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Hybrid Learning- Exploring Innovative Strategies in Indian Higher Education.

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Abstract

This thesis investigates hybrid learning in higher education institutions in India, focusing on postgraduate courses, to understand its impact and effectiveness. The study identifies key challenges, including network connectivity, student engagement, and technological barriers. It proposes innovative strategies such as affordable internet solutions through partnerships with telecom companies, improved public Wi-Fi infrastructure, and the provision of necessary devices to address these issues. The study also suggests adopting Udemy, a leading destination for online courses that empowers professional growth, to enhance the academic experience.

To promote digital equity and improve education quality and accessibility, the thesis emphasizes enhancing student support systems, developing robust digital infrastructure, and creating inclusive learning environments, considering scalability and feasibility. Applying the Unified Theory of Acceptance and Use of Technology (UTAUT) framework, the research highlights the importance of performance expectancy and facilitating conditions in technology acceptance among students and teachers.

The study underscores the need for collaboration between educational institutions, governments, and private companies to develop scalable and sustainable solutions for hybrid learning. However, the study's focus on postgraduate courses in Indian higher education potentially limits its generalizability. Future research should expand to different educational levels and regions, both within and outside India, and employ long-term studies to assess the sustainability of the proposed strategies. Incorporating mixed-methods approaches and exploring emerging technologies like artificial intelligence and virtual reality can provide a more comprehensive understanding and foster innovative improvements in the current digital education landscape.

Keywords: Hybrid learning, Higher education, Digital equity, Technology access, UTAUT, India, Postgraduate courses, Internet connectivity, Student engagement, Digital infrastructure.

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List of abbreviations:

- BVBCET : B. V. Bhoomaraddi College of Engineering and Technology
- COVID-19: Coronavirus Disease 2019
- EE :Effort Expectancy
- FC :Facilitating Conditions
- HOD : Head of department
- IT : Information technology
- IIT : Indian Institute of Technology
- MOOC : Massive Open Online Courses
- MSRUAS : M. S. Ramaiah University of applied sciences
- NEP : National Education Policy
- PE : Performance Expectancy
- PG : Post graduation
- SI : Social Influence
- SWAYAM :Study Webs of Active–Learning for Young Aspiring Minds
- TAM : Technology Acceptance Model
- TRA : Theory of Reasoned Action
- TPB : Theory of Planned Behavior
- UNESCO : United Nations Educational, Scientific and Cultural Organization
- UTAUT : Unified Theory of Acceptance and Use of Technology

1: Introduction

Hybrid learning is the combination of traditional classroom teaching and online learning (Linder, 2017), and it has gained a substantial hold in the education sector, especially following the changes post-COVID-19 pandemic. Advancements in technology have brought significant impacts on educational delivery. The use of technologies has become essential in a broader range of pedagogical activities and promoted the development of new models or methods of education (Singh, Steele, & Singh, 2021). Hybrid learning and teaching is a mode of education that has benefited from the advancement of information and communications technologies (Mei, Lu, & Ma, 2022). This approach offers flexibility and easy accessibility, allowing students to engage in learning both in physical classrooms and online learning through digital platforms (Mourtzis et al., 2021).

Despite many related studies on hybrid education, there remain gaps in the existing literature in this area to make this mode of study more effective. Raes, Detienne, Windey, and Depaepe (2020) show that most of the existing literature reviews on hybrid learning challenges are exploratory and qualitative in nature and have focused mostly on descriptions of students' experiences, the organisational implementation, and the technological design. They concluded that future research should include more empirical investigation. The literature review by Raes et al. (2020) also identified that relevant studies that addressed the academics' perspective have been scanty, and more attention should be paid to areas such as the readiness of academic staff and the challenges they have encountered. Furthermore, as hybrid learning and teaching feature extensive use of technology (Raes et al., 2020), the technological infrastructure of a region and an educational institution, as well as the digital literacy of academics, have been found to influence the efficiency of hybrid teaching (Wong, Kwan, Wu, & Cheung, 2022). Studies should address issues such as whether academics are technically ready to carry out hybrid teaching, whether they could pay attention to students from online and face-to-face classes, engage both groups in learning, and interact with and maintain relations with students as well as conduct fair assessments.

Additionally, the implementation of hybrid learning faces numerous challenges (Nortvig, Petersen, & Balle, 2018), which creates problems with technology and internet connectivity among students and educators (Sharma et al., 2022). Despite these drawbacks, hybrid learning offers valuable opportunities for education. Therefore, it is important to explore innovative strategies to address the challenges associated with this mode of learning.

This thesis aims to investigate the challenges of hybrid learning in higher education institutions in India, specifically focusing on postgraduate education. It will explore the perceptions of students and teachers regarding various issues related to hybrid instruction, as well as their preferences and recommendations for support. The results will contribute to developing innovative strategies to address the challenges of hybrid learning and promote digital equity in higher education.

1.1 Background of the study:

Hybrid learning has gained considerable traction in the education sector, especially post the COVID-19 pandemic (Michalíková & Povinský, 2020). According to Lanjuan and Jinshuang (2020), hybrid learning is feasible and can effectively open ways for innovative pedagogical approaches that use digital technologies to enhance teaching and learning outcomes. Hybrid learning offers flexibility and accessibility; however, the implementation of hybrid learning faces significant hurdles, primarily related to digitalization (Liz & Mikic, 2019). Challenges such as learning style and cultural challenges: students might miss out on skills like creative thinking and problem-solving (Laufer & Leiser, 2021). Pedagogical learning challenges: sharing new ways to create, deliver, and focus on online materials can save resources (Basilaia & Kvavadze, 2020). Time management challenges: teaching online demands significant time and effort (Mohammad & Ismail, 2022). Creating online materials and assisting students may require extra hours, technical and technological challenges: insufficient technical support and investment in technology infrastructure (Goodyear, 2021). Some applications require special software, slowing down internet access, and internet connectivity (Sarkar, 2020). By addressing these obstacles, hybrid learning presents valuable opportunities for improving educational outcomes. Hence, it is imperative to explore innovative strategies to overcome barriers and promote digital equity in higher education.

This study will address higher education institutions in India. This is because India has seen a big increase in the use of digital technology in recent years, and India has all kinds of colleges and universities, from big famous ones to smaller ones. They offer lots of different courses, so studying hybrid learning helps us understand how it works in India. By considering hybrid learning, this thesis attempts to ensure that more students have a fair chance at getting a good education. Lastly, the government in India is doing a lot to encourage digital education, for instance with the SWAYAM platform (Anurag & Shivam, 2022). The SWAYAM platform facilitates the hosting of all the courses available for the students from class 9 to post-graduation, and can be accessed by everyone, anywhere, at any time and is provided to the

learners free of cost and assisted by more than 1000 faculty and teachers selected from across the nation in preparing different courses (Anurag & Shivam, 2022). Understanding how hybrid learning fits into these efforts helps us make better decisions about education policies. All these factors together make India an interesting place to study hybrid learning and find ways to make education accessible to students.

1.2 Problem statement:

Hybrid learning in higher education faces various challenges, particularly related to digitalization. The digital divide between students and educators, due to issues with technology and internet connectivity, hampers the effectiveness of hybrid learning initiatives (Sarkar, 2020). These challenges delay the full realization of hybrid learning's potential to provide quality education and exacerbate disparities in educational opportunities (Sharma and Sood, 2022). Therefore, there is a pressing need to explore innovative strategies to address these digital issues in hybrid learning environments and promote digital equity in higher education.

1.3 Research aims:

The aim of this research is to explore hybrid learning in higher education institutions in India, focusing on courses at postgraduate level. This study helps us to understand the impact of hybrid learning considering the COVID-19 pandemic, internet connectivity, identify challenges related to technology access and explore innovative strategies to address these challenges, and encourage digital equity in higher education. By accomplishing these objectives, the research aims to contribute to the development of effective strategies for improving the quality and accessibility of education in the digital age.

1.4 Research Question: What innovative strategies will address the digital issues in hybrid learning and teaching, considering scalability and feasibility?

Scope of study: In India, there has been a significant increase in digital transformation, particularly with smart devices and internet connectivity (Singh & Steele, 2021). This digital revolution has provided a strong foundation for online learning platforms and tools, making hybrid learning more accessible to a larger segment of the population. Hybrid learning offers students the flexibility to engage in quality learning experiences from diverse locations. This paper investigates the challenges and opportunities associated with the digital transformation of higher education in India, identifying innovative strategies for development, digital equity, and enhancing the quality and accessibility of education in the country.

Outline of Thesis:

Chapter 1 provides an overview of the thesis, which studies hybrid learning in higher education institutions in India. Chapter 2 provides an overview of the literature and theoretical frameworks, highlighting the key focuses of studies on hybrid learning and teaching, evaluation approaches, and challenges. Chapter 3 presents the research methodology employed to explore hybrid learning in higher education institutions in India. Chapter 4 presents the findings, and chapter 5 discusses the findings. Chapter 6 has the conclusion, practical implications, and suggestions for future studies.

2: Literature review and theoretical framework

2.1 Hybrid Learning and Teaching:

Hybrid learning and teaching utilize technologies to engage students across various learning environments, responding to diverse learning preferences and enhancing experiences. This approach often combines online and offline elements, as well as in-class and extracurricular activities (Wong & Kwan, 2022). Anurag (2022) highlights several features of hybrid instruction, including its adaptability to different instructional modes that provide customized learning activities for various student groups. It increases active learning through the flipped model, enhances student engagement, and improves self-regulated and self-directed learning skills. In higher education, hybrid learning and teaching are praised for their simplicity, high flexibility, facilitation of time management, and enhancement of face-to-face attendance value (Marchisio, Rabellino, Roman, & Sacchet, 2022. p. 21).

Miller and Sellnow, (2021), further describe hybrid learning and teaching as encompassing such features as allowing students to choose how they want to attend a class session, providing equivalent class activities in all modes of delivery, using the same learning materials for all students, helping students master technological skills to take part in class activities with different delivery modes, and assessments. Various benefits to student learning have been reported for a class using the hybrid mode. They include for example, increasing student engagement, catering to learner diversity, persistence, and retention, fostering student autonomy and independence, improving student learning performance, increasing students access to courses and resources, increasing learning flexibility, and maximising students' social presence (Miller and Sellnow, 2021).

A study by Wongwuttivat, Buraphadeja, and Tantontrakul (2020) compared face-to-face learners with those engaged in hybrid learning using virtual environments. They found that

blended learners outperformed their traditional counterparts in knowledge transfer and academic achievement. Hybrid learning also facilitates connections with multiple role models and mentors, offering added value compared to traditional methods (Schumann, 2019).

2.2 Focuses of Studies on Hybrid Learning and Teaching:

Hybrid learning and teaching have been applied across various disciplines, including IT education, nursing education, business education, science education, second language learning, and medical education (Beatty, 2019). Research on hybrid instruction has concentrated on several key areas. One significant focus has been the development and implementation of hybrid learning and teaching models, methods, and activities (Li, Wong, Kwan, Wu, & Cheung, 2022). Ochia (2021) examined the development and application of hybrid teaching methods in a graduate biomechanics course, noting that such methods can reduce human contact, maintain course objectives, enhance students' learning experiences, and boost engagement with the course. Similarly, Rodríguez-Paz, González-Mendivil, Zárate-García, Zamora-Hernández, and Nolzco-Flores (2021) investigated a hybrid teaching model in an engineering course, finding it effective in motivating students and improving performance, as evidenced by high passing rates among those enrolled.

Another focus is on students' perceptions based on their experiences with hybrid learning and teaching. Pham (2022) investigated students' perceptions of hybrid learning and teaching implementation at a college and reported that most students were well-prepared for using technology in this context, although some encountered technical and communication issues. In contrast, Gomaze (2022) analyzed students' experiences in hybrid learning environments and noted that, despite students being exposed to both synchronous and asynchronous learning settings and feeling comfortable in these environments, they remained reluctant to fully engage in learning.

Lorenzo (2021) examined the difficulties university students encountered during their transition from traditional face-to-face teaching to hybrid instruction. He identified challenges such as decreasing student motivation, increasing feelings of loneliness, experiencing technical problems, and reduced engagement with teachers and peers. In a similar vein, Titan (2021) conducted a case study on teaching a hybrid computer programming course and observed that the major challenges included staying focused during lectures, balancing personal wants and needs, and keeping pace with live lecture.

The issue of sustainability in relation to hybrid learning and teaching has been examined by Compton and Standen (2023), who found that most students preferred the continuation of hybrid learning and teaching as an option after the COVID-19 pandemic. They highlighted that the flexibility of this option aligns closely with UNESCO's sustainable development goal of inclusive and equitable quality education. Additionally, Pucciarelli and Kaplan (2022) analyzed the challenges and opportunities of the hybrid teaching approach and suggested that transitioning to this model could contribute to more sustainable and responsible education. Other studies have discussed the design and implementation of hybrid teaching environments, emphasizing how sustainability can be addressed through relevant technology solutions and inter-institutional cooperation. Griffin et al. (2022) highlighted the potential benefits and advantages of sustainable hybrid learning and teaching practices.

2.3 Evaluation of Hybrid Learning and Teaching:

Evaluating hybrid learning and teaching is crucial for helping education practitioners make informed decisions about its planning and implementation. This includes considerations such as the types of students to be provided hybrid instruction, course components, course material design, and assessments (Goodyear, 2021). Existing literature in this research area has predominantly focused on factors influencing the effectiveness of hybrid learning and teaching (Liu, 2021). For instance, Liu (2021) identified key factors affecting the effectiveness of hybrid classes, including course objectives, students' learning motivation, pedagogies, and technological resources, such as hardware and software. Raes (2020) conducted a meta-analysis of 47 studies on hybrid learning and teaching, revealing that much of the literature is exploratory and qualitative, focusing mainly on technological design, organizational implementation, and student experiences. Raes emphasized the need for more empirical investigations involving diverse participant groups. Similarly, Howell (2022) identified gaps in hybrid learning and teaching research and recommended more evaluation studies based on the results of its implementation, along with the need for professional development of academic staff and additional support.

In this context, despite significant efforts focused on student learning, there has been limited attention given to how academic staff assess the effectiveness of their hybrid teaching methods. Evaluating hybrid learning and teaching should account for the specific contextual factors involved in its implementation. For example, Li and Wong (2019) highlighted the high digital literacy levels among members of the academic community, underscoring the need to deepen our understanding of the challenges academics face in hybrid learning and teaching practices.

These challenges include addressing pedagogical issues, integrating technology, and designing instruction tailored to hybrid environments (Li et al., 2022).

2.4 Challenges of Hybrid Learning and Teaching:

Despite the promising outlook for hybrid learning, there are numerous digital problems that need to be investigated. These problems include various challenges (Ali, Uppal, & Gulliver, 2018), such as:

Technical Accessibility: Differences in having digital tools like updating of software's and internet connection between students and teachers can make it hard for everyone to take part in hybrid learning.

Digital Literacy: Insufficient digital literacy skills among students may affect navigating online learning platforms and utilizing digital tools effectively.

Infrastructure Requirements: Ensuring robust technological infrastructure, with sufficient reliable internet connectivity with speed and access to requisite software and hardware, will be essential for the seamless implementation of hybrid learning initiatives.

Financial Constraints: Not having enough money or budget might make it difficult to buy the digital equipment needed for hybrid learning

Policy and Regulatory Frameworks: Not having clear rules and rules that are not the same from one to another educational institution and plans can make it confusing and hard to do.

Ali, Uppal, and Gulliver (2018) identified 68 unique barriers to virtual learning environments, categorized into four areas: technology, individual, pedagogy, and enabling conditions. The literature suggests that for a virtual learning environment to be successful long-term, it must effectively deliver all aspects of traditional education, including teaching-learning processes, academic processes, assessments, evaluation processes, and services (Ali, Uppal, & Gulliver, 2018).

2.5 Theoretical framework:

Two well-known theories in hybrid learning in higher education are the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). To describe the acceptance process, UTAUT incorporates components from many theories of technology acceptance, with special emphasis on performance

expectancy, effort expectancy, social impact, and enabling factors (Venkatesh et al., 2003). Conversely, as factors influencing the adoption of technology, TAM mainly concentrates on perceived utility and perceived ease of use (Davis, 1989).

Research has applied these theories to hybrid learning contexts. For instance, Singh and Thurman (2019) utilized UTAUT to explore student adoption of hybrid learning platforms in Indian institutions, highlighting the roles of social influence and performance expectancy.

2.5.1 The Technology Acceptance Models in Higher Education

The Technology Acceptance Model (TAM) developed by Davis (1989) has been widely utilized in software-related fields. This model was used to assess workers' opinions and acceptability of e-learning platforms in workplaces, with additional factors such as organizational support, computer self-efficacy, prior experience, and task equivocality included to match specific research environments. Al-Busaidi (2013) extended the TAM model to examine students' perceptions of hybrid learning by incorporating factors like fulfillment and individual traits.

Previous research has shown that TAM is effective in facilitating the adoption of e-learning and other online education settings (Abdullah & Ward, 2016; Al-Marroof et al., 2020; Alone, 2017; Kanwal & Rehman, 2014; Mehta et al., 2019; Rafiq et al., 2020). Davis (1989) and Davis et al. (1989) argued that technology adoption is linked to the personal decision to learn the technology, with perceived ease of use and perceived usefulness being crucial elements. Al-Marroof et al. (2020) further demonstrated TAM's effectiveness in providing implications for the adoption of online education during uncertain times, offering valuable insights for educational institutions and policymakers aiming to enhance education through online technologies.

2.5.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

The literature on modern information systems has developed and validated several models of technological adoption, including the Technology Acceptance Model (TAM). However, researchers faced challenges in deciding among these models and their applicable structures. In 2003, Venkatesh et al. introduced a unified paradigm known as the Unified Theory of Acceptance and Use of Technology (UTAUT). According to Venkatesh, Morris, Davis, and Davis (2003), UTAUT is an encompassing model that integrates existing knowledge and provides a foundation for future investigations in this field. They demonstrated that UTAUT outperforms earlier models in explaining diverse usage intentions.

Since 2003, UTAUT has been validated in various contexts. By 2010, significant interest in the education sector emerged. For example, Šumak, Polančič, and Heričko (2010) used UTAUT to study student adoption of Moodle. Pardamean and Susanto (2012) applied it to assess blog technologies in education, while Tan (2013) examined students' acceptance of computerized placement exams. Comparisons with other adoption models consistently demonstrate UTAUT's superior explanatory power. Al-Mamary, Shamsuddin, and Aziati (2015) highlighted its widespread use in understanding technology acceptance, emphasizing critical technological components. Several studies (Abdullah & Ward, 2016; Ozkan & Kanat, 2011) have further confirmed UTAUT's effectiveness in explaining users' acceptance behaviors across different technological contexts.

In contrast to models like TAM, TRA, and TPB, UTAUT has garnered significant attention in the literature (Abubakar & Ahmad, 2013). TAM focuses on users' acceptance based on perceived usefulness and ease of use, while TRA emphasizes attitudes and subjective norms in predicting intentions. TPB extends TRA by including perceived behavioral control. UTAUT integrates these factors and incorporates facilitating conditions and social influence to comprehensively predict technology acceptance and use (Taherdoost, 2018). Research suggests that UTAUT provides a more effective framework with greater explanatory power compared to TAM, TRA, and TPB.

UTAUT was preferred over TAM for this thesis due to its comprehensive framework, which includes performance expectancy, effort expectancy, social influence, and facilitating conditions—all critical in educational settings. Unlike TAM, UTAUT considers social and organizational factors, making it highly relevant for analyzing hybrid learning contexts and addressing their complex dynamics. Its emphasis on social impact and performance expectations enhances understanding of technology adoption in educational settings. This model was chosen to allow for a more thorough analysis of the factors influencing faculty and student adoption of hybrid learning technologies in India, thereby bolstering the validity of the study findings.

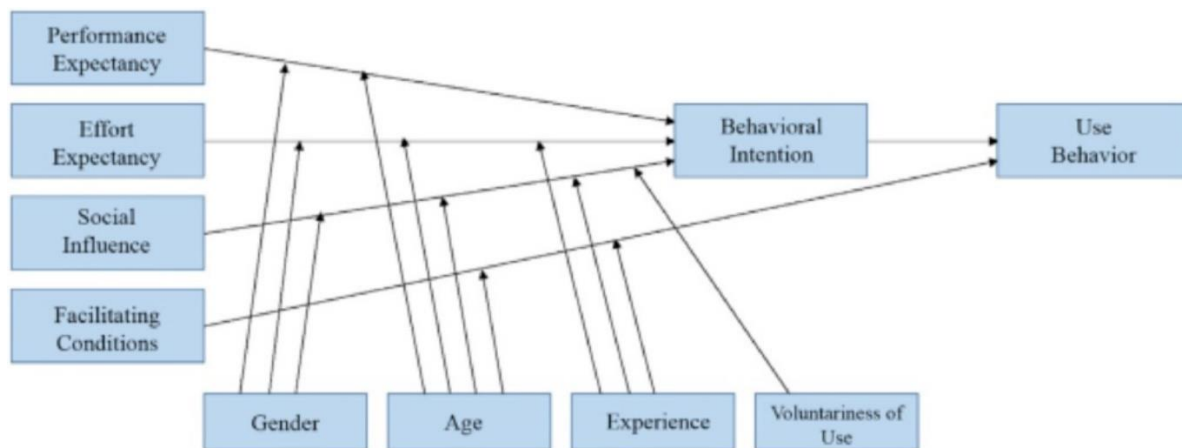


Figure. 1. The unified technology acceptance and use of technology theory (UTAUT) (Venkatesh et al., 2003).

Performance Expectancy (PE): This is about what teachers and students believe hybrid learning technologies, like virtual classrooms can do for their academic performance. It's about how they see these technologies helping them get better grades and understand their courses better.

Effort Expectancy (EE): This is about how easy or hard students find it to use hybrid learning technologies. It is about whether tools are seen as easy to use, which affects whether students are willing to use them for their studies.

Social Influence (SI): This is about how peers and social pressures affect whether students decide to use hybrid learning technologies. It's about whether students feel encouraged or supported by friends, classmates, or other important people, which can make them more interested in using these technologies.

Facilitating Conditions (FC): This is about what resources and support systems students and teachers think are available to help them use hybrid learning technologies effectively. It includes things like tutorials, technical help, and a good setup of technology. Strong support makes it easier for students and teachers to use these technologies confidently for teaching and learning.

These ideas are important for understanding how students and teachers in Indian higher education view, start using, and make the most of hybrid learning technologies. They highlight what motivates them and the challenges they face when adopting these new learning methods.

3: Research methodology

This section explains the research method chosen for the study. It covers the hybrid learning experience of students and teachers of Indian higher education and to understand their challenges and effectiveness. It describes how data will be collected and analysed and discusses the ethical considerations for this research.

3.1 Qualitative research methods:

Qualitative research has become increasingly significant due to its ability to provide valuable perspectives on the intricate dynamics of educational environments. In response, a study reviewed literature about underlying assumptions, practical application, challenges, and potential opportunities in qualitative research, using the content analysis technique (Mantula et al., 2024). The study revealed that qualitative research is a valuable approach in higher education as it allows for a deeper understanding of complex phenomena and provides a rich description of experiences and perspectives. Mantula et al. (2024) showed that challenges in qualitative research include poor understanding of its potential and lack of time and sufficient funding. The study recommends the adoption of qualitative research when exploring complex educational phenomena as this approach provides a more comprehensive understanding of experiences and perspectives. Educational institutions need to provide support to researchers, including funding, training, and guidance on ethical considerations.

The qualitative research paradigm is based on interpretivism, which seeks to explore and understand social problems to understand the reasons entrenched in those experiences (Addo & Eboh, 2014). Furthermore, Shava and Nkengbeza (2019) view qualitative research as an inquiry that aims at gaining an in-depth understanding of human behaviour and the reasons that govern such behaviour. Based on these studies a qualitative research method has been chosen for this thesis.

Qualitative research allows for flexibility to explore developing themes and it helps to capture diverse perspectives that may arise during the data collection process (Bernard, 2002), given the dynamic nature of technology and education.

3.2 Case Description for Higher Education Institutions in India:

According to Ramakrishnan and Rajiv (2022), before March 2020, most Indian higher education institutions primarily followed traditional face-to-face teaching methods. Technology was used minimally, often limited to tools such as PowerPoint presentations for

lectures and tech gadgets for capturing attendance. Higher education institutions utilized technology mainly for essential academic processes, including PowerPoint presentations instead of overhead projector slides, video projectors instead of overhead projectors, and smart boards. Specialized software for subjects like finance, research methodology, statistics, analytics, and business intelligence was typically used in computer labs or classrooms where students used their laptops.

Many Indian higher education institutions were slow to adopt blended learning methods, with technological interventions in education not being a priority. Few institutions employed hybrid learning or the flipped classroom method. Massive Open Online Courses (MOOCs) were often criticized for lacking credible evaluation methods and were not widely encouraged. Despite this, the Indian government advocated incorporating MOOCs into the educational framework and encouraged faculty to create courses for the SWAYAM platform. SWAYAM, an initiative by the Government of India, aims to bridge the digital divide for students who are not familiar with e-learning and lack access to the knowledge economy (Gupta & Chaturvedi, 2022).

3.3 Ethical considerations:

The relationship established between researchers and participants in qualitative studies can raise various ethical concerns. Qualitative researchers face dilemmas such as respect for privacy, the establishment of honest and open interactions, and avoiding misrepresentations (Warusznski, 2002). Important ethical concerns in qualitative research include anonymity, confidentiality, and informed consent (Richards & Schwartz, 2002).

According to the Swedish Research Council (2017), participants must be informed of their right to withdraw from the study at any point. This includes obtaining informed consent from all participants, maintaining confidentiality, respecting values and cultural norms, avoiding harm or exploitation, and ensuring the well-being and dignity of all individuals involved in the research process.

3.3.1 Trustworthiness

The trustworthiness of the data involves establishing credibility and reliability (Graneheim & Lundman, 2004). This can be achieved through rigorous data collection methods to ensure that the information collected accurately represents the experiences of educators and students in hybrid learning environments while maintaining confidentiality and anonymity. Transparency was also upheld throughout the research process by thoroughly documenting data collection

procedures, including transcript and analysis methods, which enhances the trustworthiness of the findings.

3.3.2 Transferability

Transferability in qualitative research involves a collaborative effort between the researcher and the reader (Heather, 2020). Effective planning and discussion of transferability can enhance the chances that others will learn from, utilize, and build upon our research. This article identifies three key dimensions of transferability pertinent to qualitative research approaches. It is crucial to systematically and transparently consider these dimensions from the outset of the review process to influence the transferability of systematic review findings positively.

3.3.3 Dependability

Dependability, also known as consistency, is one of the four criteria for ensuring rigor and trustworthiness in qualitative research (Ilyana, 2022). It refers to the process of establishing consistency from the perspectives of constructivism and interpretivism.

In this study, interviews were conducted with multiple participants to maintain data consistency. To achieve this, researchers should follow systematic methods for data collection and analysis, such as using a consistent set of interview questions and applying uniform coding procedures for responses. Additionally, maintaining detailed records of all research activities, including any modifications made during data collection or analysis, is essential for ensuring the dependability of the findings.

3.3.4 Conformability

Qualitative researchers have proposed confirmability as a concept to describe the extent to which results can be corroborated by others (Morse, Barrett, Mayan, Olson, & Spiers, 2002). Biddix (2018) described confirmability as a concern in data analysis, asserting that it is verifiable when researchers provide clear details about their data analysis procedures, including how data sources were transformed into codes and codes into themes. Findings are considered fair and unbiased when researchers acknowledge and mitigate their own biases and assumptions during the research process. This ensures that the research outcomes are not unduly influenced by the researchers' personal opinions or beliefs.

3.4 Data collection:

Educators and students of higher education, from India were interviewed. Considering these a semi structured interview method was used for the study. The purpose of collecting data from

both teachers and students was to understand their experiences and challenges with hybrid learning in higher education in India. By interviewing both groups, the study compared their views on hybrid learning technologies. This approach gave a complete picture of the hybrid learning environment. The study aimed to identify common challenges for both teachers and students, as well as unique issues each group faces. This helps in finding effective solutions that work for everyone involved.

Considering above facts, the interviews were conducted with two different categories of people, teachers, and students, 5 faculty members from different colleges in India, and 5 students from different colleges respectively. The focus of all the interviews was to understand the experience and challenges in the hybrid mode of teaching and learning. A Semi- Structured interview was used and the order in which questions were posed to the participants were in the same order, so that the answers given were also in the same context. This was done so that the context effects were minimized. Existing literature was used to understand the challenges faced by higher educational institute posed by the virtual learning environment.

The semi-structured interview questions were based on existing theories about hybrid learning (see Table 1). These questions were asked to all interviewees to maintain consistency in data collection and minimize differences. In addition to the standard questions, follow-up questions were posed as needed. An interview with eight open-ended questions was prepared for all respondents (Bryman, 2016). These open-ended questions allowed for further discussion to obtain more detailed information from participants. The interview questions, which are listed in the Appendix section of this thesis, were carefully designed to balance structure and flexibility. This approach enabled the interviewer to explore the research topic in depth while remaining open to new insights and opportunities for additional questions.

The decision to use semi-structured interviews was made because this format provides flexibility and allows for deeper insights into respondents' perspectives on the topic (Myers & Newman, 2007). During the interview, the researcher paid close attention and asked follow-up questions as needed to gain more profound insights related to the research question (Bryman, 2016). Respondents were carefully selected using the snowball sampling method to ensure they could adequately address the research question. This method is efficient and cost-effective, facilitating the recruitment of hard-to-reach participants, saving time, and promoting effective communication, making it a popular choice in educational research (Naderifar, Goli, & Ghaljaie, 2017).

3.4.1 Development of the Interview Questions

The development of the interview questions was meticulously structured to gain a comprehensive understanding of the experiences and challenges associated with hybrid learning and teaching. The primary goal was to capture the perspectives of both educators and students in higher education institutions in India. The interview questions were crafted to explore three central themes: the experience of hybrid technology learning (Mantula, Mpofu, Mpofu, & Shava, 2024), the challenges encountered in its implementation (Miller, Sellnow, & Strawser, 2021), and technology acceptance (Abdullah & Ward, 2016).

It started with a thorough review of the existing literature on hybrid learning and teaching. This provided a strong theoretical understanding and helped to identify key issues and recurring themes in the field, which highlighted the importance of understanding the nuanced experiences of users and the practical challenges they encounter. It refers to the detailed and subtle aspects of how individuals engage with hybrid learning, capturing the variations in their perceptions and interactions. Practical challenges they encounter are the real world difficulties and obstacles users face when implementing and using hybrid learning technologies.

The questions were then constructed to be open-ended, allowing respondents to provide detailed, reflective, and easy responses. This approach was chosen to ensure that the interviews could capture a wide range of perspectives and experiences. For instance, questions like "Can you describe your experience with hybrid learning and how it has influenced your teaching methods?" were designed to get practical and detailed narratives from the respondents.

A balance between structure and flexibility was maintained in the interview guide. While the core questions were standardized to ensure consistency across all interviews, the semi-structured format allowed for follow-up questions to probe deeper into specific areas of interest as they emerged during the conversation (Bryman, 2016). This flexibility was crucial for capturing unexpected insights and further exploring significant points raised by the respondents.

A pilot testing of the draft interview questions was conducted with 2 people one for teacher and one for student like the target sample. After that refined and modified the questions, ensuring they were clear, relevant, and comprehensive. This iterative process helped in fine-tuning the questions to better address the research objectives.

The final interview guide, detailed in the Appendix section of this thesis, includes six open-ended questions personalized for both educators and students. These questions aimed to explore their experiences with hybrid learning technology, the challenges they face, and their ideas for solving digital problems in Indian education. This structured but flexible method allowed for a thorough look at the research topic and helped in understanding the complicated aspects of hybrid learning.

Below are the interview questions focused on three primary themes: the experience of hybrid learning and the challenges encountered in implementing this mode of instructions, as well as the technology acceptance. Below is a categorized list of the questions under each theme.

Theme	Questions	Sources
Experience of Hybrid Learning	<p>For Educators:</p> <ul style="list-style-type: none"> • Can you describe your experience with hybrid learning and how it has influenced your teaching methods? • How do you evaluate the students in this mode of learning? <p>For Students:</p> <ul style="list-style-type: none"> • How has been the hybrid learning experience compared to traditional classroom teaching? • Do you have any suggestions for next batch students to make hybrid learning more effective? 	<p>Linder, (2017)</p> <p>Gamage & Dehideniya (2022).</p>
Challenges in Hybrid Learning	<p>For Educators:</p> <ul style="list-style-type: none"> • What challenges have you faced using this mode of instruction, particularly about technology access and internet connectivity for students? • Can you tell me the factors prompting the success or failure of initiatives to address the digital issues in hybrid learning environments? <p>For Students:</p> <ul style="list-style-type: none"> • How did connectivity challenges affect your learning? • What type of technical or technological issues have you encountered with hybrid learning during your studies? 	<p>Miller & Sellnow (2021)</p>

	<ul style="list-style-type: none"> • What additional support or resources can bridge the digital issues in hybrid learning environments? 	
Technology acceptance	<p>For Educators:</p> <ul style="list-style-type: none"> • Have you been involved in any initiatives to improve technology access and internet connectivity for students? If yes, could you explain them and their effectiveness? • How do you view the scalability and feasibility of hybrid learning environments? • In your opinion, what policies and practices could be implemented to improve or develop the digital equity in higher education in India? • Can you suggest some strategies which can help to improve hybrid learning effectively? <p>For Students:</p> <ul style="list-style-type: none"> • Do you know any initiatives taken to improve technology access and internet connectivity for students in your educational institution? If yes, could you share your thoughts on their effectiveness? • Do you believe their teaching methods are scalable and feasible? Can you explain how? • How do you think digital equity can be achieved or promoted in higher education in India, and what role do you see students playing in this process? 	<p>Linder, (2017),</p> <p>Rumi Roy & Prakash Sharma (2023)</p>

Table 1: Development of the Interview Questions

3.4.2 Description of interview

The interviews were conducted for this research by using online communication platforms such as Zoom, considering the interviewee's preference and time availability. These were recorded and transcribed with the Otter.ai application. The recording of the interview was done with the interviewees' consent. The interviews were approximately between (24-35) minutes in duration. All the interviews were conducted in English.

Category 1: Educator respondents

Sl. no	Gender	Course(s) Taught	Designation	Years of Experience	Duration of interview
1	Male	Department of Mechanical Engineering	Professor	25	34 mins 49 sec
2	Male	Data science and Artificial intelligence	Professor	09	27 mins 15 sec
3	Male	Computer science and Engineering	Professor	07	35 mins 28 sec
4	Male	Business and Management	HOD	17	30 mins 4sec
5	Male	Civil engineering	Professor	21	27 mins 34 sec

Table 2: Educators Respondents list

Category 2: Student respondents

Sl. No.	Gender	Course of study	Level	Institute	Duration of interview
6	Male	Artificial Intelligence & Machine learning	Final year student	MSRUAS, Bengaluru	30 mins 28 sec
7	Female	luxury brand Management	Intern	MSRUAS, Bengaluru	24 mins 49 sec
8	Male	Information Technology	Final year	Reva University	24 mins 41 sec
9	Female	Masters of science in Architecture	4 th semester	BVBCET Hubballi	32 mins 52 sec
10	Female	Masters of science in Architecture	4 th semester	BVBCET Hubballi	27 mins 13 sec

Table 3: Students Respondents list

3.5 Data Analysis:

Before analysing the data, thorough steps were taken to ensure the validity and accuracy of the primary data. This involved carefully reading and cross-checking the transcripts with the original recordings to ensure they accurately represented the respondents' responses. This process helped to minimize errors or misinterpretations and maintained data integrity. After preparing the transcripts, thematic analysis was used to analyse the data. This method is flexible and helpful for identifying different aspects of awareness levels of hybrid learning in higher education (Braun & Clarke, 2006). This method was useful to identify relevant patterns or themes by exploring the data.

Additionally, this study uses theoretical frameworks to analyse the data by identifying key themes that closely relate to the research question. By following below steps, based on Bryman's (2016), were taken to analyse the data.

- The transcripts were to understand the respondents' perspectives. This helped to get familiar with the data and identify important statements. (Bryman, 2016).
- The coding was done by identifying important, interesting, and relevant statements in the transcripts. These codes described the statements, which included topics like defining hybrid learning challenges, explaining effectiveness and flexibility, addressing digital infrastructure, education policies, exploring potential use of hybrid learning, and factors causing issues in adopting hybrid learning.

The relevant statements were grouped based on their content and relevance to the research question. This coding process organized and classified the data, making it easier to manage and helping to identify key themes and trends.

- After coding the relevant statements, themes were identified by looking at the recurring interesting topics (Bryman, 2016). Identifying themes involved finding similarities and recurring patterns in the coded data. The codes were grouped to represent key concepts that reflect respondents' views on the awareness of hybrid learning in Indian higher education (Bryman, 2016).

Manual coding was done by reading the transcripts and marking them with different colors in the transcripts for understanding. Below are the codes

- Access to Devices and Connectivity
- Affordable Internet Solutions
- Bridging the Digital Divide

- Collaboration and Interaction
- Connectivity Issues
- Digital Infrastructure Development
- Faculty Adaptation and Training
- Feedback and Assessment Mechanisms
- Flexibility in Learning
- Inclusive Learning Environments
- Interactive Learning Platform
- Student Support Systems
- Technological Barriers
- Technology Integration in Curriculum
- Scalability of Hybrid Solutions
- Student Engagement Challenges

which helped identify recurring themes and patterns. themes are discussed in detail in the results section of this thesis. Those are challenges in hybrid learning, opportunities in hybrid learning, innovative strategies for addressing digital issues, ensuring digital equity, enhancing the quality and accessibility of education and sustainability of hybrid learning initiatives.

4: Results

To address the research questions of this thesis: What innovative strategies will address the digital issues in hybrid learning environments, considering scalability and feasibility? Semi-structured interview were conducted with both 5 teachers and 5 students within higher education. Six themes were identified during the data analysis stage.

4.1 Challenges in Hybrid Learning:

Challenges in hybrid learning environments are multifaceted, as noted by both students and teachers. For instance, Teacher 1 highlighted the difficulty in maintaining student engagement due to the lack of direct eye contact, which makes it hard to assess attentiveness and participation. Additionally, Students pointed out persistent internet connectivity issues, especially during adverse weather conditions, which hinder consistent access to online classes. These challenges underscore the need for ongoing technological and pedagogical adaptations to ensure effective hybrid learning.

4.1.1 Technological Barriers

This section understands the insights of technological barriers encountered within an educational context. It highlights the challenges posed by existing technologies and software, each with its own limitations when applied in an higher educational setting.

Connectivity options like Google Meet, Teams, and Zoom have varying restrictions on participants and features such as recording capabilities and resolution. It's crucial for both parties to consider these factors when selecting a platform. For example, Google Meet is commonly used, while Zoom's free version has a 45-minute limit and participant restrictions (Teacher 1).

One more thing is a lot of licensing trash, like Zoom or whatever, right? It all comes with some of the licensing cost when you are using more than 15 or 20 people. So those we didn't, I mean, nobody figured out really who is going to bear that cost (Teacher 3).

Teacher 1 points out that platforms like Google Meet and Zoom have limitations on the number of participants, restrictions on features such as resolution quality and recording, and time constraints on free versions, which limit the duration of sessions unless paid for. Additionally, Zoom's memory limitation poses a challenge. Teacher 3 emphasizes the financial barrier of licensing costs associated with these platforms when used by more than 15 or 20 people, and the unresolved issue of who should bear these costs. These technological barriers hinder the effectiveness and accessibility of hybrid learning by imposing practical and financial constraints.

4.1.2 Connectivity Issues

Most of the participants have mentioned connectivity issues in hybrid learning, find the below points for respective respondents.

Technical issues primarily revolved around internet connectivity problems. As a professor's child, I've witnessed both sides of the effort spectrum. In cases of internet issues, faculty made efforts to digitally record content, ensuring accessibility for students despite challenges (Student 5).

Heavy rainfall during the rainy season caused internet speed to decrease, affecting students in rural areas like Himachal Pradesh and Karnataka. Personally, I also faced challenges, having to travel five kilometers to teach due to connectivity issues. This highlights the unique

challenges faced in India, where about 10-15% of people, including teachers and students, struggle to access content in rural areas. (Teacher 4).

Connectivity issues pose significant challenges for hybrid learning, as evidenced by the experiences of Student 5 and Teacher 4. Student 5 noted that internet connection problems were common, particularly during adverse weather conditions, which frequently disrupted online access. Faculty members often responded by digitally recording content to ensure it remained accessible to students. Teacher 4 highlighted that during the rainy season, heavy rainfall exacerbated internet speed issues. This problem was particularly severe in rural areas such as Himachal Pradesh and some parts of Karnataka, where data connectivity was often unreliable. Because of power issues Teachers and students in these regions struggled to join online classes, with some educators needing to travel long distances to find a stable connection. Despite the promise of technology to overcome geographical barriers, approximately 10-15% of people in rural areas still face significant obstacles in accessing online educational content.

4.1.3 Student Engagement Challenges

Interaction with individuals is the major challenges from both teacher and student perspectives below are the respondents' responses.

Classrooms were equipped with dual screens and cameras to provide a comprehensive view of the environment and lip movements synchronized with the lecture. Sound quality issues were also addressed with improved microphones, enhancing the overall learning experience (Student 2).

Students require a device like a tablet, laptop, or mobile phone to attend lectures, but maintaining attentiveness is crucial due to the absence of direct eye contact. Assessing engagement and learning is challenging without direct interaction, despite efforts such as note-taking and assignments (Teacher 1).

Student engagement in hybrid learning environments poses significant challenges, as evidenced by the experiences of both teacher and student. Student 2 highlighted the technological advancements in classrooms, such as dual screens and high-quality cameras, which allow students to see the entire classroom and the lecturer's facial expressions and lip movements. These improvements, along with enhanced sound quality through better microphones, were designed to create a more immersive and engaging online learning experience. However, Teacher 1 pointed out that despite these technological enhancements, maintaining student attentiveness remains problematic. The lack of direct eye contact in online

classes means that teachers cannot easily assess whether students are genuinely engaged or multitasking and distracted. To address this, teachers have implemented strategies such as requiring students to take notes, complete assignments, and participate in discussions. However, the absence of direct interaction continues to hinder accurate assessment of students' presence, attentiveness, interest, and overall learning.

According to the UTAUT, enhancing performance expectancy through high-quality technological tools and improving facilitating conditions with better support systems are crucial. However, the social influence and effort expectancy aspects how peers and teachers influence student behaviour and the perceived ease of participating remain challenging in hybrid environments without direct interaction. Thus, while technological improvements contribute to a more effective learning environment, the unique challenges of maintaining engagement highlight the need for continuous innovation and adaptation in teaching methods.

4.1.4 Faculty Adaptation and Training

Both teachers and students expressed a need for training that could help mitigate the challenges they encounter. Respondents highlighted areas where additional skills development would be beneficial.

Students are offered digital literacy training programs due to technology updating so fast that it can be implemented. So, wherein by doing this we can improve you know, better and in terms of the technical technology here basically, we can easily improve the technology by doing this (Student 3).

I think what I also feel is like the training or preparing teachers as well as students for this kind of hybrid learning, some kind of educational training, or educational vertical skill up. I mean, if we do or not do, then it is like it is it will affect really affect. This is kind of a factor, which will really affect the success or failure of the initiative, in my opinion (Teacher 3).

Faculty adaptation and training in hybrid learning environments are crucial, as highlighted by both Student 3 and Teacher 3. Student 3 emphasized the importance of offering digital literacy training programs to both students and faculty to keep pace with rapid technological advancements, which would significantly enhance the effectiveness of hybrid learning. Teacher 3 supported this view, stressing that educational training and skill development for teachers and students are vital for the success of hybrid learning initiatives. Without proper training, the transition to hybrid learning may have chances to face challenges, it may impact on overall success. By implementing comprehensive training programs, institutions can ensure that both

faculty and students are better equipped to navigate and leverage new technologies in hybrid learning environments.

4.2 Opportunities in Hybrid Learning:

According to interviews, opportunities in hybrid learning environments are very high, because it offering significant benefits such as enhanced flexibility, accessibility, and personalized learning experiences. The hybrid model allows students to balance their education with other commitments, enabling them to pursue additional skills and interests. Furthermore, it provides the convenience of accessing recorded lectures and resources from any location, ensuring continuous learning despite geographical or temporal constraints. Additionally, the integration of advanced technology and digital tools fosters a more engaging and interactive educational experience, catering to diverse learning styles and needs.

4.2.1 Flexibility in Learning

One of the key factors to the success of hybrid learning is flexibility, below are the comments from the respondents

I would say and give a lot of flexibility to students. And a lot of processes and procedures were simplified during this time, it makes more attractive and that students have time to do other works or follow their passion it gives more flexibility (Student 1).

It has helped me to save my time and energy and give time for myself to get into the other things and to learn better, you know, to learn more, more skills. So great (Student 3).

Because we fall during the time of pandemic, and we've had the experience of both hybrid learning, I would say it has been a mixed kind of experience, I would say, in a way, which is good, because it gave us the flexibility to learn, I would say in terms of timing (Student 5).

There are no factors which promote our success one of the important factors which promotes this type of activities, the money of travel involved, the time availability of the expert and the easiness of coming, doing these things will be the advantage. So, for example, one did not come from a long distance to here to conduct the classes or to be involved in the classes, the students also can sit in their places and listen (Teacher 1).

And when there was no confusion whether to come or no, in India, that's how kind of you know, hybrid got in place. But yeah, we managed it, it was good. Even now we can see, today people are learning online. And kind of, you know, pandemic era. In that one, you know, online can be a wonderful education (Teacher 4).

Flexibility in learning, described by both students and teachers in hybrid environments, aligns closely with the Unified Theory of Acceptance and Use of Technology (UTAUT) model, particularly its construct of facilitating conditions. Student 1 highlighted how hybrid learning simplified processes, allowing for pursuit of other interests, which enhances performance expectancy (benefit perception). Student 3 appreciated the time saved and the ability to learn additional skills, reflecting effort expectancy (ease of use). Student 5 valued the timing flexibility, which contributes to positive user experiences influenced by facilitating conditions (environmental support). Teacher 1 emphasized the convenience of reduced travel and enhanced access to expert instruction, reinforcing facilitating conditions. Teacher 4 underscored effective online management, crucial during the pandemic, showcasing how these conditions support technology adoption and integration in education. Together, these insights underscore how hybrid learning's flexibility aligns with UTAUT's framework, fostering its acceptance and successful implementation in educational settings.

4.2.2 Technology Integration in Curriculum

To run hybrid learning lot of technology and software applications are available, below are the students' and teachers' perspective

And now I think both teachers and students have a huge learning curve here. How to adapt and how to inculcate these gadgets into learning. So, yeah. Having a proper setup makes online class learning more effective. time, it was hard to you know, hard to grasp all the things from just a basic set of gadgets for online classes (Student 1).

If there is no availability of hybrid learning, there is no accessibility or visibility for me, either I have to miss the classes or I have to go back and then I asked my friends for my for the information or what they have learned for past years. if, like we are recording the conversation, if the classes are held and those are recorded, it is feasible for me to sit anywhere in the world and listen to the classes that have happened and get more education. So, I think, yes, it is visible (Student 4),

I have learnt most of the software skills from a portal where it gave me a range of you know, to understand in depth of software understanding and usage, but apart from software also for the most specific to subject (Student 5).

I have been using the hybrid method since 2003. I created video and web lectures for a program on thermodynamics back then. Since 2016, I have been teaching for a web-enabled MTech program, where students attend from their companies while I teach from here. I have experience

with eLearning and web-enabled teaching methods, which have been very convenient for me
(Teacher 1).

As a professor, we are doing, and we are continuing to create very good content and uploading it into the channel. But yeah, it's their job also to continue reading or showing the interest
(Teacher 2).

We started using techniques like emails, also things to share the information and online teaching, Zoom calls, Team calls, all these kinds of things. So that is that was my experience
(Teacher 3).

The discussions among students and teachers about integrating technology into the curriculum show how they are adapting to digital tools to improve learning. Student 1 mentioned the challenge of using new gadgets but stressed the need for a good setup to learn effectively online. Student 4 valued recorded lectures for their flexibility and ease of access, allowing revisiting classes from anywhere. Student 5 shared gaining software skills through online platforms, which boosted their subject knowledge. Teacher 1, teaching online since 2003, found hybrid methods practical. Teacher 2 creates digital content to engage students, and Teacher 3 uses tools like emails, Zoom, and Teams for effective communication and teaching.

These insights resonate with the Unified Theory of Acceptance and Use of Technology (UTAUT), which highlights factors influencing how technology is accepted and used in education. Specifically, they align with performance expectancy (technology enhancing learning), effort expectancy (technology ease of use), social influence (peer impact on adoption), and facilitating conditions (resources supporting technology use). Integrating technology has made education more accessible, flexible, and engaging for both students and teachers, reflecting UTAUT's framework and enhancing learning environments.

4.3 Innovative Strategies for Addressing Digital Issues:

Summary of interviews on this area, hybrid learning presents several significant opportunities that enhance educational outcomes. It offers flexibility, allowing students to balance their studies with personal and professional commitments. This approach also increases accessibility, enabling learners to participate from any location with internet access. Additionally, hybrid learning promotes digital literacy by integrating advanced technologies and online resources into the curriculum. The blend of in-person and online education fosters

a more adaptable, inclusive, and engaging learning environment, accommodating diverse learning styles and needs.

4.3.1 Affordable Internet Solutions

Most of the students have money constraints for their education, and for that students are always trying to go for affordable internet connectivity, below are the points which are mentioned in the data collected.

Students to buy dongle to make sure everyone is available online. So, the classes are going online here (Student 3).

Hybrid education provides free internet and access to eLearning platforms and e-libraries, promoting digital equity. Access to basic resources, provided by institutions or companies, is essential to support students in achieving educational success (Student 4).

Digitally, additional supports or resources required to students I would say like providing access to free internet (Student 5).

I think nowadays, if they have a good saw that is a service provider, they will be able to access the internet connectivity very easily (Teacher 1).

Affordable internet solutions are crucial for ensuring effective hybrid learning, as highlighted by students and teachers. Student 3 mentioned the necessity for students to purchase dongles to stay connected and keep classes on schedule. Student 4 emphasized that free internet access, provided by institutions or larger companies, along with access to eLearning platforms and libraries, can significantly promote digital equity in higher education. Student 5 echoed this sentiment, stressing the importance of providing free internet to support students' digital learning needs. Teacher 1 noted that with a reliable service provider, students can easily access the internet, facilitating their participation in online education. These points underscore the importance of affordable and accessible internet solutions in achieving a successful hybrid learning environment

4.3.2 Access to Devices and Connectivity

Students expect connectivity and access to multiple devices in their study, below is the data collection from students and teacher.

They provided access to resources from home or public Wi-Fi, but no private internet connections. Only public internet was available at the university campus (Student 4).

The university created specific courses with sequentially ordered videos on all subjects, making them easily accessible anytime (Student 5).

At the end of each lecture, we share the presentation via email, which includes all discussed points in a textual format for easy reference. I also send additional notes to aid students in their studies (Teacher 3).

Access to devices and connectivity was a mixed experience, as noted. According to Student 4, while the university provided access to internet through public Wi-Fi on campus, they did not offer private internet connections, limiting students' ability to connect from home. On the other hand, Student 5 highlighted the university's efforts in creating an organized e-learning platform with sequentially ordered videos, which made learning accessible anytime. Complementing these insights, Teacher 3 emphasized the usefulness of shared presentations and notes via email, enabling students to catch up on missed content and utilize textual resources for their studies. This combination of public connectivity, structured online resources, and supportive instructional materials reflects the efforts made to facilitate access despite some limitations in private connectivity.

4.4 Ensuring Digital Equity:

According to the interviews, collaboration between the government and private sector is essential to confirm digital equity, with efforts focused on providing subsidies and financial assistance for digital devices and internet access. Establishing community learning centres equipped with shared digital resources in rural and low-income areas can further bridge the digital divide. Additionally, developing low-bandwidth and offline-accessible educational content is crucial to ensure that all students, regardless of their internet connectivity, have access to quality education, thereby fostering inclusivity and equal opportunities for learning.

4.4.1 Policies

Policies are most important to run the complete system. Here are the participants views about the current policies and what needs to be updated in the current policies to make hybrid learning more effective in Indian higher education.

Frequent power outages and poor internet connectivity at my place significantly impacted my studies. Despite existing policies, we need better implementation and more support from the government to address these issues in India (Student 3).

Government schemes providing free resources and access to portals, along with initiatives from universities to promote eLearning options, are crucial steps in supporting digital education. These initiatives contribute to expanding access to educational resources and opportunities **(Student 5).**

Government-initiated platforms should prioritize ease of use and accessibility, ensuring minimal payment and accessibility issues. Additionally, there must be streamlined methods to address copyright concerns to facilitate the use of digital content in eLearning. Initiatives like the npTEL program in India already aim to address copyright issues and enhance accessibility for students **(Teacher 1).**

Aligning university guidelines with government policies can enhance education standards, ensuring consistency across institutions. Government support in addressing internet connectivity issues and providing benefits based on students' educational backgrounds would further improve accessibility and equity in education. **(Teacher 2).**

The National Education Policy (NEP) in India plays a crucial role in improving digital equity, alongside initiatives like providing Wi-Fi in rural areas. While policies are in place, effective execution is essential for their success. Technology is indispensable for enhancing access to education **(Teacher 4).**

The government should focus on developing cost-effective educational policies while educating parents on the value of education and ensuring equitable access to learning resources. Encouraging students to explore knowledge beyond classrooms is crucial, alongside prioritizing eye health by providing adequate computer facilities and larger screens in schools. Both government and public efforts are needed to prioritize eye health in the digital education era **(Teacher 5).**

Effective policies are crucial for achieving digital equity in higher education in India. Initiatives such as providing free resources and improving internet connectivity are emphasized. Ensuring user-friendly platforms, addressing copyright issues for seamless access to educational content, and implementing uniform policies across universities to standardize and enhance education quality are also highlighted. Proper execution of policies to achieve digital equity and advocating for policies that reduce educational costs and provide essential digital tools are additional priorities. Applying the Unified Theory of Acceptance and Use of Technology (UTAUT), Here are examples of how Performance Expectancy (PE), Effort Expectancy (EE),

Social Influence (SI), and Facilitating Conditions (FC) are demonstrated based on the insights from the students and teachers:

Performance Expectancy (PE): Example: Students 3 and 5 discuss the need for government initiatives to provide free resources and better internet connectivity. They believe that these measures will significantly improve their academic performance by ensuring consistent access to necessary learning materials and online classes, demonstrating the perceived usefulness of technology in enhancing educational outcomes.

Effort Expectancy (EE): Teacher 1 highlights the importance of creating user-friendly platforms. This emphasizes that if educational technology is easy to use and navigate, both students and teachers will be more likely to adopt and effectively use it, showing how ease of use influences acceptance and usage of digital tools.

Social Influence (SI): Teacher 2 mentions the necessity of uniform policies across universities to standardize and improve education quality. This suggests that when institutions and government bodies endorse and support the use of technology, it positively impacts individuals' intentions to use these technologies, illustrating the role of social influence.

Facilitating Conditions (FC): Teacher 5 talks about the need for policies that minimize educational costs and provide appropriate digital tools like larger screens and computers. Additionally, Teacher 4 stresses the importance of proper execution of existing policies. Both examples indicate that having necessary resources and support systems in place, such as cost-effective technology and adequate hardware, is crucial for successful implementation and adoption of digital learning solutions.

These examples collectively highlight how the key factors identified by the UTAUT model performance expectancy, effort expectancy, social influence, and facilitating conditions play an important role in the adoption and effective use of technology in the educational context.

4.4.2 Bridging the Digital Divide

Here are the participants' views on the digital divide in hybrid learning.

We can see everything I feel that iPads like taking notes and iPads and all should be increased in the classroom (Student 1), and usually my lecturer used to, there was something called as the whiteboard in Zoom meetings before. So, in that whiteboard, they used to always put us

measurements and stuff like that, but it was not that useful. I think a better technology should come up (student 2).

In rural areas, access to equipment like laptops or computers is more crucial than internet connectivity, as many people already have mobile phones. Having online software available through universities would greatly enhance opportunities for students pursuing fields like architecture, complementing the availability of eLearning platforms and e-libraries (Student 4).

Students can go through the recorded session and go through the study materials through online (Teacher 2)

In IIT Madras, we collaborated with CBSE schools in nearby district headquarters to provide rural students with access to our final classes. As internet connectivity improved, students were able to attend all classes remotely from their respective locations, enhancing their educational opportunities. (Teacher 5).

Bridging the digital divide in education requires a multifaceted approach that incorporates better technology and infrastructure, as suggested by Students. Student 1 advocates for the increased use of iPads for note-taking, Student 2 emphasizes the need for improved technologies over basic tools like whiteboards in online platforms, suggesting that advanced tools could enhance learning outcomes. Student 4 points out the necessity for better equipment in rural areas, where access to mobile phones is common, but larger devices and specialized software are lacking. Teacher 2 and Teacher 5 highlight the role of online platforms and recorded sessions in facilitating learning, and initiatives like those at IIT Madras that create partnerships with local schools to provide access to necessary resources. By ensuring facilitating conditions such as availability of high-quality devices and software, and fostering social influence through institutional support, these measures can significantly reduce the digital divide and improve educational equity. which aligns with the Unified Theory of Acceptance and Use of Technology (UTAUT) factors of performance expectancy and effort expectancy, enhancing the perceived usefulness and ease of use of educational technology.

4.4.3 Inclusive Learning Environments

Creating an inclusive learning environment is crucial, as emphasized by Students. Student 1 advocates for a unified platform that integrates all aspects of learning, including online classes, study materials, and assignments, to streamline the educational process. Student 4 highlights the importance of investing in high-quality equipment and internet for effective hybrid

learning, acknowledging that not all students have equal access to such resources. Student 5 further points out the challenges faced by students who rely solely on mobile phones, which can hinder their ability to fully engage with and understand their coursework. To foster inclusivity, educational institutions must ensure that all students have access to the necessary technological tools and platforms, thereby enabling a more equitable and effective learning experience.

I think unified platform is important because all things and events such as online classes, study materials, assignment (Student 1).

In terms of hybrid learning, what I would like to suggest my juniors is that invest in good quality equipment's or good quality internet because that is going to be very useful (Student 4). And then also access, that not everyone would have an access to a system or a laptop or everything. So if you're doing it on phone, then it becomes difficult for a student to learn and, yeah. Understand your subjects clearly (Student 5).

4.5 Enhancing the Quality and Accessibility of Education:

To enhance the quality and effectiveness of education, it is vital to create interactive and engaging digital content tailored to various learning styles and needs. Leveraging artificial intelligence and data analytics can further personalize learning experiences and track student progress, ensuring that each learner receives the support they need to succeed. Promoting blended learning models that combine hands-on, experiential learning with online coursework provides a comprehensive approach, enriching the educational experience and better preparing students for real-world challenges.

4.5.1 Student Support Systems

An effective student support system in hybrid learning environments can be significantly enhanced by addressing both technological and instructional needs. As highlighted by Student 2, visually effective teaching tools, such as interactive illustrations on screens, can make learning more engaging and comprehensible. Student 3 emphasizes the importance of digital equity initiatives, such as providing affordable internet and distributing devices, which are crucial for ensuring that all students have access to necessary resources. Student 5 suggests that offering free internet access and educational videos, possibly through a subscription-based platform, can further support students who cannot afford these resources. Teacher 5 adds that regular doubt-clearing sessions are highly beneficial, as they provide personalized support and encourage students with a keen interest in learning to excel. By integrating these approaches,

a robust support system can be developed that caters to both the technological and academic needs of students, fostering an inclusive and effective learning environment.

Innovative teaching methods, such as illustrating concepts visually on-screen, can effectively bridge digital issues and enhance understanding for students. These interactive resources provide valuable support for effective learning (Student 2).

To address digital equity in education in initiatives such as providing affordable internet taxes and distributing devices (Student 3).

Providing access to free internet and learning videos, along with subscription-based platforms, can offer additional support to those who cannot afford access to educational resources. This approach ensures equitable access to learning opportunities for all individuals. (Student 5).

Once in a week, we used to have the doubt clearing sessions even those sessions were very effective. The guys who have more interest in learning they did extremely well (Teacher 5).

4.5.2 Digital Infrastructure Development

One of the most important factors is digital infrastructure development because whatever strategy we can make but execution part very important here it is all depending on infrastructure almost all participants have discussed about the same below are their thoughts

Hybrid learning may not be scalable or feasible in remote areas due to challenges such as electricity problems. These issues hinder the effectiveness of hybrid learning initiatives in such regions (Student 3).

Achieving digital equity in higher education in India requires equal focus on both rural and urban areas in terms of eLearning initiatives. Collaboration between educational institutions and companies like Jio or Reliance could provide affordable internet access, benefiting students across regions. This partnership could also be mutually beneficial, offering business opportunities for companies while enhancing educational opportunities for students (Student 4).

I think some of the rural places or schools are trying to still implement it. Not if not given, like personally have equipment, but also like digitally given a platform, not just from their teachers, but also from various places. (Student 5).

For effective online teaching, four essential components are required: a laptop or PC, a good quality camera, microphone, and speakers, and a writing pad or tablet for interactive teaching. While internet connectivity may vary depending on the location of students, ensuring access to these resources is vital for successful online education (Teacher 1). what we have done is we have recorded the sessions with a good quality and we have shared it into the platform so that students can go through the in the channel then they can go through it (Teacher 2). Creating a centralized platform where students can access recorded lectures and learning materials allows for independent learning and reduces dependency on live lectures. This approach empowers students to access resources at their own pace and enhance their learning experience (Teacher 3).

Infrastructure includes not only physical elements like roads and buildings but also essential components like internet connectivity. Providing internet access in rural areas contributes significantly to infrastructure development, enabling individuals to communicate and access resources efficiently. This collaboration between telecommunications companies like Jio and government support plays a vital role in enhancing connectivity and advancing infrastructure worldwide (Teacher 4).

In digital education, there's a shift towards sustainability, emphasizing the need to minimize infrastructure costs and paper usage. Platforms like SWAYAM facilitate this transition by offering online resources and conducting exams digitally, aligning with the goal of ensuring sustainability in educational practices (Teacher 5).

Developing robust digital infrastructure is essential to address the challenges of hybrid learning, particularly in remote areas where electricity and connectivity issues are prevalent (Student 3). Ensuring digital equity in higher education requires partnerships with major companies like Jio and Reliance to provide affordable internet access for both urban and rural students (Student 4). Rural schools are making progress by digitally equipping students and providing platforms for learning (Student 5). Key components for effective digital learning include laptops, high-quality cameras, tablets, and reliable internet connectivity (Teacher 1). Recording and sharing educational content online can help mitigate connectivity issues and make resources accessible to all students (Teachers 2 and 3). Recognizing internet connectivity as part of essential infrastructure and emphasizing sustainability in digital education initiatives are crucial steps toward improving accessibility and efficiency (Teachers 4 and 5).

4.6 Sustainability of Hybrid Learning Initiatives:

To foster the sustainable evolution of education, it's imperative to develop policies and frameworks that support the long-term integration of hybrid learning into the education system. Encouraging ongoing research and innovation will enable adaptation to changing educational needs and technological advancements, ensuring that educational practices remain relevant and effective.

4.6.1 Scalability and feasibility of Hybrid Solutions

Hybrid learning is running with available technologies and network or internet connectivity so how effective it can reach users and how it is effective from study perspective, these points were discussed below

Hybrid learning is scalable, facilitated by online platforms and software that can easily expand through subscription upgrades. Smart boards and online meetings further enhance scalability, although ensuring engagement with each student remains a challenge in large-scale implementations (Student 1).

Scalability in digital education can be achieved by creating content that caters to a wider audience beyond specific universities, including rural areas. Offering certification courses based on teachings further enhances reach and accessibility, facilitating scalability in imparting knowledge (Student 5).

Scalability wise, we don't have any issues because in the colleges as I said we have all set according to our course materials, we didn't face any issues on scalability because of the things what we have we have go through or what we have or what I can say what we are experienced in the COVID situations Basically, yes, scalability wise, we are good. (Teacher 2).

Sometimes I feel very uncomfortable, oh, my god, manage my posts, to manage my laptop and to manage the students. Forget that kind of things become kind of a very irritating factor for any teacher, but I do not think it's a very much feasible and you know, scalable model. Okay, but yes, can be done for time. That is, it. But the wonder of situation. That's it? Yeah. Yeah, very true (Teacher 4).

it has to be scaled up especially for the developing countries. I want to tell you how it can be done. Rather than having complete infrastructure at one location (Teacher 5).

The scalability of hybrid learning is emphasized by the ease of scaling online platforms and software, making it accessible to a larger audience (Student 1). While feasibility may vary, the

potential for scalability lies in the universality of content that can cater to diverse student populations and institutions (Student 5). Teachers in colleges affirm scalability, citing preparedness in course materials and experiences during the COVID situation (Teacher 2). However, some teachers express discomfort with the management aspects and question the long-term feasibility and scalability of the model (Teacher 4). To address scalability challenges, innovative approaches such as decentralizing infrastructure are proposed, particularly for developing countries (Teacher 5).

4.6.2 Feedback and Assessment Mechanisms

As discussed with teachers most of them were mentioned about assessment of student in hybrid mode of learning it is one the challenging factor for them, and mean time if students have any connectivity issue how it can be conduct in successful way. Here in this study mentioned below points about the subject

Without internet connection, if we can able to have some application developed, it will really help us in all in all the ways, so, where we have one platform and if anybody if all the students can really have an access, it will really help everybody for a betterment (Student 3).

Assessing student engagement in online classes can be achieved through various mechanisms such as assignments, note-taking, pre-class readings, and testing comprehension during class. Additionally, projects, homework, case studies, and practical training can further evaluate students' understanding and attendance in digital education settings (Teacher 1).

Implementing a structured learning approach like Udemy for students can enhance their engagement and learning outcomes. By dividing course content into digestible modules and incorporating assessments to ensure comprehension before advancing to the next stage, students can effectively progress through the material and maximize their learning experience (Teacher 2).

In online teaching, both synchronous and asynchronous evaluation methods are valuable. Synchronous evaluation involves immediate feedback and presentations during class, while asynchronous evaluation allows students time to complete assignments before submission. Utilizing recorded videos for reference enhances accessibility and supports students in their learning journey. (Teacher 4).

Feedback and assessment mechanisms play a crucial role in ensuring effective learning outcomes in both online and offline educational settings. Student 3 emphasizes the importance of developing applications that do not rely solely on internet connectivity, providing a centralized platform accessible to all students. Teacher 1 suggests implementing various assessment methods, such as assignments, note-taking, and project-based learning, to gauge student understanding and attendance. Similarly, Teacher 2 highlights the significance of structuring course content like Udemy to ensure comprehensive learning by incorporating sequential testing methods. Additionally, Teacher 4 discusses the synchronous and asynchronous evaluation approaches, emphasizing the importance of engaging students through interactive and recorded sessions. These insights underscore the need for versatile feedback and assessment strategies to enhance student engagement and comprehension in digital learning environments.

5: Discussion

5.1 Experience

Hybrid learning has provided significant flexibility and convenience for both students and teachers, because it offers a blend of online and in-person instruction. Students appreciate the ability to save time and energy, pursue other interests, and access recorded lectures at their convenience. This flexibility supports continuous learning and skill development. Teachers, on the other hand, have leveraged their prior experience with eLearning tools to create engaging online content and facilitate learning through various platforms like Zoom and Google Meet. By integrating interactive tools and maintaining a focus on quality, both students and teachers have adapted to the hybrid learning model, despite the initial learning curve associated with new technology.

Our findings align closely with Marchisio and Rabellino (2022) and Miller and Sellnow (2021), who emphasize the flexibility of hybrid learning in meeting diverse learning needs and enhancing time management for students. Similarly, the literature highlights how hybrid learning provides additional value to face-to-face interactions, which our study echoes through the benefits of accessing recorded lectures and pursuing other interests.

Technology Integration and Challenges: Both our study and Lorenzo (2021) identify challenges such as the initial learning curve associated with adopting new technology and the need for faculty capacity building. Singh (2021) stresses the importance of integrating innovative

technology and ensuring emergency preparedness, underscoring the literature's focus on enhancing social presence and teaching effectiveness in online mediums.

5.2 Challenges

Despite its benefits, hybrid learning presents several challenges. Technological barriers, such as platform limitations, licensing costs, and connectivity issues, have hindered seamless learning experiences. Teachers noted the financial burdens of software licenses and the technical limitations of free online meeting platforms. Connectivity problems, especially in rural areas, have affected students' ability to participate in live sessions, exacerbated by environmental factors like heavy rainfall. Engagement remains a critical issue, with teachers struggling to maintain student attentiveness and participation without direct interaction.

Addressing these challenges requires scalable strategies such as improving internet infrastructure, providing affordable internet solutions, and utilizing interactive tools to enhance engagement.

The challenges identified in our study align with those highlighted in the literature, particularly regarding technical accessibility, digital literacy, infrastructure requirements, and financial constraints (Ali and Gulliver, 2018). However, our study adds a more granular understanding of specific issues, such as the impact of environmental factors on connectivity and the direct financial burdens faced by educators.

While previous studies have emphasized the need for robust infrastructure and digital literacy (Liu, 2021; Raes, 2020), our findings highlight the critical need for scalable and practical solutions tailored to local contexts. Our study also underscores the importance of maintaining student engagement, which is less emphasized in the broader literature but is crucial for the success of hybrid learning environments.

Additionally, our research contributes new insights into the specific challenges faced in rural areas and the effects of environmental factors on connectivity, which have not been widely covered in previous studies. By proposing targeted strategies to address these issues, our study provides a practical roadmap for improving hybrid learning and teaching, enhancing its effectiveness and sustainability in diverse educational settings.

5.3 Technology Acceptance

Addressing the digital divide and ensuring technology acceptance in hybrid learning involves improving performance expectancy and facilitating conditions, as outlined in the Unified

Theory of Acceptance and Use of Technology (UTAUT). Affordable internet solutions, such as subsidized or free internet packages through partnerships with telecom companies, are essential. Providing grants for necessary devices, enhancing public Wi-Fi infrastructure, and offering regular personalized support sessions can further support digital equity and technology integration. Effective feedback and assessment mechanisms, coupled with versatile online tools like Udeacity learning can be adopted to academic level it will help teachers to evaluate the student's status of education, this can enhance student engagement and comprehension. By implementing these strategies, educational institutions can foster a more inclusive and effective learning environment, bridging the digital divide and ensuring widespread acceptance and usage of hybrid learning technologies.

According to case study from Anurag & Shivam (2022), learning is the way of extending knowledge through better communication or between two different locations away from each other or from classrooms or educational institutions site by using video, audio, computer, and communications via multi-media or with the combination of hybrid learning platform and other traditional knowledge delivery methods. Hybrid learning platforms comprise different forms of electronically supported teaching methods. Normally communication system always serves the learning process as a specific way of transfer of knowledge. E-learning is an essentially computer-abled transfer of knowledge via better communication. There are different e-learning platforms applications E-learning opportunities have proved their active participation in recent and required growing way of sharing knowledge with great potential in higher education. In context with maximize or increase the potential, e-learning innovations that should endeavour for satisfying the requirements of learners, educators, or other stakeholders.

The study highlights the importance of addressing the digital divide and ensuring technology acceptance in hybrid learning by improving performance expectancy and facilitating conditions through affordable internet solutions, device grants, enhanced public Wi-Fi, and personalized support. This aligns with the case study by Anurag & Shivam (2022), which emphasizes the role of e-learning platforms in extending knowledge via multimedia and computer-enabled communication, demonstrating their growing potential in higher education. Both sources advocate for e-learning innovations that meet the needs of learners and educators, ultimately fostering an inclusive and effective educational environment.

6: Conclusion

This thesis aimed to explore hybrid learning in higher education institutions in India, particularly focusing on postgraduate courses. The study highlighted the significant impact of hybrid learning, especially post-COVID-19 pandemic, noting that almost every college has adopted this model. To successfully implement hybrid learning, key issues such as internet connectivity, technological barriers, and student engagement were identified. Innovative strategies to address these challenges were proposed with an emphasis on scalability and feasibility.

Ensuring affordable internet solutions through partnerships with telecom companies, improving public Wi-Fi infrastructure, especially in rural areas, implementing policies on electricity in remote areas, and providing necessary devices were identified as crucial measures. These strategies can be scaled to reach a broader student base and ensure feasibility by leveraging government and private sector collaborations.

Additionally, enhancing student support systems, developing robust digital infrastructure, and creating inclusive learning environments were emphasized to promote digital equity and improve the overall quality and accessibility of education. By focusing on scalable solutions such as modular course design, interactive learning tools, and comprehensive training programs for both teachers and students, institutions can ensure the sustainable and effective implementation of hybrid learning across diverse educational contexts.

6.1 Implications for theory and practice

The findings of this study have important implications for both theory and practice. The application of the Unified Theory of Acceptance and Use of Technology (UTAUT) provides a valuable framework for understanding the factors influencing technology acceptance and usage among students. By capturing this performance and facilitating conditions, institutions can enhance student engagement and technology integration. Practically, the study emphasizes the need for collaborative efforts between educational institutions, governments, and private companies. For instance, institutions can partner with telecom companies to offer affordable internet solutions and improve public Wi-Fi infrastructure. Additionally, providing necessary devices and technical support to students and educators can bridge the digital divide. The proposed strategies offer a concrete roadmap for implementing effective hybrid learning environments, including developing robust digital infrastructure, enhancing student support

systems, and creating inclusive learning environments to promote digital equity and improve education quality and accessibility.

6.2 Limitation of research

Despite the valuable insights provided by this research, there are several limitations. The study was geographically confined to India and specifically focused on postgraduate courses, which may limit the generalizability of the findings to other educational contexts or levels. Additionally, the research only included postgraduate students who had experienced hybrid learning, which may not capture the full range of challenges and dynamics faced by other students. Moreover, the study did not address the health impacts of hybrid learning, particularly concerning eye strain from prolonged screen time. Future research should include a broader range of educational levels and regions, as well as examine the health impacts of hybrid learning.

6.3 Recommendation for Future work

This study was done only for post-graduate students in India. Future research should aim to address these limitations by expanding the scope of the study to include different educational levels and regions also within and outside of India. Long-term studies would be helpful to see how well the proposed strategies work over time and if they last. Additionally, incorporating a mixed-methods approach that combines quantitative data with qualitative insights could provide a more comprehensive understanding of the challenges and opportunities in hybrid learning and implementation of policies from government, especially in rural areas. Finally, exploring the role of emerging technologies, such as artificial intelligence and virtual reality, in enhancing hybrid learning experiences could offer new avenues for innovation and improvement in the digital education landscape.

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8. Appendix

Interview Protocol

For Educators:

1. Can you describe your experience with hybrid learning and how it has influenced your teaching methods?
2. What challenges have you faced using this mode of instruction, particularly about technology access and internet connectivity for students?
3. Have you been involved in any initiatives to improve technology access and internet connectivity for students? If yes, could you explain them and their effectiveness?
4. How do you the scalability and feasibility of hybrid learning environments?
5. Can you tell me the factors prompting the success or failure of initiatives to address the digital issues in hybrid learning environments?
6. In your opinion, what policies and practices could be implemented to improve or develop the digital equity in higher education in India?
7. Can you suggest some strategies which can help to improve hybrid learning effectively?
8. How do you evaluate the students in this mode of learning?

For Students:

1. How has been the hybrid learning experience compared to traditional classroom teaching?
2. How did connectivity challenges affect your learning?
3. What type of technical or technological issues have you encountered with hybrid learning during your studies?
4. Do you know any initiatives taken to improve technology access and internet connectivity for students in your educational institution? If yes, could you share your thoughts on their effectiveness?
5. Do you believe their teaching methods are scalable and feasible? Can you explain how?
6. What additional support or resources can bridge the digital issues in hybrid learning environments?
7. How do you think digital equity can be achieved or promoted in higher education in India, and what role do you see students playing in this process?
8. Do you want to any suggestion for next batch students to het hybrid learning more effective?