technology advances, it is evident that e-learning will play an increasingly important role in the education sector.

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LIST OF ABBREVIATIONS

DL	-	Distance Learning
CML	-	Computer Managed Learning
CBT	-	Computer Based Training
WBT	-	Web-Based Training
VR	-	Virtual Reality
AR	-	Augmented Reality
MOOC	-	Massive Open Online Courses
GE	-	Game Elements
ICT	-	Information Communication Technology
OL	-	Open Learning
HE	-	Higher Education

CHAPTER I

INTRODUCTION

1.1 Introduction

Learning is eventually contemplated as one of the important supports for changes in society; it is a course of attaining performance, skill, and knowledge (Elfaki et al., 2019, p. 225-33.). Access to education has been a privilege for many people in history and has always been of utmost importance to people. Traditional education no longer suits some people because of the busy schedules of this generation. Technology has an influential role in the education field; technology developments impact education field enhancement by providing different ways of learning chances.

Virtual education is an alternative to classroom education. E-learning can be as effective as classroom learning, as many students use applications related to educational areas in a wide range. Even educational institutions and schools are interested in implementing online courses, as they are growing very fast and are gaining people's attention.

E-learning processes are found to be more convenient than classroom learning as they require the physical presence of students, which is not possible for some who have trouble appearing in classes due to various reasons (Tawafak et al., 2019, p. 388-397.). The process of e-learning includes the use of online devices, information shared with professors and among other students, communication using multimedia type, and lecturers are objective. Also, flexible timings and location of classes are important elements that attract and interest many people in internet learning. Student's education materials are formed using Internet technology and other necessary technologies. Some may not consider virtual education as a suitable option for learning, yet online learning allows one to access massive amounts of information in bulk and easily to improve competency, knowledge, and effectiveness.

1.2 E-learning and its evolution

The history of Distance Learning (DL) started in the 1700s and 1800s; this period was the main reason for today's skill and knowledge in society. It can be classified into three different ages and five various generations at the instruction level. The first level of distance learning was courses, which is studying in correspondence, also known as independent study and home study, where academic study materials were sent to the individual through mail to learn (Bozkurt, 2019, p. 252-273). During those days, transportation was commonly by railway only, which was cheap and fast, yet people accessed education from work and home. Most adults were students of correspondence studies who could make the decisions for this way of education, and all had some similar reasons, such as family, occupational, and social commitments. In earlier days, education was provided only through teachers, so educators in the distance had only one basic motive, which was to somehow reach the learners from a distance and educate them interested in learning.

In an era of revolution, the only technology dominating was print, so the teaching style of this period was written materials, printing the study, and delivering to the distance learner. This was categorized as an industrial form of schooling. The combination of the postal service for delivering study material and the printing press for quick written material made correspondence study possible for people. Particularly, people left out of traditional education, such as farmers, workers, and women, were the main elements for the foundation of distance learning. Providing education to commoners from a distance decreased illiteracy rates and injustices in society like preventing women from learning and workers from entering traditional education institutes (Gatus and Vargas, 2022, p. 2594-2601).

Distance learning progressed to another level through radio because it was the dominant technology during this period. Radio improved and speeded the quickness of interaction and communication. Later, it increased among educators and learners. Through radio learning became easier for people because of less time delivery and immediate reach to study contents.

Consequently, because of easy reach to study content, more people were interested in learning from a distance eventually; this led to an increase in educated people and a number of people interested in education as it gave them independence and knowledge. Soon, universities emerged during the '90s with a decent number of students to study, which was beyond expectation at that particular time (Perraton, 2020, p. 34-45.).

The third age of distance learning was e-learning which was known as digital and network age. Knowledge can be gained via digital technologies rather than appearing in person and transporting from different regions, which is time-consuming. Earlier learners were very dependent on teachers for education and means of receiving study material; a delay in teachers reaching the coaching center would be a waste of time for learners. But, digital technology offers many possibilities for interaction between learners and educators. Simply put, mobile learning has rich quality and communicating content. People shows interest in learning for live long as e-learning makes it possible for all people regardless of age and present education qualification of individual (Tawafak et al., 2019, p. 388-397.).

Distance learning has been around for centuries, and e-learning was developed in 1920. also, distance learning evolution naturally came down to online learning (Tawafak et al., p. 388-397.), which is implemented and utilized using electronic devices and technologies available in this current generation. In those times, people used mail and postcards for learning and to do courses in correspondence from a distance so the mail is taken as the origin of e-learning (Dar et al., 2019, p. 377-380.). Emerging of the internet in the 20th century caused tremendous growth in e-learning with the help of PC (personal computers). Although the intention of distance learning remained the same throughout all these years of history, the medium to teach and learn kept changing for the better according to the current period of time. E-learning is considered an important factor for the growth of any nation, as education plays a major role in various aspects. Soon after independence, the government of India faced many challenges in bringing education to all the people of the country, along with consistency in the

system of education. The enormous growth of e-learning is due to its way of being easily available and approachable for people regardless of place and time.

Learning and teaching is definitely a two-way process involving teachers to teach and students to learn. For past decades, learning and teaching methods have completely altered with additional benefits (Suganthi, p. 51-53.). A long time ago, only books and people were sources of knowledge for students and learners who were interested in a particular subject. The main factor expected and required from the student side is problem and analytical solving ability along with critical thinking to improve their knowledge. Using technology to learn eventually paves the way for students to understand technology and knowledge related to technologies in the current market and support the development and growth of technologies. Also, modern learning using technology is a constructive method as it demands learners' understanding and skill to progress on the subject with their own experience of knowledge.

E-learning transforms learning to student-involved and centered from instructor-centered (Narayanan, 2020, p. 1-4.). Online learning mainly focuses on sharing information and interacting between people to gain knowledge, so it requires participants, of course, to focus and contribute a certain amount of time to follow up instruction. Traditional education was instructor-oriented, with teachers discussing a few pieces of information on topics and completing syllabi. E-learning evolved into virtual learning when educational institutions started using computers and other electronic devices to teach students with improved methods. All levels of people in society are aware of e-learning, and its benefits, which has made e-learning grow among people tremendously to date. Also, people of this generation are aware of accessing and utilizing technologies available for education in the market for their own benefit without much guidance and difficulties.

E-learning, also known as open learning (Gatus and Vargas, p. 2594-2601.), is the main motive of distance learning, e-learning, and open learning. The main motive is to remove the hurdles that keep people from education. E-learning is flexible and scalable so that people can

access education and learn things they are interested in regardless of their prior education status and disabilities.

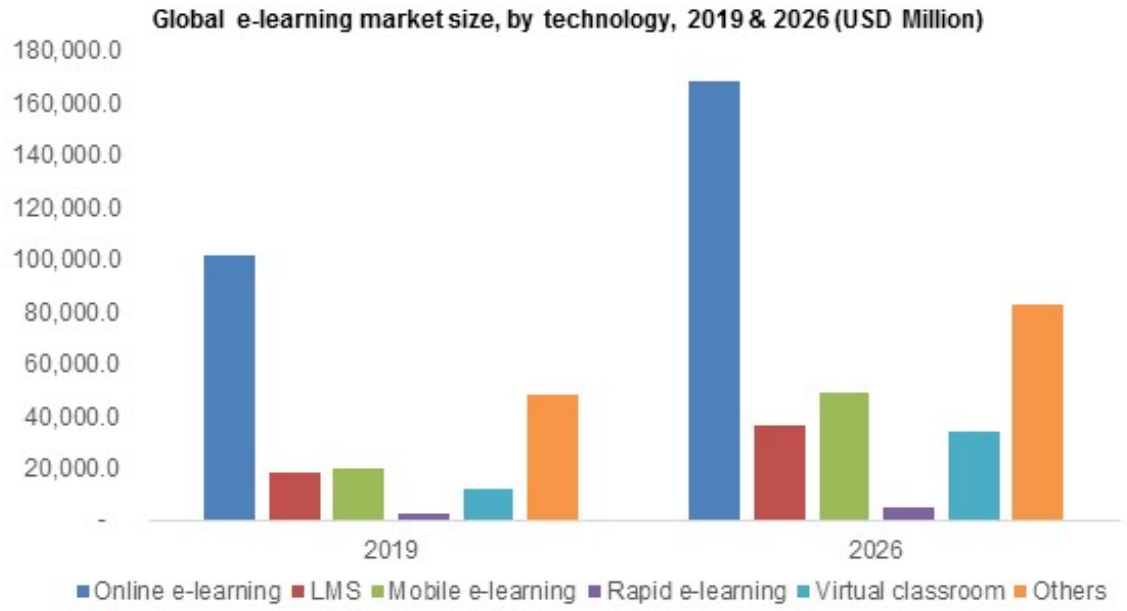

Figure 1.1

Prediction of e-learning market size growth in the global market

Source: (WorldEconomicForum, 2021, p. .)

The figure describes the e-learning growth in popularity in 2019 and 2026. It describes the market size of online education among people all over the world over the period of 2019 to 2026 and expects the online education sector to be $1 trillion in 2025 (WorldEconomicForum, 2021, p. .). From 2019 to 2026, it is expected that the growth of online learning, mobile learning, and virtual classrooms significantly expand over the period. This shows students will have an even larger range of courses to their liking and an impact of e-learning on this generation of students, even among people with a passion for learning.

After the pandemic, the world has changed globally and has been reset for all new developments and emerging technologies, even though there are certain things unchanged, such as the importance of education, the passion for learning, and many other things (Bozkurt and

Sharma, 2020, p. i-x.). Due to the upcoming pandemic, globalization has been conflicted, especially in education. Distance learning severely decreased the managerial energy, construction and lesson documentation, register, and boycotting of lectures.

Professors and pupils say online education is a way to motivate to listen to lectures across the world despite the tough situations that keep students from arriving at educational institutions. It makes students individual learners and learn simultaneously at any time.

E-learning requires only a few minutes of registration and basic details for contacting the individual related to the course and assignment. This generates possibilities for taking world-class, high-quality classes, which are available for people from different regions all over the world.

Many experts suggested that understanding technology and methods of instruction is necessary for both students and teachers in distance learning, as this involves technologies that are not familiar to students during class hours (Sari and Nayır, 2020, p. 328-360.).

E-learning has advanced with the help of technologies; the latest evolution of distance learning is e-learning, which requires electronic devices to educate and learn. Technology in communication and information made changes in all kinds of industries. Online learning is considered a new way to offer services related to education with the help of electronic devices that advance the skills and knowledge of individuals (Pham et al., 2019, p. 1-26.). E-learning has been famous among universities because it gives away benefits like the generous costs associated with teaching and learning in person and infrastructure maintenance to colleges and universities.

E-learning using mobile has become an important concern for many universities because new kinds of applications and devices are changing education so it makes e-learning to be appropriately utilized and executed. The pandemic has been the biggest crisis for people in the last three years, which largely impacted the education system and led to the shutdown of schools and colleges; students suffered because of the sudden closure of educational

institutions during a crisis (Salta et al., 2022, p. 93-122.). Transformation from traditional learning to online learning people faced some issues and found it difficult to focus. Slowly, the learning community accepted e-learning with an understanding of the pandemic critical consequences.

Education is an important factor in the development of individuals, communities, countries, and the world. This is the only way for many people to climb up social ladders and treasure, which cannot be taken away as said knowledge is something that never leaves and stays regardless of a person's status. The amount of people educated now decides the future of the nation and the fate of the next generation. So, learning is important in any state of condition, which made people from all over the world accept online learning as an alternative to traditional learning in periods of crisis. In the current period, a diverse approach to education is presented by education institutes.

1.3 Types of E-Learning

1.3.1 Computer Managed Learning (C.M.L)

Computer-managed learning (CML) refers to a technological system that uses computers and software to facilitate and manage learning. It automates various aspects of the learning process, including content delivery, assessment, and progress tracking. CML systems typically utilize algorithms and data analysis to adapt the learning experience to individual learners, providing personalized instruction and feedback. By leveraging technology, CML aims to enhance learning outcomes by providing efficient, interactive, and adaptive learning experiences.

1.3.2 Synchronous Online Learning

Synchronous online learning refers to a mode of education in which students and teachers engage in real-time activities and interact with each other through virtual platforms. In this learning approach, participants are required to be present at specific scheduled times to attend live lectures, discussions, or group activities facilitated by an instructor. Unlike asynchronous

learning, which allows students to access pre-recorded lectures and materials at their own pace, synchronous online learning promotes immediate engagement and collaboration among participants in a virtual classroom setting.

1.3.3 Asynchronous Online Learning

Asynchronous online learning refers to a learning method wherein students access course materials, complete assignments, and interact with instructors and peers at their own pace and time without the need for real-time live instruction. In this educational format, students typically have the freedom to set their own schedule and work through the course material at their own convenience. Asynchronous online learning allows for flexibility and self-paced progression, enabling students to engage in their studies while accommodating personal and professional commitments.

1.3.4 Adaptive E-learning

This was the new type of E-learning, which allowed every learner to redesign and implement learning materials with ease. With several factors, such as considering characteristics, goals, skills, abilities, and student performance, the adaptive E-learning method allows education to be more personalized and student-focused when compared to earlier practices. Laboratory-based adaptive instructional techniques were now feasible for analyzing student data in terms of mathematical sequencing. If executed correctly, this could mark the beginning of a new age of educational science. Despite the fact that it was more challenging to design and implement than traditional teaching approaches, its potential value and effectiveness are often underestimated.

Technology is accepted for the growth of several procedures of supply towards e-learning to adapt to several preferences besides the requirements of learners. Few educators won't have any requirements for systems because the method of the preeminent systems is dominant enough for learning. Few of the regularly utilized methods of delivery towards e-learning is mentioned below (Bouchrika, 2023, p. 1-2.).

1. **Computer-Based Training or Web-Based Training**

Learners of computer-based Training (CBT) will have access to content via media like DVDs and CDs. CBT is regularly run through the system of the learner. And when it comes to Web-Based Training (WBT), learners would be utilizing the internet as a media. Management systems in learning are regularly utilized in the perspectives of WBT. Through both WBT and CBT, sessions for the students are self-paced and we won't be able to find any communication between teachers and students. Such methods of delivery would naturally work for adults who wish to learn a new skill.

2. **Blended eLearning**

Combined e-learning associates both face-to-face teaching and teaching, which is based on computer-mediated. This procedure enhances the instruction in person through technology like web-based communication and collaboration software. The combined e-learning inspires information and educational evaluation beyond the settings of the classroom. It simplifies the combination of diverse spaces for learning and supplies malleability on the basis of the program of the learner.

3. **Mobile eLearning**

The accessibility of modern mobile technologies, such as greater bandwidth organization and wireless technologies, is also to be considered in the augmentation of e-learning headed for mobile e-learning. In this perspective, handheld computing devices are basically utilized to deliver access to the learning content and general resources.

4. **Adaptive Learning**

Adaptive learning is an educational approach that leverages technology to provide personalized and tailored learning experiences for individual students. It encompasses a wide range of technologies and techniques that adapt instruction and resources based on each learner's unique needs, preferences, and progress. The main objective of adaptive learning is to

enhance the learning process by customizing educational content, pace, and strategies to maximize student engagement and comprehension.

1.4 E-Learning Activities

Gamification is basically the word utilized for the overview of $game\ elements(GE)$ in the frameworks that are non-game plus its applications (Rojas-López et al., 2019, p. 583-597.). It is frequently utilized in learning the framework to enhance engagement among students and the way they perform. Gamification is launched as a resolution to implement engagement among students in e-learning schemes. It implicates analytically adding GE to several regions in platforms of e-learning.

The target of ICT is to make the students enthusiastic and involved in their activities of leading as well as learning in order to enhance their learning skills throughout life. The process of getting an education during the pandemic involves the students utilizing various digital learning platforms. Google Class room, Zoom, LMS, and Google Meet are the commonly utilized media. The best instance for instigative e-learning is when the students will be given a situation or else the query and will be permitted to explain as well as respond. Hence an extended method can be expected to provide the solution for the problem. By using the technology of Virtual Reality (VR) and augmented Reality (AR), we will have the option of experiencing real-life circumstances like meetings in board rooms, training halls, or else conversations in the cafeteria. In order to conquer quarantine problems, numerous research explained the utilization of online platforms through the tools for video conferencing, which subjugated learning as well as teaching, including Google, Microsoft Team, Zoom, and Moodle (Alfadda and Mahdi, 2021, p. 883-900.).

1.4.1 Q&A Sessions

Sessions of Q&A let the students carry their process of learning in the mode group setting. Students are cheered to carry a question as well and the group will have the chance to

respond. A session like that will occupy the learners in raising the questions, plus the group is anticipated to respond. The instructor would be contributing to the discussion by expanding or intensifying the constructed information or the comprehension level (studios, 2020, p. .). Sessions similar to that are constantly a modest yet predominant way to start an interaction among the students. Accumulating sessions of exercise otherwise the evaluations through the way of puzzles, multiple-choice queries, and quizzes could hold the learner's attention.

1.4.2 Group Discussion

Media of discussion delivers students through available platforms towards group discussions in the atmosphere of e-learning. They also support the instructors in tracking the student discussions. To enhance learning among students, it is essential for the teachers to recognize the students' intellectual involvement in the forum of discussion (Kew and Tasir, 2021, p. 39-57.). Sessions like brainstorming allow the learners online to challenge subjects and tasks through their devices through blogs, groups on social media, and discussions online.

1.4.3 Hands-on Demos

Delivering the users with chances to be involved through activities that are realistic from the perspective of e-learning is the supreme way to enhance the inclusive experience in learning, specifically the sequence or learning methods. Predominantly well appropriate to software or application tutoring correspondences and hands-on demonstrations. There might be a cost instigated in constructing a hands-on practice that is appropriate for utilizing it in an e-learning atmosphere; anyhow, accumulating this communicating practice into a session delivers indulgence and recollecting results (studios, 2020, p. .).

1.5 Knowledge and Practice of E-learning

The adoption of e-learning has become a global trend in the learning field, with the aim of improving traditional learning methods and increasing capacity for training and education. This trend has been employed in a deliberately unplanned or purposeful manner to improve the

skills and knowledge of students, as needed in today's world. The smooth functioning of an e-learning platform is crucial for effective learning as well as learner satisfaction. The best virtual knowledge environment involves 3 groups of interactions such as learner–content interaction (LCI), learner–learner interaction (Mander, p. 3-5.), and learner–facilitator interaction (LFI). These relationships were crucial for achieving learner satisfaction and learning effectiveness through promoting higher-order thinking. Furthermore, they facilitate inspiring learning experiences for new learners. This research emphasizes the learners-facilitator and learner-learner interactions, which were both potential replacements for other interactions (Nyathi et al., 2023, p. 210-225.).

E-learning was introduced in developed economies through careful planning over time. This planning was based on the understanding that e-learning is likely to gain more visibility and influence as time goes on. The pandemic (i.e., COVID-19) caused a significant decline in in-person learning, leading to an unrestricted shift to E-learning among educational organizations in most advanced economies (Amanor-Mfoafo et al., 2020, p. 2-5.).

Information and communication technology (ICT) is a crucial element of the learning system that offers teachers an opportunity to enhance teaching and improve students' performance. The ICT used in education goes beyond the transfer of knowledge from enthusiastic teachers to students; it also facilitates the sharing of experiences among a group of peers in real-time. The ICT impact on education can enhance the abilities of teachers and students, alter curriculum, foster more comprehensive and extensive learning, and improve learning and teaching techniques in general (Qazi et al., 2021, p. 45539-45551.).

It was a slow process to introduce fresh learning platforms like blended learning (b-learning) and mobile learning (m-learning) through higher education institutions in emerging economies. Despite its significant benefits, B-learning was not widely adopted due to low rates of vaccination against COVID-19. Due to the potential spread of viruses, Zimbabwe experienced prolonged periods of closure in the education segment (Cihan, 2021, p. 107708.).

In the period of 21st century, teaching involves more than a group of interpersonal and practical skills. To achieve this, a change in mindset must be nurtured through continuous professional development. Educational professionals and teachers must collaborate to reconcile the disparities between their education and the educational needs of students. However, this had much easier technology which was already incorporated into the public school organization in Kuwait (Alhashem et al., 2022, p. 240-255.).

1.6 Consequences of E-learning

Initially, the pandemic period led all the universities to shut down, and 1.2 billion graduate students were out of education. Thus, education policies dramatically changed in all ways. The largest demand for e-learning emerged, bringing a paradigm transition from traditional learning to e-learning via digital platforms (Mallikarjuna et al., 2020, p. 8753-8758.).

Some points are noticed that the increased role of communication and information technologies have emerged vastly during the COVID-19 lockdown period. Further, parents tackled many challenges to the closure of schools, which are aggravated issues in social inequality. Migrations from traditional education to e-learning education during the pandemic period cannot happen overnight. Various applications are used, such as Zoom, Google Class, MS Teams, and others. With the unexpected transition from traditional learning to e-learning, there are several problems tackled by both lecturers and students. Poor internet connection and blackouts pose challenges for e-learning platforms. Though there is a problem in connection, the medical departments have started the e-learning system to continue their studies without taking any breaks. Though e-learning has some disadvantages, online education also has several advantages. Students and learners highly preferred learning through the e-learning education system (Hurley, 2023, p. .). The benefits and advantages of e-learning are listed in the following.

Everywhere Learning is not limited through place or time, Able to leverage analytics, Fairer it extends to more people to learn, Supports individual learning needs and styles, is Effective

in Cost, Builds resilience into the education system, Easily adaptable, yet consistent, Provides continued education for vulnerable groups, Always developing in all aspects, Effective at producing good results, Possible solution to teacher shortages, Environmentally sound, Promotes collaboration, Self-paced, Time Efficient In science and technology, modern world, the education modes are evolved from non-formal to informal, informal to formal, formal to distance learning and distance learning to e-learning.

1.7 Problem Identification

Every discovery and new innovation faced some complications among certain criteria of people in the emerging phase. Distance education also faced criticism during its period, and e-learning is a natural evolution of distance learning in which people used postcards and mail as modes of communication. E-learning has grown rapidly during the pandemic period among people across the world because internet-enabled technologies are only a requirement for communication, but still, some people find it difficult to adapt to online education with the use of technologies. A major reason for people to be apprehensive about e-learning is limited access to technology or the internet, which leads to a lack of technology knowledge. Also, there are other factors that affect e-learning growth and conception among common people of the world. There is less training for students to learn regarding initiatives of e-learning, inadequate technology resources, adaptive issues among students because of low motivation and digital literacy, lack of support from administration and technical side, non-friendly user format, lack of understanding in implementing technology and mismatching them, misapprehension on online education topic among people.

1.8 Research Hypothesis

$H_1$1: There is a significant impact of a pandemic on e-learning in higher education

$H_0$1: There is no significant impact of a pandemic on e-learning in higher education

$H_1$2: There exists a challenge and opportunity for e-learning in the context of the pandemic

$H_0$2: There is no challenge and opportunity for e-learning in the context of the pandemic

$H_1$3: E-learning has evolved due to the pandemic and there is an implication for the future of higher education

$H_0$3: E-learning has not evolved due to the pandemic and there is no implication for the future of higher education

$H_0$4: Effectiveness and the value of e-learning impact the perception of students and faculty

$H_1$4: Effectiveness and the value of e-learning does not impact the perception of students and faculty

1.9 Research Questions

1. What are the challenges and opportunities of e-learning in the pandemic situation?
2. How has e-learning evolved due to the Pandemic, and what implications does this have for the future of higher education?
3. How do students and faculty perceive the effectiveness and value of e-learning, and what factors contribute to these perceptions?

1.10 Research Objectives

1. To examine the impact of the Pandemic on e-learning in higher education.
2. To identify the challenges and opportunities of e-learning in the pandemic situation
3. To explore how e-learning has evolved due to the Pandemic and its implications for the future of higher education.
4. To investigate the perceptions of students and faculty regarding the effectiveness and value of e-learning and the factors that contribute to these perceptions.

1.11 Significance of the Study

During the pandemic, educational institutions have faced a lot of difficulties as students were kept away from studies for a long time, which couldn't be prolonged anymore since it affected the global educational percentage and future generations of all the countries. E-Learning offered distance education to students regardless of time and place. Universities, schools, and other educational institutions adopted online learning to provide education to learners and made students adapt quickly to new technologies and platforms to avoid a lack of education and learning in crisis. The pandemic especially affected the higher education of many students, making them fear the future as they couldn't start their education or complete courses. Since, e-learning is flexible with time, accessible with just technology, and cost-efficient as students can learn and educate themselves at home or the workplace without any travel to universities and schools which also paved the way for many higher education students to learn from high-quality universities with highly qualified professors in online from different regions using technologies and application available in online platform. E-learning improves students' interaction and engagement time in a productive way as online classes are two-way communication processes and student-oriented with sharing knowledge among fellow mates and instructors.

1.12 Scope of the Study

Only a few studies have been conducted on the significance of the pandemic on E-learning and its role in the evolution of e-learning. A mixed method study is utilized in the present study to analyze the role of the pandemic in the growth and development of e-learning. The utilization of e-learning during the pandemic and the pandemic's impact on the growth of e-learning is the primary subject of research. Consequently, by "tying up loose ends" of exploratory research, this investigation improves our understanding of the significance of e-learning and the pandemic effect on the growth of e-learning among people. The study will fill

the gap in the literature, which will help people understand the significance of e-learning for future generations and the pandemic impact on e-learning worldwide.

1.13 Summary

This paper describes in detail the significance of the pandemic on the evolution of e-learning. This study focuses on e-learning in higher education during a period of a pandemic. This paper focuses on the factors that challenge the growth and affect opportunities of e-learning in a pandemic. It also explores the influence of the pandemic on e-learning and how it opened new scope for higher education for many students. Perception of people, especially students and instructors of educational institutions, are described in detail with elements influencing that perception.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

E-learning has been referred to as the new pattern of online education, which is based on educational data. It has integrated the recent education theory with supportive technologies to obtain the enhanced performance of smart e-learning. It has been noted from 2 viewpoints. From the perspective of data-driven services, e-learning has been considered as the 3-tier architecture, which includes the service level, data level, and supporting technology level. In recent years, the contribution of e-learning experts in e-learning centers has vastly grown. Determining and then increasing the quality of e-learning programs in return for the success problem is now place the way to ensure the application efficiency.

The E-learning has improved the learners' knowledge and skills. In e-learning, suggestion systems are considered to be the most important. Since the year 2000, these suggestion systems have become famous in e-learning and have included collaborative filtering, hybrid systems, and content-based systems. The utilization of advanced technology like the internet, electronics, and satellite communication has been considered the only substitute that is obtainable to improve and expand the quality of higher education quality.

2.2 E-learning in the Educational Sector

The development and usage of e-learning in education have been considered the most important accomplishments in higher education. It has solved most problems in this system and has addressed the e-learning challenges as important concerns and issues of society.

From the study conducted by Alenezi and Technology p. 48-56, (2020) it is inferred that the impact of e-learning on teaching and learning behaviors. The first objective is to regulate the roles that computer skills have on students' learning practices. The second

objective is to determine the effectiveness of the number of periods spent on offline or online study.

The third objective is to define the usage of e-learning approaches in the efficiency of teaching. Also, this research has delivered its viewpoint and the analyses of several views regarding the role that e-learning materials have in the performance of teaching and learning behaviors.

The existing study is considered to be marginally significant. The results of this study have provided ideas regarding the features of e-learning and the academic accomplishments for the endowment of critical data to raise the studies' work in these sectors. It has also provided the essential knowledge and guidelines that apprehensive policymakers have taken advantage of. Finally, this paper has highlighted the inputs to researchers, teachers, and learners concerned with e-learning.

The students know about e-learning, and they have been taught via e-learning. This research has been conducted in institutes that offer higher studies in New Delhi and Ahmadabad. Also, these institutes have been teaching students in the e-learning method and within their classroom teaching.

This existing study has found that in the modern education system, it is significant for educational institutes to utilize e-learning, which has provided flexibility for students and has helped to increase their learning strategies.

Mainly, it is deceptive from the results that e-learning has been accepted by the students in the academic illumination and as a source of reference. The stimulating and enlightening discovery that has come from the results is that female students have equally efficiently used e-learning than male students.

The existing study conducted by Pratiwi et al. p. 127-133, (2021) aims to regulate the e-learning systems' positive impacts on the improvement of the students' learning concepts, and this research has also correlated the e-learning system with the previous learning system.

The method, which has used in this research paper is the method of the literature study, which has obtained the information and data from several accessible sources. In this paper, it has analyzed the chosen data and created the conclusions. Generally, e-learning has been utilized as the learning revolution. It has used the Software Learning Management.

Using this system has helped to increase the student's learning wisely. This has happened because of the usage of highly intensive E-learning, and also the quality of the user has increased. Utilizing this E-learning system has helped to increase the student's learning. Hence, it has declared that the purpose of E-learning is to increase the education to the widespread community and also to improve the learning quality.

The study conducted by (Firmansyah et al., 2021, p. 61-76.) has attempted to explain the e-learning state that has occurred in higher education institutes in Indonesia during the coronavirus pandemic. The main objective of this research paper is to define the conditions of e-learning, which have been executed based on the students' viewpoint as performers who have experienced it directly. The analysis results of this research are expected to be measured for the Higher Education implementation of e-learning after the pandemic. This paper's results are considered to be most important for the stakeholders in Higher Education. In order to achieve e-learning effectiveness, it is necessary to make improvements and adjustments, which have been made on several sides, beginning from the educational institutes as educators, students, and authorities. These are the results obtained in this research paper.

Similarly, another study by (Hamzat and Olatokun, p. 15-20.) the e-learning method. Generally, e-learning has been accepted globally by ensuring the learning method because of the coronavirus era. Also, this research paper has focused on the theoretical definition of e-learning teaching and learning, and it has adopted the various kinds of equipment and the choice of their application in PG training in Nigerian private universities. This research has also addressed the advantages and the lessons learned, and it has faced challenges in the acceptance of e-learning teaching and learning.

Correspondingly, the preceding study p. 123-137 by Hoerunnisa et al., (2019) has declared e-learning with multimedia classes. The advancement of ICT in the current decades has motivated school education to incorporate ICT into prospectuses in several subject domains. The theme of sharing devices in computer subjects and basic networks has been taught in Multimedia classes.

Also, this research has been conducted with the same teacher, method, and approach but in various learning media. The efficiency in the use of e-learning media has been resolute, depending on the mean difference in the learning attainment within the control class and the experimental class.

The independent T-test was required to measure and prove the mean difference in e-learning attainment. The obtained results specify that the E-learning media, with the Moodle platform, has effectively and significantly improved the students' motivation and achievement.

Additionally, E-learning media has also increased students' effective participation in discussions. Finally, this research paper's results are a reference source for education experts and instructors regarding the usage of e-learning in vocational schools.

The study by Alchamdani (2020) (p. 129-136) to determine the coronavirus pandemic impact on the e-learning process. The researcher has surveyed to view the coronavirus pandemic's impact on e-learning universities in Southeast Sulawesi.

This research used descriptive studies with the survey method. This method is considered useful for collecting information from a large number of people regarding a specific issue or topic. However, the e-learning process during the coronavirus pandemic had some hurdles in its implementation.

Accessing the Internet does not produce optimal results in e-learning. Also, internet accessibility, the capability to access instructional media, the capability to obtain the internet quota, and e-learning have mainly been utilized to regulate student contribution in the e-learning process.

The prior study by Tamah et al. (2020) (p. 803-832) has carried out on teachers' language in e-learning during the coronavirus pandemic in Indonesia. This paper has presented the case study, which has involved 18 teachers from 4 regions of Indonesia. Also, the Data has been collected through weekly reflections, interviews with teachers, and online surveys. It has conducted the group interview of 5 students for every 18 teachers used in the triangulation.

The deep analysis has held into the sample illustrative for the different kinds of attributes, and the researchers have mainly focused on 4 teachers for deep analysis. Also, this research has found the interplay of 5 relevant factors in the e-learning processes, contrary to the 5 stages of engagement. These factors are the teachers' and learners' preceding exposure to e-learning, pedagogical knowledge, the support system, and technological knowledge. The Teachers in this research have struggled to increase the quality of e-learning.

Nonetheless, there has been increased awareness of the insufficiency of e-learning delivery and a reformed sense of commitment, so instructors hope to enhance their skills and improve their expert practices

Correspondingly, another study by Al-Rahmi et al. (2019) (p.26797-26809) investigated and explored the potential factors that have influenced the students' behavioral intentions in the usage of the e-learning system. Also, this paper has proposed the extended TAM, which has been verified and examined by the usage of integrating TAM and the IDT. Specifically, the SEM-Amos has been used as an important tool for data analysis. The method of usage of SEM-Amos has 2 levels, which are the convergent validity, the discriminant validity of the measurements, assessing the construct validity, and analyzing the structural model. Finally, the result of Cronbach's Alpha reliability of the coefficient has been considered as 0.911 factors in the IDT and TAM, which have impacted in Students behavior purpose by the usage of E-Learning system in HE.

Similarly, another study has compared the e-learning process, and it is very simple to utilize when an online class is held. This study has shown the e-learning accessibility, usage,

and combination. Additionally, this study has been used to determine e-learning features, and it has made it simple for professors and students to conduct e-learning activities.

This existing study by Amin et al. (2002) (p. 247-257) has been used to view which of the e-learning is considered to be most economical in data pulses. Data pulses are considered the most essential part due to their insufficiency of data pulses, and the students have not used e-learning. This study has used a qualitative method with a survey design, where data has been collected by using the research instruments, and presentation has been linked to numbers.

2.3 Significance of E-Learning Styles

E-learning has produced constructive learning outcomes, and it has allowed students to enthusiastically participate in learning anywhere and at any time. In recent, adaptive e-learning has been considered a developing method that has rapidly spread and been implemented in higher education institutes. Adaptive e-learning is considered as the learning process, where the content has been taught, which depends on the students' responses in learning styles.

The prior research explored the predictive role of e-learning readiness and e-learning style on student engagement. The sample study consisted of 527 students from the Karabuk University Distance Education Centre. This research methodology is correlational. The styles of e-learning and readiness have predicted the behavioral engagement aspect, which has been analyzed using stepwise multiple regression. It has been very difficult to handle student engagement in e-learning because the learners and instructor are not in the same place.

Though the improvement in the observed sense of student engagement in e-learning has set a learning goal, and it has managed the timeline with this goal, and it also has put the effort, and it has identified their requirements and then organized their learning to meet requirements, and hence it has pay the attention to the learning object or learning situations, also enjoyed doing research, it has identified it easy to remember, it has desired to work with the visual elements, then study with visuals facilitating retrieval, take responsibility for their learning,

prefer to work independently and rely on their learning ability (Ergun and Adibatmaz, (2020) (p. 175-189.).

The study carried out on enhanced learning resource recommendation based on online learning style model that has introduced enhanced techniques such as AROLS. This process has integrated with the comprehensive model of the learning style of e-learners. This process has approved the e-learning style as the preceding knowledge. Initially, this process has generated learner groups of various learning styles. Then, the behavioral patterns have been signified by the learning resource parallel matrix, and the association rules of every cluster have been removed, with the help of using the learners' browsing histories.

In the final step, this enhanced method created a personalized approval set of variable size rendering to the data mining results in the earlier steps. Experiments in real data have shown that this method offers better precision in approval results while maintaining computational benefits compared to traditional item-based CF approval. These experiments have proven the value of incorporating e-learning styles in the learning resource references by Chen et al., (2019) (p. 348-356.).

The study conducted by Dikmen (2020) on mediating role of medical students' attitudes towards distance education in the relationship between E-Learning styles and academic achievements with main objective to evaluate the structural equation model in the association of the e-learning styles in calculating the GPA by the medical faculty students in the corona period. Additionally, the intermediating role of attitude in e-learning in the association of the e-learning styles and the GPA has been examined. This research has been carried out by the model of relational screening, and it comes under the models of quantitative research. The data has been collected from 148 students who were studying in the 6-year medical program at the university Dikmen, (2020), (p. 351-373.).

During the coronavirus outbreak, every course in the medical school was taught exclusively by e-learning with the help of Moodle-based LMS. The final results have proved that the attitude in e-learning does not vary by gender.

The Study conducted by Gomede et al. (2020) on use of deep multi-target prediction to identify learning styles with objective to examine the usage of algorithms in computational intelligence to analyze and increase the accuracy of autonomic methods to find the e-learning style. This study has used the hypothesis, and the e-learning style has been accurately found with the help of the CI algorithm, and then the student's e-learning preference has been detected in the Gomede et al. (2020) (p. 1756.).

This research has been conducted, and it has also identified the structures that represent the student's e-learning style depending on the collection of big data in the MOOC environment. It has also used these structures to classify these e-learning styles.

This research paper has investigated whether the theory of e-learning style has been suited to the classification model rather than others. Finally, the results have shown that the algorithms have been used to overcome the limitations found in the existing works.

Similarly, in another study by Ameer and Parveen, (2023) (p.43), the kinesthetic learners' perspective in e-learning has been used to examine. The suggested study aims to screen and obtain the viewpoint of kinesthetic learners among school students in the e-learning environment. The Kinesthetic learners have preferred the tactile input to visual or writing/auditory input. The students have learned the best by doing tasks and then physically experiencing the material. The kinesthetic learners have preferred hands-on learning, and the students have identified the e-learning changeover as difficult. The results of this study have suggested the kinesthetic students' viewpoint of e-learning revealed that students have less assurance in the learned content of e-learning during the Corona time period. Final results have shown that 18% of the study's contributors have screened as the kinesthetic, and then they have reported as the challenging time.

Correspondingly, the existing study by Stamm et al. (2021) (p.3.) on kinesthetic learners during the COVID-19 pandemic: occupational therapy students' perspective on E-learning. The main aim of this study is to understand the kinesthetic learner's viewpoints in the e-learning environment. The purpose of this study is to inspect the Occupational Therapy Doctorate students' viewpoints on e-learning during the period of the coronavirus outbreak. Particularly, the goal is to discover the belvederes and adaptions of the kinesthetic learners' at the transformation from the traditional classroom to online learning. This research has used various methods to identify the kinesthetic learners' experience in the e-learning of the Midwest City OTD program. The descriptive method has been used to inspect the perceptual reactions in the quantitative analysis, and it has extrapolated the meaning in the analysis of separate qualitative discussions.

The preceding study by Neuschlova and Kompanikova, p. 5. on learning styles and their use in medical education in the form of e-learning materials aims to estimate students' satisfaction with the teaching practices and the materials for their chosen learning styles. The way of opinion and the type of intellect have prevailed among the students in the learning process, and it has identified how the students have evaluated the accessible materials for the self-study and the full-time instruction in the Immunology subject. The survey was conducted with a class of students studying in the Slovak language; 125 students were noted, and 116 students answered the questionnaire, representing 92.8 %. Among the students who were studying the English language, 96 students were noted, and 87 students completed the questionnaire, and it has representing 90.6 %.

The research started in June 2019 and ended in September 2019. It was observed that 203 students completed questionnaires, and it was calculated. The results have provided important information, which is essential to improve the education of faculty. It is expected that this method has been used to encourage the students to obtain knowledge in immunology, and it has also increased students' stimulus in learning. It has also encouraged the teachers to

incorporate numerous learning styles while working in the student teams and it has the need to use the suitable method in numerous situations with several teams.

The prevailing study by Özonur et al., (2020) (p.1858-1863) on identifying distance learners' learning styles has used to find learners styles in e-learning, who have studied in the degree of computer programming, and it has used in the regulation of the variations within the departments. This research has used the survey research plan. It is used to define the previous or recent circumstances that occur. This study has also set out to find e-learners' styles of learning. The analysis has shown that results in most chosen styles of learning computer programming, every student has a separate e-learning style. By using evolving technology, growing distances, and rising time value, online education has been considered to be very common. It is necessary to examine the features of e-learners to plan efficiently in e-learning and then to attain learning consequences. Finally, this research has identified the chosen styles for e-learning in students who have registered in online education programs, and the academics in related programs have been learned.

2.4 Students perceptive towards e-learning

The existing study has tried to reveal how e-learning has shaped education. It can also encompass students' viewpoints and the experience of e-learning. This study has engaged the IPA to inspect the positive experiences of the contributors penetratingly. In this study, the respondents have been chosen from the Delhi NCR.

The semi-structured interviews were conducted to gather primary data to recognize students' viewpoints on the influence of ICT. The identifications are categorized into 2 sections known as "themes," which may include "inhibitors that have restricted the e-learning adoption" and "e-learning adoption for drivers" Phutela and Dwivedi, (2020), (p. 545-559.).

Currently, India has an insignificant place for e-learning, but it has enormous potential in it. This research has been very useful for the Indian educational institutes and also in the developing countries by considerate the students' perspectives on adopting the e-learning.

Educational institutes might have improved systems so that it has holed students of their countries and they have attracted students from similar countries for education. Also, this study has used the method of IPA to determine the factors, and it has been considered as the better contribution.

Correspondingly, the existing study by Turkyilmaz et al., (2019) (p. 616-621) aims to determine the range in which NYU College of Dentistry students have used online applications, databases, and social media. Then, their inclination is the platforms, and their concern is integrating e-learning into courses. The main hypothesis of this study is e-learning implementation and essential education, which have improved the lecture attendance and the students' view point in the increased academic performance.

The survey was developed after a preliminary and emphasis group discussion with the voluntary pre-doctoral dental students, who have relevant experience using various dental applications and social media in dental education. The study results suggest that e-learning has been effectively used in the dental school's prospectus to improve the students' learning, particularly in clinical curriculum. Based on the results, the most used application is YouTube, which seemed to be ideal for visual learning.

The recommended study aims to determine the serious issues for e-learning during the coronavirus period. During the coronavirus pandemic, educational institutes have been forced to shut down, initiating massive disruption in the education system.

The Data has been gathered by surveying 131 university students, and the PLS-SEM method has been used to employ the data analysis process. The results of this study have shown that the corona-linked factors, such as the perceived challenges and the coronavirus awareness, have not only impacted the students' intention but also these effects have been mediated by the perceived ease and perceived usefulness of e-learning usage systems. Hence, the results have shown that the educational institute's awareness has not impacted the student's intention to contribute to e-learning during the coronavirus period. The results proved that the gender and

length of e-learning systems usage have impacted the students' e-learning systems use (Nikou et al., 2021, p. 299-315.).

The prevailing study by Abdur Rehman et al., (2021) (p. 259-276.) is to dispute and highlight the difficulties encountered by the students of the university about e-learning in a period of corona. Moreover, it has outlined the e-learning solutions using the theoretical lens of EMT. Finally, this study has maintained the upgrading case in the present systems of e-learning to permit the HE systems, specifically in emerging countries, to reduce damages and improve the quality of education. These existing study results have been explained by several challenges, which include the lack of awareness, i.e., from the institutions and students, lack of motivation, less quality of interaction, absence of class activities, and potential of e-learning adoption. Otherwise, rare chances have also appeared by set of ideas like the outline of student counseling programs, a plan for quality e-learning content, and a comprehensive emergency management plan.

Similarly, another suggested study has focused on estimating the efficiency of the e-learning experience from the student's perspective. E-learning has been developed as a progressively predominant learning method in HE institutes because of the rapid progress of IT in India. The study has presented the II e-learning order model and also its efficacy. E-learning is well-defined by three I-order constructs: service quality, system quality, and information quality.

The E-learning efficiency has been well-defined by 2 I order concepts, such as net benefits and user satisfaction. The predictability of this introduced model is considered to be high to elucidate the e-learning impact on e-learning efficiency. The final results of this study have shown that service quality and system quality have contributed much to the e-learning system when associated with information quality.

The Student's view is in the information, which has been easily accessible on the website, and it has not been very useful and has been considered as the 1-way mode of

communication. The researcher has identified 3 dimensions such as system quality, information quality, and service quality of the e-learning system, which have contributed to the net benefits and user satisfaction. Then, the results identified that the students were satisfied with website e-learning and determined to endure it for future use. This study has been identified as beneficial, and it has helped in the growth of careers and has made employment

Correspondingly the recommended the study's by Chopra et al.,(2019) (p. 94-116) purpose is to find problems related to the benefits, disadvantages, usages, and obstacles of e-learning programs in public universities by examining the viewpoints of students and educators who have used this e-learning mode in rare circumstances.

The research population has included the students and faculty members in the Faculty of IT at the University of Benghazi. This study's results have obtained promising identifications that have demonstrated some of the higher education sector's problems, difficulties, and benefits of using E-learning. Students have believed that based on these results, E-learning has contributed to the students learning. Also, this study has reduced the instructor's job, though it has raised well for students. The teaching staff has agreed that E-learning has been considered to be beneficial in improving the student's skills, and it has needed financial resources, and implementation cost for them has been considered to be very high (Maatuk et al., 2022, p. 21-38.).

The existing study by Al Zahrani et al., (2021) (p. 1-11) objective is to explore the e-learning experience of students in health sciences colleges of Saudi Arabia with respect to the technical preparedness, e-learning advantages, academic achievements, and their references for developing e-learning. The impulsive shift to e-learning, deprived of preceding preparedness, has exposed some pitfalls that have needed to be adjusted. The identifications of this study has considered to be satisfactory experience for learners and students. However, there is a better chance of increasing and expanding the e-learning process. In this study, all methods have been

used in accordance with related guidelines and regulations. Each contributor has signed a written informed consent.

The desired study by Salmani et al., (2022) (p. e0263388) has been used to explain Iranian nursing students' experiences in e-learning during the coronavirus pandemic. In Iran, the nursing students and the medical students have been educated in person format. Earlier to the coronavirus outbreak, virtual education did not have a defined position in teaching health sciences, and Virtual education began the suddenly end of universities. By using the camera and microphone, it is considered being possible for professors to take online classes, and their students are able to see and communicate with the teachers while teaching. This study has utilized the qualitative design, which has led with in-depth single-person interviews, to define Iranian nursing students' perceptions of their reality of the Corona period.

The existing study Zaneldin et al., (2019) (p. 475-496) has explained the conducted survey with 67 UG students in United Arab Emirates institutes, and it has examined the efficiency, advantages, and students' satisfaction by using the video-based e-learning method in conveying the topics of construction management UG course by announcing instructional videos, which has been relevant to the course topic. This survey has been intended and posted on the Blackboard learning platform, and students have been asked to access these videos and reply to the survey through Blackboard. To approve the study identifications, has suggested to relate this study's results with the result assessment of the "construction" course of preceding semesters in a way to understand the influence of this study and its inferences on the learning process.

Similarly, another recommended study has been used to find the degree of satisfaction of students in Saudi Arabian colleges. It has activated e-learning and teaching approaches, direct and indirect virtual classes, and academic content.

Most of the student's satisfaction level in e-learning and virtual classes is considered to be Medium, and there are no statistically substantial variations in the difference in academic

level, GPA, and specialization. Moreover, huge problems have accompanied this procedure. The major issue is the flaw of the Internet and the trouble of accessing virtual classes, the huge burdens necessary from students and instructors, and the lack of awareness of students in e-learning, additionally, fretfulness and fear of corona and its influence on the emotional status of students, their performance in academics and the student's achievement in success in semester courses (Bawaneh, 2021, p. 52-65.).

The presented study investigated the association between student satisfaction in e-learning and academic achievement during the coronavirus period in developing nations. Then, the study addressed the e-learning adaption channels and digital proficiency of students' schedules in association with the student's satisfaction with academic achievements and e-learning.

Also, this existing study by Younas et al.,(2022) (p. 948061) has used a questionnaire-based research method to inspect the association among Pakistani University students' e-learning academic achievement and satisfaction. This study was conducted in 6 cities in the Punjab Province of Pakistan. Also, 650 female and 550 male students of various age groups and educational backgrounds contributed to the online survey, and a questionnaire was used to get the main data.

The findings have shown the association between academic achievement and e-learning satisfaction of Pakistani students who have used e-learning during the epidemic and reported good academic achievement stages. The study is notable because it has offered policymakers and educators the viewpoint on sufficiently promoting e-learning adoption and guaranteeing student satisfaction.

The considered study has investigated the impact of digital technology, economic status or the psychological state, and course type on Jordanian university students' defiance in e-learning and instructional and assessment quality. This study is considered to be essential, and it has derived from its search for teaching-learning experience. Its valuation is held by the

stakeholders, particularly by students as primary catalysts, who may help to redesign and transform the HE paradigm in Jordan.

The existing study by Al-Salman and Haider, (2021) (p. 286-302) has offered a distinct lens for examining and uncovering short-term effects and future inferences of a sudden shift to the experiment of e-learning in the students of Jordanian universities' academic, psychological, and social well-being. This study has also examined the students' opinions and the reactions to the achievement or failure of e-teaching or the e-learning experiment. The data has been gathered from the responses of 4037 UG students of 4 Jordanian universities, which have been considered as 2 public and 2 private.

Similarly, another study conducted a survey of university UG students who tried to understand their viewpoints on e-learning during the coronavirus pandemic. Specifically, this study is interested in the students' opinions on content delivery and communication in e-learning and the health and social effects of e-learning (Chakraborty et al., 2021, p. 357-365.).

The recommended study by Herodotou et al.,(2019) (p. 1273-1306) has addressed the complete research aim of unloading assignation of teachers with PLA, and it might negatively or positively support the student's performance, and it has first provided the TAM, AR, and PLA. Then, it explained the OU Analyze system, which has an in-house PLA system by the Open University of the UK. The contributing teachers have been offered the choice of joining online meeting sessions regarding the predictive analytics of the tools, which has included the OUA available, and they have been used to help the teaching practice.

The contribution has been limited, starting from 5–6%, in spite of scheduling sessions in advance. The suggested study has to find the best practice in using predictive data, which has assisted the teachers in understanding PLA, planning suitable intervention strategies, and involving students threatened with learning prior to failing or not finishing their studies.

2.5 Teachers' Perceptive Towards E-Learning

The suggested study by Amalia et al., (2021) (p. 170-179.) has identified the inclination of e-learning implementation in schools. The principals, parents, teachers, and students have known the inhibiting and supporting aspects of e-learning performance in education. This existing study has included the principal, 32 students, and 15 teachers, and the data has been collected through interviews, documentation, and observation. This study has shown that the teachers and principals have been ready for e-learning implementation from finance, technological skills, and side resources. From the results, it has been identified that the students and parents are unprepared for e-learning. They also needed time to learn about e-learning and allocate their expenses to it

The existing study by Almazova et al., (2020) (p. 368.) has focused on the issues of e-learning and e-teaching during the coronavirus pandemic in Russian HE. It has investigated the challenges of university teachers during coronavirus time and defined their readiness for online learning and teaching.

The efficiency of the educational process in a given format has been improved by the usage of teaching materials like study guides, electronic textbooks, tests, methodological recommendations, and so on, in the university's e-document base, and that has been easily accessible to the teachers, students, and university staff. The academic staff work has been meant to familiarize basic methods of teaching and education with existing realities of e-learning and interaction with students during the coronavirus pandemic.

Online learning can be categorized as a form of distance learning in many places in many decades after the growth of the internet. Evaluation of internet has introduced the learning abilities into another perspective and has introduced new innovative things in learning culture. According to education, industries and institutions have planned and scheduled their teaching and learning vision. The suggested study by Karasneh et al. (2021) (p. pp252-261.) has assessed the online learning experience during COVID-19, the challenges and barriers they faced while

adapting to a new learning environment based on the professors' perspective in the Jordan region.

The intimated study has introduced descriptive, questionnaire, and cross-sectional based investigation for analyzing the experience among Jordanian lecturers about e-learning implementation during covid-19. 508 lecturers have responded to the analysis through the study. Males of 67.5% and remaining females have responded to the survey about their experience with the online teaching methodology. Educators have spent almost 20.2 to 15.9 hours a week educating students online. The recommended study has found some positive attitudes towards e-learning or online, whereas 67.5% have reported that they prepared well for the online mode of teaching. At the same time, 40.8% of them reported being satisfied and comfortable with the communication they experienced while teaching online from students during the lockdown period. Some of them found it overwhelming and preferred e-learning systems during a pandemic. However, the major barriers found in the recommended study are internet connection (56.5%) problems and family atmosphere (69.3%) issues. Participants have found that they lack technical and computer skills; however, they adapted to the new environment with little training.

Web-based learning, internet-based learning, online learning, and e-learning have all created unlimited learning facilities for students as well as various teaching modes for students in the long run. These methods slowly replaced traditional learning methods and increased their potential for learning prospects. Incorporating e-learning systems has been associated with integrating fundamental knowledge about technologies in studies.

E-learning devices and technologies have been considered mediating tools that have replaced traditional learning methodologies. Subsequently, the suggested study has evaluated the learning process of ESL teachers' ability while incorporating the e-learning tools in ESL (English as a Second Language). The ESL teachers' have faced many challenges while including e-learning classes during COVID-19. The suggested study has utilized a qualitative

approach for assessing ESL teachers. The prevailing study has included 20 teachers for the analysis. In-depth interviews were conducted among teachers and, collected their experiences and encountered their challenges while teaching English in online classes. The majority of ESL teachers have reported that e-learning has produced effective results with the effect of various limitations. The intimated study has measured the ESL teacher's challenges from their perspective as readiness to use and learn the online tools, accessing the mobile phones and internet with poor connectivity and managing the students with low numbers in online classes. The preferred study has produced high insights for policymakers to create policies based on the analyzed factors by Lukas et al., (2021) (p. 330-348.).

Due to the pandemic, China, the origin of COVID-19, has undergone many problems. Chinese teachers and students have reformed and adapted to new learning environments with the assistance of technology. The depicted study has chosen 10 science and technology Universities that have been examined for the research. Extensive research has been conducted for educational planning during COVID-19 in China. 8 teachers have been selected for the interview, and reports have been submitted for further improvements of educational systems. Based on the findings, new demands and changes have been adopted by the teachers when implementing e-learning throughout the country. With the existence of tension about the new normal environment, however, teachers' beliefs about e-learning have created great differences in the online schooling structure. With the complex practices, the education sector has moved into another dimension by Gao et al., (2022) (p. 903244.).

2.6 Impact of Covid-19 on E-Learning

In December 2019, a global emergency was declared due to the outbreak of the coronavirus. As the world entered a global pandemic situation, many countries declared and asserted many restrictions. The illustrated study focused on the Jordanian education sector, and the process followed in the education sector during COVID-19, with the existence of lockdowns.

The recommended study has utilized an online-based survey methodology across the twelve governorates in Jordon. 463 participants between 18 and 21 years old brought back their opinions about e-learning in the survey. Overall, 1/3 (42.3%) of participants from rural areas suffered from poor internet connection and infrastructure services. The model has interpreted the survey results as almost half of the students have spent less time studying during or after the pandemic than before COVID-19. Many education sectors and universities have adopted e-learning, which has led the education sector during COVID-19, with the smart concern of ensuring students' and teachers' health Alsoud et al., (2021), (p. 1404-1414.).

E-learning has created a high impact on the higher education sector and has created a vital role in distance education. Simultaneously, e-learning has been considered an alternative tool for campus teaching methods. Furthermore, during COVID-19, slowly, e-learning has slowly attracted great attention among teachers and students. The recommended study has performed analysis on first-year medical college students who have preferred learning platforms online. With the availability of e-books in ELPs in recent decades, eventually, the acceptance of e-learning has become popular after the pandemic. Ubiquitous ways of analysis have been carried out with different aspects, such as exam-related issues and challenges. The suggested study analysed different parameters of two different types of students learning comprehensive skills, such as before and after COVID-19 user patterns of utilizing the e-learning tools, online and offline studying patterns, studying and understanding the ability of e-learning users and non-users. Before the pandemic, 68 out of 251 candidates had registered for e-learning programs; contemporarily, after COVID-19, 201 out of 255 students enrolled for ELP in medical college for the second semester. The reviewed study has revealed the report that after COVID-19, the reception of ELP has increased among medical college students Kipp and Health, (2021), (p. 11372.).

The suggested study has conducted an evaluation in the Malaysian education industry among students about e-learning perseverance. Similarly, the research has focused on investigating the IT characteristics factors that support e-learning systems and students' ability to accept the perceived value towards the satisfaction of e-learning Mohd Satar et al., (2020), (p. 2278-3091.).

The research has analysed mediated tools or key factors such as IT complexity, IT presentation, and IT pace change in e-learning. Data have been collected by circulating questionnaires online among 500 students. The survey received 488 responses. 470 were considered valid responses. Then, a demographic analysis was conducted on the collected data. The model reported that 58.9%, that is, 277 of 470, were female, and 41.1% (193) were male participants.

Moreover, 57.4% were from public universities, 42.6% were from private universities, and some of them were from bachelor's degrees, persuading students, etc. The survey has reported that students have utilized home Wi-Fi or prepaid data for e-learning. Predominantly, the recommended study has analysed the number of courses they registered for e-learning and the number of hours they spent online studying the courses. The collected data have been subjected to purification and normality, and an assessment process. The processed data was then validated using Structural Equation Modelling (Taghipour et al., p. 2201230.) By employing IBM SPSS AMOS 24.0. As a result, the model has demonstrated that the ITPC has a negative impact, ITPN has created a positive impact, and ITCX has also depicted a positive impact on e-learning satisfaction. The secondary finding factors indicated that the PV, in terms of ease of use, usefulness, and perceived behavioural control, has created a negative impact on e-learning satisfaction.

Digital education has the opportunity to eradicate the physical lectures in upcoming eras. Especially, covid-19 has boosted the online learning system gradually. The existing study has taken the Austrian-based Graz University of Technology as an example for the analysis of

changeover during COVID-19 e-learning sessions. The suggested study has analysed students' and teachers' behaviour while adapting e-learning and conducted insight in-depth analysis. The model has reviewed the first three weeks' enablers, barriers, and bottleneck problems faced by teachers and students Ebner et al., (2020, (p. 94.).

The Status Quo technique has been implemented in the selected study with different factors. Then, the university adapted slowly e-learning tools techniques, and assessment methods during the crisis situation. The survey has been conducted by utilizing an e-learning readiness assessment, and internal news media of the university. The results of the previous semester and the first six weeks of crisis e-learning assessments have been compared, and changes have been incorporated into the e-learning structure. Henceforth, e-learning opportunities have been increased in the period of COVID-19 with statistical impacts.

Devastation has happened during the pandemic in the socio-economic and health conditions of the people and various industries, especially the suggested study that has conducted the impact of COVID-19 on the education sector. Consequently, the education sector has transformed into another level of competitive environment namely online learning or e-learning. The particular study has concentrated on e-learning impacts among dental and medical students during the coronavirus pandemic and lockdown period. The survey has been conducted on CMH Lahore Medical College 280 students and responses have been collected via Google forms. The questionnaire was arranged in a descriptive online mode to access the tools and techniques, online skills and relationships, students' views, and student's perceptions of the merits of e-learning Anwar et al., (2021,) (p. 217.).

The survey included 179 females and 104 males, who have encouraged the e-learning practices more than the current teaching methodology. Meanwhile, the responses have revealed that e-learning has saved time and provided flexibility in learning style. Moreover, female participants have thrown more positive responses and readiness towards the new learning environment than male students.

Generally, e-learning was not suggested as a better option for medical education before COVID-19. However, after some time, e-learning has created a notable impact on the education industry and levied its footprint on the medical and educational industries. Especially the represented study has focused on advocating e-learning acceptance among ophthalmology undergraduate students at Jordan University during COVID-19. The survey has included an array of questionnaires such as merits and demerits of e-learning, experience of e-learning when compared to traditional learning, interaction among students and teachers while attending e-learning sessions, and further enhancement or expectations about e-learning in the medical industry. 22 out of 23 ophthalmologist and students have participated in the survey. 95.5% have responded that flexibility in utilizing time and place has created more advantages, whereas 77.3% have denoted that scares of skills have been considered hurdles in implementing e-learning. However, 90 participants have not perceived satisfactory results on e-learning Alqudah et al., (2020,) (p. 44-47.).

The education industry has completely transferred into another form during the COVID-19 peak period and after the COVID-19. Online learning has been widely accepted and incorporated across the world. The research has focused on University EFL learners, shortly known as English Language Learners, and their learning patterns during the COVID-19 pandemic. Further, obstacles and challenges they faced around the world and the suggested study have provided some of the possible solutions for them to handle the situation in the near future.

The survey was conducted in Saudi Arabian universities during the shift of COVID-19 in the second semester of 2020. The depicted study has examined the learner's experience with e-learning and the feasibility of virtual method adaptation during half of the semester. The survey was conducted in the form of a questionnaire among 184 learners and assessed their responses. The survey has assessed technical, communication, and academic challenges faced by ELF learners during covid-19. The survey has depicted the result that ELF learners are not

satisfied with the online learning system; instead, they preferred the old teaching methodology because EFL learners have not attained the expected progress in their learning system and learners' performance has not achieved satisfactory results. The e-learning has negatively influenced EFL learners in the suggested survey reports Mahyoob, (2020), (p. 2-10.).

2.7 Benefits of E-Learning

E-learning was considered one of the most underestimated learning tools before COVID-19. After COVID-19, the technology acceptance model exploited society as a major. As a consequence, in higher education, to achieve and cope with studies, even medical colleges have adopted e-learning as a mediating tool for learning. The suggested study has conducted the use of e-learning among staff members and students at Zagazig University, Egypt Abed and Education, (2019), (p. em1672.).

The model has analysed the staff member's opinion and their technological skills towards accessing the online teaching platforms. 88% of staff members have agreed that the incorporation of technology has increased the value of education. With the experience of faculties, the preferred study has analysed participant's perceived usefulness in the range of 77.1%, perceived ease of use in the range of 76.5%, and acceptance of learning in the range of 80.9%. However, the suggested study has recognized some of the barriers, as unstable internet connection (40%) has made them frustrated sometimes. In addition, inadequate computer tools (32%) and labs (36%) have created some problems in e-learning. By mitigating the infrastructure problems, the acceptance of e-learning will be improved in the near future by the students and tutors. The model has analysed the factors affecting e-learning ability and existing solutions for the acceptance of e-learning in the near future for coping with technological innovation in the information technology division Zalat et al., (2021), (p. e0248758.).

Electronic learning is considered and approved as one of the intellectual methods in the learning sector. E-learning is the evaluation of mathematical revolution. Due to the exhaustive innovations in technology, it exploited the education industry to the next level. With the

assistance of technological tools and techniques and global network connections have shaped the learning methods. The vast availability of information and multimedia networks, virtual classes, and discussions regarding subjects on the internet have exploited and adapted the benefits of e-learning in the education industry.

E-learning is a tool to manage time and has created a flexible environment for obtaining many course certificates from different locations without going and studying directly at the institutions. E-learning supports virtual classes and improves the self-learning ability among the students. Reducing administrative burdens for teachers and institutions. Moreover, e-learning has provided good communication between students and institutions online, and equality has been maintained Abed and Education, (2019), (p. em1672.).

Students can access unlimited materials through e-learning. They have the flexibility to learn from their comfort zone, access the materials unlimited times, and attend the course at any time when they register through e-learning.

E-learning is the version of distance learning and remote education. With the implementation of e-learning, instructors and learners are separated by time and/or distance. Recorded lectures are also available in the e-learning process with some cost/free sometimes on social media platforms like YouTube. The research has evaluated the moderating effects and perceived benefits of e-learning and its contribution towards maintaining social distancing during a pandemic. During covid-19 the quality of e-learning has been measured in the suggested study Saxena et al., (2021), (p. 532-554.).

The research has designed the conceptual model for analyzing the benefits of e-learning and its quality by observing learners' satisfaction under the circumstances of social distancing. SEQ and Partial Least Square Approach have been employed on the 435 responses collected from University students from India. As a result, E-Learning Quality (ELQ) has created a positive relationship with learners and learning variables such as assurance, responsiveness,

reliability, and website content. However, the Perceived Benefits of Maintaining Social Distancing (PBMSD) have reached a moderate impact on ELQ.

Lockdown has reduced the student's intention of reading and learning habits. During lockdown, language course registered students have suffered enormously because language skills have always been developed when the students communicate with each other in any form. However, the selected study has revealed the lockdown has created unidentified issues for students who have registered for international business courses at the University of Padjadjaran. All students have participated in the analysis of barriers to e-learning. 96.4% of them accessed the e-learning tools, and 56% of them levied the reply as satisfaction with the implementation of e-learning during the crucial situation. Although the students found the physical isolation, they performed well in e-learning. Fair assessment has been observed from students' point of view Krishnapatria, (2020), (p. 1-8.).

English teaching and learning through e-learning are commonly implemented in the education industry. The recommended study has aimed to focus on the effectiveness of e-learning in English-pursuing students in Madrasahs in Indonesia. The mixed qualitative and quantitative methods have been implemented to analyze the students from online classes. After analysis, the suggested study has concluded that e-learning has been considered as a more effective and useful tool for teaching during unfair circumstances.

The survey responses have been collected from 362 students and 13 teachers for the analysis. The findings have revealed that the students have been motivated to join the English classes during the pandemic. Students have perceived the e-earning system ad positively and learned well with the utilization of tools. The students perceived no difficulty in accessing the e-learning tools, interaction among them was clearly perceived, and their performance has been improved in Madrasah in terms of teaching and learning during COVID-19 Purwantoro et al., (2021), (p. 5234-5244.).

The efficacy of e-learning and its direct impacts have been measured in the conventional study. The hypotheses test has been conducted using a regression model and evaluated by using the SPSS-25 data analysis tool. 247 graduate and undergraduate business students have been empirically investigated for the suggested study. The project-based learning, team cohesion, and flipped learning have created a high impact on learning among students. The model has observed experiences, observations, and engagement among business students. The findings of the study have established a positive relationship between factors such as project-based learning and students' learning effectiveness and engagement.

Moreover, flipped learning has shown a positive effect on students' learning ability and a negative impact on the engagement learning process. The engagement factor has created a positive direct effect on students' learning ability and increased their performance. E-learning has increased the students' responsiveness and comprehensive ability. Students have taken ownership of their studies in e-learning and performed well Umar and Ko, (2022), (p. 1724.).

2.8 Barriers to E-Learning

Due to COVID-19, high demand has emerged for online learning or e-learning tools and platforms. The preferences, perceptions, and barriers to e-learning have evolved enormously during COVID-19 and the lockdown period. The survey has been conducted among medical students for the barriers they have faced, while attending e-learning classes in the suggested study. A total of 296 medical students from second-year and pre-final year students' responses have been collected and analysed by utilizing SPSS software tools.

The findings of the survey have shown the barriers as represented in percentages. 179 (62.5%) participants were identified as females for the survey. Among them only 18 (6.2%) students had growth up with the advanced computer operating knowledge and internet accessing skills. 138 students have preferred the blended model of teaching methodology for their convenience. 203 (71.0%) medical students have preferred non-interactive learning processes such as YouTube and slide presentation classes.

180(62.9%) have responded as a lack of personal interaction towards the classes, and 53 (18.5%) have shown a lack of hardware availability for attending the e-learning programs. The recommended study has also found the vital difference in male and female teaching classes and attending students' responses to their classes. Lack of student-teacher interaction, lack of access to high-speed internet, and lack of hardware facilities have created great barriers to e-learning Suryawanshi and Venugopal, (2020), (p. 4100.).

The Spread of COVID-19 has illustrated and instigated another new normal world. Due to this, the economy and education have been redefined to accept the changes in all fields. The term e-learning is referred to a group of people working (teaching and learning) together in an online platform for their growth. E-learning provides trainers and learners with different experiences while coordinating with each other. The suggested study has illustrated that the age of the trainer has affected the ability to provide quality learning materials because there has been wide difference in accessing the technologies across different age groups of people.

262 participants responded to the survey, 139 of whom were male. 22.1% of trainers responded that unfamiliar technologies are a barrier to adapting to e-learning. The lack of policies on e-learning has been noted as a significant barrier to its implementation.

Technology adaptation and influence have varied for different age group tutors. Another factor that affects e-learning has been defined as tutors spending more time preparing for e-learning than classical teaching methods. Trainers have explored a higher workload than previous methods. One more challenge has been included in the survey known as technical issues, such as lack of accessing the internet, stress, and anxiety while accessing the e-learning tools and coordinators Al Shamari, (2022), (p. e0274816.).

Lockdown policies have adapted another style of running schools worldwide. The preferred study Almanthari et al., (2020), (p. 1-9.) has particularly focused on reviewing the views of secondary school mathematics teachers' opinions on e-learning systems and the barriers associated with them. Online schools have been adopted as an unprecedented

experience by school teachers and students. As a consequence, the intimated study has assessed four types of barriers, namely teachers, students, school, and curriculum of teachers and students while adapting e-learning in Indonesian schools. 159 participants responded to the online questionnaire, and the demographic background of teachers has been taken into account for better results of the survey and resulted as teachers' backgrounds have never affected the studies. However, student barriers have created a positive correlation with school and curriculum-level barriers.

The quantitative and qualitative approaches have been utilized for assessing the students' attitudes towards e-learning and captured experiences of real-time online teaching. By observing the responses from teachers and students, the suggested study has provided the solution for future e-learning betterment. The findings of the results have shown that the live online classes attending students' scores have improved better than the unidirectional transmission of teaching.

Moreover, the significance of the study has been attained based on the student's environment, discipline, study space, and gender followed by the students. The existing study has reflected that online learning has increased the burden on students, brought many difficulties to students while learning, and distraction while learning, and self-regulated study all factors have influenced the students' progress and knowledge. In some cases, student's physical and mental health have been destroyed or diminished Wang and Practice, (2022), (p. 212-228.).

2.9 Research Gaps

- The existing study Alenezi and Technology, (2020), (p. 48-56.) has given its viewpoint of examining several views regarding the role by which e-learning materials have in the improvement of teaching and learning behaviours. In spite of the discovery, there the various issues that have not been efficiently addressed in the implementation of E-learning procedures, and its focus has held on the preceding computer skills, and the

time period has been calculated in hours, as how the separate person has spent on the e-learning materials and demographic and social factors.

- The existing study Turkyilmaz et al., (2019), (p. 616-621.) results have suggested that e-learning has been used in the dental school's prospectus to improve students' learning, particularly in the clinical curriculum. In the future, there is a need to completely know about the e-learning influence on the student's performance, which includes the inspections and the clinical capability outcomes. This e-learning will be noted and observed in the upcoming studies.
- The existing study Panigrahi et al., (2021), (p. 1840-1862.) has some limitations, which have been listed below: generally, in environmental causes, only system features with superior structures have been taken into account. These limitations will be rectified in future studies by examining the peer interactions on various dimensions of appointment. Then, this study conducted a cross-sectional survey. In the future, the researchers may invited to perform longitudinal research for e-learning efficiency. This longitudinal study may have helped to uncover the dynamics of relation within the environmental and personal factors in several dimensions of engagement in time.
- The existing study Aguilera-Hermida, (2020), (p. 100011.) has been inferred cautiously as it has few limitations. Generally, the Students have expressed their viewpoints, which have been impacted by various factors. Particularly, the study was conducted in the middle of the coronavirus pandemic, which had effects such as stress, fear, uncertainty, and so on. Similarly, the generalizability of the identifications has been limited.

2.10 Summary

The literature review section of the particular thesis has analysed the various obstacles faced by teachers while using mobile phones, laptops, and other sources for teaching with or without the assistance of the institution. The review section also has included the obstacles

faced by students in terms of lack of motivation, lack of resources, lack of financial stability and lack of internet connection, lack of parental support, and, in most cases, procrastination while learning affects their learning ability. In recent eras, e-learning has had the highest scope among the other learning mediators due to incurring a minimum time and providing high-quality education. In addition, anywhere and anytime, assessing the materials online has created better opinions about e-learning among teachers and students in the presence of many hurdles. Therefore, tailor-made education has been given for suitable professions.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Design

The current study incorporates a mixed-methods research approach to examine the impact of the pandemic on e-learning and its evolution. The study evaluates the data collected from both quantitative and qualitative methods. The data were collected through interviews and surveys with students, educators and developers of the e-learning platforms. The complete framework of the research has been provided by the research design. Typical research can be

done through two types: correlational research and experimental research Myers et al., (2013), (p. 25-34.)

The method to provide a précised framework on which the research has been followed is described as the research design. The researcher has followed a method to collect the data and investigate the data that results in fulfilling the objectives of the research, and obtaining answers to the questions derived is also described as research design. In direct words, the research design is the topic that highlights the strategy that is followed by the researcher to obtain the answers to the research questions and to analyze the study variables.

The current study follows both quantitative and qualitative research methods to collect and analyze the data. The quantitative data has been collected through an online survey conducted among graduate and undergraduate students along with the faculty members of higher education institutions across the United States. The survey enquires about their perception of effectiveness, their opinions about its future, and their experiences with e-learning during the pandemic. On the other side the qualitative method collects data through in-depth interviews with a small number of students and faculty members who have experienced e-learning during the pandemic. Through these interviews, the researcher explores the challenges and opportunities of e-learning, its evolution, and its implications for the future of higher education. Descriptive and inferential statistics can be analysed to examine the relationship between variables, and using thematic analysis, qualitative data can be analysed to identify themes and patterns in the data.

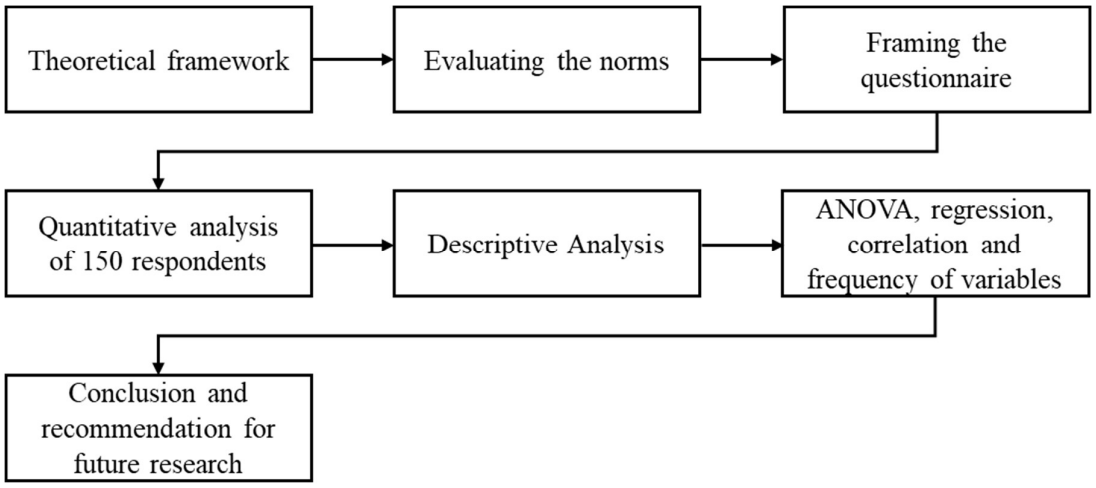

Figure 3.1 Research Design

The primary objective of the research design is to ensure that the evidence collected can be able to answer the questions as clearly as possible (Rezigalla, 2020, p. 5-8.). The studies follow certain methods in order to examine the theoretical constructs like operationalization and conceptualization. The conceptualizations of constructs vary from the value of reinforcing and cultivating to the professional and communication process. Associated constructs like different tools and designs were also involved in this to understand the research work. Qualitative approach is the method that is comprised in conceptualization constructs that is used to collect the data. The data congregated using a qualitative approach are analysed in this construct with the aid of the thematic analysis method. While conceptualization was deployed for the theoretical approach, experimental research approaches were done by operationalization constructs. The usage of a quantitative approach to gathering data was enabled by the operationalization framework. In order to apply the research design along with the sampling technique, the collected data are transferred into testable research variables. The two approaches that are described as the two common approaches are displayed in the figure given below.

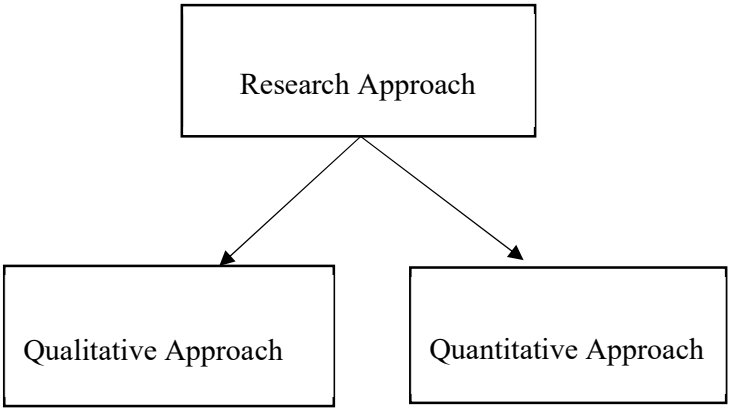

Figure 3.2 Research Approach

Quantitative Approach

The quantitative method is a useful tool for measuring and analyzing numerical data that is connected to the effects of the pandemic on e-learning. This includes things like changes in the number of students enrolling, rates of course completion, and performance metrics. By using quantitative data, we can gather statistical evidence and gain a better understanding of the extent and impact of the changes that have occurred in e-learning during the pandemic. Through quantitative analysis, we can also uncover trends, patterns, and connections between various factors that influence e-learning, such as the relationship between the adoption of technology, instructional design, and student outcomes.

Qualitative Approach

The qualitative approach takes a different approach by delving into the experiences, perceptions, and perspectives of those involved in e-learning. Through methods like interviews, focus groups, and observations, researchers can explore the challenges, barriers, and opportunities faced by institutions and individuals during the pandemic Phutela and Dwivedi, (2020), (p. 545-559.)

Mixed-Method approach

Combining quantitative and qualitative approaches in a mixed-methods study can provide a more comprehensive and nuanced understanding of the impact of the pandemic on e-learning. The quantitative data can help identify the scope and magnitude of the changes, while the qualitative data can provide explanations and deeper insights into the underlying factors and processes. The mixed-methods approach can enable triangulation of the findings, allowing for a more robust and reliable analysis of the research problem. The integration of quantitative and qualitative data can lead to a more holistic understanding of the evolution of e-learning during the pandemic and its implications for the future. By employing both quantitative and qualitative methods, the thesis can capture the multifaceted and complex nature of the impact of the pandemic on e-learning, leading to a more comprehensive and nuanced understanding of this important topic.

3.2 Sampling Technique

Purposive sampling is a technique used by researchers to select participants for a study based on specific characteristics or criteria that are important to the research question. In this thesis, the researchers are investigating how the COVID-19 pandemic has impacted e-learning and its development. By using purposive sampling, the researchers can deliberately choose participants who have first-hand experience and insights into how e-learning has been affected by the pandemic. This targeted approach is suitable because the researchers are not aiming for a representative sample of the general population, but rather want to gather detailed perspectives from those directly involved in e-learning during the pandemic. Purposive sampling ensures that the researchers can access the most relevant and informative participants to answer their research questions. Moreover, the study benefits from a mixed-methods approach, which combines qualitative and quantitative data. The qualitative component requires in-depth, contextual information that can be best obtained from purposefully selected participants, while the quantitative component may utilize the purposive sample to create surveys or other measurement tools.

3.3 Sample Size and Study Area

For the analysis process the number of entities in the subset of a population will be selected. The sample size can be determined through various factors. As we are not testing the entire population, we are interested in evaluating the population parameter by measuring the sample size. The goal of determining the sample size is to ensure that the sample is small enough to be cost-effective and manageable. At the same time, it needs to be big enough to give statistically valid results and accurate estimation of population parameters. Therefore, we must initiate the confidence intervals, so that the sample values will lie within the range. Based on the type of research the number of participants enough to be considered to form an essay functions according to the fundamental principle. For correlational studies, 30 participants are considered to be sufficient to generate a representative sample size.

3.4 Research Instrument

With the help of a structured questionnaire, the data can be congregated in the current study for conducting the survey among students and faculty members. There are two kinds of questionnaires, namely structured questionnaires and unstructured questionnaires. Other than questionnaires, there are other kinds of instruments for gathering data from the respondents for the research, and those are,

- **In-Depth Interviews:** Researchers use in-depth interviews to ask questions to particular respondents either through face-to-face interviews or through mass communication to reveal information regarding the research topic. This interview instrument is used to collect descriptive data for the research.
- **Projective Data Gathering:** Projective data gathering is an indirect interview method embraced by respondents who are hesitant to answer certain questions. Therefore, the researcher asks indirect questions to attain an answer relevant to the research objective.

- **Questionnaire:** The easiest and most direct method to gather data from the selected respondents is the questionnaire process. Here a string of questions with related answers were given to participants for choosing. The current study follows a questionnaire process to collect data from students and teachers.

3.5 Data Collection Process

The process of gathering data from different sources with the aim of framing the conclusions for the study variables is defined as data collection. The data collection procedures incorporate data type identification, data sources, and the techniques required to be employed. The data collection plays a significant part in the arena of commercial, government, and research. Through interviews, social media surveys, online surveys, transactional tracking, and online tracking, data can be gathered. The data collection process has been categorized into two methods such as primary data collection and secondary data collection.

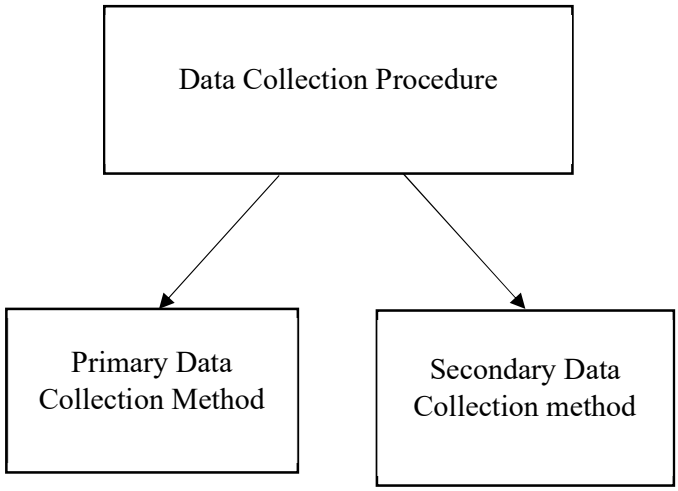

Figure 3.3 Data Collection Method

3.5.1 Significance of Data Collection

For every researcher and any company, data gathering is crucial as they wish to know about their firms' performance among consumers. Furthermore, firms conduct data collection on a daily basis to be aware of their companies' profits. In the field of academics, the researcher

incorporates data collection techniques with a view to attaining the outcome relevant to the research objective.

3.5.2 Primary Data Collection

The primary data collection is the process of gathering first-hand data from the respondents for the research work. The procedure for collecting primary data sources is accomplished by circulating questionnaires to the respondents in the form of surveys or interviews. The data congregated through the primary data collection method required to be more relevant to the study variable, and the outcome of the data is also appropriate to the research objective. The current study incorporates a primary data collection method for congregating data from the students and teachers as they were using an e-learning system during the pandemic. There are some techniques to gather data in the form of primary data, and those techniques are in-depth interviews, questionnaires, and projective data collecting.

The current study utilizes a structured questionnaire for gathering primary data from the students and teachers. The data congregated from the primary method is more appropriate and accurate to derive the outcome for the research objective. Hence, the current study incorporated this method to know the accurate range of performance and customer satisfaction. One of the techniques of primary data collection is a questionnaire, which circulates a series of questions to the respondents to gather data relevant to the study variable. Similarly, the current study also formed a series of questions associated with the impact of a pandemic on the e-learning system.

3.5.3 Importance of Primary Data Collection

The researcher utilizes primary data collection in the form of a survey or interview to avoid prejudiced responses and manipulated data, which will be of the least reliable value for the

study. Therefore, researchers prefer primary data collection over secondary data collection to gain reliability, validity, and authenticity for the data.

- **Reliability:** The major aspect of entrusting the research outcome relies on the reliability of the congregated data. With the aid of primary data, reliability enhances the quality of the collected data. Therefore, the results of the congregated data make the study more reliable. This won't be possible if the data is congregated from a secondary source.
- **Authenticity:** The involvement of prejudiced opinions or unreliable data in the research will make the study less authentic. The data can be authentic only if it is congregated without biased opinion from the targeted participants. Moreover, the congregated data will be reliable and authentic only if the method utilized to analyze the data is appropriate for the study. Besides, the hidden information from the data will make it less authentic.
- **Validity:** The study mostly relies on the validity of the data and outcome because the validity of the data provides scientific quality for the study. The study utilizes a scientific approach with a view to making logical outcomes to enhance the validity of the research. The primary data collection from the targeted participants makes the data more valid for the research's outcome.

3.5.4 Secondary Data Collection Method

The method of collecting second-hand data through existing information is defined as secondary data collection and also it has the statistical analysis. The secondary data are congregated from seeking the existing data information relevant to the concern study. With the help of secondary data collection, it is simple and cost-effective to gather the information; this information spurs the accuracy and authentic level of the research. The methods for gathering the secondary data are listed below;

- Personal Information of clients
- Government records

- Organization’s reports
- Financial reports
- Business Magazines

3.5.5 Importance of Secondary Data Collection

Secondary data make it easier for researchers to gather data from the prevailing sources. However, the validity and reliability of research that utilizes secondary data collection wouldn't be accurate and appropriate. Yet, many researchers choose the secondary data collection technique because it is inexpensive and time-saving. Moreover, secondary data collection is useful in the place of insufficient or unwilling respondents.

3.6 Variable Definition

The significant element of the entire statistical data is referred to as the variable. The variable is the sample participants' characteristics which can be unique and vary according to the various participants. The important aspect of the variables is that they help in the mechanism of data collection Kaliyadan and Kulkarni, (2019), (p. 82.). The current study will evaluate the impact of a pandemic on the evolution of e-learning methods. The main focus of the present study is to know the impact caused by COVID on online learning methods. The current study evaluates the responses of the students and the teachers on the experience of studying through e-learning. The present study incorporates dependent and independent variables. The present study decided to collect data from the students and teachers who have been impacted by the implementation of the e-learning system.

3.6.1 Dependent Variables

The variables, under the impact of the independent variable, would be deviated and are denoted as the dependent variables. The current study has considered the grades scored by the students as the dependent variables. Because these variables can be impacted after the implementation of an e-learning system.

3.6.2 Independent Variables

If the variable influences the dependent variable of the study with the aim of discovering the impacts caused, it is denoted as an independent variable. The current study considers the e-learning system, which is implemented in educational institutions, and the problems reported by the students as the independent variables. According to the nature of the issues reported by the students, the independent variable impacts the learning capacities of the students. If the issues takes more than expected time to be rectified then this impact the performance of educational institutions.

A purposive sampling method has been utilized in this study in order to identify the respondents with the ability to provide the most relevant information about the impact of a pandemic on e-learning. The participants for this current study have to fulfil certain norms such as;

- The respondents should have experienced studying through e-learning platforms.
- The respondents regarding the impact of the pandemic have to be studied during the COVID lockdown.
- Moreover, the respondents who are willing to participate in the survey and unveil the information should be associated with an educational institution.

In the current study, the responses will be gathered using structured questions for directing the survey among students and teachers. The questionnaires are of two kinds, namely structured questionnaires and unstructured questionnaires.

The study considered 150 students and faculty members to gather data regarding the pandemic's effect on the e-learning system.

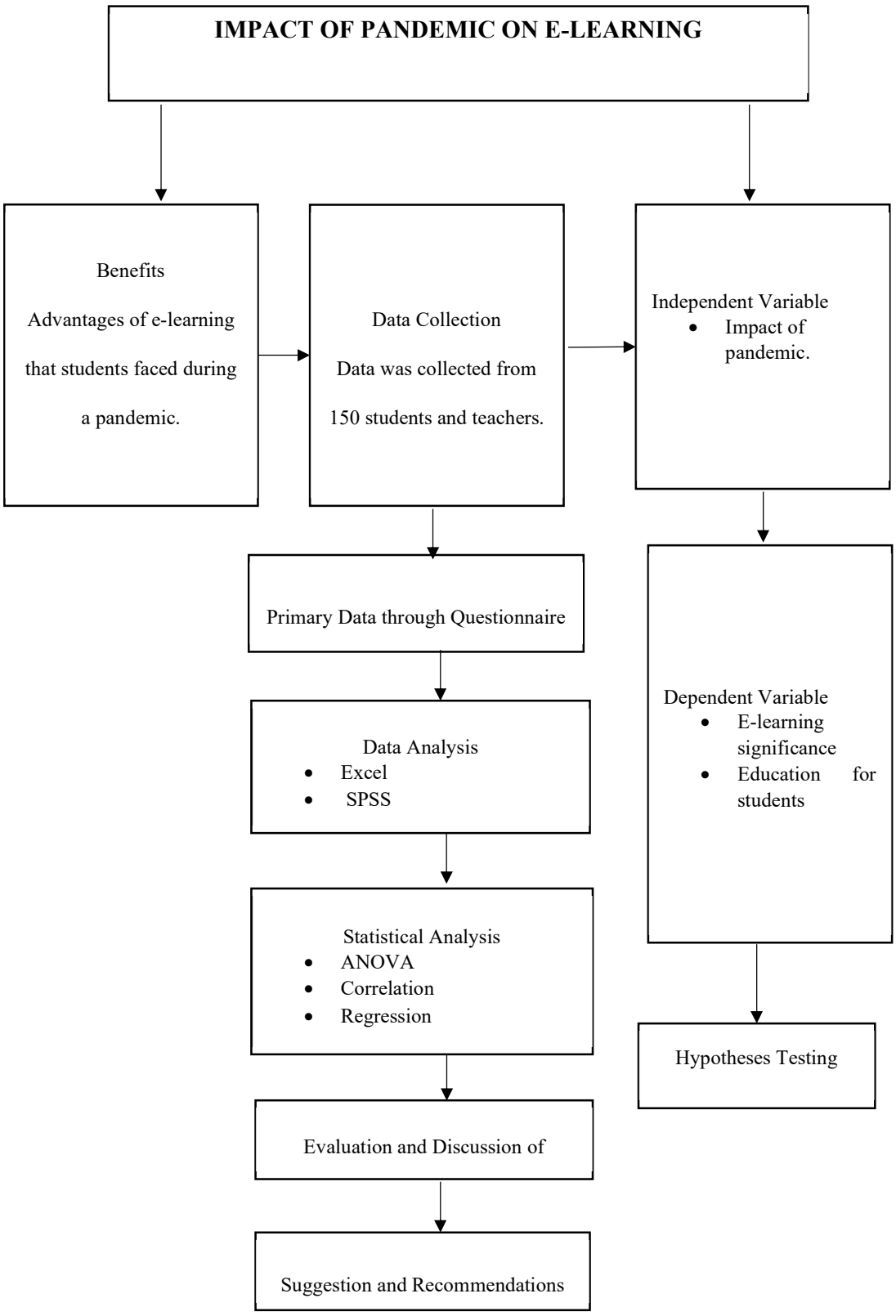

Figure 3.4 Research Framework

3.7 Data Analysis

The process of analysing the empirical and theoretical data is defined as data analysis. With the use of a statistical tool, the collected data can be evaluated to form a research outcome in a theoretical background. Qualitative data analysis and quantitative data analysis are the two types of data analysis. This study follows mixed-method research that includes both quantitative data analysis and qualitative data analysis methods to the congregated data from the research participants. To identify the study variables, MS Excel will be used to analyze the data received from the respondents using survey-based questions.

SPSS software will be used to evaluate the variables after feeding the data into MS Excel. SPSS software analyses the collected data, and the outcomes can be pictured through frequency variable, graph, table, and standard deviation forms. The evaluation techniques this study utilizes are given below.

- Descriptive techniques
- Frequency of the variables
- Regression evaluation
- Correlation evaluation
- Chi-Square test
- ANOVA evaluation

Identification of data and the verification of the association between the study variables can be done through the given techniques. In the current study, interpretations will be conducted and the necessary facts regarding development will be recommended. SPSS software helps to derive an efficient outcome from the current study for the documentation of the study variables. Through figures and tables, the variable's frequency has been demonstrated, whereas the structured hypothesis of this study can be assessed through ANOVA evaluation and regression evaluation. The steps to evaluate the current study are listed below:

- **Step 1:** To depict the frequency of the variables and demographics of the variables, MS Excel is utilized.
- **Step 2:** To determine the mean, median range, and standard deviation of the study variables, the current study utilizes SPSS software, which lists the data and evaluates it through statistics.
- **Step 3:** To appraise the structured hypothesis, evaluation of ANOVA, Regression, and Correlation can be utilized.

SPSS Software

For analysing both quantitative and qualitative analysis, many researchers prefer the SPSS software. Various analytical processes like data integration, machine learning algorithms, descriptive statistical analysis, open-source extensibility, and text analysis can be performed by this software. SPSS software will be surrounded by qualitative analysis and empirical analysis along with the collected data from the respondents. This software converts and covers the value of the questions. In the form of statistical analysis this software helps the researchers to identify the problems and provide solutions for them. The main role of this software in this study is to test the study's hypothesis and statistical effect on the study variables. Therefore, the current study utilizes SPSS software to analyze the test hypothesis of the study and predict the possible impact on the education of the students after the implementation of e-learning.

3.8 Ethical Considerations

This study complies with the ethical regulations for research including human subjects. Informed consent will be collected from all participants, and their anonymity and confidentiality will be maintained throughout the study. In a research aspect, the ethical consideration is known to be the collection of principles that helps to carry out the entire study and research with appropriate design sections and practices. These data were collected only

under the willingness of the survey participants to participate in the research analysis. The responses for the questionnaire are requested of the survey participants. Their personal data or responses are not forced to be exposed to the researcher. All data collection would be kept under high confidential. Some of the morals are followed by the present study, which is prior to the survey evaluation. The researcher and the data were passed to the survey participants in the prior stage. This respective research is much devoted and is more applicable to practical ethical concerns and practices.

3.9 Summary

The methodology for assembling the data and ways to analyze the data were described in detail in this chapter. The present research is entirely dependent on the empirical and descriptive studies. This research embraced both quantitative analysis and qualitative analysis techniques, and it processes the primary data. The primary data was collected using survey methodology. Then, the collected data was evaluated with the help of the SPSS tool, and the outcomes were given in the statistical values form. The primary data has been collected from the students and faculty members of educational institutions through the survey. Almost 150 samples were collected from students and faculty members. The present study includes the impact of a pandemic on e-learning and its evolution.

Further, how students suffered from the pandemic and how they benefitted through online education through e-learning services have been analysed in the survey. How useful are the e-learning platforms, and what are the difficulties faced by the students that have been collected through the survey? The collected datasets guide educational institutions and enhance the e-learning techniques to be more comfortable and make sure that students can understand the lessons taught. Also, this section of the study gives a brief explanation of methods applied to analyze the collected data for the study.

CHAPTER IV

ANALYSIS AND INTERPRETATION

4.1 Introduction

The section judges the data by validating the hypothesis as well as addressing the investigation goals. The statistics were flocked from the 150 respondents from the education sectors in India. It has been estimated utilizing diverse statistical procedures with the fortitude of achieving responses to study objectives. It applied numerous statistical implements that are appropriate for validating the study hypothesis. It utilized percentage analysis, correlation, T-test, ANOVA, and reliability for analyzing as well as improvising data associated with studying constructs.

4.2 Demographic Analysis

Age factor

Table 4.1 Age group of faculties

Age group	Frequency (F)	Percentage (%)
26 to 40 years	65	65
41 to 60 years	29	29
Above 60 years	6	6

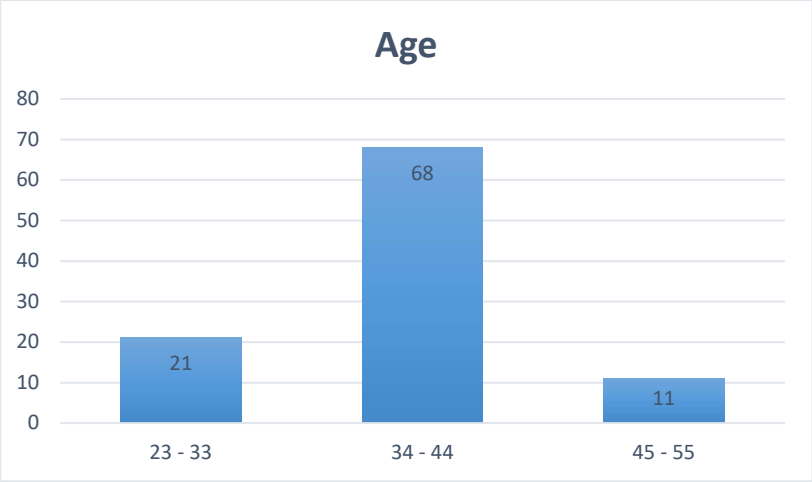

Figure 4.1 Age group of faculties

The statistics were gathered from 150 faculties of the educational division. The defendants were nominated from various age categories. The proportion of defendants in the age category 34 to 44 is 68%, which is comparatively greater than the proportion of other defendants. The proportion value of 45 to 55 years is 11%, which is the second greatest category. The assessment of further age assemblies correspondingly 23 to 33 years is 21%.

2. Gender of Faculties

Table 4.2 Gender of the faculties

G (Gender)	F	%
Female	48	32
Male	102	68

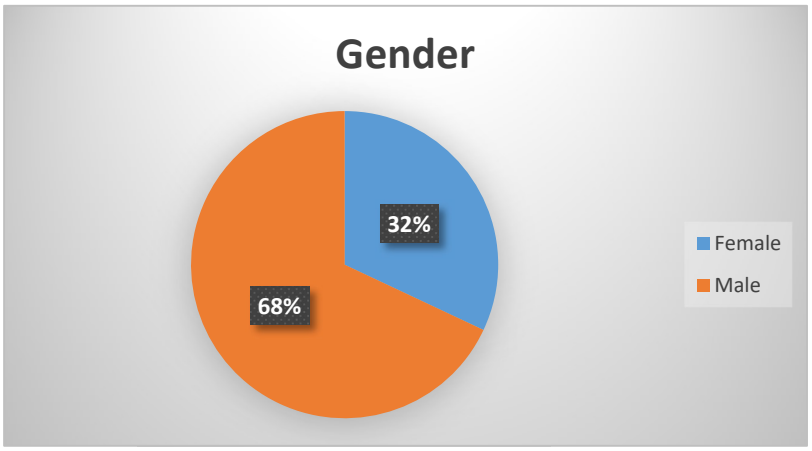

Figure 4.2 Gender of Faculties

Figure 4.2 signifies that 68% of defendants are male faculty members, whereas 32% are female faculty members in the educational sectors in India. Explicitly, among 150 defendants, 102 defendants are men, and 48 defendants are women. Evidently, the male

defendants are comparatively higher than women. Finally, the male communal contributes significantly to examinations.

3. Study Category

Table 4.3 Study category of faculties

Study category	F	%
Post Graduate	102	68
Research Scholars	48	32

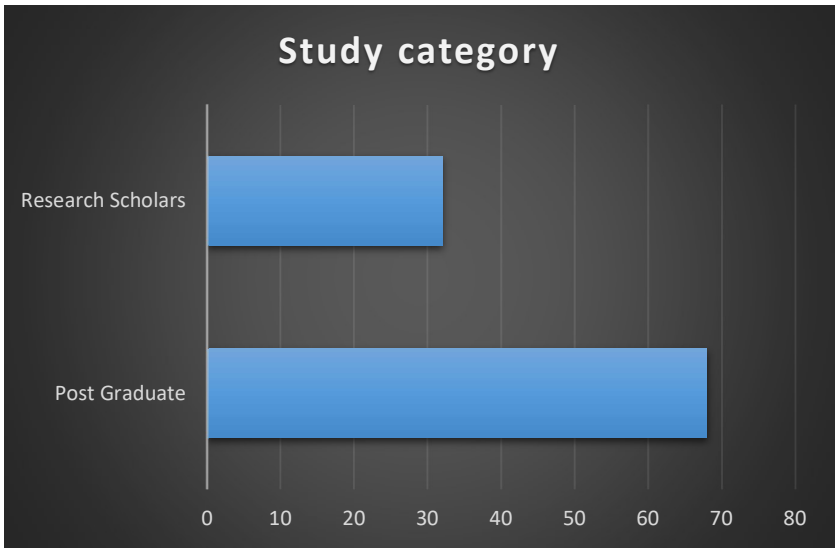

Figure 4.3 Study category of faculties

The table and Figure 4.3 indicate that 102 of the 150 contributors are postgraduates. 48 of the 150 contributors are accomplished as research scholars, which is 32% of the total contributors.

4. Online Platform

Table 4.4 Online platform

online platform	F	%
Cisco WebEx	15	15
Google Meet	35	35
Microsoft Team	90	90
Zoom	10	10

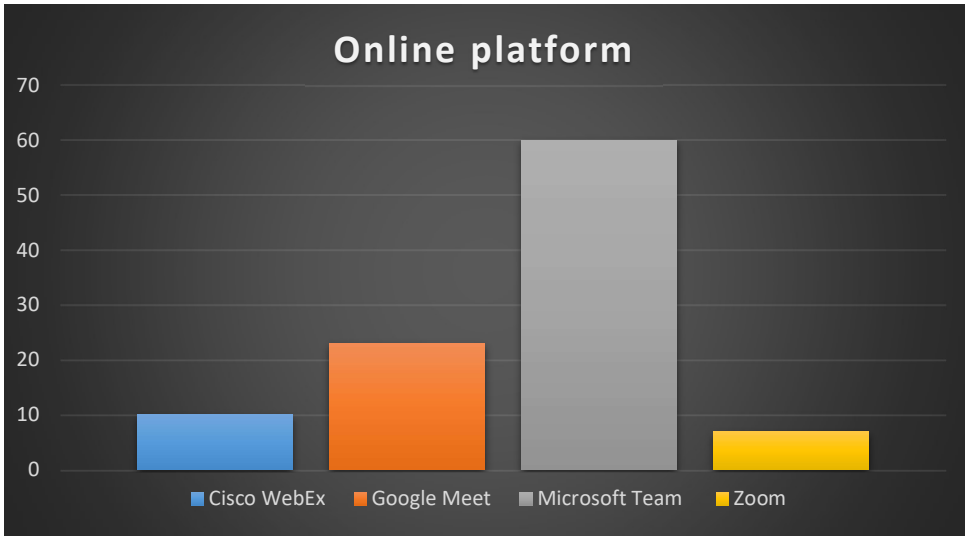

Figure 4.4 Online platform

Figure 4.4 shows that 10% of defendants reveal that their institution uses Cisco WebEX for delivering online courses, whereas 23% of respondents reveal that their institutes use Google Meet. 60% of defendants use Microsoft Teams, and the remaining 10% of the institutes use Zoom. Most institutes use Microsoft Teams for delivering online courses.

4.3 Statistical Analysis

Reliability and validity

The reliability analysis test assesses internal consistency. This test is applied to evaluate the likert queries to verify whether the questions considered for analysis are reliable or not. In SPSS Statistics Cronbach's alpha is incorporated.

Table 4.5 Reliability	
Cronbach's α	N
.831	23

Table 4.5 demonstrates the reliability analysis Cronbach's alpha value, and 0.831 is the A value determined from the analysis test. This value indicates the great range of internal steadiness for the reliability scale with the particular tester.

Factor analysis

Table 4.6 KMO and Bartlett's Test (KBT)		
KMO Value of Sampling Acceptability		.868
BT	Chi-Square	1533.574
	df	190
	S	.000

Table 4.6 illustrates the consequence of the KMO as well as Bartlett's test for analyzing sampling adequacy and also an association between variables of the study, respectively. The KMO's outcome should be more than 0.7 in order to prove that the samples are adequate. The

outcome of KMO for the study is .868, which proves the adequacy of the samples. For Bartlett's test, the value should be below 0.05 in order to illustrate the association between variables of the study. Bartlett's test consequence is .000, which establishes there is connotation amongst the study variables.

Hypothesis 1

$H_1$1: There is a significant impact of a pandemic on e-learning in the HE

$H_0$1: There is no significant impact of pandemic on e-learning in the HE

One–way ANOVA test

The main aim is to identify the modification values of the factor that have a significant effect on the dependent variable.

Bridging the gap

Table 4.7 Descriptive

Bridging the gap among faculty and students

	N	M	SD	SE	95% CI		Min.	Max.
					LB	UB		
post graduate	105	2.78	.480	.047	2.69	2.87	1	3
research scholar	45	2.33	1.260	.182	1.97	2.70	1	4
Total	150	2.64	.832	.067	2.51	2.77	1	4

Table 4.8 ANOVA					
Bridging the gap among faculty and students					
	SOS	df	M^2	F	Sig.
Between Groups	6.600	1	6.600	10.105	.002
Within Groups	98.629	148	.653		
Total	105.229	149			

Table 4.8 exemplifies the consequence of the ANOVA test concerning the influence of the pandemic on e-learning in the HE. Rendering to the consequence of the ANOVA test, both the postgraduate and research scholars agree that their e-learning aids bridge the gap between faculty and students in the pandemic circumstances. The pandemic condition has a significant impact on the e-learning process in HE. Moreover, the consequence evidences that there is an association between the independent variable (pandemic) as well as the dependent variable (Tawafak et al.,p. 388-397.). Moreover, the p-value is .000, which represents the pandemic condition, which has a relationship with e-learning in the HE sector. The consequence proves the hypothesis H1. The consequence is controvert to the null hypothesis.

Practical knowledge

Table 4.9 Descriptive								
Does e-learning enhance the practical part of the subject?								
	N	M	SD	SE	95% CI		Min.	Max.
					LB	UB		
23-33	35	2.37	.646	.109	2.15	2.59	1	3

34-44	102	1.33	.474	.047	1.24	1.43	1	2
45-55	13	1.25	.447	.112	1.01	1.49	1	2
Total	150	1.56	.677	.055	1.45	1.67	1	3

Table 4.10 ANOVA

Does e-learning enhance the practical part of the subject?

	SOS	df	M^2	F	Sig.
Between Groups	29.822	2	14.911	56.144	.000
Within Groups	39.838	147	.266		
Total	69.660	149			

Table 4.10 exemplifies the consequence of the ANOVA test concerning the impact of a pandemic on e-learning in the HE. Rendering to the consequence of the ANOVA test, all the age groups agree that their e-learning platform supports enhancing practical knowledge in the pandemic circumstances. The e-learning aids to elevate the practical experience of the students during the pandemic situation. Moreover, the consequence evidences that there is an association between the independent variable (pandemic) as well as the dependent variable (e-learning in HE). Moreover, the p-value is .000, which represents that e-learning elevates the practical knowledge of the students during the pandemic circumstances. The consequence proves the hypothesis H1. The consequence is controvert to the null hypothesis.

Correlation

The technique is employed to assess the connotation between two constructs. The assessment of correlation governs the association among the constructs. If the association is 1 or -1, then there is connotation among the constructs. Consequently, the current study utilized the Pearson relationship to govern the connotation between the pandemic circumstances and e-learning in the HE.

Table 4.11 Correlations

		Online Teaching platforms aid in bridging the gap between faculty as well as students.	Does the e-learning management system facilitate your online learning effectively?	Online teaching has attained its goal of programme delivery in a satisfied manner during the pandemic circumstances.	Does the utilization of an online library through a mobile App is very convenient, easy to use, and serves its purpose better?	Does e-learning enhance the practical part of the subject?
Bridge the gap between faculty and students?	P	1	.183*	.043	.902**	.455**
	S		.024	.010	.000	.000
	N	150	150	150	150	150
	P	.183*	1	808**	.167*	.209**

Does the e-learning management system facilitate your online learning effectively?	S	.024		.000	.039	.010
	N	150	150	150	150	150
Does the online teaching platforms achieved their objective of the programme delivery	P	.043	.808**	1	.118	.193*
	S	.010	.000		.014	.017
	N	150	150	150	150	150
Does the use of an online library through a mobile App is very convenient, easy to use, and serves its purpose better?	P	.902**	.167*	.118	1	.585**
	S	.000	.039	.014		.000
	N	150	150	150	150	150
	P	.455**	.209**	.193*	.585**	1

Does e-learning enhance the practical part of the subject?	S	.000	.010	.017	.000	
	N	150	150	150	150	150

Table 4.11 establishes the consequence of the correspondence to regulate the connotation amongst the independent construct (pandemic) as well as the dependent construct (e-learning in the HE). The p-value is .000, besides the correlation value of positive 1, in which the impact of pandemic circumstances and e-learning in the HE is correlated. All the parameters of the impact of pandemic conditions and digital learning are positively correlated. The consequence of the correlation test is argued to the null hypothesis. Hence, there is a substantial influence of the pandemic on e-learning in the HE.

Regression

The regression procedure governs the arithmetical value of constructs. Moreover, the investigation assesses the connotation of the study constructs, both dependent and independent. The current study utilized regression assessment to inspect the relationship between the pandemic and e-learning in the HE.

Table 4.12 Model Summary

M	R	R^2	Adj. R^2	SE
1	.602[a]	.404	0.40	.965
a. Predictors: (Constant), Gender				

Table 4.13 Coefficients[a]						
M		Unstd Coeff.		Std. Coeff.	t	S
		B	SE	β		
1	(Constant)	2.581	.234		11.013	.000
	Gender	.124	.168	.060	.736	.046
a. Dependent Variable: online library through a mobile App is very convenient?						

Table 4.13 demonstrates the negative impact of the pandemic and e-learning in the HE. The independent variable (pandemic circumstances) influences the dependent variable (e-learning in the HE) of the present study hypothesis. Additionally, the p-value is .000, which exemplifies that the pandemic circumstances have a significant influence on e-learning in the HE. The consequences of regression assessment prove that there is a connotation between the pandemic circumstances and e-learning in the HE. Moreover, the consequences are controvert to the null hypothesis.

Table 4.14 Model Summary				
Model	R	R^2	Adj. R^2	SE
1	.522[a]	.273	.268	.579
a. Predictors: (Constant), Study category				

Table 4.15 Coefficients[a]						
Model		Unstd Coeff.		Std. Coeff.	t	Sig.
		B	SE	β		
1	(Constant)	.564	.141		4.013	.000
	Study category	.760	.101	.522	7.526	.000
a. Dependent Variable: Does e-learning enhance the practical part of the subject?						

Table 4.15 demonstrates the connotation impact of the pandemic and e-learning in the HE. The independent variable (pandemic circumstances) influences the dependent variable (e-learning in the HE) of the present study hypothesis. Additionally, the p-value is .000, which exemplifies that the pandemic circumstances have a significant influence on e-learning in the HE, which supports enhancing the practical part of the subject. The consequences of regression assessment prove that there is connotation amongst the pandemic circumstances, and e-learning in the HE aids in elevating the practical knowledge of the subject. Moreover, the consequences are controverted to the null hypothesis.

Cross-tabulation

Table 4.16 Cross tabulation

Count

		Does the e-learning management system facilitate your online learning effectively?			Total
		SA	A	N	
Do you2 that online teaching/learning platforms help to bridge the gap between faculty and students?	SA	3	0	16	19
	A	16	17	0	33
	N	0	85	0	85
	DA	0	16	0	16
Total		19	118	16	153

Table 4.17 Chi-Square Tests			
	V	df	Asym. S
P	184.438[a]	6	.000
LR	150.529	6	.000
L-L	5.074	1	.024
N	150		

The p-value of the test, which is .000, shows that there is a substantial association between the online management system and bridging the gap between faculty and students. Therefore, this proves the connotation between the management system and bridging the gap between faculty and students. Moreover, the outcome of the Chi-square test contradicts the null hypothesis, indicating the connotation of the impact of the pandemic condition on the e-learning system of HE.

Table 4.18 Cross tabulation						
Count						
		the online library is convenient				Total
		SA	A	N	DA	
Does the online teaching platforms achieved their objective of the programme delivery?	SA	20	16	0	0	36
	A	0	17	68	0	85
	N	0	0	0	13	13
	DA	16	0	0	0	16
Total		36	33	68	13	150

Table 4.19 Chi-Square Tests			
	V	df	Asym. S
P	286.356[a]	9	.000
LR	253.426	9	.000
L-L	2.099	1	.147
N	150		
a. 7 cells (43.8%) have count <5. The least count is 1.67.			

The p-value of the test, which is .000, shows that there is a substantial association between the online library and the satisfaction of the faculty in delivering subject knowledge during the pandemic conditions. Therefore, this proves the connotation between the online library and the satisfied experience of the faculty. Moreover, the outcome of the Chi-square test contradicts the null hypothesis, indicating the connotation of the impact of the pandemic condition on the e-learning system of HE.

Independent t-test

An Independent T-test is referred to as a geometric test. This analysis governs the impression among two variables of research. The T-test is constantly utilized in evaluating the study's hypothesis to determine the impact of one variable on the other. In the current study, the T-test is utilized to determine the impact of the pandemic and e-learning practices in the nation.

Teaching behavior

Table 4.20 Group Statistics					
	Study category	N	M	SD	SE
	post graduate	102	1.83	.375	.037

Does the online teaching platforms achieved their objective of the programme delivery	research scholar	48	2.67	1.260	.182

Table 4.21 Independent Test

		L		t-test						
									95% CI	
		F	S.	t	df	S	MD	SE	L	U
Does the online teaching	Equal variances assumed	154.567	.000	6.145	148	.000	.833	.136	1.101	-.565
platforms achieved their objective of the programme delivery	Equal variances are not assumed.			4.488	50.946	.000	.833	.186	1.206	.461

The above table establishes the consequence of the T-test to prove the hypothesis. The p-value of the T-test is .000, which illustrates that there is a significant effect between effective program delivery and e-learning practices. According to the p-value, the beneficiaries of implementing e-learning will ultimately lead to enhanced teaching behavior during the

pandemic condition. The results prove that e-learning practices aid in achieving program delivery in a satisfactory manner. Moreover, the value of the T-test contradicts the null hypothesis.

Therefore, the above analysis has revealed that the pandemic condition has a substantial impact on e-learning in the HE. Hence, Hypothesis 1 has been proved.

$H_1$1: There is a significant impact of a pandemic on e-learning in the HE

Hypothesis 2

$H_1$2: There exists a challenge and opportunity for e-learning in the context of the pandemic

$H_0$2: There is no challenge and opportunity for e-learning in the context of the pandemic

ANOVA test

Unstable internet connections

Table 4.22 Descriptives

Do you face unstable internet connections, particularly in underdeveloped locations, to ensure equity amongst students through e-learning?

	N	M	SD	SE	95% CI		Min.	Max.
					LB	UB		
male	102	2.00	.000	.000	2.00	2.00	2	2
female	48	2.67	1.260	.182	2.30	3.03	1	4
Total	150	2.21	.774	.063	2.09	2.34	1	4

Table 4.23 ANOVA					
Do you face unstable internet connections, particularly in underdeveloped locations, which make it impossible to ensure equity between students through e-learning?					
	SOS	df	M^2	F	Sig.
Between Groups	14.507	1	14.507	28.754	.000
Within Groups	74.667	148	.505		
Total	89.173	149			

Table 4.23 exemplifies the consequence of the ANOVA test concerning the challenges faced in e-learning in the HE. Rendering to the consequence of the ANOVA test, both the males as well as females agree that the unstable internet connection in underdeveloped regions does not ensure equity among the students and faculties. The e-learning aids in facilitating online learning in a satisfactory manner during the pandemic situation. Moreover, the consequence evidences that there is an association between the independent variable (challenges) as well as the dependent variable (equity among students). Moreover, the p-value is .000, which represents that unstable internet connections, particularly in underdeveloped locations, affect equity between students through e-learning. The consequence proves hypothesis H2. The consequence is controvert to the null hypothesis.

Table 4.24 Descriptives								
Do you feel difficulty in discussing the doubts related to content within the provided time limits?								
	N	M	SD	SE	95% CI		Min.	Max.
					LB	UB		
23-33	32	1.50	.508	.090	1.32	1.68	1	2
34-44	102	2.00	.000	.000	2.00	2.00	2	2
45-55	16	3.00	.000	.000	3.00	3.00	3	3

Total	150	2.00	.463	.038	1.93	2.07	1	3

Table 4.25 ANOVA

Do you find it difficult to discuss doubts related to content through the chat box of virtual conferencing applications, which requires responding within time limits?

	SOS	df	M^2	F	Sig.
Between Groups	24.000	2	12.000	220.500	.000
Within Groups	8.000	147	.054		
Total	32.000	149			

Table 4.25 exemplifies the consequence of the ANOVA test concerning the challenges in clarifying the doubts during the e-learning process. Rendering to the consequence of the ANOVA test, both the research scholar as well as post graduates agree that they find it difficult to clarify the doubts in the chatbox as it possesses limited time. The faculties feel difficulties in clarifying the doubts in the chatbox. Moreover, the consequence evidences that there is an association between the independent variable (challenges) as well as the dependent variable (efficiency of e-learning). Moreover, the p-value of .000, which represents the restricted time limits of the chatbox, affects the faculties in clarifying the doubts about e-learning. The consequence proves the hypothesis H2. The consequence is controvert to the null hypothesis.

Regression

Table 4.26 Model Summary

Model	R	R^2	Adj. R^2	SE of the Est.
1	.403[a]	.163	.157	.710

Table 4.27 Coefficients[a]						
Model		Unstd. Coeff.		Std. Coeff.	t	Sig.
		B	SE	β		
1	(Constant)	1.333	.174		7.660	.000
	Gender	.667	.124	.403	5.362	.000

Table 4.27 demonstrates the connotation regarding the challenges faced in e-learning in the HE. The independent variable (challenges) influences the dependent variable (e-learning in the HE) of the present study hypothesis. Additionally, the p-value is .000, which exemplifies that the challenges faced by the faculties have a significant influence on e-learning in the HE. The consequences of regression assessment prove that there is connotation amongst the challenges faced by the faculties and e-learning in the HE. Moreover, the consequences are controvert to the null hypothesis.

Table 4.28 Model Summary				
Model	R	R^2	Adj. R^2	SE of the Est.
1	.504[a]	.254	.249	.268

Table 4.29 Coefficients[a]						
Model		Unstd. Coeff.		Std. Coeff.	t	Sig.
		B	SE	β		
1	(Constant)	3.667	.066		55.736	.000
	Study category	.333	.047	.504	7.094	.000

Table 4.29 demonstrates the connotation regarding the challenges faced in e-learning in the HE. The independent variable (challenges) influences the dependent variable (e-learning in the HE) of the present study hypothesis. Additionally, the p-value is .000, which exemplifies that the challenges faced by the faculties have a significant influence on e-learning in the HE. The consequences of regression assessment prove that there is connotation amongst the challenges faced by the faculties and e-learning in the HE. Moreover, the consequences are controvert to the null hypothesis.

Cross tabulation

Table 4.30 Crosstabulation

Count				
		Study category		
		post graduate	research scholar	Total
Do you face unstable internet connections, particularly in underdeveloped locations, which make it impossible to ensure equity between students through e-learning?	SA	0	16	16
	A	102	0	102
	N	0	16	16
	DA	0	16	16
Total		102	48	150

Table 4.31 Chi-Square Tests

	V	df	Asym. S.
P	150.000[a]	3	.000
LR	188.061	3	.000

L-L	24.239	1	.000
N	150		

The p-value of the test, which is .000, shows that there is a substantial association between the challenges faced by the faculty in the e-learning process and the improper internet connection. Therefore, this proves the connotation between improper internet connection and equity among the students. Moreover, the outcome of the Chi-square test contradicts the null hypothesis, indicating that the connotation between the barriers of e-learning and equity among the students influences the equity amongst the students.

Table 4.32 Cross tabulation

Count

		Age			Total
		23-33	34-44	45-55	
Does the assessment, supervision, and heavy workload affect the effectiveness of e-learning?	DA	32	102	0	134
	SDA	0	0	16	16
Total		32	102	16	150

Table 4.33 Chi-Square Tests

	Value	df	Asym. Sig. (2-sided)

P	150.000[a]	2	.000
LR	101.847	2	.000
L-L	70.601	1	.000
N	150		

The p-value of the test, which is .000, shows that there is a substantial association among the challenges faced by the faculties in the e-learning process. Therefore, this proves the connotation that assessment, supervision, and heavy workload affect the effectiveness of learning. Moreover, the outcome of the Chi-square test contradicts the null hypothesis, indicating the connotation of the barriers to e-learning influences the effectiveness of learning amongst the students.

Correlation

Table 4.34 Correlations

		Do you face unstable internet connections, particularly in underdeveloped locations, which make it impossible to ensure equity between students through e-learning?	Do you face any personal challenges, such as economic and psychological stress in e-learning?	Does the assessment, supervision, and heavy workload affect the effectiveness of e-learning?	Do you find it difficult to discuss doubts related to content through the chat box of virtual conferencing applications, which requires responding within time limits?	Do you feel distracted, pay less attention to e-learning courses, and have difficulty maintaining self-discipline?
Do you face unstable	P	1	.544**	.544**	.899**	.899**
	S		.000	.000	.000	.000

internet connections particularly in underdeveloped locations to ensure equity amongst students	N	150	150	150	150	150
Do you face any personal challenges such as economic and psychological stress in e-learning?	P	.544**	1	1.000**	.748**	.748**
	S	.000		.000	.000	.000
	N	150	150	150	150	150
Does the assessment, supervision, and heavy workload affect the effectiveness of e-learning?	P	.544**	1.000**	1	.748**	.748**
	S	.000	.000		.000	.000
	N	150	150	150	150	150
	P	.899**	.748**	.748**	1	1.000**

Do you feel	S	.000	.000	.000		.000
difficulty in discussing the doubts related to content as it requires time limits	N	150	150	150	150	150
Do you feel	P	.899**	.748**	.748**	1.000**	1
distracted and	S	.000	.000	.000	.000	
pay less attention to e-learning courses, and have difficulty maintaining self-discipline?	N	150	150	150	150	150
**. Correlation is significant at the 0.01 level (2-tailed).						

Table 4.34 establishes the consequence of the correspondence to regulate the connotation amongst the independent construct (challenges) as well as the dependent construct (e-learning in the HE). The p-value is .000, besides the correlation value is positive 1, which evidences the challenges faced by the faculties in the e-learning process of HE are correlated. All the parameters of the challenges of the e-learning process are positively correlated. The consequence of the correlation test is controvert to the null hypothesis. Hence, there is a substantial influence of challenges in the e-learning process.

Independent t-test

Table 4.35 Group Statistics					
	Study category	N	M	SD	SE
Do you face unstable internet connections, particularly in underdeveloped locations, which makes it impossible to ensure equity between students through e-learning?	post graduate	102	2.00	.000	.000
	research scholar	48	2.67	1.260	.182

Table 4.36 Independent Test										
		L test		t-test						
									95% CI	
		F	S	t	df	S	MD	SE	L	U
Do you face unstable internet	Equal variances assumed	387.077	.000	5.362	148	.000	.667	.124	.912	.421

connections, particularly in underdeveloped locations, which make it impossible to ensure equity between students through e-learning?	Equal variances not assumed.			3.665	47.000	.001	.667	.182	1.033	.301

The above table establishes the consequence of the T-test to prove the hypothesis. The p-value of the T-test is .000, which illustrates that there is a noteworthy effect among challenges faced in adopting e-learning practices in the nation. According to the p-value, the issues in the implementation of the e-learning practices will ultimately impact the learning process. The results prove that the challenges are faced by the faculties in adopting the e-learning platform likely network issues in under-developed regions. It might cause inequity among the students. Moreover, the value of the T-test contradicts the null hypothesis.

Psychological stress

Table 4.37 Group Statistics					
	Study category	N	M	SD	SE
	post graduate	102	4.00	.000	.000

Do you face any personal challenges such as economic and psychological stress in e-learning?	research scholar	48	4.33	.476	.069

Table 4.38 Independent Samples Test

		L test		t-test						
									95% CI	
		F	S	t	df	S	MD	SE	L	U
Do you face any personal challenges	Equal variances assumed	805.120	.000	7.094	148	.000	.333	.047	.426	.240
such as economic and psychological stress in e-learning?	Equal variances not assumed.			4.848	47.000	.000	.333	.069	.472	.195

The above table establishes the consequence of the T-test to prove the hypothesis. The p-value of the T-test is .000, which illustrates that there is a noteworthy effect among challenges faced in adopting e-learning practices in the nation. According to the p-value, the issues in the implementation of the e-learning practices will ultimately impact the learning process. The results prove that the challenges are faced by the faculties in adopting the e-learning platform

likely psychological stress and economic impact. It might cause inequity among the students. Moreover, the value of the T-test contradicts the null hypothesis.

Therefore, from the above analysis, Hypothesis H_2

H_12: There exists a challenge and opportunity for e-learning in the context of the pandemic has been proved.

Hypothesis 3

$H_1$3: E-learning has evolved due to the pandemic and there is an implication for the future of HE

$H_0$3: E-learning has not evolved due to the pandemic and there is no implication for the future of HE

One way ANOVA test

Table 4.39 Descriptive

Has e-learning transformed from simply providing information to full-scale learning and turned into a widely accessible method of information delivery to learners of all ages?

	N	M	SD	SE	95% CI		Min.	Max.
					LB	UB		
23-33	32	1.50	.508	.090	1.32	1.68	1	2
34-44	102	2.00	.000	.000	2.00	2.00	2	2
45-55	16	3.00	.000	.000	3.00	3.00	3	3
Total	150	2.00	.463	.038	1.93	2.07	1	3

Table 4.40 ANOVA					
Has e-learning transformed from simply providing information to full-scale learning and turned into a widely accessible method of information delivery to learners of all ages?					
	SOS	df	M^2	F	Sig.
Between Groups	24.000	2	12.000	220.500	.000
Within Groups	8.000	147	.054		
Total	32.000	149			

Table 4.40 exemplifies the consequence of the ANOVA test concerning the effectiveness of learning potential on e-learning in the HE. Rendering to the consequence of the ANOVA test, all the age groups agree that their e-learning platform aids in enhancing the information delivery to all age students compared to the traditional learning methodologies. E-learning aids in facilitating online learning in an effective manner during the pandemic situation. Moreover, the consequence evidences that there is an association between the independent variable (Tawafak et al., p. 388-397.) As well as the dependent variable (futuristic education). Moreover, the p-value is .000, which represents that the e-learning system aids in facilitating information delivery greater than conventional learning during the pandemic situation. The consequence proves the hypothesis H3. The consequence is controvert to the null hypothesis.

Table 4.41 Descriptive								
The cost-effective nature of e-learning makes it a great investment for up skilling.								
	N	M	SD	SE	95% CI		Min.	Max.
					LB	UB		
23-33	32	1.50	.508	.090	1.32	1.68	1	2

34-44	102	2.00	.000	.000	2.00	2.00	2	2
45-55	16	3.00	.000	.000	3.00	3.00	3	3
Total	150	2.00	.463	.038	1.93	2.07	1	3

Table 4.42 ANOVA

The cost effective-nature of e-learning makes it a great investment for up skilling?

	SOS	df	M^2	F	Sig.
Between Groups	24.000	2	12.000	220.500	.000
Within Groups	8.000	147	.054		
Total	32.000	149			

Table 4.42 exemplifies the consequence of the ANOVA test concerning the effectiveness of learning potential on e-learning in the HE. Rendering to the consequence of the ANOVA test, all the age groups agree that their e-learning platform aids in enhancing the information delivery to all age students compared to the traditional learning methodologies. E-learning aids in facilitating online learning in an effective manner during the pandemic situation. Moreover, the consequence evidences that there is an association between the independent variable (Tawafak et al., p. 388-397.) As well as the dependent variable (futuristic education). Moreover, the p-value is .000, which represents that the e-learning system aids in facilitating information delivery greater than conventional learning during the pandemic situation. The consequence proves the hypothesis H3. The consequence is controvert to the null hypothesis.

Correlations

Table 4.43 Correlations						
		The e-learning has transformed from simply providing information to full-scaled learning and turned into a widely accessible method of information delivery to learners of all ages?	The cost effective-nature of e-learning makes it a great investment for up skilling?	Artificial Intelligence and Manual Learning will rule e-learning in the future HE?	E-learning systems often incorporate gamified elements and interactive features to enhance learner engagement?	Various education technology providers are also hinting towards the rise of mobile learning solutions (also known as m-learning) as the advanced stage of education technology in future?
The e-learning has transformed	P	1	1.000**	.741**	1.000**	.243**
	S		.000	.000	.000	.003

from simply providing information to full-scaled learning and turned into a widely accessible method of information delivery to learners of all ages?	N	150	150	150	150	150
The cost	P	1.000**	1	.741**	1.000**	.243**
effective-nature	S	.000		.000	.000	.003
of e-learning makes it a great investment for up skilling?	N	150	150	150	150	150
Artificial	P	.741**	.741**	1	.741**	.392**
Intelligence and	S	.000	.000		.000	.000

Manual Learning will rule e-learning in the future HE?	N	150	150	150	150	150
E-learning systems often incorporate gamified elements and interactive features to enhance learner engagement?	P	1.000**	1.000**	.741**	1	.243**
	S	.000	.000	.000		.003
	N	150	150	150	150	150
Various education	P	.243**	.243**	.392**	.243**	1
	S	.003	.003	.000	.003	

technology providers are also hinting towards the rise of mobile learning solutions (also known as m-learning) as the advanced stage of education technology in future?	N	150	150	150	150	150
**. Correlation is significant at the 0.01 level (2-tailed).						

Table 4.43 establishes the consequence of the correspondence to regulate the connotation amongst the independent construct (factor) as well as the dependent construct (futuristic e-learning). The p-value is .000, besides the correlation value is positive 1, which evidences the impact of technologies and futuristic e-learning in the HE is correlated. All the parameters of technologies and e-learning are positively correlated. The consequence of the correlation test is controvert to the null hypothesis. Hence, there is a substantial impact of technologies on e-learning in the HE.

Regression

Table 4.44 Model Summary

Model	R	R^2	Adj. R^2	SE of the Est.
1	.831[a]	.691	.689	.258

a. Predictors: (Constant), Age

Table 4.45 Coefficients[a]						
Model		Unstd. Coeff.		Std. Coeff.	t	S
		B	SE	β		
1	(Constant)	.691	.075		9.225	.000
	Age	.691	.038	.831	18.203	.000

Table 4.45 demonstrates the connotation impact of e-learning in the HE compared to the conventional education system. The independent variable (Tawafak et al., p. 388-397.) influences the dependent variable (information delivery) of the present study hypothesis. Additionally, the p-value is .000, which exemplifies that e-learning facilitates enhanced information delivery compared to conventional methodologies. The consequences of regression assessment proves that there is connotation amongst the information delivery in the e-learning process. Moreover, the consequences are controvert to the null hypothesis.

Table 4.46 Model Summary				
Model	R	R^2	Adj. R^2	SE of the Est.
1	.831[a]	.691	.689	.258
a. Predictors: (Constant), Age				

Table 4.47 Coefficients[a]						
Model		Unstd Coeff.		Std. Coeff.	t	S
		B	SE	β		
1	(Constant)	.691	.075		9.225	.000
	Age	.691	.038	.831	18.203	.000

Table 4.51 demonstrates the connotation of the impact of investment and e-learning in the HE. The independent variable (investment) influences the dependent variable (e-learning in the HE) of the present study hypothesis. Additionally, the p-value is .000, which exemplifies that e-learning is a great investment for enhancing the skills of students. The consequences of regression assessment prove that there is a connotation amongst the effective investment in the e-learning modules. Moreover, the consequences are controvert to the null hypothesis.

Cross tabulation

Table 4.48 Cross tabulation

Count

		Age			Total
		23-33	34-44	45-55	
Has e-learning transformed from simply providing information to full-scale learning and turned into a widely accessible method of information delivery to learners of all ages?	SA	16	0	0	16
	A	16	102	0	118
	N	0	0	16	16
Total		32	102	16	150

Table 4.49 Chi-Square Tests

	V	df	Asym. Sig.

P	214.831[a]	4	.000
LR	155.502	4	.000
L-L	102.995	1	.000
N	150		

The p-value of the test, which is .000, shows that there is a substantial impact of online learning in delivering information effectively rather than the conventional mode of learning. Therefore, this proves the connotation of information delivery in the online mode of learning. Moreover, the outcome of the Chi-square test contradicts the null hypothesis, indicating the connotation amongst the impact of e-learning in delivering the information for all the age groups.

Table 4.50 Cross tabulation

Count

		Age			Total
		23-33	34-44	45-55	
The cost effective-nature of e-learning makes it a great investment for up skilling?	SA	16	0	0	16
	A	16	102	0	118
	N	0	0	16	16
Total		32	102	16	150

Table 4.51 Chi-Square Tests			
	V	df	Asym. Sig.
P	214.831[a]	4	.000
LR	155.502	4	.000
L-L	102.995	1	.000
N	150		

The p-value of the test, which is .000, shows that there are substantial beneficiaries of investing in the online mode of learning. Therefore, this proves the connotation of effective investment in the online mode of learning and upgrading the students' skills. Moreover, the outcome of the Chi-square test contradicts the null hypothesis, indicating the connotation of the impact of e-learning investment on upgrading the students' skills.

Independent t-test

Software tools

Table 4.52 Group Statistics					
	Study category	N	M	SD	SE
Artificial Intelligence and Manual Learning will rule e-learning in the future HE?	post graduate	102	1.67	.474	.047
	research scholar	48	2.00	.825	.119

Table 4.53 Independent Test									
	L test		t-test						
								95% CI	
	F	S	t	df	S	MD	SE	L	U

Artificial Intelligence and Manual Learning will rule e-learning in the future HE?	Equal variances assumed	18.093	.000	3.133	148	.002	.333	.106	.544	.123
	Equal variances not assumed.			2.604	62.017	.012	.333	.128	.589	.077

The above table establishes the consequence of the T-test to prove the hypothesis. The p-value of the T-test is .000, which illustrates that there is a noteworthy effect between e-learning practices and the adoption of software tools for futuristic e-learning systems. According to p-value, the beneficiaries in the implementation of the advanced software tools in the e-learning practices will ultimately lead to an effective system in education. The results prove that the AI and ML tools adoption leads to the evolution of futuristic education. Moreover, the value of the T-test contradicts the null hypothesis. Therefore, from the above analysis, it has been revealed that the hypothesis.

$H_1$3: E-learning has evolved due to the pandemic, and the implications for the future of HE **have been proved.**

Hypothesis 4

$H_0$4: Effectiveness and the value of e-learning does not impact the perception of students and faculty

$H_1$4: Effectiveness and the value of e-learning impact the perception of students and faculty

ANOVA Test

Table 4.54 Descriptives								
The implementation of e-learning highlighted the effectual and analytical thinking capacities of students throughout the entire e-learning session.								
	N	M	SD	SE	95% CI		Min.	Max.
					LB	UB		
23-33	32	1.50	.508	.090	1.32	1.68	1	2
34-44	102	2.00	.000	.000	2.00	2.00	2	2
45-55	16	3.00	.000	.000	3.00	3.00	3	3
Total	150	2.00	.463	.038	1.93	2.07	1	3

Table 4.55 ANOVA					
The implementation of e-learning highlighted the effectual and analytical thinking capacities of students throughout the entire e-learning session.					
	SOS	df	M^2	F	Sig.
Between Groups	24.000	2	12.000	220.500	.000
Within Groups	8.000	147	.054		
Total	32.000	149			

Table 4.55 exemplifies the consequence of the ANOVA test concerning the impact of e-learning on enhancing the analytical and effectual thinking of the students. Rendering to the consequence of the ANOVA test, all the age groups agree that their e-learning platform supports elevating the thinking potential of the students. Moreover, the p-value is .000, which represents the e-learning aids in elevating the analytical and effectual thinking of the students. The consequence proves the hypothesis H4. The consequence is controvert to the null hypothesis.

Table 4.56 Descriptives								
The assessment and feedback mechanisms are highly valued and are integrated into the students' knowledge development for scheduling and enhancing the pace of learning.								
	N	M	SD	SE	95% CI		Min.	Max.
					LB	UB		
23-33	32	1.50	.508	.090	1.32	1.68	1	2
34-44	102	2.00	.000	.000	2.00	2.00	2	2
45-55	16	3.00	.000	.000	3.00	3.00	3	3
Total	150	2.00	.463	.038	1.93	2.07	1	3

Table 4.57 ANOVA					
The assessment and feedback mechanisms are highly valued and are integrated into the students' knowledge development for scheduling and enhancing the pace of learning.					
	SOS	df	M^2	F	Sig.
Between Groups	24.000	2	12.000	220.500	.000
Within Groups	8.000	147	.054		
Total	32.000	149			

Table 4.57 exemplifies the consequence of the ANOVA test concerning the impact of the feedback mechanism on the improvisation of e-learning in the HE. Rendering to the consequence of the ANOVA test, all the age groups' faculties agree that their assessment and feedback mechanism aids in improvising the knowledge development of students in the pandemic circumstances. The e-learning aids in facilitating online learning in a satisfactory manner during the pandemic situation. Moreover, the p-value is .000, which represents the assessment and feedback mechanisms are highly valued and are integrated into the students'

knowledge development for scheduling and enhancing the pace of learning. The consequence proves the hypothesis H4. The consequence is controvert to the null hypothesis.

Regression

Table 4.58 Model Summary				
Model	R	R^2	Adj. R^2	SE of the Est.
1	.831[a]	.691	.689	.258

Table 4.59 Coefficients[a]						
Model		Unstd Coeff.		Std Coeff.	t	S
		B	SE	β		
1	(Constant)	.691	.075		9.225	.000
	Age	.691	.038	.831	18.203	.000

Table 4.59 demonstrates the connotation amongst the impact of e-learning on enhancing the effectual and analytical thinking of the students in the session. Additionally, the p-value is .000 which exemplifies that e-learning aids in enhancing the analytical and critical thinking of the students. The consequences of regression assessment prove that there is a connotation between the implementation of e-learning and the analytical thinking of the students. Moreover, the consequences are controvert to the null hypothesis.

Table 4.60 Model Summary				
Model	R	R^2	Adj. R^2	SE of the Est.
1	.831[a]	.691	.689	.258
a. Predictors: (Constant), Age				

Table 4.61 Coefficients[a]						
Model		Unstd Coeff.		Std Coeff.	t	Sig.
		B	SE	β		
1	(Constant)	.691	.075		9.225	.000
	Age	.691	.038	.831	18.203	.000

Table 4.61 demonstrates the connotation amongst the impact of technological infrastructure on the learning flexibility of the students. Additionally, the p-value is .000, which exemplifies that the technological infrastructure has a significant influence on e-learning in the HE. The consequences of regression assessment prove that there is a connotation between the technological infrastructure and the learning flexibility of the students. Moreover, the consequences are controvert to the null hypothesis.

Cross tabulation

Table 4.62 Cross tabulation				
Count				
		Gender		Total
		male	female	
The implementation of e-learning highlighted the effectual and analytical thinking capacities of students throughout the entire e-learning session.	SA	0	16	16
	A	102	16	118
	N	0	16	16
Total		102	48	150

Table 4.63 Chi-Square Tests			
	V	df	Asym. S
P	86.441[a]	2	.000
LR	94.397	2	.000
L-L	.000	1	1.000
N	150		

The p-value of the test, which is .000, shows that there is a substantial association between the e-learning implementation and the analytical thinking capacities of the students. Therefore, this proves the connotation between the adoption of e-learning and the thinking potential of the students. Moreover, the outcome of the Chi-square test contradicts the null hypothesis, indicating the connotation between the impact of e-learning and the thinking capacity of the students.

Table 4.64 Cross tabulation				
Count				
		Gender		Total
		male	female	
Are the technological infrastructure and the	SA	0	16	16
	A	102	16	118

supportive infrastructure in e-learning domains considered to be effective, influential factors for students' learning flexibility?	N	0	16	16
Total		102	48	150

Table 4.65 Chi-Square Tests

	V	df	Asym. S
P	86.441[a]	2	.000
LR	94.397	2	.000
L-L	.000	1	1.000
N	150		

The p-value of the test, which is .000, shows that there is a substantial association between the technological infrastructure and the students' learning flexibility. Therefore, this proves the connotation between the technological infrastructure and the students' learning flexibility in the e-learning platform. Moreover, the outcome of the Chi-square test contradicts the null hypothesis, indicating the connotation of the impact of technological infrastructure and learning flexibility on the e-learning system of HE.

Mann-Whitney (U) analysis

The test compares the distribution of ranks among two groups. It is a non-parametric analysis. It is also referred to as Wilcoxon-rank test.

Bridging the gap

Table 4.66 Ranks				
	Gender	N	MR	SOR
Bridge the gap between faculty and students	male	102	82.17	8381.00
	female	48	61.33	2944.00
	Total	150		

Table 4.67 Test Statistics	
	Bridge the gap between faculty and students
M-W U	1768.000
W	2944.000
Z	3.053
AS	.002
a. Grouping Variable: Gender	

The test is performed for the faculties to identify their perception of the e-learning platform and bridge the gap between faculty and students. It will help the faculties to know about the beneficiaries of the e-learning platforms in the minimization of the gaps between faculty and students. The parameters such as significant p-value is 0.002 which is less than the control p-value of 0.05. Therefore, it proves the faculties are aware of the significance of the implementation of e-learning practices and the beneficiaries of minimization of the gap and act as a bridge for faculty and students. Hence, it contradicts the null hypothesis. It proves the

hypothesis that the e-learning platform aids in constructing the bridge between faculty and students.

4.3. Qualitative Analysis

For qualitative analysis, 10 experts from the education sector in India will be selected to interrogate through the interview method. Based on the data gathered from respondents, the thematic analysis will be performed using a thematic approach. Finally, upon the collected data, the thematic analysis under qualitative study will be performed to gain insights regarding the impact and future growth of e-learning practices.

4.3.1 Thematic Analysis

The thematic analysis is the procedure of recognizing the themes within the acquired qualitative data. The thematic analysis takes place in 6 stages,

I. First stage: Data Familiarity

The first step in thematic analysis is to acquire familiarity with the obtained data. This stage is more important in the thematic analysis so that the researcher becomes familiar with the collected data. The transcripts from the interview are repeatedly analyzed for data familiarity.

II. Second stage: Generation of Initial codes

The second step in thematic analysis was creating codes from the collected data. The codes can yield the descriptive label form, which directly defines the text itself. The code operates as a tag utilized to recover and classify similar data; therefore, the researcher can draw out and investigate the overall data over the dataset related to the respective code Castleberry and Nolen, (2018), (p. 807-815.).

On the basis of the respondent's words, the codes were created. Initially, the categorization of text happens while the respondent's answers are in transcript form, and then, subsequently, codes are created. The data categorization process aids the research in understanding its

purpose in a systematic manner. The coding process decreases the associated data into small data pieces. The below table 1 displays the generated codes from the obtained interview transcripts of experts of the wind industry across the India.

Table 1. Retrieval of Preliminary-Codes from the response of experts

S. No	**Question**	**Response obtained in the form of transcripts from principals**	**Codes generated**
First participant	1. In your opinion, what are the beneficiaries of e-learning platforms in the education sector during the pandemic conditions?	1. Innovative learning experience 2. Enhanced program delivery 3. Practical knowledge	[C1]Learning experience [C2]Program delivery [C3]Knowledge
	2. In your opinion, what are the hurdles faced while implementing online learning practices?	1. Poor internet connection 2. Heavy work pressure	[C4]Limited network coverage [C5]Work stress

	3. Can you describe the evolution of e-learning platforms in the pandemic circumstances?	1. Effective investment for upgrading skills 2. Information delivery	[C6] Skills upgraded [C7] Information delivery
	4. Can you illustrate the futuristic e-learning practices in the modern world?	1. AI and ML technology 2. M-learning practices	[C8] AI, ML, and M-learning tools
	5. Can you describe the influential factors of effective e-learning practices?	Not aware.	[C9] Negligence
Second participant	1. In your opinion, what are the beneficiaries of e-learning platforms in the education sector during the pandemic conditions?	1. Easy access and comfort ability 2. Quick information delivery	[C10] Cost effective [C11] Efficient output [C12] Continuous performance

	2. In your opinion, what are the hurdles faced while implementing online learning practices?	1. Affects the mental health status 2. Work stress 3. Economic factors	[C13] Psychological stress [C19] work stress [C20] Economic factors [C21] Adaptation problems
	3. Can you describe the evolution of e-learning platforms in the pandemic circumstances?	1. Accessibility of online platforms	[C22]Accessibility
	4. Can you illustrate the futuristic e-learning practices in the modern world?	1. Incorporation of the gamified elements 2. Attractive applications	[C25] gamified elements [C26] Attractive features [C27] Consistent performance
	5. Can you describe the influential factors of effective e-learning practices?	1. Analytical thinking 2. Technological infrastructure	[C28] Thinking capability [C29] Infrastructure

Third participant	1. In your opinion, what are the beneficiaries of e-learning platforms in the education sector during the pandemic conditions?	1. The imaginative power of the individual is elevated 2. More interactive session	[C30]Imaginative power [C31] Interactive session
	2. In your opinion, what are the hurdles faced while implementing online learning practices?	1. The underdeveloped region faces poor internet connection. 2. Inequity among students in learning 3. Self-control is eradicated	[C32] Poor connection [C33] Inequity [C34] Non maintenance of self-discipline
	3. Can you describe the evolution of e-learning platforms in the pandemic circumstances?	1. Effective delivery of information 2. Great investment	[C33] Information delivery [C34] Cost effective
	4. Can you illustrate the futuristic e-learning practices in the modern world?	1. M-learning 2. Gamified elements	[C34] Gamified elements

	5. Can you describe the influential factors of effective e-learning practices?	1. Feedback mechanism 2. Real-time engagement	[C35] Feedback [C36] Engagement [C37]Interactive
Fourth participant	1. In your opinion, what are the beneficiaries of e-learning platforms in the education sector during the pandemic conditions?	1. Bridging the gap among faculty and students 2. Technical knowledge 3. Easy accessibility	[C38]Mode of operation [C39] Efficient output [C40] Knowledge
	2. In your opinion, what are the hurdles faced while implementing online learning practices?	1. Heavy workload 2. Difficult to maintain self-discipline in the session 3. Psychological impact	[C40] Work stress [C41]No Self-discipline [C42] Psychological risk
	3. Can you describe the evolution of e-learning platforms in the pandemic circumstances?	1. Investment is easy 2. In the pandemic condition where students are enrolled in e-	[C43] Easy investment [C44] Safety

		learning to avoid infection	
	4. Can you illustrate the futuristic e-learning practices in the modern world?	1. Gamified elements	[C45] Digital tools [C46] Advanced features
	5. Can you describe the influential factors of effective e-learning practices?	1. Technological infrastructure 2. Analytical thinking 3. Real-time engagement	[C47] Infrastructure [C48] Thinking capability [C49] Students engagement

III. Third stage: creation of themes from the generated codes

Question number	**Codes obtained from the transcripts of experts**	**Themes created**
1	• Learning experience • Program delivery • Knowledge • Cost-effective	• Efficient working and output • Cost-effective

	• Efficient output • Continuous performance • Imaginative power • Interactive session • Mode of operation • Efficient output • Knowledge	• Highly performed • Imaginative power • Interactive • Sustainability • Knowledge gaining
2	• Limited network coverage • Work stress • Psychological stress • work stress • Economic factors • Adaptation problems • Poor connection • Inequity • Non maintenance of self-discipline • Work stress • No Self-discipline • Psychological risk	• Internet disruption • Work stress • Psychological impact • Inequity • Economic factors • No discipline
3	• Skills upgraded • Information delivery • Accessibility • Information delivery	• Up gradation of skills • Cost effective

	• Cost effective • Easy investment • Safety	• Effective investment • Safety • Accessibility
4	• AI, ML, and M-learning tools • gamified elements • Attractive features • Consistent performance • Gamified elements • Digital tools • Advanced features	• Digital tools • Attractive features • Advanced technologies
5	• Negligence • Thinking capability • Infrastructure • Feedback • Engagement • Interactive • Infrastructure • Thinking capability • Students engagement	• Thinking potential • Infrastructure • Interaction • Engagement • Feedback

IV. Fourth stage: Themes review

In this stage, the created themes are grouped together to eliminate the redundancy of data and to exhibit data similarity.

- Imaginative power
- Interactive
- Sustainability
- Knowledge gaining
- Internet disruption
- Work stress
- Economic factors
- No discipline
- Up gradation of skills
- Effective output
- Effective investment
- Safety
- Accessibility
- Digital tools
- Attractive features
- Advanced technologies
- Thinking potential
- Infrastructure
- Interaction
- Engagement
- Feedback

V. Fifth Stage: Define themes

In this stage, the reviewed themes will comes under the common category that supports the research findings.

The pandemic condition has significant impact on the e-learning practices in HE

- Learning experiences
- In expensive
- Imaginative power
- Sustainability

The challenges are evolved during the implementation of e-learning practices.

- Work stress
- Psychological impact
- Inequity
- Economic factors
- No discipline

The evolution of e-learning in the pandemic and its implications in the future education

- Effective output
- Effective investment
- Safety
- Accessibility
- Digital tools
- Attractive features
- Advanced technologies

There are numerous influential factors that initiate the adoption of effective e-learning practices in HE

- Thinking potential
- Infrastructure
- Interaction
- Engagement
- Feedback

VI. Sixth stage: Report writing from the inferences made

The inferences attained from the thematic analysis of the data gathered from the qualitative data are,

- E-learning practices evolved during the pandemic condition comprise of numerous beneficiaries to the students for achieving the conceptual knowledge
- There are several challenges faced by the faculties in adopting the e-learning practices in HE
- The technological growth evolve the novel digital tools in the implementation of e-learning practices.
- These findings reveal the importance of e-learning practices in the education sector to attain growth and sustainability.

Overall mixed methodology

4.4 Discussion

It exhibits the inquiry of the present research and equates with the prevailing research. Moreover, it pronounces the inference and exclusivity of our present study. Additionally, the present study emphasizes the implications of e-learning practices. It also illustrates the beneficiaries of e-learning practices in enhancing the education of the nation. Moreover, it

suggests measures to adopt effective e-learning practices that enhance the technical knowledge of the populace in India.

The existing study Alenezi and Technology, (2020), (p. 48-56.) establishes e-learning's impact on teaching and learning behaviors. Also, it concludes that the e-learning practices create the effectiveness of how many periods have been spent offline or online in students' studies. It also proved that teaching, as well as learning behaviour, are enhanced by means of e-learning practices. Similarly, the present research evaluates the beneficiaries of online education and its impact on the learning behavior of students. Through ANOVA, a significant P value less than 0.05 proves that e-learning practices have a significant impact on the learning behavior of the students.

The suggested study Trakru et al., (2019), (p. 96-101.) reveals the e-learning efficacy specifically in HE institutions. It also examines the efficacy in terms of gender and city. The conventional study concludes that the knowledge gain is higher in e-learning practices. Likewise, the present study also articulates the efficacy of e-learning, and through the regression test, it has been proved that e-learning aids in achieving the technical knowledge to the students.

The existing study Panigrahi et al., (2021), (p. 1840-1862.) has revealed the e-learning efficacy by examining part of student appointment in the apparent learning effectiveness in Indian education. Additionally, the personal factors, such as Internet self-efficiency, and the environmental aspects, such as the system and service quality parameters and information on the several extents of student engagement, like emotional, cognitive, and behavioural, have been evaluated. Likewise, the present research study analyses student engagement in online education. Through the cross-tabulation test, it has been proved that student engagement is elevated in online education.

The suggested study Pratiwi et al., (2021), (p. 127-133.) aims to regulate the e-learning systems' positive impacts on the improvement of the students' learning concepts, and this

research has also correlated the e-learning system with the previous learning system. With the support of an e-learning management system, the student's learning has increased wisely. Through the utilization of highly intensive E-learning, the learning behavior of the students is also increased. Hence, it has been declared that the purpose of E-learning is to increase the education to the widespread community and also to improve the learning quality. Similarly, the present study also articulates the similar implications of e-learning practices, and through the empirical analysis, it proves evidently that the effective e-learning management system aids in achieving the objective of learning in the online platform.

The suggested study by Ferri et al., (2020), (p. 86.) has analyzed the chances and risks in emergency e-learning that depend on the experience during the pandemic of corona emergency. Certainly, the coronavirus emergency has declared that only the technologies have not represented the solution. The huge variation gaps among the students in various situations of education systems have mostly been highlighted in the coronavirus pandemic situation. Most students and teachers have faced several hurdles in e-learning because of the existing limits in the pedagogical, social challenges, and technological. Similarly, the present study also evaluates the challenges in adopting e-learning practices in the pandemic condition. The poor internet connection which tends to generate inequity among the students. Those students in the undeveloped regions will face hurdles in internet connectivity and won't be able to fetch the beneficiaries of e-learning.

The suggested study Alawamleh et al., (2020), (p. 380-400.) has explored whether e-learning has effective communication within the students and the instructors in a negative way or the e-learning has affected the students' productivity stages and this study has evaluated and then suggested the ways for increasing the effective communication in the online within the students and instructors. This paper has suggested that professors should communicate their students by huge informal channels such as audio calls, video calls instant messages online chat groups, and similar to formal channels such as email and online platforms. Likewise, the

present study also articulates the perception of the students and faculties in achieving an effective learning system.

4.4. Summary

This chapter delivers a comprehensive presentation of the findings. Moreover, the research questions has been analyzed and following solutions have been delivered. The primary research question about the challenges and opportunities of e-learning has been provided with the solution such as the network issues within the under-developed regions which might lead to an inequity among the students. The secondary research question such as the evolvement of e-learning and implication has been provided within this section. The evolution of e-learning has been developed through various phenomenon such as effective output and investment, safety, accessibility, digitalized tools, attractive features and advanced technologies. Furthermore, the third research question has been analyzed and the result produced have been given that e-learning aids in elevating the analytical and effectual thinking of the students. Also, the thematic analysis is completed to link the gathered data from the responses to the review of the literature. From the examination of the composed data from the responses, the valuable insight of the experts towards the incorporation of e-learning practices evolved during the pandemic condition. Finally, this chapter ends with a summary section.

CHAPTER V

CONCLUSIONS

5.1 Summary of the Study

Online learning mainly focuses on sharing information and interacting between people to gain knowledge, so it requires participants, of course, to focus and contribute a certain amount of time to follow up instruction. Traditional education was instructor-oriented, with teachers discussing little information on topics and completing the syllabus. E-learning has evolved into virtual learning when educational institutions started using computers and other electronic devices to teach students in improved methods**.**

E-learning is flexible and scalable so that people can access education and learn things they are interested in regardless of their prior education status and disabilities. The goal of this type of learning is to highlight the statement that no one should be denied access to education. No matter what an individual situation is, they can always reach and continue their education regardless of time and place through mobile and other digital technologies.

E-learning requires only a few minutes of registration and basic details for contacting the individual related to the course and assignment. This generates possibilities for taking world-class high-quality classes to be available for different people from different regions all over the world.

Online learning is considered a new way to offer services related to education with the help of electronic devices that advance the skills and knowledge of individuals. E-learning has been famous among universities because it gives away benefits like the generous cost associated with teaching and learning in person and infrastructure maintenance to colleges and universities. It makes educational institutions take part and get involved in the formation of an educated and digital civilization where sharing and learning can be done in a modest, easy, and quick approach anywhere at any time with the help of internet-assisted technologies.

E-learning plays an important factor in the current scholastic system. Since this alternates the whole academic board and turns out to be one of the wanted discussions in the education field. Nowadays many learning people have the desire to learn at a distance and get certificates from education institutions around the world. Poor communication services make it impossible for those who reside in remote places.

Online learning uses technologies related to education to receive or deliver academic study material and teaching material via the Internet. It is important to use the Internet for access to educational sites, materials, and any content that is available online and to post teaching material from the educational institute's side.

The chief objective of the present study is to examine the impact of pandemic on the e-learning in HE. It also evaluates the challenges and opportunities of e-learning in the pandemic circumstances. Additionally, it explores the evolution of e-learning and its implications in futuristic education. Finally, the perception of students as well as faculties regarding the effectiveness and value of e-learning. The survey was acquired from the faculties who are indulged in the e-learning process in HE. From the responses, quantitative research were utilized to determine the challenging factors during the business expansion. The thematic analysis is conducted to analyze the e-learning systems in the nation.

The following are the findings of the study:

- The proportion of the defendants belonging to the age of 26 to 40 years is 65% which is comparatively greater than the proportion of other defendant age.
- The gender of consumers is predicted as follows: 68% of defendants are male faculties, whereas 32% are female faculties.
- The educational qualifications of the consumers are as follows: 68% are accomplished postgraduates, followed by 32% of research scholars.
- The preference for the online platform is estimated through frequency analysis, which states that 60% of contributors have always preferred the Microsoft team. 23% of

contributors sometimes prefer Google Meet. Ten % often prefer the Cisco or Zoom platform.

- From the demographic estimation, it has been evident that most of the consumers are in the age category of 26-40 years, male users, and completed post-graduation. It has also proven that the utmost faculties prefer the Microsoft team. These categorized consumers provide significance to the research study.
- The noteworthy influence among the variables are analyzed through the ANOVA test. The impact of the pandemic and e-learning are evaluated through ANOVA tests. The high mean value and significant p-value of 0.000 prove the association among dependent as well as independent variables. The outcome proves that the pandemic has a noteworthy impact on the e-learning system in the HE.
- Moreover, Regression analysis evaluates the association between the study variable of the pandemic and the e-learning system. The p-value is .000, which illustrates that the pandemic impacts the e-learning system in HE. The outcomes of the regression test prove that there is a connotation between the pandemic and the e-learning system. The pandemic condition will influence the students towards digital learning.
- ANOVA tests evaluate the existence of challenges in the adoption of e-learning. The high mean value and significant p-value of 0.000 prove the association among dependent and independent variables. The outcome proves that challenging factors have a noteworthy impact on the e-learning system in the HE.
- Moreover, independent t-test analysis evaluates the association between the study variable of challenging factors and the e-learning system. The p-value is .000, which illustrates that challenging factors impact the e-learning system in HE. The outcomes of the independent t-test prove that there is a connotation amongst challenging factors and e-learning systems. The challenging factors will influence

the implementation of digital learning.

- The cross-tabulation test's p-value of less than 0.05 proves that the gamified features and other interactive features elevate student engagement in the e-learning system. Hence, E-learning has evolved due to the pandemic, and there are implications for the future of HE.
- The effectiveness and value of e-learning are evaluated through the ANOVA test. The high mean value and significant p-value of 0.000 prove the association among dependent as well as independent variables. The outcome proves that the effectiveness and value of e-learning impact the perception of faculties and students.
- Moreover, independent t-test analysis evaluates the association between the study variable of effectiveness and value of learning and the perception of faculties and students. The p-value is .000 which illustrates that influential factors for effective e-learning impact the perception of both faculties and students. The outcomes of the independent t-test prove that there is a connotation between the effectiveness of learning and the perception of students and faculties. The influential factors will impacts the perception of students and faculties.

5.2 Research solutions

- **Challenges and opportunities:** The present study concludes that the pandemic condition has a significant impact on the e-learning system. It also presented opportunities such as increased adaptability to online learning, enhanced documentation and monitoring of education and the potential for greater student autonomy in learning processes. Overall, the shift to e-learning has necessitated improvements in digital infrastructure and teaching methods to better support students and educators.

- **Future of higher education**: Advanced digital tools are recommended to achieve the objective of e-learning systems. This evolution suggests a future where online education is integral, potentially enhancing accessibility and efficiency while requiring improvements in digital literacy among students and educators.
- **Effectiveness and value of e-learning:** The influential factors contributing to the effectiveness of learning in terms of student and faculty perceptions are evaluated. Key factors influencing these perceptions include technological competence, and the quality of course design and interaction.

5.3 Limitations

This study has some potential limitations. The research involves the education sector, which is limited to a particular region. The research was performed only with a specific number of faculties and hence lack generalizability. The current study did not include certain significant components of motivational as well as pedagogical factors in the e-learning system. The e-learning system of HE is discussed which lacks a detailed report of the issues and the process of tackling them. However, the implication provided by the research can be useful to improve the quality of education in the upcoming years across the world.

5.4 Future Recommendation

The research provides various results predicted from the data analysis. The study endorses the following propositions from considering the consequences:

- The study acts as a point of reference for the implementation and beneficiaries of e-learning. It affords a way for future consideration of documentation of growth aspects that influence the execution of e-learning.
- The study will benefit the government and stakeholders, and future research is required regarding the policies framed by the Government to develop the nation's e-learning system.

- The research study proposed the beneficiaries of e-learning. Hence, future studies require an in-depth understanding of the system's mechanism.
- The factors influencing the implementation of e-learning can be discussed elaborately in the upcoming research.
- The research contributes to the education sector of the nation. There is a need to future researches in other developing countries.

APPENDIX A

SURVEY COVER LETTER

Dear All,

I hope this message finds you well.

We are conducting a study titled "**The Impact of the Pandemic on E-Learning and its Evolution: A Mixed-Methods Study**" and would greatly appreciate your participation. Your insights will contribute significantly to our research efforts.

Kindly take a few moments to complete the questionnaire provided in the link below. Your responses will be utilized solely for academic purposes and will remain confidential.

Your valuable input will help us gain a deeper understanding of the challenges, opportunities, and evolution of e-learning in the context of the pandemic. We aim to explore various aspects such as the effectiveness of online teaching platforms, the challenges faced, and the future implications for higher education.

Thank you for your time and contribution to our study.

Warm regards,

Ravi Iyer

APPENDIX B

INFORMED CONSENT

Title of Study: The Impact of the Pandemic on E-Learning and its Evolution: A Mixed-Methods Study

Researcher(s): Ravi Iyer

Introduction: You are invited to participate in a research study conducted by Ravi Iyer to investigate the impact of the COVID-19 pandemic on e-learning and its evolution. Before deciding whether to participate, you need to understand the purpose, procedures, risks, benefits, and rights as a participant in this study.

Purpose: This study aims to understand the experiences, challenges, and opportunities associated with e-learning during the COVID-19 pandemic. Your participation will contribute to a broader understanding of how e-learning has evolved and its implications for higher education.

Procedures: If you agree to participate, you will be asked to complete a questionnaire consisting of multiple-choice questions related to your experiences with e-learning platforms, the impact of the pandemic on your learning, challenges faced, and perceptions of e-learning effectiveness. The questionnaire will take approximately 10 to 15 mins to complete.

Risks: Participation in this study involves minimal risks. However, there may be a slight risk of discomfort or inconvenience associated with reflecting on your experiences with e-learning during the pandemic.

Benefits: While there are no direct benefits to you as a participant, your participation will contribute valuable insights to academic research on e-learning and pandemic impacts. The findings may inform future educational practices and policies.

Confidentiality: Your responses will be kept confidential to the extent permitted by law. Only the researchers involved in the study will have access to the data collected. Your identity will remain anonymous in any reports or publications resulting from this study.

Voluntary Participation: Participation in this study is voluntary, and you have the right to withdraw at any time without penalty. Your decision to participate or not will not affect your current or future relationship with the researchers or their affiliated institutions.

Checkbox for Participant Agreement

Participant's Name: _____

Participant's Signature: _____

Date: _____

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