Impact of Technology in Classrooms in the Colleges of Kathmandu: Challenges and Policy Recommendations

Tulasi Acharya[1,2] & Gopi Krishna Dhungana[3]

[1] PhD., English and Public Administration, South Georgia State College, USA

[2] Nexus Institute of Research and Innovation, Nepal and author of *Sex, Desire, and Taboo in South Asia*

[3] MPhil, an op-ed editor of Annapurna Post, a Nepali national daily, and a writer, researcher, and lecturer, Nepal

Correspondence: Tulasi Acharya, English and Public Administration, South Georgia State College, USA. Nexus Institute of Research and Innovation, Nepal. E-mail: tulasi.acharya@sgsc.edu

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Abstract

The integration of technology in classrooms has transformed educational practices globally, accelerated notably by the COVID-19 pandemic. This study examines the impact of technology in colleges throughout Kathmandu, Nepal, focusing on both its benefits and challenges. Technology, including platforms like Google Classroom and educational apps, has significantly enhanced engagement and learning experiences for students, as highlighted by educators and learners surveyed. However, persistent challenges such as inadequate infrastructure, limited access to devices, and technical issues like unreliable internet connectivity hinder widespread adoption and effective use. Through a mixed-methods approach, utilizing surveys and narrative analysis, the article interprets experiences and insights from teachers and students and discusses themes that underscore the critical role of technology in improving educational access and quality in Nepal. Teachers express varying degrees of confidence and readiness in integrating technology, while students report increased engagement and improved learning outcomes facilitated by digital tools. The discussed results reflect on both the challenges and opportunities of technology in classrooms which suggest Policy recommendations, such as enhancing infrastructure investment, providing professional development for educators, and fostering digital literacy among students to bridge the digital divide and maximize the benefits of technology in education. This research contributes to understanding the nuanced dynamics of technology integration in a developing country context, offering insights for policymakers, educators, and stakeholders to optimize educational practices and ensure inclusive access to quality education in Kathmandu and beyond.

Keywords: technology, classrooms, colleges, digital, Google, education, Nepal

1. Introduction

By now, the integration of technology in classrooms has not been a nascent idea, although it was often overlooked in traditional educational settings. The landscape dramatically shifted, particularly in the wake of the COVID-19 pandemic, when schools worldwide swiftly adopted online teaching methods, leveraging various technologies and software. This global transition not only underscored technology's potential, but also accelerated its adoption in education, marking a significant paradigm shift. Even before the pandemic, technologies like PowerPoint, YouTube, and learning management systems such as Blackboard and Canvas had begun reshaping educational practices. However, in the developing countries like Nepal, the use of technology was minimally introduced, that too only in urban areas which have access to computers and internet, let alone the learning management systems such as Blackboard and Canvas which have been highly practiced in developed countries like the United States of America. However, Google became a widely used free platform for education. In the context of using technology and LMS (Learning Management Systems) platforms for classrooms of Nepal, teachers have very little experiences and, therefore, are less aware of their usefulness for the efficacy of teaching. Cox and Wcislo (2023) writes, "The platform offers a comprehensive set of features for virtual classrooms, simplifying teaching and learning. Teachers can create classes, communicate, share resources, and manage assignments" (28). In the context of America, those who teach online classes using LMS platforms must undergo training before they start teaching any online course. On that note, one of the researchers has also taken these online training courses multiple times. Such training seems to be a far cry from reality in the context of Nepal.

Originally from Nepal, having been an educator in America for the last fifteen years, it is interesting to discuss the impact of technology in Nepali classrooms with the knowledge of American classrooms. Until 2008, when one of the researchers was still teaching at colleges in Nepal, educators had hardly any knowledge of how technology could work in classrooms. They had rare access to computers, let alone the integration of technology into their teaching. Later, they started using PowerPoint and projectors to present content in classrooms. The COVID-19 pandemic changed the scenario dramatically when they ended up teaching many classes remotely, as modern gadgets and technologies became more frequently available, especially in urban areas.

In the era of artificial intelligence, the role of technology in education remains pivotal, especially in the classroom where ideas are shared and discussed (Wang and Zhang, 2022). Advocates emphasize its capacity to enhance teaching effectiveness and student engagement, offering new dimensions to learning experiences. Even the experiments on whether or not technology helps in classroom show positive results, reflecting on the students' needs that were met by technology-assisted classroom guidance program (Li and Walsh, 2023; Al-Sharhan, and et al, 2016; Mims-Word, 2012). However, debates persist regarding the optimal balance between technological tools and traditional pedagogical approaches. Some even discuss technology as a substitute for the teacher and not transformative of teaching and learning (Sargent & Calderón, 2022). This paper delves into these discussions, examining how educators and learners perceive the benefits and challenges of integrating technology in classrooms in the context of colleges of Kathmandu, Nepal and analyze the effectiveness and reliability of the results.

1.1 Problem Statement

The ongoing discourse revolves around effectively integrating technology into educational frameworks. While proponents advocate for its indispensable role in modern education, skeptics caution against over-reliance, highlighting potential drawbacks, such as technology failing to maintain traditional teaching pedagogy or the possibility of just replacing a teacher instead of bringing a transformative change in teaching and learning. However, there are a lot of research on the importance and significance of technology that provide benefits to the world of education (Couch and Towne, 2018; Al-Taai and Others, 2023; Moraes and others, 2022; Garlinska and others, 2023; Alharbi, 2023). Understanding these dynamics is crucial for devising strategies that harness technology's full potential while addressing associated concerns, ensuring its effective integration into educational settings.

1.2 Significance of the Study

The significance of this study lies in its exploration of technology's impact on teaching and learning within the specific context of Kathmandu, Nepal. In a country grappling with educational challenges exacerbated by geographic and socio-economic factors, technology presents a promising avenue to enhance educational access, quality, and inclusivity. By examining perspectives from local colleges, this research aims to provide insights into how technology can be leveraged to bridge educational gaps, empower educators, and equip students for a digitally-driven future, along with its challenges and lessons one can learn and can also be reflected in other settings and contexts that will be useful for comparative analysis.

2. Literature Review

Teaching online or using technology has been a practice since 20th century (Tuia and Esera, 2023). This practice even emerged vehemently during the Covid 19 and after it. In technologically advanced countries, institutions, teachers, and parents collaborated to provide digital learning resources (Kiryakova and Kozhuharova, 2024; Gilbert, 2015). Online learning has benefited both developed and developing nations, with the potential to enhance education in less developed nations during the COVID-19 pandemic and after. However, many developing nations still lack sufficient resources and access to adequate technology. In the context of Samoan people, Tuia and Esera (2023) writes, "Covid-19 brought to the fore the need for teachers and students to understand and exploit educational technology for teaching and learning (p.74).

According to Gause and others (2022), the increasing availability of technological devices, such as portable digital assistants, continues to transform the teaching-learning landscape, including technology-supported learning. These devices have become integral to modern education. Cloud computing services like YouTube, Google Apps, Dropbox, and Twitter are now essential tools in teaching and learning, significantly enhancing higher education, including nursing education. Their research shows the benefits of technology use in classrooms. Even people with different kinds of disabilities will benefit from the use of technology (Ahlin and Hiddinga, 2023). Visser and others writes, "For most people, technology makes things easier. For people with disabilities, technology makes things possible" (12).

The significance of technology in developing countries like Nepal is even higher than other developed countries which are advanced in technology (Lim and others, 2020). In Nepal, a country landlocked in the Himalayan Mountain Range and still recovering from a decade-long conflict and a devastating 2015 earthquake, technology in classrooms can address significant educational challenges. With a primarily agriculture-based economy heavily reliant on foreign aid and remittances, Nepal faces obstacles in human development, especially in ensuring universal access to and completion of primary education. High illiteracy rates, low secondary education performance, and limited access to higher education, particularly for marginalized groups, underscore the need for innovative solutions (Lim and others, 2020). Technology can enhance educational access and quality, bridge gaps for students in remote areas, and support teachers with professional development. It can also promote inclusivity, address gender disparities, and link education with income generation opportunities, thus improving employability and economic prospects. By integrating technology into education, developing countries like Nepal can significantly improve education equity, quality, and efficiency, fostering social and economic development. Regarding the demographics of students, one can see the importance and challenge of technology use in classrooms. Demography and literacy rates of people affect the use of technology in the classroom. Staddon (2020) discusses age differences in technology use and attitudes and the knowledge of technology use.

Technology not only enhances students' learning and achievement levels (Cripps, 2020; Pratiwi et al., 2021a) but also facilitates a shift in language pedagogy from teacher-centered to student-centered approaches (Boulus Shehata and others, 2023; Acharya, 2022; Mahmud, 2018). Additionally, it empowers foreign language learners by providing opportunities for independent learning outside the classroom through various programs, websites, videos, online lectures, and e-books (Ahmed et al., 2020; Ubaedillah & Pratiwi, 2021). Digital technology is recognized as a potent tool for promoting autonomous learning, enabling teachers to act as facilitators in the classroom (Ling et al., 2020; Sadaghian & Marandi, 2021). Learners are encouraged to take responsibility for their learning, actively engage in learning contexts and methods, and assess their progress (Choi & Lee, 2020). Moreover, students collaborate to connect new ideas with prior knowledge, utilize language as a tool for learning, and develop both language proficiency and critical thinking skills (Tseng & Huh, 2019). The use of technology is equally important for the equalitarian society. In the context of developed countries, what Mims-Word (2012) wrote 2012 still resonates relevant:

Educational leaders must be aware that gender equity among middle school students with respect to the use of computer technology should be grounded in the development of programs that not only address the educational aspect of schools, but also allow students to develop their appreciation for, and understanding of the interrelationship among computer usage, careers, and values (p.271).

According to Mims-Word (2012), "with the implementation of such programs, schools could operate as equalizers for the sexes regarding computer competency and attitudes" (p.271). Jacobs (2023) and Mirazchiyski and Černe (2023) also reinforce this idea of how technology help form the equalitarian society.

3. Data Collection Method

In this study, a mixed-methods approach was employed to investigate the impact of technology use in classrooms. Primary data collection involved distributing an informal survey via Google Survey forms. The survey was designed with both multiple-choice and open-ended questions, targeting educators and students in selected colleges across Kathmandu, Nepal. Six colleges were selected, especially from the Arts and Humanities areas that the researchers had their academic backgrounds from, including five teachers and ten students from each college. Colleges were chosen based on their reputation in the capital city. Participants were invited to respond voluntarily, ensuring anonymity and confidentiality. The survey garnered responses from a diverse sample of educators and students within a defined timeframe. This mixed-methods approach facilitated a nuanced exploration of the perceptions, challenges, and benefits associated with technology use in classrooms in Kathmandu, Nepal. By triangulating perspectives from primary survey data and synthesizing insights from secondary sources, this study aims to provide valuable recommendations for enhancing educational practices and policies in the region.

3.1 Limitations

While this study leveraged Google form for data collection, it encountered several limitations. The primary data collection method, while valuable in capturing diverse perspectives through online surveys, relies on respondents' accessibility and willingness to engage via digital platforms. The small sample size of responses may not fully reflect the breadth of experiences among the technology users in classrooms in Nepal, thus limiting the generalizability of findings. Also, the respondents were mostly from the Arts and Humanities areas, it might not holistically represent the perspectives of students and teachers from diverse academic areas. However, the study also possesses strengths in its

approach. It draws insights from educators and students from a few reputed colleges in Kathmandu. The study aims to offer comprehensive insights into the importance and challenges of technology use in classrooms and inform future policy considerations.

3.2 Data Analysis

The collected data underwent narrative analysis, utilizing methods outlined by Creswell (2007) and Czarniawska (2004). This qualitative approach involved categorizing and coding data into emergent themes, facilitating an interpretative analysis. Narrative analysis is instrumental in qualitative research as it elucidates implicit meanings within personal narratives, offering alternative perspectives that can inform policymaking decisions (Feldman et al., 2004; Miller, 2012).

By examining cultural and social biases through narrative analysis, the study aimed to uncover underlying issues that existing policies might overlook. This methodological choice prioritizes personal narratives and experiences, allowing respondents — such as those of technology users in classrooms —to influence policy discourse effectively (Acharya, 2019). The emphasis on personal stories/experiences provides depth and authenticity, crucial for understanding lived experiences beyond quantitative metrics (Carbado et al., 2003; Bruner, 1991).

In summary, narrative analysis served as a robust tool in this study, enabling a nuanced exploration of technology users' experiences and perspectives in Nepal. This methodological approach not only enriches our understanding of the importance and challenges of technology use in classrooms, but also underscores the importance of users' experiences in shaping policies.

4. Discussions

In this section, I have analyzed data collected from both educators and the students. The data are their narratives and experiences regarding the use of technology in classrooms and its impact. I have garnered the perspectives from both teachers and students and discussed them here.

4.1 Technology Use in Classroom (Teachers' Perspectives)

Based on the report, here is a chart to discuss in the following paragraphs.

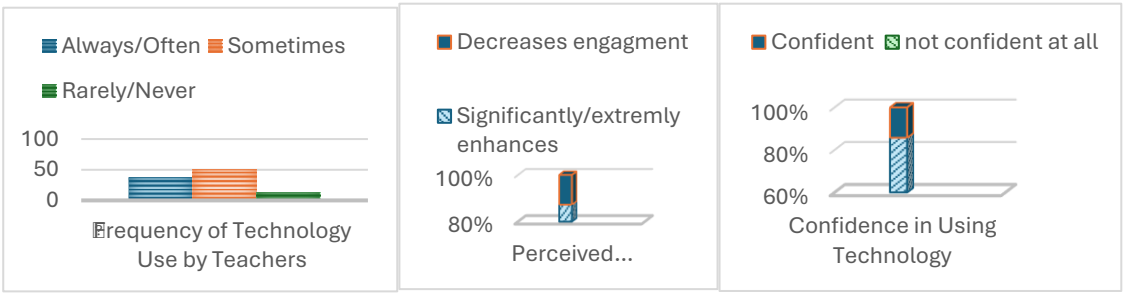

Figure 1.

Most of the teacher respondents use technology frequently in their classrooms, with a significant number indicating they use it "Always" or "Often" (37.5%). However, there is still a notable percentage (12.5%) who never use technology. This could be due to some colleges that lack sufficient technological infrastructure, or because the teachers are unable to adapt to and familiarize themselves with modern technology.

Those who use these tools mostly rely on computers/laptops and interactive whiteboards as the most frequently used technologies in classrooms. Tablets and smartphones are used to a lesser extent, while educational software/apps are the least used. This indicates that the colleges have yet to develop or implement educational software for classroom use. Unlike the education system in the US, where software like Desire2Learn, Canvas, and Blackboard are frequently used, such software seems to be a distant reality even in the advanced urban areas of Nepal like Kathmandu.

However, the majority of respondents (teachers) (85.7%) believe that technology significantly or extremely enhances the learning experience for students. They agree with the positive impact technology has had on students' lives. Additionally, 87.5% of the respondents agreed that technology increases engagement in class, with only a small fraction (12.5%) observing decreased engagement. This lack of engagement might be due to some teachers not being

tech-savvy or unwilling to move away from traditional teaching approaches that do not involve technology. This also reflects their confidence in using technology; 75% of the respondents feel very confident in their ability to integrate technology into their teaching practices, although some (12.5%) lack confidence entirely.

Despite this, the majority find it challenging to incorporate technology due to issues like inadequate infrastructure, student preparedness, and technical problems. Some of the challenges mentioned include lack of easy access to technology, electricity issues, lack of good devices, poorly equipped digital classrooms, and insufficient internet connection. Additionally, students' lack of laptops and other learning materials, poor internet connectivity, and the heat produced by digital whiteboards were cited as issues. This reflects on the broader issues of poverty and insufficient funding for infrastructure.

Most of the teachers agree with the idea that there is a positive impact of technology on classroom dynamics. One of them responds:

I believe technology can help better engage with students. For example, if you are giving lectures only, their focus would divert. While, if you present the same material in PPT slides, you can engage students with the text or the contents of the slides, and the slides would also be helpful for those who miss the class. Also, that would help students understand and encourage them to ask questions. (One of the respondents' responses on the Google form)

This shows that the respondents have acknowledged the positive effect of using technology in the classroom. Many of them reflect on the idea that technology has made traditional teaching methods irrelevant and the classroom environment more interactive. It helps in better engagement and interaction, enhances teaching effectiveness and student engagement, and revolutionizes the classroom by offering new learning opportunities.

Regarding how the learning experiences have been enhanced, for example, one of the respondents says, "For example, Mendeley (for referencing) has substantially reduced my time to citations and references" (one of the responses on the Google form). Some of the technologies they have introduced and used in the classroom, which they found useful, include Mendeley for referencing, audio-visual learning methods, PPT slides, interactive multimedia presentations, and smart boards. These specific examples show how technology enhances student learning by making lessons more interactive, visual, and accessible.

Thus, the influence of technology on academic performance is realized by most of the respondents. One of them says, "By using technology, students can perform better within shorter time. It helps like life hacks." Many of them share the common belief that technology positively influences students' academic performance by enhancing engagement, providing resources, and improving efficiency. Similarly, another respondent states similar ideas emphasizing the positive impact of technology in classrooms. They say, "Use of technology significantly influences students' academic performance by providing access to a vast array of resources. It enables interactive learning, fosters collaboration, enhances engagement, allows for personalized learning experiences, and improves efficiency in research and assignments" (a response on the Google form).

Thus, there is no room for disagreement against the idea that technology has helped students access information and make learning more interactive, collaborative, and effective. Some teachers even use strategies for equitable access to technology. One of them responds.

As a teacher, I try to ensure equitable access to technology by integrating a mix of online and offline resources and arranging for shared devices when necessary. I also provide some training sessions to help all students become proficient in using technological tools, regardless of their prior experience.

Despite a few dissenting respondents, the majority highlighted different strategies as important factors for equitable access to technology, such as utilizing college labs, integrating online and offline resources, providing shared devices and training sessions, and encouraging digital literacy and peer support. Their responses reflect the idea that without these strategies, the integration of technology alone wouldn't be effective. To assess the effectiveness of technology integration, various factors come into play, according to them, such as assigning homework and projects, asking questions, observing student confidence, and articulating specific learning outcomes. Therefore, the majority agree with the use of technology and its positive impact in the classroom, but they emphasize that it should be aligned with different strategies and preparedness.

One of the respondents concludes, "The digital divide between tech-savvy and tech-afraid teachers as well as students in urban centers versus those in rural areas highlights the need for targeted training and resources to bridge gaps. Ensuring access to technology and digital literacy is crucial for creating balanced and inclusive teaching-learning practices."

This highlights the gap in the use of technology between rural and urban areas, which is determined by the availability of infrastructure and people's socio-economic and geographical conditions. However, there is another opinion that contrasts with the majority, stating, "Technology should not be made the central focus of teaching and learning. It is just an assistant."

Overall, the responses from the teachers show that the role of technology in the classroom is multifaceted and continuously evolving. It has enhanced the teaching-learning process, promoted collaboration and communication, and fostered creativity and innovation. Respondents recognize the evolving role of technology in education and emphasize the need for inclusive access and balanced integration with traditional methods.

4.2 Impact of Technology in Classroom (Students' Perspectives)

Here we have a bar diagram to represent the report that will be discussed and analyzed in the following paragraphs:

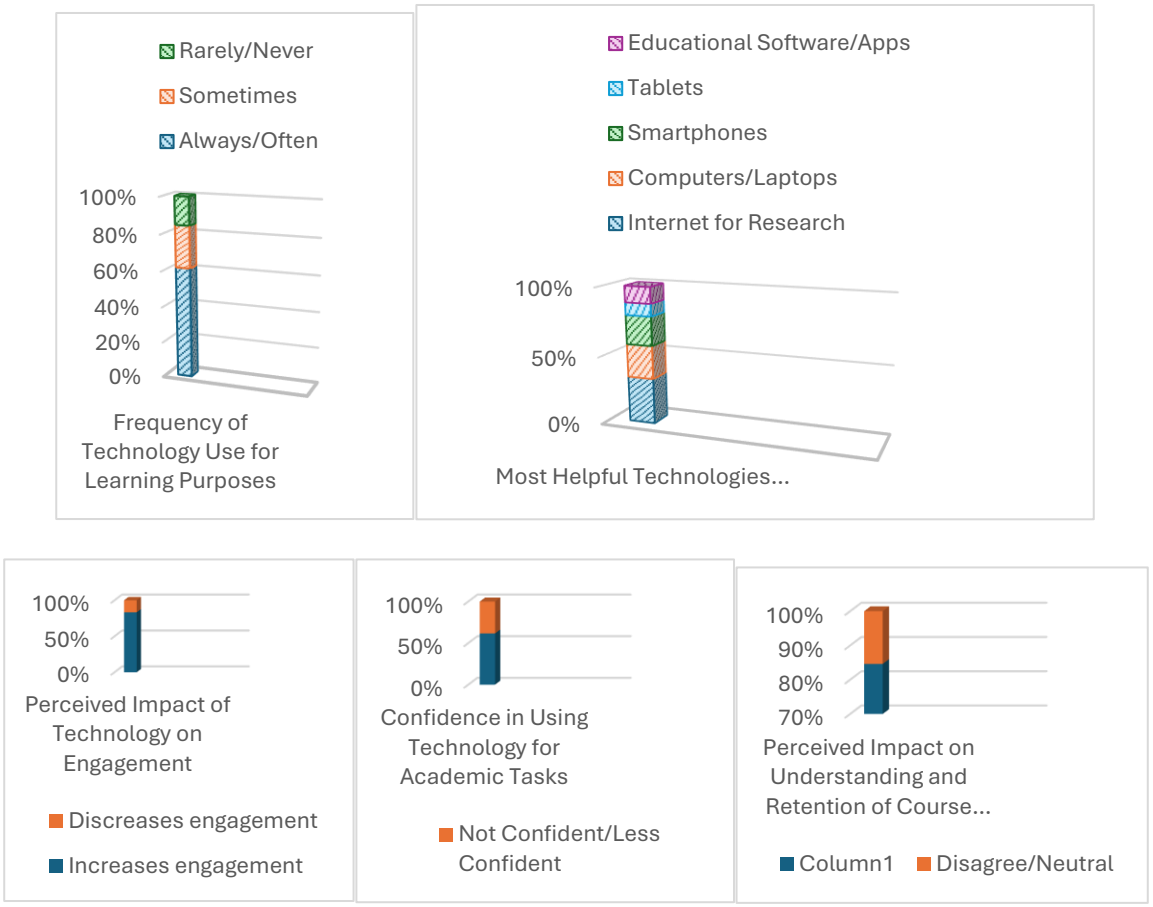

Figure 2.

According to the report, most students (61.5%) always use technology for learning purposes outside the classroom, indicating a high dependency on technological tools for their studies. Only a small fraction (15.4%) rarely or sometimes use technology, showing that most students find it beneficial and integral to their learning process. Some of those who don't use technology could lack access because either the colleges do not have sufficient infrastructure, or the students cannot afford to own one for themselves, or they are not trained about using technology.

Among the students, the internet for research is deemed the most helpful technology by 84.6% of the students, emphasizing the importance of access to online resources. Computers/laptops and smartphones are also significant, while tablets and other educational software/apps are less favored (23% and 30%, respectively), suggesting a preference for more versatile and multipurpose devices and easy access, for example smart phones which commonly used by young students.

The use of technology and its impact on the students is positive. Most students (83.3%) believe that technology increases their engagement in classroom activities. This indicates that technology integration can make learning more interactive and engaging, thus enhancing the overall educational experience.

Unlike the older generation, many students feel confident using technology for academic tasks, with 61.6% expressing high levels of confidence (very confident and extremely confident). This confidence is crucial for effective use of technology in learning. However, around 49% are less confident. This significant number of students who are not very confident about using technology in the classroom highlights the need for training in technology use and making technology accessible and familiar to them. Nonetheless, most students (84.6%) agree or strongly agree that technology helps them better understand and retain course material, showcasing the positive impact of technology on learning outcomes. One of the students responds:

One specific instance where technology has positively impacted my learning experience in the classroom was when we used an online collaboration tool to work on a group project. We were able to easily share and edit documents, communicate in real-time through chat, and even have video conferences to discuss our progress. It made the whole process more efficient and allowed us to work together seamlessly, even if we weren't physically in the same location. Plus, it was really fun to see everyone's contributions come together in one place. (One of the students' responses on the Google form)

Another student shared the similar response:

One specific instance where technology has really helped me in the classroom is when we started using interactive online simulations for research experiments. These simulations allowed me to conduct experiments virtually, which was super helpful, especially when we couldn't access the information by going outside to research. They made complex concepts more understandable and engaging. Plus, I could repeat the experiments as many times as I needed to really grasp the concepts. It definitely made learning research more interactive and fun for me.

Most of the students provided various examples, such as using online collaboration tools for group projects, educational apps like Mendeley for research, and motivational videos. These examples highlight how technology facilitates collaboration, research, and personal development. However, one student raised concerns about the quality of education at their college, indicating a lack of resources and technology. They wrote:

I'm not happy with the education except for the English classes. The education is the worst; I don't see any worth in attending those classes. The teachers themselves need training and should realize that college plays a crucial role in shaping the future of students. It's where we gain knowledge, skills, and experiences that set us up for success in our careers and lives. It's important for colleges to prioritize providing quality education and guidance to ensure a bright future for all students. They don't know how to use technology. I feel like teachers are not qualified for higher secondary level. The teachers should be changed as soon as possible, considering today's generation's point of view. Otherwise, most students will have to sacrifice their dreams. (One of the responses on the Google form).

This raises an important question about the quality of education, inviting the concerned authorities to investigate and reform the institution, and not only integrating technology in classrooms, but also giving enough training and providing other opportunities of professional development for teachers.

Regarding the challenges of using technology, many of the students had similar thoughts. These challenges include technical issues like slow internet and software glitches, distractions from other apps or websites, and inadequate internet facilities. One of the students responds:

Sometimes, using technology for learning can come with its own set of challenges. One common challenge is technical issues like slow internet or software glitches that can disrupt the learning flow. Another challenge is the temptation to get distracted by other apps or websites while using technology for learning. It's important to stay focused and create a conducive learning environment, whether it's in the classroom or at home.

These challenges suggest areas where improvements can be made to enhance the efficacy of technology in education. With that said, many of them suggest ways to improve technology in the classroom. One of the students responds, "I think technology in the classroom could be improved by providing more interactive learning tools." Their suggestions include providing more interactive learning tools, improving internet facilities, balancing traditional and technological teaching methods, and increasing access to educational resources. The student respondents do not ignore the skills and knowledge they have gained through technology use in the classroom. One of them responds:

In my opinion, some of the most important skills and knowledge I've gained through the use of technology in education are improved digital literacy, the ability to access a vast amount of information quickly and enhanced

critical thinking and problem-solving skills. Technology has also helped me develop collaboration and communication skills through online platforms and tools. Overall, technology has opened new opportunities for learning and has equipped me with valuable skills for the digital age.

Reflecting on the narratives of the students and even teachers, it is inferred that the technology in classrooms helps develop the students' collaboration and communication skills. However, a small majority of the students demonstrated a lack of knowledge because they were not tech-savvy and not very aware of technology use in the classroom. They said, "I am in a learning phase, so at this time I do not have proper knowledge in any skill, but I am learning about coding, writing, etc."

Overall, students mentioned improved digital literacy, enhanced research abilities, better critical thinking, and collaboration skills. This shows that technology has played a significant role in equipping students with essential skills for the digital age. At the same time, the students also emphasize the balance between traditional teaching and technology-enhanced learning. This shows that only relying on technology will not bring positive results in the classroom. In that context, one of the respondents says:

I think it's important to find a balance between traditional teaching methods and technology-enhanced learning. While lectures can provide a solid foundation of knowledge, technology can make learning more interactive and engaging. It's all about finding the right mix that caters to different learning styles and maximizes our learning potential.

The majority of the students suggest a blend of traditional teaching methods and technology-enhanced learning since such blend can offer a well-rounded educational experience, catering to various learning styles and fostering engagement and understanding. They say it is "moderately good." They recognize the value of both approaches and suggest that a well-rounded educational experience can be achieved by integrating both.

From their responses, it can be inferred that technology has played a huge role in shaping students' education. It has made learning more accessible, interactive, and engaging. From online resources to virtual simulations, technology has expanded the possibilities of what one can learn and how one can learn it. It has also helped develop important skills like digital literacy, collaboration, and critical thinking. Overall, technology has truly transformed the way students learn and has opened a world of opportunities for them. Students acknowledge the transformative role of technology in education, emphasizing its benefits in making learning more accessible, interactive, and engaging. However, some express concerns about the over-reliance on technology and the need for proper guidance in using it effectively.

The survey results indicate a positive reception of technology among students in Kathmandu colleges. While there are challenges to address, the overall impact of technology on learning is beneficial, promoting engagement, confidence, and essential skills development. The reports show that balancing traditional and technological teaching methods and addressing technical issues can further enhance the educational experience.

4.3 Teachers vs. Students' Perspectives

Reflecting on the reports and narratives and perspectives from both teachers and students, there are very few and slight differences, but many ideas and insights are in common. We can discuss the differences in the following five themes as shown in the table below:

Table 1.

Frequency of Technology Use	Types of Technology Used	Perceived Impact on Engagement and Learning	Challenges Faced	Suggestions for Improvement
Teachers: A significant number use technology frequently ("Always" or "Often"), though 12.5% never use it due to lack of infrastructure or familiarity.	Teachers: Primarily use computers/laptops and interactive whiteboards. Tablets and smartphones are less common, with educational software/apps being the least used.	Teachers: 87.5% believe technology increases class engagement and 85.7% feel it enhances learning. Confidence in using technology is high (75%), though some lack confidence (12.5%).	Teachers: Struggle with inadequate infrastructure, student preparedness, and technical problems. Issues include lack of access to technology, electricity problems, and insufficient internet.	Teachers: Emphasize strategies for equitable access to technology, such as integrating online and offline resources, providing shared devices, and training sessions.
Students: The majority (61.5%) always use technology outside the classroom, indicating high dependency. A small fraction (15.4%) rarely or sometimes use technology, mainly due to lack of access.	Students: Internet for research is the most helpful technology (84.6%), followed by computers/laptops and smartphones. Tablets and educational apps are less favored.	Students: 83.3% feel technology increases engagement in classroom activities. High confidence levels in using technology (61.6%), though about 49% are less confident. Most (84.6%) agree that technology helps.	Students: Face technical issues like slow internet and software glitches, distractions from other apps, and inadequate internet facilities.	Students: Suggest more interactive learning tools, better internet facilities, balancing traditional and technological methods, and increasing access to educational resources.

4.4 Commonalities Between Teachers' and Students' Perspectives

Similarly, there are a few topics under which we can find many commonalities between the teachers and students' perspectives as shown in a Ven Diagram below.

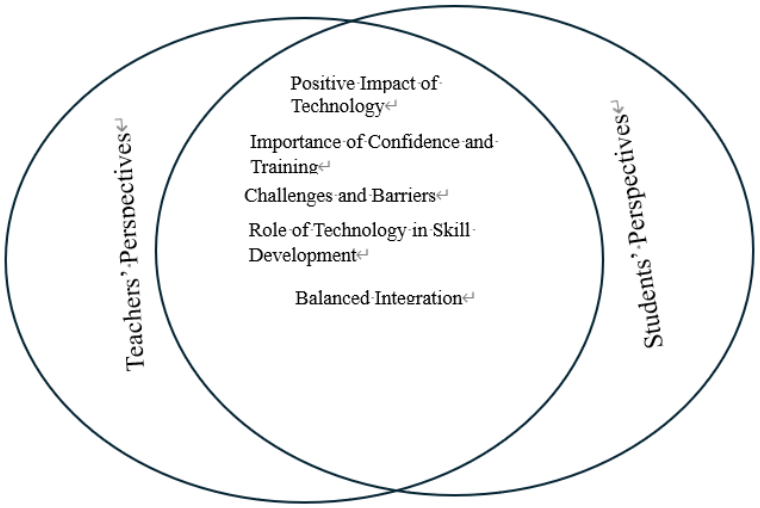

Figure 3.

4.4.1 Positive Impact of Technology

Both teachers and students acknowledge that technology has a significant positive impact on learning, engagement, and academic performance. It enhances the classroom environment, making it more interactive and engaging.

4.4.2 Importance of Confidence and Training

Both groups highlight the importance of confidence and familiarity with technology. While teachers focus on their ability to integrate technology into teaching, students emphasize the need for training to increase their confidence in using technology.

4.4.3 Challenges and Barriers

Both teachers and students recognize the challenges associated with technology use, including infrastructure issues, technical problems, and the need for better resources and support.

4.4.4 Balanced Integration

Both perspectives stress the need for a balanced integration of traditional teaching methods and technology-enhanced learning. They agree that technology should complement, not replace, traditional teaching practices.

4.4.5 Role of Technology in Skill Development

Both groups agree that technology plays a crucial role in developing important skills. Teachers see it as a tool for better engagement and interaction, while students note its role in improving digital literacy, collaboration, and critical thinking.

Teachers and students in Kathmandu colleges see technology as a beneficial tool that enhances learning and engagement. However, both groups face challenges such as infrastructure issues and the need for better training and resources. They agree that a balanced approach, integrating both traditional and technological methods, is essential for maximizing the benefits of technology in education.

5. Policy Recommendations and Discussions

In the discussion, results from previous research were added to strengthen the results found in this research (Couch and Towne, 2018; Al-Taai and Others, 2023; Moraes and others, 2022; Garlinska and others, 2023; Alharbi, 2023). Based on the analysis of teachers' and students' perspectives on the impact of technology in classrooms, several policies can be recommended to address the challenges and enhance the positive effects of technology in education. Here are some policy recommendations and their discussions:

(1) Infrastructure Improvement and Investment: Analyzing the experiences and perspective of both students and teachers, there is a need of investment in upgrading technological infrastructure in colleges, ensuring reliable internet connectivity, sufficient digital devices, and well-equipped digital classrooms. Many teachers and students face challenges related to inadequate infrastructure, such as poor internet connectivity and lack of access to technology. By improving these infrastructures, colleges can provide a conducive environment for effective technology integration. This policy would involve significant funding, but it is crucial for leveling the playing field, particularly in rural areas where infrastructure is typically weaker.

(2) Professional Development for Teachers: There is the need of implementation of ongoing professional development programs focused on technology integration, helping teachers become more confident and proficient in using digital tools in their teaching practices. While a majority of teachers feel confident in using technology, a notable percentage lack confidence. Professional development programs can bridge this gap, offering training on various educational technologies and effective teaching strategies. This can be complemented with peer support and mentorship programs where tech-savvy teachers assist their colleagues.

(3) Student Training and Support: There is the need of training sessions and workshops for students to improve their digital literacy and confidence in using technology for academic purposes. Although many students are confident in using technology, there is still a significant portion that feels less confident. Providing targeted training can help these students utilize technology effectively, enhancing their learning experience and academic performance. These sessions can cover basics like using educational software, internet research techniques, and safe internet practices.

(4) Development and Integration of Educational Software: There is the need to ecourage the development and integration of educational software and apps tailored to the curriculum needs of students in Nepal. The analysis shows a gap in the use of educational software and apps compared to countries like the US. Developing and integrating local educational software can provide students with additional resources to enhance their learning. This software can include interactive learning tools, virtual labs, and platforms for collaboration and communication.

(5) Equitable Access Strategies: One needs to implement strategies to ensure equitable access to technology, such as providing shared devices, creating technology lending programs, and ensuring all students have access to digital resources both on and off-campus. Both teachers and students highlight the need for equitable access to technology. Colleges can set up computer labs, lending programs for devices, and ensure that digital resources are accessible from home. These measures can help students who do not own personal devices and those from economically disadvantaged backgrounds.

(6) Blended Learning Approach: There should be the adoption of a blended learning approach that combines traditional teaching methods with technology-enhanced learning to cater to diverse learning styles and maximize educational outcomes. Both teachers and students recognize the importance of balancing traditional teaching methods with technology. A blended learning approach can offer the best of both worlds, ensuring that technology complements rather than replaces traditional teaching. This approach can be tailored to different subjects and learning objectives, making education more engaging and effective.

(7) Feedback and Continuous Improvement: There must be the establishment of a system for regular feedback from both teachers and students on the use of technology in classrooms to identify areas for improvement and ensure the continuous evolution of tech-enhanced education practices. Regular feedback mechanisms can help colleges stay updated on the effectiveness of their technology integration policies. This can involve surveys, focus groups, and suggestion boxes. Acting on this feedback can lead to continuous improvement, addressing emerging challenges and adapting to new technological advancements.

(8) Addressing the Digital Divide: One should implement targeted initiatives to bridge the digital divide between urban and rural areas, ensuring that all students have equal opportunities to benefit from technological advancements in education. The digital divide is a significant issue that needs addressing. Policies should focus on providing additional resources and support to rural areas, including infrastructure upgrades, training programs, and access to digital devices. Collaborations with government agencies, NGOs, and private sector partners can be crucial in implementing these initiatives effectively.

6. Conclusion

The analysis of teachers' and students' perspectives on the impact of technology in classrooms highlights the significant benefits and challenges associated with its use in education. Both groups recognize that technology enhances engagement, learning experiences, and academic performance, making classrooms more interactive and dynamic. These ideas reinforce the idea of how technology positively impact classroom activities, benefiting both teachers and students (Li and Walsh, 2023; Couch and Towne, 2018; Al-Taai and Others, 2023; Moraes and others, 2022). However, in the context of Nepal, issues such as inadequate infrastructure, lack of access to devices, technical problems, and disparities between urban and rural areas impede the effective integration of technology. To address these challenges, it is essential to invest in infrastructure, provide ongoing professional development for teachers, offer student training, develop educational software, ensure equitable access to digital resources, and adopt a balanced approach that integrates traditional and technological teaching methods. By implementing these policies, educational institutions in Nepal can maximize the benefits of technology, fostering a more inclusive and effective learning environment for all students.

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