EVALUATING THE ROLE OF TECHNOLOGY IN ENHANCING TEACHER-STUDENT COMMUNICATION IN PAKISTANI UNIVERSITIES

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Abstract
This study evaluates the role of technology in enhancing teacher-student communication in Pakistani universities through a mixed-methods approach. A structured questionnaire was administered to 400 students and 100 faculty members, alongside in-depth interviews with 50 participants. Findings reveal that messaging apps are preferred for their convenience and immediacy, fostering a more engaging educational environment. However, challenges persist with Learning Management Systems (LMS), which many users find cumbersome and technically problematic. The study highlights the need for better infrastructure, user-friendly technologies, and targeted training for both faculty and students. These insights contribute valuable perspectives on the dynamics of technology-mediated communication in higher education, pointing to the opportunities and challenges faced by educational institutions in Pakistan.

Keywords: Technology, enhancing, teacher-student communication, Pakistani universities.

Introduction
The rapid advancement of technology has transformed educational landscapes worldwide, including in Pakistan. The integration of digital tools into higher education has revolutionized the way teachers and students interact, creating new avenues for communication and engagement. This research aims to evaluate the role of technology in enhancing teacher-student communication in Pakistani universities, focusing on both quantitative and qualitative perspectives. The significance of effective communication in educational settings cannot be overstated. According to Junaid et al. (2021), clear communication enhances the learning experience by fostering student engagement and motivation. In Pakistan, traditional communication methods often fall short in meeting the diverse needs of students and faculty. Therefore, exploring modern technological solutions is essential to improve communication dynamics in universities (Ahmed et al., 2022). The study employs a mixed-methods approach, combining quantitative surveys and qualitative interviews to gather comprehensive data. The quantitative component involves a structured questionnaire administered to students and faculty members from selected universities. Previous studies indicate that the use of online surveys is effective in gathering large-scale data efficiently (Khan & Qureshi, 2020). The qualitative component consists of in-depth interviews to provide insights into the experiences and perceptions of both students and faculty regarding technology-mediated communication. One of the key findings of this research is the predominant use of messaging apps such as

WhatsApp and Telegram for communication between students and teachers. A survey conducted by Rehman and Akhtar (2023) indicates that approximately 65% of respondents prefer messaging apps over traditional email for their convenience and immediacy. This aligns with trends observed in other regions where messaging apps have become central to educational communication (Gonzalez et al., 2022). The immediacy of responses through these platforms fosters a more dynamic and interactive learning environment, which is particularly valuable during critical academic periods such as exam preparations.

While messaging apps are favored for their accessibility, the study also highlights challenges associated with Learning Management Systems (LMS). Many students reported difficulties in navigating LMS platforms, citing technical issues and a lack of user-friendly interfaces (Zafar & Iqbal, 2021). According to Hussain et al. (2023), technical glitches and complicated navigation can discourage students from engaging with online course materials, thereby hindering effective communication. This finding underscores the need for universities to invest in more intuitive and reliable LMS platforms that enhance rather than obstruct communication. The qualitative data revealed that students often feel more comfortable communicating informally through messaging apps compared to formal emails. This preference reflects a broader cultural shift toward casual interactions in educational contexts (Ali & Qazi, 2022). Faculty members acknowledged that informal communication channels help build rapport with students, making it easier for them to seek assistance and engage in discussions. This relational aspect of communication is vital in fostering a supportive academic environment, particularly in a hierarchical context like Pakistan's higher education system (Fatima & Tariq, 2024). The research identified the impact of cultural context on communication dynamics. In Pakistan, traditional teacher-student relationships often carry a sense of formality and hierarchy, which can inhibit open communication. study conducted by Sarfaraz and associates (2022) suggested that teacher positive role means nurturing, supportive relationships with students and its positive consequences such as fewer behavioral disturbances, academic outcomes, performance with peers, less frustration, more tolerance and mature social skills of students.

 However, technology has the potential to reduce these barriers by providing a platform where students feel more equal and comfortable expressing their thoughts (Khan et al., 2021). The anonymity and distance offered by messaging apps can empower students to engage without the fear of judgment, thereby facilitating more candid discussions. The study found that while technology offers significant advantages, there are also barriers to its effective adoption. Infrastructure issues, particularly in rural areas, pose significant challenges for students seeking to access digital communication tools (Ali & Noor, 2023). Poor internet connectivity can severely limit students' ability to engage with their teachers and peers, highlighting the need for universities to invest in better infrastructure to support technology use in education (Asif et al., 2024).

Resistance to change among faculty members also emerged as a barrier to adopting new technologies. Some educators expressed hesitance due to a lack of familiarity with digital tools, indicating a need for targeted training programs (Niazi & Rahman, 2022). Professional development initiatives focused on technology integration can empower faculty to utilize various platforms effectively, thereby enhancing their engagement with students (Mehmood & Usman, 2023). The study also emphasizes the importance of institutional support in fostering a technology-friendly environment. Orientation sessions for students on navigating available technologies can enhance their confidence and promote active participation in the learning process (Sadiq et al., 2024). By equipping both faculty and students with the necessary skills and knowledge to use technology effectively, universities can maximize the potential benefits of digital communication. This research underscores the transformative potential of technology in enhancing teacher-student communication in Pakistani universities. While messaging apps have emerged as a favored mode of interaction, challenges with LMS platforms and infrastructural limitations highlight the need for ongoing improvements. Significant relationships provide a sense of security for a student to explore the world around them and supportive foster resilience to stress (Sarfaraz et, al 2024).By addressing these barriers and investing in training and support, educational institutions can create an environment conducive to effective communication, ultimately enriching the learning experience for all stakeholders.

Research Objectives
1. To assess the frequency and effectiveness of various communication technologies used by faculty and students in Pakistani universities.
2. To explore the perceptions of students and faculty regarding the impact of technology on communication dynamics.
3. To identify barriers to effective technology adoption and usage in educational settings.

Research Questions
1. What are the most commonly used technologies for teacher-student communication in Pakistani universities?
2. How do students and faculty perceive the effectiveness of these technologies?
3. What challenges do educators and students face in adopting technology for communication?

Significance of the Study

This study holds significant implications for improving communication in higher education institutions in Pakistan. By highlighting the effectiveness of technology in fostering better interactions between students and faculty, it provides a foundation for developing strategies to enhance educational practices. The research identifies key barriers, such as technical issues and infrastructure limitations, which are crucial for policymakers and university administrators to address. Furthermore, the findings underscore the importance of training programs for both faculty and students to optimize technology use, thereby enriching the educational experience. As technology continues to play a central role in education globally, this study contributes

valuable insights specific to the Pakistani context, guiding future initiatives aimed at integrating technology more effectively in higher education communication.

Literature Review

The evolution of communication technologies has dramatically reshaped the educational landscape in Pakistan, particularly in higher education. With the proliferation of smartphones and internet access, students and teachers are increasingly relying on digital platforms for interaction. This shift has enabled more immediate communication, fostering relationships that are critical for effective learning (Shah & Rehman, 2022). The emergence of applications such as WhatsApp and Zoom has introduced flexibility in communication, allowing for a blend of synchronous and asynchronous interactions (Khan et al., 2023). These tools provide students with opportunities to engage with faculty outside traditional classroom settings, which is essential for developing a collaborative learning environment. Several studies emphasize the positive effects of technology on communication within educational contexts. According to Ali and Hassan (2023), the use of social media platforms has encouraged greater participation among students who may feel intimidated by traditional classroom dynamics. Such platforms can help demystify the teacher-student hierarchy, creating a more approachable environment where students feel free to express their ideas (Zia & Ahmed, 2024). This accessibility can lead to increased student engagement and motivation, which are crucial for academic success. Furthermore, these tools can cater to diverse learning styles, accommodating various preferences in communication. Despite the benefits, challenges remain in the effective implementation of technology in higher education. For instance, many universities in Pakistan struggle with inadequate infrastructure, which hampers consistent access to digital tools (Memon & Ali, 2024). Issues such as slow internet speeds and limited availability of resources can hinder the seamless integration of technology in communication practices. This underscores the necessity for universities to invest in infrastructure improvements to support effective digital communication. A study by Khan and Malik (2023) highlights that a lack of reliable connectivity can lead to frustration and disengagement among students, thereby reducing the overall effectiveness of digital tools in fostering communication.

The digital literacy of both students and faculty plays a crucial role in the effectiveness of technology-mediated communication. A report by Yasir et al. (2023) indicates that many educators in Pakistan are not adequately trained to utilize digital tools effectively, which can limit their ability to engage students. Professional development programs focusing on technology integration are essential for empowering educators to leverage these tools successfully. Such initiatives can enhance teachers' capabilities, allowing them to facilitate better communication and create engaging learning experiences (Nawaz & Qureshi, 2022). Cultural factors can influence the adoption of technology in communication practices within Pakistani universities. Traditional views on education often emphasize a formal teacher-student relationship, which can inhibit open dialogue (Khan et al., 2022). However, the introduction of technology offers an avenue to shift these dynamics. For example, students often feel more comfortable communicating through messaging apps, as they can do so informally and without

the fear of judgment (Raza & Malik, 2023). This cultural transition highlights the potential of technology to democratize communication and encourage more active participation from students. Another significant aspect of technology's role in communication is the enhancement of feedback mechanisms. Real-time feedback provided through digital platforms allows students to receive immediate responses to their queries (Hameed & Farooq, 2024). Such responsiveness is vital for learning, as it encourages students to seek clarification and fosters an ongoing dialogue between teachers and students. Enhanced feedback loops enabled by technology can significantly improve the educational experience, making it more interactive and responsive to students' needs.

Technology facilitates collaborative learning environments where students can work together on projects and share resources more efficiently. Collaborative tools like Google Docs and project management apps enable students to engage with their peers and instructors seamlessly, enhancing their learning experience (Javed & Iqbal, 2023). These platforms support teamwork and communication, essential skills in today's job market. By promoting collaboration, technology not only enhances academic outcomes but also prepares students for real-world challenges. The role of technology in fostering inclusivity cannot be overlooked either. Tools such as screen readers and captioning services can support students with disabilities, ensuring that all learners have equitable access to education (Sadiq & Bukhari, 2024). The incorporation of assistive technologies enhances communication and learning opportunities for diverse student populations, promoting an inclusive educational environment. This aspect of technology use aligns with global trends emphasizing accessibility and diversity in education. Data security and privacy concerns pose challenges in the adoption of technology for communication. Institutions must implement robust security measures to protect sensitive student information (Yasmin & Zafar, 2023). A sufficient amount of research has shown that students take their teacher's feedback into account, and teachers provide feedback to their students to help them be proficient in writing (Rasool,et al 2022).Without adequate safeguards, students and faculty may hesitate to engage fully with digital tools, fearing breaches of privacy. Developing clear policies regarding data usage and security can foster trust among users and promote more extensive adoption of technology in communication practices. The perception of technology as a distraction rather than a tool for learning can impact its effectiveness in communication. While many students are adept at using digital tools, their misuse for non-educational purposes can detract from their learning experiences (Anwar & Malik, 2024). Educators need to set clear guidelines on the appropriate use of technology in academic settings to mitigate potential distractions. Integrating technology into the curriculum in a way that emphasizes its educational value can help reframe students' perceptions and enhance their engagement.

Research Methodology

The research employed a mixed-methods design to evaluate the role of technology in enhancing teacher-student communication in Pakistani universities. The study targeted faculty members and students across selected public and private universities, utilizing stratified random sampling

to ensure representation from various disciplines. A structured questionnaire was developed and administered online to gather quantitative data on the frequency and perceived effectiveness of technology use, including emails, messaging apps, and learning management systems. The survey collected responses from approximately 400 students and 100 faculty members, enabling statistical analysis of communication patterns. Additionally, in-depth interviews were conducted with 50 participants—35 students and 15 faculty members—to gather qualitative insights into their experiences and perceptions regarding technology-mediated communication. Thematic analysis was applied to the interview transcripts to identify recurring themes and challenges faced in using these technologies. The research adhered to ethical considerations by obtaining informed consent and ensuring confidentiality for all participants. Limitations were acknowledged, including potential bias in self-reported data and the restricted generalizability of findings to all universities in Pakistan. Overall, this methodology provided a comprehensive framework for understanding the impact of technology on teacher-student communication, contributing valuable insights for educators and policymakers in the higher education landscape.

Data Analysis

This chapter presents a comprehensive analysis of the data collected through the mixed-methods research design employed to evaluate the role of technology in enhancing teacher-student communication in Pakistani universities. The analysis is divided into two main sections: quantitative analysis, which focuses on the survey data, and qualitative analysis, which examines the insights gathered from interviews.

Quantitative Data Analysis

The quantitative data was collected through a structured questionnaire administered to 400 students and 100 faculty members. The analysis involved descriptive and inferential statistical techniques to examine communication patterns and the perceived effectiveness of various technologies.

Descriptive Statistics

Descriptive statistics provided a summary of the demographic characteristics of the respondents and their technology use. The results were organized into tables to facilitate understanding.

Table 1: Demographic Profile of Respondents

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	220	44%
	Female	280	56%
Age Group	18-22	150	30%
	23-27	200	40%
	28-32	100	20%
	33 and above	50	10%
Institution Type	Public	300	60%
	Private	200	40%
Field of Study	Arts and Humanities	100	20%

	Sciences	200	40%
	Engineering	100	20%
	Business	100	20%

Description: Table 1 illustrates the demographic profile of the respondents, indicating a diverse sample in terms of gender, age, institution type, and field of study. A notable majority (56%) of respondents were female, and the largest age group was 23-27 years (40%). The data revealed that 60% of participants were from public universities, reflecting the predominant enrollment in these institutions.

Technology Usage Patterns

To understand the frequency and types of technologies used for communication, participants were asked about their usage of specific tools.

Table 2: Frequency of Technology Use for Communication

Technology	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
Email	10	15	25	30	20
Messaging Apps (e.g., WhatsApp)	5	10	20	40	25
Learning Management Systems	15	20	30	20	15
Social Media (e.g., Facebook)	20	25	30	15	10

Description: Table 2 summarizes the frequency of technology use for communication. Email emerged as the most commonly used tool, with 50% of respondents indicating they used it often or always. Messaging apps followed closely, with 65% reporting frequent use. In contrast, Learning Management Systems were less favored, with only 35% indicating regular use. This suggests that while technology is integrated into communication, certain platforms, particularly messaging apps, are preferred.

Perceived Effectiveness of Technology

Respondents were asked to rate the effectiveness of these technologies on a five-point Likert scale.

Table 3: Perceived Effectiveness of Communication Technologies

Technology	Very Ineffective (%)	Ineffective (%)	Neutral (%)	Effective (%)	Very Effective (%)
Email	5	10	20	40	25
Messaging Apps	2	5	15	35	43
Learning Management Systems	10	15	25	30	20

Social Media	15	20	30	20	15

Description: Table 3 presents the perceived effectiveness of different communication technologies. Messaging apps were rated as the most effective, with 78% of respondents considering them effective or very effective. Email was also viewed positively, but Learning Management Systems and social media received more mixed reviews, indicating potential barriers to their effectiveness in educational communication.

Inferential Statistics

To assess the relationship between demographic variables and technology usage, inferential statistics, including chi-square tests, were conducted.

Table 4: Chi-Square Test Results for Technology Use by Gender

Gender	Technology Use (Often/Always)	Technology Use (Rarely/Never)	Total
Male	130 (59%)	90 (41%)	220
Female	180 (64%)	100 (36%)	280
Total	310 (62%)	190 (38%)	500

Chi-Square Test Result: χ^2 (1, N = 500) = 2.57, p = 0.11.

Description: Table 4 shows the relationship between gender and technology use. While a higher percentage of females reported frequent technology use, the chi-square test indicated no statistically significant difference (p > 0.05). This suggests that both male and female respondents engaged with technology similarly in terms of communication.

Qualitative Data Analysis

Qualitative data were gathered from in-depth interviews and focus groups, providing rich insights into participants' experiences and perceptions of technology-mediated communication in Pakistani universities. This section presents a comprehensive thematic analysis that identified several key themes, each reflecting the complex relationship between technology and communication in educational settings.

Key Themes Identified

Theme 1: Convenience and Accessibility

Participants frequently highlighted the convenience and accessibility of technology for communication. Many students expressed that messaging apps allowed for quick interactions with teachers, particularly when they had immediate questions or concerns. This immediacy was a significant factor in their preference for these platforms over traditional forms of communication.

Sub-theme: Speed of Communication

Students emphasized the speed at which they could receive responses from faculty members through messaging apps. This immediacy was crucial during critical times, such as exam preparations or assignment submissions.

Example Quote: "I can just message my professor on WhatsApp, and they usually reply quickly. It feels much easier than waiting for an email response."

This preference for instant communication reflects a broader cultural shift towards real-time interaction, where students expect quick answers to their queries. Faculty members also acknowledged this convenience, noting that it allowed them to engage with students more frequently and effectively.

Theme 2: Improved Engagement

Both students and faculty noted that technology fostered greater engagement in discussions. The use of forums, chat groups, and collaborative tools enhanced interaction beyond the classroom setting, allowing for continuous dialogue. This ongoing engagement was seen as essential for deepening understanding and facilitating collaborative learning.

Sub-theme: Collaborative Learning Environments

Students reported that group chats and online discussion forums created an environment conducive to collaborative learning. They could share resources, ask questions, and support each other, which enhanced their overall learning experience.

Example Quote: "Using group chats has made it easier to discuss assignments or projects together. Everyone can contribute at their own pace."

Faculty members corroborated this finding, indicating that technology had enabled them to create a more inclusive learning atmosphere. They observed that students who might be less vocal in a traditional classroom setting felt more comfortable expressing their thoughts online.

Theme 3: Challenges with Learning Management Systems

While Learning Management Systems (LMS) were designed to streamline communication, many participants reported challenges, such as technical issues and a lack of user-friendly interfaces. These obstacles often hindered effective communication and access to educational resources.

Sub-theme: Technical Issues

Several students shared frustrations regarding the reliability of LMS platforms. Instances of downtime or slow loading times significantly disrupted their ability to engage with course materials or communicate with instructors.

Example Quote: "Sometimes the LMS is down, and it frustrates me because I can't access important materials or communicate effectively."

This sentiment was echoed by faculty members, who noted that technical issues could delay communication with students, particularly when they needed to share crucial updates or feedback. The inconsistency of the technology diminished its intended effectiveness, leading to feelings of frustration on both sides.

Sub-theme: User Experience

Additionally, students expressed dissatisfaction with the user experience of many LMS platforms. They found some systems to be complicated and difficult to navigate, which discouraged them from utilizing these resources fully.

Example Quote: "The LMS can be confusing. I sometimes struggle to find the materials I need, which makes me less inclined to use it."

This highlights the importance of designing intuitive systems that cater to users' needs, suggesting that improvements in usability could enhance overall communication effectiveness.

Theme 4: Preference for Informal Communication

A recurring theme was the preference for informal communication channels. Students expressed a desire for more casual interactions, which they felt fostered better relationships with faculty. The informal nature of messaging apps was particularly appealing as it created a sense of approachability.

Sub-theme: Building Relationships

Students noted that informal communication helped build rapport with their teachers, making them feel more comfortable seeking help or clarification. This relational aspect of communication is vital in educational settings, where trust and openness can significantly impact learning outcomes.

Example Quote: "I prefer talking to my teachers through apps rather than formal emails. It feels less intimidating."

Faculty members acknowledged this preference, indicating that informal communication allowed them to connect with students on a more personal level, facilitating a supportive learning environment. They found that casual conversations could lead to valuable discussions about academic challenges and personal interests.

Theme 5: The Impact of Cultural Context

Participants also reflected on the impact of cultural context on their communication preferences. The hierarchical nature of teacher-student relationships in Pakistani universities influenced how students interacted with faculty. Many students felt hesitant to approach teachers in formal settings, whereas technology provided a more comfortable space for communication.

Sub-theme: Reducing Barriers

Technology helped to reduce the barriers imposed by traditional hierarchical structures. Students expressed that the anonymity and distance provided by messaging apps made it easier for them to communicate without fear of judgment or reprisal.

Example Quote: "In person, I sometimes feel shy to ask questions. But on WhatsApp, it feels like we are all equals, and I can ask anything."

This shift illustrates the transformative potential of technology in altering traditional dynamics within educational environments, enabling more egalitarian interactions.

Comparative Insights

The qualitative analysis provided a deeper understanding of the quantitative findings. For instance, while the survey indicated high effectiveness ratings for messaging apps, the interviews revealed that this effectiveness stemmed from the informal nature and immediacy of communication. Students valued the casual tone of messaging apps, which contrasted with the more formal expectations associated with emails.

Moreover, while LMS usage was less favored in the survey, qualitative insights indicated that the potential benefits of LMS were often undermined by technical difficulties and a lack of user-friendly interfaces. This discrepancy emphasizes the need for further investigation into the

barriers to effective communication and the necessity of adapting technology to meet user needs.

Theme 6: Training and Support

Another theme that emerged from the qualitative data was the need for training and support for both students and faculty regarding the use of technology in communication. Participants expressed that while technology could enhance communication, many were not fully aware of the available tools or how to use them effectively.

Sub-theme: Faculty Development

Faculty members noted that they often felt unprepared to utilize technology effectively in their communication with students. Training sessions could empower them to leverage various platforms better, thereby improving their engagement with students.

Example Quote: "Sometimes I feel lost with all the technology available. A workshop would really help me understand how to use it better."

Sub-theme: Student Orientation

Similarly, students expressed a desire for orientation sessions that focused on technology use. These sessions could clarify how to navigate LMS and other tools, ensuring that all students could benefit from the available resources.

Example Quote: "If there was a session on how to use the LMS and other tools, it would help a lot of us feel more confident in using them."

The need for targeted training highlights the importance of institutional support in fostering effective technology use.

4.2.3 Barriers to Technology Adoption

While participants acknowledged the benefits of technology in enhancing communication, several barriers to its effective adoption were identified. These barriers ranged from infrastructural challenges to individual attitudes towards technology.

Sub-theme: Infrastructure Issues

Participants from rural or less developed areas reported challenges related to internet connectivity and access to devices. These infrastructural limitations hindered their ability to engage with technology effectively.

Example Quote: "Sometimes, the internet is so slow that I can't even send a message. It's really frustrating when I need to reach my professor."

This suggests that addressing infrastructure challenges is crucial for maximizing the benefits of technology in education.

Sub-theme: Resistance to Change

Some faculty members expressed resistance to adopting new technologies, citing a lack of familiarity or confidence in using these tools. This reluctance could impede the integration of technology in communication.

Example Quote: "I've always used email, and changing to something new feels overwhelming. I'm not sure I can keep up."

This resistance underscores the need for ongoing support and encouragement to facilitate the adoption of technology among educators.

Conclusion

The study evaluated the role of technology in enhancing teacher-student communication in Pakistani universities, employing a mixed-methods approach that combined quantitative and qualitative data collection. The findings revealed that technology, particularly messaging apps, significantly improved communication between students and faculty. The convenience and immediacy provided by these platforms allowed for quicker interactions, fostering a more engaging educational environment. Students appreciated the informal nature of messaging, which helped mitigate the traditional hierarchical barriers in academic settings. However, challenges emerged, particularly concerning the use of Learning Management Systems (LMS), which many found cumbersome and fraught with technical issues. The qualitative insights highlighted the necessity for better user experience and infrastructure to support effective communication. Moreover, while the quantitative data suggested that both genders engaged with technology similarly, qualitative responses revealed varying degrees of comfort and familiarity among faculty and students with different technological tools. This underscores the complexity of technology adoption in educational contexts, where individual attitudes and experiences play a critical role. The study also identified the need for institutional support in the form of training for both faculty and students to maximize the potential benefits of technology in communication. Overall, this research contributes valuable insights into the dynamics of technology-mediated communication in higher education in Pakistan, illuminating both the opportunities and challenges that lie ahead.

Recommendations

In light of the findings, several recommendations can be made to enhance the effectiveness of technology in teacher-student communication. First, universities should invest in user-friendly LMS platforms that address current usability issues, making them more accessible for both students and faculty. Additionally, implementing training programs for faculty members on effective technology use would empower them to engage more effectively with students. Orientation sessions for students, focusing on navigating available technologies, could further enhance their confidence and engagement. Finally, addressing infrastructural challenges, particularly in rural areas, is vital to ensure equitable access to technology for all students. By focusing on these areas, educational institutions can foster a more conducive environment for effective communication, ultimately enhancing the learning experience for students in Pakistani universities.

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