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Students' perceived satisfaction in the Digital Classroom: Insights from higher education

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Abstract

This research examined the satisfaction of students from universities in Pakistan with digital classrooms. For this, we used qualitative technique that conducted deep interviews during dependence on e-learning. Given the worldwide move toward e-learning, this study sought to examine the determinants of learners' satisfaction with their digital learning experiences. Themes emerged from the analysis of interview data: accessibility and usability of platforms; quality of communication and interaction; flexibility and convenience; challenges with technical issues, and impact on learning and engagement. Although the flexibility and accessibility online modalities remained popular among students. Participants also showed dissatisfaction with online learning practices because of low interaction and engagement in some of the digital classrooms, and technical glitches that disrupted learning for some students. Implications of the findings are discussed in relation to the prior literature, highlighting an urgent need to upgrade existing technological infrastructures as well as teaching methodologies in order to substantially improve the overall performance of e-learning. This serves to enhance the overall picture for e-learning satisfaction and provides some recommendations for quality improvement of online education with respect to technological dimension and human dimension. Through an examination of these themes, this investigation imparts critical lessons to educators, policymakers, and administrators on developing and maintaining online learning environments.

Keywords: e-learning, student satisfaction, digital classrooms, online education, technological challenges.

Introduction

Education holds significant importance in Pakistan (Akram & Yang, 2021; Rashid & Mukhtar, 2012), where efforts have long been underway to improve the learning process by integrating technology into the curriculum (Akram, 2020; Jalalzai et al.,2024). One such effort has been the introduction of computers in schools and colleges, a step toward modernizing the system. Furthermore, the transition to e-learning during the COVID-19 pandemic didn't pose as many challenges for higher education in Pakistan as anticipated (Akram et al., 2021). Since the onset of the pandemic, distance learning has become a vital element of educational systems worldwide, including in Pakistan (Akram et al., 2021; 2022; Qamar & Bawany, 2021). However, it is important to note that distance learning wasn't a new concept for Pakistan, as several initiatives had already been explored before the pandemic (Aslam, et al., 2021), where the it forced nearly all educational institutions to replace traditional in-person instruction with online learning platforms. This rapid shift mirrored the global trend of embracing digital learning as a necessity in the face of the unprecedented health crisis (Li & Akram, 2023; Noor et al., 2021; Jalalzai et al.,2023).

E-learning is defined as a "teaching and learning approach that either fully or partially integrates the educational framework and promotes the acceptance of new ways of acquiring knowledge through the use of electronic media and devices" (Downes, 2005; Johnson & Brown, 2017). These tools enhance the accessibility of education, facilitate communication, and promote interaction among students and instructors (Hu & Raman, 2024). In today's world, e-learning refers to a form of education that utilizes a range of electronic devices, from computers and laptops to mobile phones and virtual platforms, to deliver knowledge and foster learning (Abdelrady & Akram, 2022). The rapid advancement of technology has transformed e-learning into an essential tool that educational institutions and universities worldwide are adopting (Akram & Abdelrady, 2023). According to Liu and Yu (2023), e-learning provides students with a virtual environment where they can engage in a wide array of activities that extend beyond traditional classroom boundaries. This virtual learning system offers numerous advantages, including immediate access to educational materials, easy collaboration between students, and efficient communication through shared discussions (Al-Adwan et al., 2022; Ma et al., 2024). The presence of physical infrastructure in developing countries further amplifies these benefits, offering the potential to bridge regional divides and provide quality education to remote areas (Aslam et al., 2022; Jalalzai et al.,2023). However, despite the promising potential of e-learning, its acceptance has not been uniform across the globe. While developed countries have partially or fully embraced e-learning systems, their implementation remains incomplete and is often deemed unsatisfactory (Nikou & Maslov, 2023). This situation highlights a gap in understanding the factors that influence the adoption of e-learning technologies (Jalalzai et al.,2023; Bismala, 2022) Previous research has primarily focused on identifying the impact of specific traits on e-learning adoption, but these factors vary depending on the subjects and contexts of the studies (Rehman & Khan, 2021; Vanitha & Alathur, 2021). Most of the existing literature emphasizes individual aspects of the key drivers of e-learning success without considering how these success factors interact synergistically (Almaiah et al., 2020; Meriem & Youssef, 2020). Some studies, such as those conducted by Baig et al. (2022) and Saleh et al. (2022), explored the direct relationship between e-learning quality parameters and user satisfaction or usage rates. However, there is a need for a more comprehensive model that can assess performance across a broad spectrum of achievement levels. To fully measure the success of an e-learning system, it is crucial to evaluate both human participants (students and instructors) and non-human elements like learning management systems. Historically, much of the research has focused heavily on the technological aspects of e-learning systems. However, recent studies have shifted attention toward the attitudes and interactions of both students and instructors, recognizing that human factors play a critical role in the success of these systems (Altawalbeh & Al-Mughrabi, 2024). As technology becomes increasingly efficient and accessible, it becomes even more important to explore the human dynamics that influence the effectiveness of e-learning. This includes examining the attitudes of students and instructors toward digital learning, their interaction patterns, and how these elements impact the overall learning experience. Consequently, there is a growing need for more research to analyze e-learning programs in order to refine them and better meet students' needs. Understanding these factors will not only improve the quality of e-learning systems but will also aid decision-makers in recognizing the strengths and weaknesses of the existing e-learning infrastructure. By doing so, educational institutions can enhance the technological acceptance and effectiveness of these systems, ultimately paving the way for a more inclusive and efficient learning environment.

Methodology

In this research, a qualitative research methodology was utilized to explore how students find educational technology to be relevant, satisfying; i.e., measuring perceived satisfaction with the digital classrooms. A qualitative design was chosen because of the sensitivity of capturing nuanced data about students' experiences and providing a holistic image on their satisfaction with online learning environments (Magaldi & Berler, 2020). Because the research focused on qualitative data, it was able to capture students' experiences in richer and more textured ways that are often missed through quantitative measures.

This article utilized a purposive sampling technique to select the participants; university students who have engaged in digital classes during the academic year from universities located in Punjab, Pakistan. These 19 were chosen across a range of subjects to guarantee diversity in their academic backgrounds and online learning experiences. This modification helped in getting a bunch of different information how the satisfaction of postgraduate students with e-learning are determinate.

Data Collection Process

The data was collected based on semi-structured interviews for each participant. The authors chose semi-structured interviews for being flexible and wide ranging, encouraging more in-depth analysis of target issues by using a conversational style (Magaldi & Berler, 2020). Interview guide included areas about ease of use, student-to-instructor communication, content delivered through the e-learning platform and the ease of navigating learning environments online. The challenges of being a student in digital classrooms and suggestions to enhance the satisfaction of these students with e-learning were among other topics discussed.

The video conferencing platform was employed as well for the 30–45 minute interviews, much like the telephonic format of this digital work. Informed consent to audio-record sessions was obtained from participants. Transcripts were created from these recordings to capture the true voices and perspectives of the students, guaranteeing that their experiences would be accurately represented in the data. The semi-structured interviews were flexible in nature and allowed the participant opinions to trend towards greater saturation, thus giving a richer understanding of their satisfaction.

Data Analysis

The data were analyzed using thematic analysis which entails following the guidelines suggested by Braun & Clarke (2006). It was developed to enable the identification of commonalities and similarities within the data, in a well-defined way to better understand what factors are affecting student satisfaction in digital classes. The first phase was data immersion, which included reading through the transcriptions carefully and then initial start coding, these concerns the important aspects of responses. These codes were then grouped into higher-level themes representing constitutive features of students' experiences (e.g., effectiveness of communication, technical issues, and the importance of peer interaction in online learning).

The themes we identified were then double-checked to determine if they did justice in portraying the experience and satisfaction levels of the students. This process was in the form of further defining and refining each theme to increase accuracy and homogeneity, providing detail on the major themes influencing student satisfaction in an e-learning environment. Subsequently, the results were analyzed through a narrative summary of the connections among these themes with respect to the learning process which is in turn represented as part of the story.

Ethical Considerations

The study received ethical approval by ABC institution in accordance to the standard criteria for human research protection. Study participants went through the informed consent process and their participation was completely voluntary. We obtained written consent from each of the interviewees. To secure confidentiality and anonymity at all stages of the study, participants were coded with numerical IDs instead of actual names to protect their identity. The data was securely stored, and the only recordings and transcripts were visible to the research team.

Results

From the data analysis, we documented the following key themes, which reveal the factors influencing students' perceived satisfaction with digital classrooms.

1. **Accessibility and Usability of Platforms**

The accessibility and availability of the e-learning platforms were one of the significant themes that emerged from the interviews. The vast majority of students stated that they were very happy with how the digital classrooms opened for them and how smooth the platforms worked. They liked that most learning management systems had really user-friendly interfaces and you could access course materials, carry out discussions, and submit assignments with minimal headache. A participant said:

> "Everything I wanted to access, my module lecture notes, assignments etc. was very easy to use and no any confusion!"

Nevertheless, some students commented on the fact that their overall experience differed depending on which cyber-cheating service their colleges adopted. Their satisfaction was positively influenced by well-organized and user-friendly platforms, while they were frustrated by more complex or less reliable systems. Some students in rural or regional areas had connectivity problems, which hampered their access to online learning resources and their overall satisfaction. A student specified:

> "Often a whole long time in loading the page, and miss a few of my live class, especially near examinations this is really very frustrating."

2. **Quality of Communication and Interaction**

Another major theme pertained to the nature of communication and engagement in their digital classrooms. The undergraduates made it clear a lot rode on whether they were taught clearly and well or left on their own. Those professors who were responsive to provide them feedback on written work scored the highest on student satisfaction. A participant said:

> "The professor was always available through e-mails and on the boards, so I never felt like I was out to dry, which made a world of difference."

In addition, students felt more involved and connected to the class when it offered peer-to-peer interactions through discussions and team collaborations. Conversely, students who reported low levels of interaction with instructors or peers shared a sense of disconnectedness and isolation resulting in lower satisfaction. A participant alleged:

> " I did not mix with anyone in the class. I felt removed from the whole thing, as if I were watching someone else's YouTube videos that they had created based on what they'd learn."

3. **Flexibility and Convenience**

One of the biggest pros among students would be the flexibility that comes with digital classrooms. Others thanked that they could attend the classes in their homes and save time, that also allowed them to have a flexible schedule. Particular advantage was perceived from the ability to revisit recordings or available learning materials at any time, supporting students with competing academic, work, and personal responsibilities. A student specified:

> " “Access to recorded lectures… there were times that saved my life! It was a perfect fit around my work schedule."

This flexibility also coincided with the ability of learners to learn at their own rate—something that many felt contributed positively to their comprehension. Indeed, this theme appears to be a key component of their satisfaction as students and that was seen with how impressed they were with online learning compared to a traditional in-person class. A participant alleged:

> "I loved not having to travel, especially in poor weather. It just made everything so much simpler and stress free."

4. Challenges with Technical Issues

While there were the benefits of flexibility and ease of access, technical difficulties kept rearing their ugly head and took away from the overall good vibes students experienced. Several facilitators experienced a confluence of technical challenges, including poor internet connectivity, crashing software during lecture prep, and audio or video technology interruptions in live sessions. A student specified:

> "The system would freeze, or the audio wouldn’t work properly. And it was so difficult to follow along, and I felt like I was falling short."

This resulted in an often loss of content, with frustration being increased son the more important lectures/tests. Many students found it difficult to attend online classes in full if they lacked the familiarity with technology or a reliable internet connection. A student specified:

> "Sometimes my internet would fail and I get kicked out of the live session, missing parts of the lecture. It was really disruptive."

In certain cases, there was no adequate institutional assistance to overcome these technical troubles which only made things worse for the students and they ended up feeling not helped and got frustrated because of this e-learning overall experience.

5. Impact on Learning and Engagement

The last major theme encapsulated was regarding the influence of digital classrooms on student learning and engagement. Most students appreciated the convenience of online learning, but many lamented that they missed out on classroom-like engagement and interaction. More than one group of students that it was more difficult to stay engaged and pay attention in virtual lectures, especially when those classes took the form of passive learning (and long uninterrupted video lecture). A participant alleged:

> " It was helpful to be able pause and rewind the lectures, but sometimes I felt like I was simply taking in information – not really interacting with it.”

Lots of students were reminding us about how interactive components such as live discussions, polls and breakout rooms made our classes inspiring because they kept us engaged and participating. Higher levels of satisfaction corresponded to those who had experienced a more interactive environment compared to others who felt quite disconnected and often found the learning process somewhat ineffective. A student specified:

" The live sessions, group discussions etc. made the subject more interesting. But, for me, as a straight-up lecture, I started to fall off pretty fast."

Discussion

The findings of this study provide a nuanced understanding of students' perceived satisfaction with digital classrooms, and these insights align with and expand upon existing literature in the field of e-learning. First and foremost, the finding related to accessibility and usability aligns with previous research such as Baroudi et al. (2020) and Baig et al. (2022) that highlighted the importance of user-friendly platforms in enhancing student satisfaction. In addition to that many students in this study appreciated the ease with which they could access course materials. It reflects with the findings of Obidat (2022), who emphasized that simple navigation and the availability of resources are critical for effective e-learning experiences. On the other hand, the challenges faced by students in remote areas with poor internet connectivity align with that of Rotas and Cahapay (2020). Their study claimed that technological infrastructure in developing countries remains a significant barrier to the full realization of e-learning's potential. As a result, the finding suggests that while platform design plays a crucial role in fostering satisfaction, broader infrastructure issues must also be addressed. In particular, it will enable ensure equitable access to digital learning environments.

In addition to the study's findings regarding the quality of communication and interaction are consistent with earlier research such as Akram and Li (2024). They acknowledged the role of effective student-instructor and peer interactions in online learning success. It's worth noting that previous studies such as Aboagye et al. (2021) emphasize a regular and responsive communication between teacher and students. Similar to this, our study reveals that communication among them significantly improves students' online learning experience. These findings resonate with Octaberlina and Muslimin (2020), who demonstrated that interactive learning environments lead to higher satisfaction. On the other hand, for students who experienced limited interaction, they feel isolation. This finding supports the argument made by Muńoz and Sanchez (2023) that insufficient engagement can diminish the effectiveness of digital education. This highlights the need for instructors to not only deliver content but to actively facilitate interaction to ensure a more immersive and satisfying learning experience.

Turning to other theme, flexibility emerged as one of the most valued aspects of digital learning. This finding aligns with prior research such as Bećirović and Dervić (2023). In our study, students appreciated the ability to attend classes from any location and adapt their learning schedules to accommodate personal commitments. This finding is supported by Baxter and Hainey (2023), who noted that flexibility is a key factor in students' preference for online learning. This flexibility enables students to balance academic and personal responsibilities. It is often highlighted as one of the main advantages of digital learning (Alenezi, 2023). However, while flexibility enhances satisfaction, it also introduces a risk of reduced motivation and self-discipline. In particular, Mansurjonovich and Sattorovich (2023) suggest that digital platforms should include features that promote time management and self-regulation to maximize the benefits of flexible learning.

On challenges front, technical glitches turned out to be the major concern expressed by students. This finding was also supported by other research including Mhlongo et al., (2023), Akram et al. (2021) and Jalalzai et al. (2024). Examples of the significant barriers created for

students by poor technology in online learning environments are pervasive. More importantly, the break in poor internet connectivity and platform malfunctions have already been found as a significant hoard of student dissatisfaction. In particular Shater et al. (2023) found this a major fault for developing countries with lacking infrastructure. As was the case with Menekse (2023). In the present research, participants were also frustrated when technical failures prevented them from participating in digital classrooms as shown in Mhlongo et al. (2023). This indicates that, to accompany e-learning in a viable way, support must be given by the institution and by having platforms available that improve this experience with fewer interruptions.

The results concerning digital classroom have similarities with earlier studies, e.g. Alemayehu and Chen (2023) pointed the difficulties in keeping students motivation during lessons in virtual environments. Other students did well in the autonomy of a self-directed pace but did not engage enough. This observation is consistent with the conclusion made by Koay and Poon (2023)

. These observations regarding combatting distraction during lectures are concordant with the comments of other participants on their own losses of focus for passive lectures, as seen in work such as that by Dubey et al; Jalalzai et al., (2023) to show that human relationships are necessary for student interest. Thus, this study serves to validate the prior argument made by Zapata-Cuervo et al. (2023). The quality of e-learning is about more than just what gets delivered; it's also determined by the level of interaction developed. As technology advances, we must combine vigorous and engaging educational methodologies with it to increase student satisfaction and academic performance. The findings of this study confirm earlier work on the significance of both human and technological dimensions in digital learning experiences. Previous research has shown such as Obidat (2022), Shater et al. While previous review of literature in e-learning systems Balamurugan et al. (2023) put more emphasis on technical aspect, such as summary the architecture, models used methods and tools that are behind the implementation and adoption of these learning system by various academic institutions, a recent survey on what students have experienced during COVID-19 outbreak highlight importance of interpersonal (instructors/peers) interaction for offering an authentic learning experiences instead of focus mainly deployment method. The results here affirm that technology is not enough to generate effective e-learning environments; a complementary approach between an organized design of systems backed by educator involvement, is the answer to success. Considering this, teachers should be appropriately equipped with the trainings (Li & Akram, 2023; Noor et al., 2021; Jalalzai et al.,2023) to execute these approaches in a well manner.

Conclusions

Since experiential perceptions of digital classrooms based on physical attendance of university students have not been explored in much detail, this study aimed to fill the gap by analyzing the facets of satisfaction and dissatisfaction associated with online learning. Student satisfaction factors that are known to contribute significantly to student satisfaction, and which have been reiterated here, are the accessibility, flexibility and convenience offered by digital platforms. But the analysis also underscores long-term problems, especially with respect to how well students engage with instructors in online courses and lingering technical support. Students liked the flexibility that going to school online provided, but they were not always happy and satisfied about the experience because it was often difficult to form actual connections with other

people and there were lots of technical problems. These results suggest that if e-learning is to greatly increase its effectiveness, then universities and other similar institutions need to invest in solid technical infrastructure and also nurture a more collaborative and supportive environment for learning. Digital classrooms that address communication flows between instructors and students, timely feedback, and peer collaboration in learning benefits can help improve student satisfaction. Additionally, the study underscores the need to tailor academic interventions to accommodate students in low connectivity zones — a reality that continues to hamper successful online learning experiences. Thus, the present study adds up to the existing literature in bringing out various dimensions of student satisfaction with e-learning. This valuable paper addresses the allure and difficulty of digital classrooms, providing some straightforward advice to educators and institutions that could contribute to online education honing its quality. Further investigation in a broader range of educational settings will show how to fine-tune student satisfaction strategies on the shifting terrain of digital learning.

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