

Undergraduate Students' Perceptions of Technology for Sustainable Education: A Qualitative Study in Pakistan

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This study aims to investigate undergraduate students' perceptions of the use of technology in education, focusing on accessibility, sustainability, usefulness, and the challenges it presents. Semi-structured interviews were conducted with 12 students from universities in Lahore, Pakistan, until data saturation was reached. The thematic analysis was conducted with NVivo software. The results showed that technology increases accessibility, engagement, and sustainability; however, digital inequities and overreliance on technology remain significant problems. Students know the benefits that can be gained through digital tools such as Google Workspace, Microsoft Teams, and other AI-driven platforms for collaborative and personalized learning. However, there are also perceived challenges, such as the disparity in high-speed internet and high-standard device accessibility, the availability of digital distractions, and the fear of technological servility that can prevent interaction with others and hinder critical thinking. Students recommended policies that promote equitable access, educator training, and piloting innovative tools to improve integration. These findings underscore the importance of adopting balanced approaches to technology use, which capitalize on its benefits while addressing challenges and fostering a more inclusive and effective educational practice program.

Keywords: technology integration, sustainable education, qualitative study, undergraduate students, Pakistan

The progress of any country depends highly on innovation in education, which has become especially significant today, given the role of technology in improving the quality of education (Abulibdeh et al., 2024). Recently, there has been much interest in using technology in education, particularly in higher education settings. The integration of various technological tools has been shown to enhance student engagement and learning outcomes (Selwyn, 2020). Innovative technology is essential for building students' access, engagement, and learning outcomes to support sustainable education (Lee & Hwang, 2022). It ensures equal access to education using technological tools that bridge geographical and socio-economic gaps (Yazdani et al., 2023). The technological interventions enable marginalized communities to access quality education, which serves as a social equity advocacy (Deng & Yu, 2023). Innovative technology

and sustainable education are integral to making a difference in enhancing learning opportunities, ensuring equity, and preparing students for their future challenges (Selwyn, 2024).

Studies have shown that technological access can bridge the gaps between geospatial and socioecological contexts, enabling marginalized communities to participate in educational activities (Podder, 2022; Okada & Gray, 2023). Platforms like Coursera and Khan Academy have democratized education, allowing students worldwide to access high-quality free online courses (Wilson, 2024). Acut et al. (2025) emphasized that equity in digital tools and resources benefits students from diverse backgrounds by enabling them to access learning opportunities that were previously unavailable. In this context, internet connectivity is increasing worldwide, making access to education easier by just connecting with the internet. However, inequalities persist in several developing countries regarding infrastructure distribution, and, more specifically, regions characterized by lower income are disproportionately affected by these inequalities (Akbar et al., 2024; Charina et al., 2022).

Das et al. (2024) noted that technological advancements have made today's classrooms more interactive, utilizing whiteboards, virtual boards, and gamified platforms that facilitate active learning and contribute to knowledge retention. For example, learning management systems (LMS), such as Moodle, enable students to interact globally and pursue their desired education in a personalized manner, anytime, anywhere (Kamruzzaman, 2023). Furthermore, technological tools that enable advances such as virtual reality (VR), augmented reality (AR), and artificial intelligence (AI) have become revolutionary in the education field by bringing purpose to experiences that are more immersive and personalized (Phulpoto et al., 2024). AR and VR bridge the experiential gap, bringing abstract concepts to a tangible form. AI-powered platforms provide personalized feedback that enhances critical thinking and problem-solving skills (Angelaki et al., 2024). Integrating technology into learning environments has significantly enhanced creative thinking skills. Research on the Technological-Project-based Learning (TPBL) Module highlights its effectiveness in fostering innovation and problem-solving through interactive, tech-driven projects, encouraging collaboration and decision-making (Ghazali et al., 2025).

The literature on innovation for sustainable education has highlighted that technology is vital in creating sustainability that seeks environmental, social, and economic goals (Afiyah, 2025; Lin et al., 2023). Utilizing digital resources, such as e-books and virtual libraries, is a more sustainable approach to using physical materials, thereby reducing waste and promoting environmental sustainability (Shwedeh et al., 2024). Virtual meetings and conferences significantly reduce the carbon emissions associated with travel. Technology saves marginalized groups from silent discrimination by utilizing screen readers and speech-to-text software, eliminating the digital divide (Edwards-Fapohunda et al., 2024). Open educational resources (OER) help improve economic accessibility, as open educational content is available for free and of high quality (Albert & Uhlig, 2022). In contrast, Bortoló's (2023) study reveals that challenges such as free access to the internet and device affordability persist as barriers for disadvantaged countries.

Studies examining predictors for sustainable education have found that technology integration in the classroom enhances students' learning outcomes, improves critical thinking, and enables personalized learning (Shishakly et al., 2024; Valverde-Berrocoso et al., 2021). Research has shown that students are increasingly motivated to participate actively through gamified

platforms, such as Kahoot and Quizlet, and virtual labs that enable hands-on activities, making learning more engaging (Jamil et al., 2024). Furthermore, Ali et al. (2024) argued that technology-driven education motivates students to analyze, evaluate, and solve problems, sharpening their critical thinking skills. For example, DreamBox and Knewton are AI-adaptive learning systems that monitor student progress and adapt content to support student learning uniquely, irrespective of learning styles and pacing differences.

Although several research studies on technology in education exist, this study aims to illuminate undergraduate students' perceptions of the role of technology in sustaining quality education, emphasizing both the perceived benefits and challenges. However, despite the growing body of literature on the topic, research on technology-enhanced learning remains fragmented regarding classification and theoretical underpinnings. The current study attempts to bridge this gap by providing a methodical analysis of the many types of technology used in undergraduate education and evaluating their effectiveness. Few research studies have investigated how these technological tools promote education for sustainability, specifically environmental, social, and economic sustainability, among undergraduate students (Khurshid, 2024; Akram et al., 2023). Despite this, these studies do not consider the nuanced descriptions of undergraduate students' experiences with these technological tools. Therefore, students' insights into technological change are essential to investigate the depth of technological advancement in real-world applications and its contribution to sustainable education.

Theoretical Framework

This study uses the Transformative Learning Theory (Mezirow, 1991; Cranton, 2006) and the Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh & Davis, 2000). The Technology Acceptance Model explains how students' perceptions of the usefulness and usability of educational technologies impact their adoption. Transformative Learning Theory, which links pedagogy with broader sustainability goals, highlights how digital tools can be utilized to create experiences that challenge stereotypes and foster meaningful learning. These frameworks enable examining students' technology use and how those interactions support long-term learning outcomes.

Methods

Research Paradigm

The constructivist paradigm informed the current study, which focuses on documenting the individual's subjective experience of constructing meaning through an interaction with reality (Creswell, 2008). The constructivist perspective acknowledges that personal and social processes influence knowledge and that truth is the product of the interaction between individual cognition and practical experiences (Andrew, Pedersen, & McEvoy, 2011). The study examines undergraduate students' perceptions of technology in education and its potential contribution to sustainable educational practices.

This paradigm aligns with the study's objectives, which aim to understand how students' experiences with educational technology are both socially and individually created. A constructivist qualitative approach is appropriate because it allows for examining diverse student perspectives impacted by institutional, societal, and individual settings (Lincoln & Guba, 1985). As a result, the paradigm affected all phases of the research design, including sampling, data collection, and theme analysis.

Research Design and Sampling

This qualitative study employed a constructivist approach to capture undergraduate students' perceptions of technology use and its role in sustainable education practices. Twelve undergraduate students from five universities in Lahore, Pakistan, were recruited for the study using the purposive sampling approach. The inclusion criteria were the following: (a) be enrolled in an undergraduate program; (b) be from Lahore city, either public or private; (c) be from different academic domains; and (d) have used technology in a classroom for at least one semester.

Research Instrument

Data were collected using Open-ended qualitative interview guides to elicit in-depth responses. The questionnaire guide consisted of two sections. The first section included demographic information on study participants, such as gender, type of institution, and academic discipline. The second section consisted of ten open-ended questions that focused on how students view technology's role in sustainable education, the benefits and challenges of technology, and whether technology helps prepare students for the challenges ahead. The interview guide was developed after a review of the literature on educational technology and sustainable education. Two qualitative research experts reviewed it to ensure that the data was understandable and relevant. Before data collection, we used a pilot interview to enhance the phrasing and flow. We also ensured the trustworthiness of the tool by sharing the transcripts to verify the key interpretations.

Data Collection Procedure

All the interviews were conducted remotely using Zoom and WhatsApp calls. To ensure participants' privacy, cameras were off during the interviews. A total of 12 interviews were completed on November 10, 2024. Each interview lasted 30 to 45 minutes and was audio-recorded with the participant's consent to ensure data transcription accuracy. We received clearance from the Ethics Review Board at Kinnaird College for Women, with protocol ID KC/ORIC/ERC/2025/008. The researcher informed the participants that their personal information would be kept confidential and that all the collected data would be used for research purposes. The interviews were stopped once data saturation was reached, which is the stage at which further interviews yielded no new insights or themes (Bouncken et al., 2025). Throughout the data collection process, saturation was regularly evaluated to guarantee the findings' depth and breadth.

Data Analysis

The researcher performed thematic analysis using NVivo software for Qualitative interviews. The study involved three coding phases: Initial codes were assigned for all themes using Open Coding. Then, sub-themes were refined into themes and aggregated into hierarchical structures to relate broader themes to one another. In the last stage, irrelevant themes were removed. Then, the data were synthesized to extract relevant responses regarding students' perceptions of technology use, its influence on sustainable education, and their recommendations.

Table 1
Demographic information about the study participants(N=12)

Characteristics	Frequencies	Percentages
Type of Institute		
Private	4	33.3
Public	8	66.7
Gender		
Female	5	41.7
Male	7	58.3
Academic Discipline		
Business Studies	3	25
Psychology	1	8.3
Computer science	3	25
Media Studies	2	16.7
Biotechnology	3	25

To guide the thematic analysis, we did not use predetermined themes. Instead, after organizing the data in NVivo software, we conducted three phases of coding, open coding, axial coding, and selective coding, aligning with “Free Nodes,” “Tree Nodes,” and “Nodes Selection” processes in NVivo. The research team conducted open and axial coding, which enabled the development of patterns and categories based on the narratives of the participants, rather than the fitting of data into pre-existing frameworks. To maintain confidentiality and anonymity, each participant was assigned a unique ID to omit their identities from the transcript.

Table 1 presents the respondents' demographic data; most study participants are from public institutions, with 66.7% of the respondents attending public institutions and 33.3% from private institutions. With 58.3% male and 41.7% female students, the number of male students was relatively equal to that of female students. The distribution of academic disciplines is diverse, with business studies (25%), biotechnology (25%), and other fields (50%). Moreover, 16.7% of study participants are from Media Studies and 8.3% from psychology.

Table 2
Explanation of Themes, Sub-Themes, and Descriptions Based on Interview Questions

Themes	Sub Themes	Description
Perceptions of Technology	Access to Technology	Examine the availability and accessibility of technology for different groups of learners.
	Using Technology in Education	Highlights the integration of technology tools in teaching strategies to improve knowledge delivery.
	Technology for Learning	Focuses on leveraging technology to enhance the overall learning experience and outcomes.
Technologies to boost sustainability.	Environmental Sustainability	Examines how technology reduces ecological footprints through the implementation of energy-efficient solutions.
	Social Equity	Promote equal opportunities by bridging gaps in education across socio-economic backgrounds.
	Economic Accessibility	Investigates the affordability of educational technologies for individuals and institutions.
Impact on Learning Outcomes	Engagement	Examine how technology fosters active participation and interest in learning activities.
	Critical Thinking	Encourages analytical and problem-solving skills through interactive and thought-provoking tools.
	Personalized Learning	Discusses tailoring educational content to meet individual learner needs and preferences.
Translate into Technological Integration Challenges.	Digital Distractions	Highlights challenges posed by non-educational content and excessive screen time.
	Inequitable Access	Addresses disparities in technology access among students and schools.
	Over-reliance on	Discusses risks of dependency on technology, which may hinder traditional learning practices.

Two recommendations for improvement.	Technology	
	Policy Suggestions	Proposes formulating policies to ensure ethical and equitable use of technology in education.
	Training for Educators	Advocates for professional development programs to empower teachers with technology skills.
	Technological Innovations	Encourages advancements in educational tools and systems to address emerging challenges.

Results

Perceptions of Technology

Access to Technology

Most students (9 out of 12) reported having access to relatively basic technological tools, including laptops, smartphones, and online platforms. However, three said unreliable internet connections and malware make it challenging to find time to use advanced gadgets.

Nearly all students (10 out of 12) stated that these tools are necessary for conducting research, completing assignments, and communicating with peers and instructors. Study participants reported unreliable internet connection issues that hindered their ability to engage in online learning, access resources, and join virtual classes.

Furthermore, students encounter issues with malfunctioning devices, which can significantly impede their ability to utilize technological tools effectively. Acquiring and sustaining a few of these advanced gadgets remains a challenge for these students, as they either lack the requisite resources to purchase them or are unavailable in their region.

Using Technology in Education

Although most students agree that technology has made education more straightforward and flexible, allowing for remote attendance and access to online resources, they also note that some aspects of its adoption are ambiguous. Students indicated that technology is less effective than in-person interaction between students and instructors in specific subjects.

In contrast, there is a concern that an online platform could not fully replicate the efficacy of in-person interaction with teachers. For example, physics, biology, and chemistry, which require hands-on practice or face-to-face discussion, cannot be taught as effectively online. The study participants also reported that there should be a balance between online and in-person learning, which leverages the irreplaceable value of person-to-person encounters in conjunction with the benefits of technology.

Technology for Learning

Several students reported the value of using various applications, such as Google Workspace, Microsoft Teams, and whiteboards, for interactive learning. These tools have been beneficial, particularly in collaborative projects, real-time communication, and interactive lessons, making learning more engaging and efficient.

However, students were not always aware of more advanced tools, such as AI-based learning platforms, that could enhance their educational journey and make it more personalized. Most students emphasized the need for proper training and orientation to maximize the benefits of these advanced AI-driven tools, suggesting that educational institutions invest in workshops or training sessions to bridge the knowledge gap and leverage the technology's educational potential.

Technologies to boost sustainability***Environmental Sustainability***

Many students appreciated digital tools because they required less paper and were more environmentally friendly. They stated that using applications and Google Classroom has decreased the amount of paper used for assignments and note-taking, which is an eco-friendly approach.

Other students further stated that they have been encouraged to submit assignments electronically, which has helped to reduce paper waste. Digital technology has also enhanced organization and storage, making it faster and easier to disseminate information published in sources.

Social Equity

According to many students, technology also brings together students from different socioeconomic backgrounds because they have equal access to all resources.

Technology has reduced the barriers in all territories by providing online platforms for everybody. Now, with the Internet, everyone can connect with anyone online to seek help globally. A digital divide still exists in many educational institutions in Pakistan. Not all students can afford laptops or have stable internet connections, which disadvantages students from low-resource families. Schools must support and resource students without access to the necessary technology to achieve complete and accurate equity.

Economic Accessibility

Most students said that quality education nowadays highly depends on online resources, of which few are paid, and many are free.

Other students questioned the high cost of subscriptions for online tools and applications, which may be unaffordable for students with low family incomes. Therefore, they cannot fully capitalize on technological advancements.

Students have also stated that most online journal articles and books have restrictions on premium features or full-option downloads, which is detrimental to the quality of learning. Financially disadvantaged students perceived their financial status as a constraint that makes it challenging to maintain continuous internet service, which hinders their access to online materials while completing their assignments. It was also suggested that universities partner with tech companies to give students free or discounted access to educational software.

Impact on Learning Outcomes***Engagement***

Students reported how gamified learning platforms and tools make the material more interactive and compelling. However, the concern was raised that excessive use of technology may lead to distractions. Some students reported using AI tutoring systems because they receive quick feedback and personalized learning content.

They also noted that creating assignments on online platforms like Canva, Google Drive, and presentation tools has made learning more interactive and innovative. The use of games in learning activities was considered an exciting approach. However, their use was perceived as a

distraction due to its potential to divert focus from achieving academic goals. They also reported that their learning improved when using digital tools and engaging in group discussions on online platforms such as Google Classroom and Microsoft Teams.

Critical Thinking

Students also noted that technology provides a better foundation for critical thinking by making more sources of information accessible. However, caution was suggested concerning packaged digital content, which can discourage students from independent analytical and critical thinking.

Others stated that students nowadays can examine one aspect from several perspectives, using Digital debate platforms and online case studies to enhance their reasoning ability. On the other hand, a few students argued that technological advances have fostered critical thinking by enabling people to engage in real-time, global discussions. However, students believed that some AI-based tools provide answers too quickly, forcing students to rely on machines rather than applying logic to solve problems.

Personalized Learning

Most students' content was tailored to their individual needs and learning pace. However, study participants reported that these tools could not consistently adapt to the specific nuances of their learning preferences. Several students highlighted that AI-based platforms are adaptive and help them to improve their weak areas. The customized online tools, such as voice translators and voice recognition software for students with disabilities, are invaluable from the students' perspective. It was also suggested that human interaction, like peer review or mentorship, should be incorporated into individualized learning for a more well-rounded experience.

Translates into Technological Integration Challenges.

Digital Distractions

Many students agree that using technology for education can create significant distractions, such as social media or non-educational apps. A few suggested that different self-discipline or app-blocking options might help with this.

The perception that background apps and pop-up notifications distract them from concentrating while studying online also existed among the students. Others opined that their capacity to focus intently on a single topic is hindered by excessive multitasking, which digital tools facilitate, making learning passive. Some students mentioned that even instructional apps can occasionally include unnecessary distractions, such as leaderboards, that promote competition over learning. Some perceptions emphasize that institutions should provide tech-friendly but distraction-free learning spaces, such as digital study areas with limited access to non-educational materials.

Inequitable Access

Several students from rural or economically disadvantaged backgrounds highlighted the inequitable access to high-speed internet and modern devices as particularly challenging. Some had suggested that institutions could offer reduced rates for institutions to access technology.

Some students noted that pupils cannot fully utilize digital tools in certain areas due to a lack of technical support. Students also thought that institutional policies must prioritize

infrastructure development in rural areas to guarantee equitable access. Universities should offer device-lending programs to ensure every student has an equal learning opportunity.

Over-reliance on Technology

However, as most students warned, overreliance on technology could mean students have fewer communication skills and hands-on experiences. Some even suggested that education should balance traditional and technological means.

Some students expressed concern that technology may reduce students' ability to recall information without digital assistance. Others pointed out that reliance on AI-generated summaries may prevent students from engaging with primary sources. Excessive screen time was thought to be a source of fatigue, potentially detrimental to information and knowledge retention. Recommendation for classrooms to adopt a hybrid approach was also made to promote a balance between traditional note-taking and digital tools to strengthen learning outcomes.

Recommendations for improvement

Policy Suggestions

Most students recommended that educational institutions should develop policies to ensure equitable access to technology for all students. Another proposed that mandatory training in using advanced technological tools be recommended. Others suggested that institutions should implement data privacy policies to protect students from unethical data collection practices by online learning platforms. Several students emphasized the need for government subsidies to help low-income families access digital learning resources. Some recommended that universities negotiate bulk licensing deals with software providers to lower student costs.

Training for Educators

Many students believe that educators should be trained to use technology effectively in their teaching. A couple of instances noted that teachers lacked essential technology tools, which hindered the learning process.

Some students highlighted that while teachers have access to technology, many lack confidence in integrating it into their teaching. Others mentioned that professors often struggle with troubleshooting technical issues during online lectures, leading to wasted class time. Students also suggested that faculty development programs should include continuous training rather than one-time workshops to ensure educators stay updated with technological advancements. Some recommended peer-training models involve tech-savvy faculty members mentoring those who are less experienced in digital teaching methods.

Technological Innovations

Most students proposed that institutions invest in innovative tools, such as virtual reality (VR) labs and AI-driven learning platforms, to support the learning experiences. One or two mentioned piloting new technology before rolling it out across the board to confirm that it will work.

Some students have proposed that universities explore blockchain-based credentialing systems to enhance digital certifications' security and widespread acceptance. Others suggested that AI-powered chatbots could be integrated into learning platforms to provide instant academic support outside class hours. Institutions invest in mixed-reality simulations for fields requiring hands-on experience, such as medical or engineering studies, recommended the study

participants. Some emphasized that pilot programs should incorporate student feedback to ensure that new technologies enhance learning before being fully implemented.

Discussion

This study investigated undergraduate students' perceptions of using technology in the classroom to contribute to sustainable education. The technological equipment most frequently used by students includes computers, laptops, tablets, smartphones, and online tools, which aligns with Acut et al. (2025), who note that widespread access to basic technology is prevalent among students. However, a group of undergraduate students reported difficulties due to instability in connectivity and the inability to afford better devices. Valverde-Berrocoso et al.'s (2021) findings highlight the digital divide as discouraging for hardworking students. The results are consistent with the work of Podder et al. (2022), which stressed the ability of technology to create inclusive learning settings. Nevertheless, in contrast to earlier research focusing on positive impacts, this study uncovers student worries about over-reliance on technology and a decline in critical thinking, highlighting new challenges in digital education that require additional investigation.

On the other hand, a minority of students found themselves at a loss with more advanced tools, such as AI-based learning platforms, underscoring the urgent need for targeted training, as highlighted by Khurshid (2024). Lee and Hwang (2022) argued that technology has made education more flexible and accessible by providing access to online resources. Nevertheless, the irreplaceable value of face-to-face interactions in specific subjects, such as those discussed by Garrison and Kanuka (2004), highlights the necessity of in-person engagement in these areas as a significant concern.

Despite the study participants being students from various academic disciplines and from both public and private institutions, our thematic analysis did not reveal any substantial disparities in students' overall perceptions. Nevertheless, some subtle variations were identified. For example, students enrolled in technology-oriented programs, such as Computer Science, demonstrated a superior understanding of AI-based tools and appeared more at ease navigating digital platforms. Conversely, students from some disciplines, including Psychology and Media Studies, frequently reported difficulties in accessing or effectively utilizing advanced technologies. These discrepancies underscore the necessity of discipline-specific digital literacy initiatives to guarantee that all students are equally prepared to capitalize on educational technologies.

Regarding environmental sustainability, students supported reducing paper use through digital tools and promoted eco-friendly practices. Charina et al. (2022) also emphasized digital learning from an environmental perspective. Podder et al.'s (2022) suggestions aligned with the institutional facilitation of e-submissions and encouraged digital note-taking to reduce waste. Ali et al. (2024) study findings highlighted the importance of social equity, in which technology served as a bridge, ensuring that students from varying socioeconomic backgrounds had equal access to resources. The economic availability of free or low-cost online resources has been recognized to increase educational accessibility, which aligns with the findings of Jamil et al. (2024). Nevertheless, the prohibitive costs of proprietary tooling were identified as a barrier to applying specific tools, preventing some students from utilizing technology (Deng & Yu, 2023). Lin et al. (2023) reported that most students opined that gamified learning platforms and interactive tools increase support and engagement.

However, many students expressed that technological advancements help them improve critical thinking and access diverse learning needs. Afiyah (2025) suggested that students primarily utilize AI-driven platforms to enhance their personalized learning experience tailored to their needs and pace. A few students reported that using cell phones in classrooms often creates distractions that make it difficult for students to concentrate on academic tasks, such as the pop-ups of online social media applications. According to Wilson et al. (2024), teachers should set specific rules for self-discipline or application blocking. Angelaki et al. (2024) study reported that students from rural or economically disadvantaged backgrounds lacked equitable access to high-speed internet and modern devices. Okada and Gray's (2023) study findings include institutional interventions and subsidized access to technology.

Conclusion

In conclusion, students suggested that institutional policies be developed to promote equitable access to technology. As Albert and Uhlig (2022) indicated, mandatory training sessions should be implemented for advanced technological tools and sustainable education. Additionally, students reported that educators need to be adequately trained if assigned to teach a course that requires technology use. Moreover, most students suggested investing in innovative tools, such as VR labs and AI-powered learning platforms, to reduce the digital divide, especially in remote areas. This study highlights the challenges and benefits of technology in the classroom, facilitating learning outcomes while improving students' interpersonal communication skills and providing hands-on experiences. In summary, technology has a significant impact on students' educational experiences. The use of technology in the classroom provides unlimited online resources, accessibility, and sustainability benefits.

Recommendations

Educational institutions should develop policies to provide all students with equitable access to technological tools and high-speed internet. One way to bridge the digital divide is to subsidize access for economically disadvantaged students and supply the required devices. Teachers should be provided with the necessary training to integrate technology into the classroom effectively. Educational institutions should invest in virtual reality (VR) labs and AI-powered learning platforms. Piloting technology before it needs to scale up fully will allow them to test its practicality and effectiveness in enhancing students' educational experiences. There should be app restrictions on educational apps, such as features that block apps and promote stringent self-discipline among students.

Study Limitations and Future Research Directions

The results of this study should be viewed within the context of its limitations. This study is based on a small, homogeneous sample of 12 undergraduates from five universities in Lahore. Although we experienced data saturation, the small sample size and single-city focus limit the generalizability of our results. Future studies could involve larger and more varied samples and use mixed methods to complement qualitative insights with quantitative data. Additionally, the current study used only self-reported perceptions from semi-structured interviews, which were reported without any validation of responses through any additional data sources. Our results may have been affected by recall bias, social desirability bias, and lack of observational or quantitative data triangulation.

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