Mathematics Teachers' Perception Towards Educational Technology Integration: Mahendra Ratna Campus Tahachal

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ABSTRACT: Integrating educational technology in mathematics education has emerged as a transformative force revolutionizing traditional teaching/ learning(T/L) practices. Understanding mathematics teachers' perceptions regarding technology integration is vital in fostering successful adoption and implementation in their T/L practice. Utilizing a structured questionnaire with Likert-scale items, the study gathered data on teachers' perceptions of technology's effectiveness and its impact on student learning outcomes. The findings revealed highly positive perceptions among mathematics teachers, with mean scores ranging from 3.73 to 4.33 and statistically significant p-values ($p < 0.05$). Moreover, the study found no significant differences in various perceptions based on gender, academic level, teaching experience, or level of teaching. The results emphasize the potential benefits of incorporating educational technology in mathematics education and provide valuable insights for stakeholders seeking to enhance mathematics learning experiences at Mahendra Ratna Campus and beyond.

Introduction

In the dynamic landscape of modern education, integrating educational technology has emerged as a transformative force, reshaping traditional teaching and learning methodologies across various disciplines (Stein & Sim Kwong, 2020). Integrating technology in mathematics education holds particular significance, promising to enhance student engagement, conceptual understanding, and problem-solving skills. However, the successful incorporation of educational technology in the mathematics classroom is contingent on the perceptions and attitudes of mathematics teachers who play a pivotal role in its implementation(Fernandes et al., 2020; Kihoza et al., 2016).

In recent years, the advancement of educational technology has offered mathematics educators diverse tools, such as interactive whiteboards, educational software, online platforms, and digital simulations, that cater to different learning styles and preferences(Borba et al., 2016; Condie & Munro, 2007). The potential benefits of technology integration in mathematics education are well-documented, including improved conceptual understanding, increased student engagement, and enhanced problem-solving skills(Barbetta, 2023; Dede,

2014). However, the successful adoption of educational technology is contingent on teachers' perceptions and attitudes toward these innovative resources.

Amidst this educational transformation, the perceptions and attitudes of mathematics teachers play a pivotal role in determining the successful adoption and integration of technology in the classroom. Understanding the perspectives of these educators is crucial as their beliefs, experiences, and preferences significantly influence the implementation of technology-driven pedagogies (Aslan & Zhu, 2015; Perienen, 2020; Yuan & Lee, 2012).

Numerous studies have explored mathematics teachers' perceptions and attitudes toward integrating educational technology in their classrooms. Kim et al. (2013)found that teachers' beliefs about the value of technology in mathematics instruction significantly influence their willingness to adopt and use technology tools effectively. Positive attitudes towards technology were associated with increased technology adoption in the teaching process.

Several studies have highlighted the potential benefits of integrating educational technology into mathematics education. For instance, Kutluca (2013)demonstrated that dynamic geometry software positively impacted students' problem-solving skills and geometric understanding. Similarly, Olive et al. (2010) emphasized the advantages of using digital tools to facilitate exploration, visualization, and mathematical reasoning.

Despite the potential benefits, challenges and barriers exist in integrating educational technology in mathematics classrooms. A study by Koehler et al. (2014) reported that insufficient access to technology resources and inadequate teacher training were primary obstacles faced by mathematics teachers. Additionally, resistance to change and concerns about the reliability of technology as a learning tool were identified as potential barriers(Ertmer et al., 2012). (Guskey & Yoon, 2009) emphasized the significance of ongoing professional development programs that address the specific needs of mathematics teachers. Effective training programs can enhance teachers' confidence in technology and improve teaching practices.

Several studies have investigated the impact of educational technology on student learning outcomes in mathematics. Integrating technology in mathematics instruction led to increased student engagement and improved problem-solving abilities(Costley, 2014; Serrano et al., 2019). Furthermore, a meta-analysis by Cheung and Slavin (2013)found that technology-assisted mathematics instruction positively affected student achievement.

Researchers have suggested various strategies to address the challenges and promote successful technology integration. Ottenbreit-Leftwich et al. (2010)emphasized the importance of aligning technology use with specific pedagogical goals and integrating technology as an organic curriculum component. Additionally, strong administrative support and a collaborative school culture have been identified as essential elements in promoting effective technology integration (Atman Uslu & Usluel, 2019; Seifu, 2020; Vongkulluksn et al., 2018; Yurtseven Avci et al., 2020).

Educational technology has emerged as a transformative force in modern education, revolutionizing teaching and learning practices across various subjects, including mathematics. Integrating educational technology in mathematics instruction promises to improve student engagement, conceptual understanding, and problem-solving skills. To successfully implement

technology in mathematics classrooms, it is crucial to understand the perceptions and attitudes of mathematics teachers toward its integration.

This quantitative research article investigates mathematics teachers' perceptions regarding integrating educational technology into their teaching practices. This study at Mahendra Ratna Campus, known for its commitment to academic excellence and innovative pedagogical approaches, provides a fertile ground for exploring the intersection of educational technology and mathematics education. By examining mathematics teachers' perceptions at this esteemed institution, this research aims to shed light on the current state of technology integration in mathematics classrooms in Nepal. The study aims to understand how mathematics teachers at the Campus perceive the use of technology, investigating their attitudes towards its adoption and assessing the impact on their teaching methods and student learning outcomes.

The all-embracing objective of this study was to identify the opportunities and challenges mathematics teachers perceive in incorporating technology into their instructional practices. Moreover, it seeks to offer evidence-based insights that can inform educational policymakers, administrators, and educators in crafting effective strategies to promote technology integration in mathematics education.

Theoretical Framework

The integration of educational technology in mathematics classrooms has become a focal point in education due to the advancing role of technology in society. This theoretical review of literature investigates mathematics teachers' perceptions regarding the use of educational technology, recognizing its importance in the effective incorporation of technology into mathematics education. The review explores three significant theoretical frameworks: the Technological Pedagogical Content Knowledge (TPACK) framework, the Diffusion of Innovation Theory, and the Constructivist Learning Theory, shedding light on how these frameworks shape teachers' attitudes and behaviors in integrating technology (Goh & Sigala, 2020; Shulman, 1987; Tan, 2016; Xyst, 2016; Yanuarto et al., 2021). Various factors influencing teachers' perceptions, including personal factors, professional development opportunities, classroom context, and institutional support, are identified.

The review acknowledges teachers' challenges when implementing technology in maths classrooms, such as concerns about traditional teaching methods and technical issues(Viberg et al., 2023). Lastly, it emphasizes the need for ongoing research to adapt to emerging technologies and assess the long-term impact of technology integration on student learning and teacher professional development. Understanding the multifaceted perceptions of mathematics teachers towards educational technology is crucial for successful integration, requiring collaboration between educators, researchers, and policymakers to navigate the evolving landscape of educational technology in mathematics education(Clark-Wilson et al., 2020; Gouseti et al., 2023).

Methods and Procedure

A cross-sectional survey was employed to gather data on mathematics teachers' perceptions of educational technology integration(Setia, 2016). A structured questionnaire was used to collect quantitative data from the participants. At various levels, the mathematics

teachers teaching at Mahendra Ratna Campus Tahachal, Kathmandu, Nepal, were selected as a sample for this study. The list of mathematics teachers had been obtained from the campus administration. A structured questionnaire was developed based on previous literature and relevant research and administered to gather quantitative data. The questionnaire included Likert-scale items, which enabled the respondents to rate their perceptions towards educational technology integration in mathematics instruction(Nemoto & Beglar, 2014). The data collection process took place over two weeks. The questionnaires were distributed to the all-mathematics teachers in sealed envelopes, accompanied by a cover letter explaining the purpose of the study and ensuring the confidentiality of their responses. The research tools were validated through expert consultation.

Once the data was collected, the responses were entered into a statistical software package for analysis. Descriptive statistics were used to summarize the participants' perceptions of educational technology integration. Mean scores and standard deviations were calculated to understand the level of mathematics teachers' perceptions. The quantitative data were analyzed using inferential statistical techniques such as t-tests and analysis of variance (ANOVA)(Liu & Wang, 2021; Rojewski et al., 2012). These analyses were employed to identify any significant differences in perceptions based on variables like gender, teaching experience, level of teaching, and academic level. The study acknowledged several limitations, such as the small sample size and the exclusive focus on one educational institution. The article discussed these limitations to contextualize the findings and provide scope for future research.

Results and Discussion

Teachers may hold a wide range of perspectives towards using ICT in teaching and learning, depending on their level of expertise, comfort utilizing technology, training opportunities, student demographics, and the particular setting in which they teach. Universities and campuses frequently play a significant role in resolving instructors' concerns and offering the necessary assistance and materials to enable their successful integration of ICT into their teaching methods(Kabariah & Adiyono, 2023; Xie et al., 2023).

Table 1: *Teachers' perceptions toward the use of ICT in teaching/learning activities*

Statements	Frequency	Mean	S.D.	t-value	P-value
ICT is an effective teaching tool	15	4.27	0.59	8.26	0.000
ICT enables me to reach my students more efficiently	15	4.00	0.75	5.12	0.000
ICT enables me to address different learning styles better	15	4.07	0.59	6.95	0.000
ICT enables me to provide more individualized feedback.	15	3.80	0.86	3.59	0.003
ICT enables me to address individual students' interests	15	3.73	0.88	3.21	0.006
ICT enables students to be more creative.	15	4.33	0.61	8.36	0.000

Source: Field survey, 2022

Table 1 displays the status of teachers' perception of ICT in teaching and learning. The data indicates that respondents' responses were significantly high in all statements, with mean scores ranging from 3.73 to 4.33 and standard deviations (SD) from 0.594 to 0.884. Moreover, the p-value was less than 0.05 for all statements, which shows a significant difference in the teachers' perception of the effectiveness of ICT in teaching and learning.

The highest mean score was observed for the statement "ICT is an effective teaching tool" (mean=4.27, SD=0.594), indicating that most teachers strongly agreed that ICT is a valuable tool for instructional delivery. The statement "ICT enables me to reach my students more efficiently" also received a high mean score (mean=4.00, SD=0.756), highlighting the positive perception of teachers towards using ICT for improved communication and engagement with students.

The results demonstrate that mathematics teachers at Mahendra Ratna Campus Tahachal favored using ICT in teaching and learning. The high mean scores and statistically significant p-values indicate that teachers believe in the effectiveness of ICT as a teaching tool and its potential to enhance various aspects of mathematics education.

The positive perception of teachers regarding ICT's effectiveness aligns with research findings in the broader context of educational technology integration. The use of technology in classrooms has been shown to foster student engagement, cater to diverse learning styles, and provide personalized feedback, as evident from the high mean scores for the corresponding statements.

Additionally, teachers expressed a positive outlook on ICT's impact on student creativity, as indicated by the high mean score for the statement "ICT enables students to be more creative." This result suggests that teachers acknowledge ICT's potential to promote student-driven learning experiences and enable students to explore and express their creativity through digital tools and platforms.

Table 2: *Perception of teachers on the use of ICT in teaching/learning activities with socio-demographic variables*

Variables	Variables	Frequency	Mean	SD	P-value
Gender	Male	13	4.00	0.58	
	Female	2	4.25	0.35	
	Total	15	4.03	0.56	0.577
Academic level	Masters	7	4.04	0.71	
	MPhil	4	3.87	0.36	
	PhD	4	4.16	0.49	
	Total	15	4.03	0.56	0.786
Teaching experience	Below 20 years	5	4.40	0.54	
	Equal or above 20 years	10	3.85	0.49	
	Total	15	4.03	0.56	0.071
Level of Teaching	Bachelor	8	4.12	0.65	
	Masters	7	3.92	0.46	
	Total	15	4.03	0.56	0.519

Source: Field survey, 2022

Furthermore, the discussion also explored the relationship between teachers' perceptions of the use of ICT and socio-demographic variables. Table 2 reveals no significant differences in teachers' perceptions based on gender, level of study, years of teaching experience, or level of teaching. These findings imply that teachers' perceptions of ICT integration in mathematics education remain consistent across different demographic categories.

The lack of significant differences based on socio-demographic variables underscores the universality of positive attitudes towards ICT integration in mathematics education at Mahendra Ratna Campus. This finding may suggest that regardless of gender, academic qualifications, years of teaching experience, or level of teaching, teachers recognize the benefits of using ICT to enhance their instructional practices and foster students learning.

Here, the research findings indicated a positive and uniform perception of mathematics teachers at Mahendra Ratna Campus Tahachal towards integrating ICT in teaching and learning. The results underscore the potential benefits of effective technology integration in mathematics education and offer valuable insights for educators, administrators, and policymakers seeking to leverage ICT to enhance teaching and learning experiences in the mathematics classroom.

Findings

The case study conducted at Campus provides valuable insights into mathematics teachers' perceptions regarding integrating educational technology into their teaching practices. The findings indicate a highly positive attitude towards using ICT in teaching and learning, as demonstrated by the significantly high mean scores and low standard deviations across all statements.

The results reveal that mathematics teachers perceive ICT as an effective teaching tool, enabling them to reach students more efficiently, address diverse learning styles, and provide individualized feedback. Teachers also acknowledge the potential of ICT to foster student creativity, promoting student-driven learning experiences.

The lack of significant differences in teachers' perceptions based on gender, academic qualifications, years of teaching experience, and the level of teaching further emphasizes the universal acceptance of technology as a valuable tool in enhancing mathematics education.

These research findings align with existing literature on educational technology integration in mathematics education, highlighting technology's potential benefits in improving student engagement, conceptual understanding, and problem-solving skills. It also emphasizes the importance of addressing challenges related to technology access, teacher training, and concerns about technology reliability.

These results show that Mahendra Ratna Campus Tahachal is making strides towards incorporating educational technology in mathematics classrooms effectively. The positive perception of teachers towards ICT integration bodes well for the future of mathematics education at the institution.

The study highlighted the importance of supporting and promoting educational technology integration in mathematics education. Continuous professional development for teachers and strategic planning for technology implementation is recommended to enhance technology integration efforts further. By fostering a positive attitude towards technology

adoption and providing adequate resources, Mahendra Ratna Campus can leverage educational technology to create engaging and effective mathematics learning experiences for its students. Furthermore, this research contributes to the growing knowledge of mathematics teachers' perception of educational technology integration. It provides evidence-based insights to inform educational practices and policies at Mahendra Ratna Campus and beyond. Further research in this area can contribute to exploring the impact of technology integration on student learning outcomes and teacher professional development to continually improve mathematics education practices in the digital era.

Conclusion

This article contributes valuable insights into mathematics teachers' perceptions of educational technology integration at Mahendra Ratna Campus Tahachal. Teachers' positive attitudes towards ICT integration underscore the potential benefits of leveraging technology to enhance mathematics education. By recognizing the significance of technology in teaching and learning, educators and administrators can collaboratively work towards creating innovative and engaging mathematics learning experiences for students on Campus and beyond. Further research in this area can explore the long-term impact of technology integration on student learning outcomes and provide continuous support for educators in their journey toward effective technology integration in mathematics education.

Acknowledgments

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