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Challenges of Integrating Digital Technology Based Teaching among Secondary School Teachers in Petaling Perdana

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Abstract

This study aims to identify the challenges faced by secondary school teachers in Petaling Perdana in integrating digital technology into their teaching. In the digital era, the integration of technology in education has become essential for enhancing learning effectiveness. However, teachers encounter various challenges, such as their readiness to adopt technology, the availability of digital infrastructure, and inadequate technical support from schools. Therefore, this study seeks to identify key issues and provide recommendations for improving the effective use of digital technology in teaching. Despite the growing use of technology in education, many teachers struggle to integrate it effectively into their teaching practices. The lack of professional training, time constraints, and insufficient school infrastructure are among the primary challenges. Hence, this study aims to understand the factors that hinder the effective use of technology. The objectives of this study are to identify the key challenges faced by secondary school teachers in using digital technology, analyse factors affecting its effectiveness in teaching, and propose improvement strategies to enhance technology integration in education. This study adopts a quantitative approach, with data collected through questionnaires distributed to secondary school teachers. Data analysis is conducted descriptively to identify the main challenges teachers face in using digital technology in their teaching. The findings reveal that the primary challenges include a lack of professional training related to technology, limited time to integrate technology into teaching, and inadequate school infrastructure. This study recommends that relevant stakeholders provide regular training, enhance digital infrastructure, and offer more effective technical support to assist teachers in utilizing digital technology.

Keywords: Digital Technology, Teacher Challenges, Professional Training, School Infrastructure, Technical Support, Teaching Effectiveness

Introduction

The use of digital technology in teaching has gained increasing attention; however, the level of acceptance and utilization among teachers varies, particularly when influenced by gender

factors. A study by Kusuma (2023) found that there are differences in technology integration between male and female trainee teachers in teaching English-speaking skills during the Covid-19 pandemic. Additionally, research by Teo (2023) indicated that teachers in Malaysia have shown a strong commitment to continuing the use of online teaching tools post-pandemic, reflecting a positive acceptance of technology. Teachers also face various challenges in integrating digital technology in schools, including skill limitations, administrative support, and the readiness of information technology infrastructure. According to a UNESCO (2021) report, 41% of teachers in Malaysia are over the age of 45, which may pose challenges in implementing educational technology in schools due to generational differences in technological proficiency. Furthermore, a study by Lo and Bity Salwana (2024) highlighted that school principals' technological leadership plays a crucial role in teachers' technology integration; however, the level of leadership effectiveness remains unsatisfactory. School support is essential in ensuring the successful integration of digital technology through quality training programs, technical assistance, and encouragement for teachers. The study by Lo and Bity Salwana (2024) emphasized that effective technological leadership by school principals can enhance technology integration among teachers. However, the extent to which this support can address the challenges faced by teachers remains unclear. Therefore, this study aims to analyse the level of acceptance and use of digital technology among teachers based on gender factors and examine the effectiveness of school support in helping them overcome these challenges. This study seeks to identify the challenges faced by secondary school teachers in integrating digital technology-based teaching. Specifically, it addresses the following key research questions:

1. Is there a significant difference between male and female teachers in facing the challenges of integrating digital technology-based teaching in secondary schools?
2. What types of challenges do male and female teachers encounter in their efforts to integrate digital technology into their teaching?
3. Does the level of acceptance and use of digital technology in teaching differ between male and female teachers in secondary schools?

In the context of this study, the tested hypothesis is that there is a significant relationship between teachers' gender and the challenges in integrating digital technology-based teaching. This relationship encompasses aspects such as teachers' readiness to adopt and use digital technology, the availability of supporting infrastructure, and the level of support from the school administration. Therefore, this study will evaluate whether male and female teachers face different challenges in integrating digital technology and how these factors influence their efforts to improve teaching quality.

Literature Review

The integration of digital technology in education has garnered increasing attention among researchers and policymakers. Despite its potential to enhance teaching effectiveness, secondary school teachers continue to face various challenges in its implementation. Factors such as teacher readiness, infrastructure availability, and school support play crucial roles in the effective use of digital technology in teaching. One aspect that remains underexplored in the literature is how gender influences these challenges, particularly among secondary school teachers.

Challenges in Teacher Readiness

Studies indicate that male and female teachers exhibit varying levels of confidence and skills in utilizing digital technology. Research by Poobalan & Mahmud (2022) suggests that a teacher's effectiveness in managing teaching and learning can be influenced by gender. A study by Tou (2020) found that male teachers have a higher readiness level towards information and communication technology (ICT) compared to female teachers, particularly in the field of Physical Education. According to Nindya Hapsari, Zaenal Abidin and Asep Ginanjar Arip (2022), male teachers are more confident in understanding and applying technological knowledge in their pedagogy. Similarly, Noor Desiro and Hazrati (2020), discovered that the level of technological knowledge regarding digital learning platforms like Google Classroom is higher among male teachers in rural schools. This suggests that gender may play a role in the level of confidence and technological skills in teaching.However, some studies indicate that female teachers are more inclined to use digital technology for student-oriented pedagogical purposes. Research by Selwyn et al. (2018) found that female teachers more frequently utilize digital technology for collaboration and student-centred learning compared to male teachers. This implies that gender differences not only affect confidence levels but also influence how technology is employed in teaching.

Challenges in Infrastructure Availability

The availability of digital technology infrastructure, such as computers, communication equipment, and stable internet access, is critical to ensuring the effectiveness of technology-based teaching. However, studies indicate that challenges regarding infrastructure readiness persist in educational institutions. Adeoye (2023) found that male teachers are more likely to own digital devices such as laptops compared to female teachers. Key factors influencing the use of digital technology in STEAM teaching include lack of school support, limited time, and insufficient internet access. Research by Rachman and Azam (2021) also shows that limitations in digital infrastructure facilities are a major barrier to the implementation of distance education. Munusamy and Jamaludin (2022) emphasize that the high cost of providing digital technology makes it difficult for schools to supply adequate equipment, such as computers and interactive screens. Existing equipment often experiences malfunctions and takes a long time to be serviced, causing disruptions in the teaching and learning process. A study by Lubis and Wan Hassan (2017) shows that multimedia-assisted teaching depends on the completeness of the school's infrastructure. Unstable internet access is also a major challenge. Mohd Nor et al. (2019) assert that high-speed internet access is a basic requirement for teachers to integrate digital technology into their teaching. Goliong et al. (2020) add that there are still rural areas without good communication network facilities, making it difficult for teachers in remote areas to effectively implement digital learning. This issue is also discussed by Thannimalai and Baloh (2021), who found that teachers in rural areas face more difficulties in conducting online teaching compared to their urban counterparts

Challenges in School Support

School leadership plays a pivotal role in ensuring the successful integration of digital technology into teaching practices. Research by Yasnain & Mohamad Khalid (2019) indicates that school leadership should inspire and encourage teachers to use technology effectively. However, Vinathan (2016) found that an unclear curriculum regarding technology use in teaching can be a barrier for teachers, regardless of gender. According to Tahir (2010), the

role of headmasters in providing digital technology infrastructure in schools is at a moderate level, suggesting that efforts to enhance digital technology integration need to be intensified. Esplin, Stewart and Thurston (2019) discovered that some principals are not yet fully prepared to enhance their technological competencies in school management. The technological leadership attitude of school management also influences the level of technology use among teachers. Ugur and Koc (2019) assert that visionary leadership can empower school organizations to implement 21st-century teaching more effectively. Therefore, equitable support for all teachers, regardless of gender, is essential to ensure the successful integration of digital technology in education. Overall, previous studies show that challenges in integrating digital technology into education are influenced by various factors, including teacher gender, technological readiness, infrastructure availability, and school support. Differences in confidence and technological skills between male and female teachers can affect the effectiveness of technology-based teaching. Therefore, more research is needed to understand more deeply how gender factors influence these challenges and to develop more effective strategies to address emerging issues.

Conceptual Framework

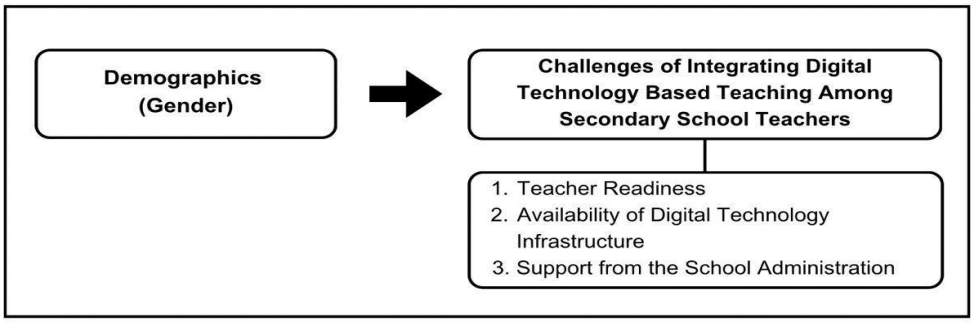

Figure 1: The Conceptual Framework illustrates the relationship between gender and the challenges of integrating digital technology-based teaching among secondary school teachers in the Petaling Perdana

Research Methodology

This study employs a survey method to collect data on the challenges related to teachers' readiness, the availability of digital technology infrastructure, and school support for the integration of digital technology-based teaching among secondary school teachers in the Petaling Perdana. The questionnaire, developed using Google Forms, was distributed exclusively to teachers teaching in secondary schools within the Petaling Perdana. The research instrument utilizes a five-point Likert scale (1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree) to measure respondents' perceptions. The collected data were analysed descriptively using percentages, mean scores, standard deviations, and the non-parametric Mann-Whitney U test. The interpretation of mean scores in this study was adapted from Nunally and Bernstein (1994).

Table 1
Interpretation of Mean Scores

Mean Score	Interpretation of Mean Scores
1.00 – 2.00	Low
2.01 – 3.00	Moderately Low
3.01 – 4.00	Moderately High
4.01 – 5.00	High

Table 1 presents the classification of mean scores based on a specific interpretation. Mean scores ranging from 1.00 to 2.00 are categorized as "Low", while scores between 2.01 and 3.00 are considered "Moderately Low". Subsequently, scores within the range of 3.01 to 4.00 are interpreted as "Moderately High". Mean scores falling between 4.01 and 5.00 are classified as "High". This interpretation aids in understanding the level of achievement or assessment in the study on the challenges of integrating digital technology-based teaching among teachers based on gender demographics in secondary schools within the Petaling Perdana.

Research Findings

A total of 52 respondents participated in this survey, with 23% (12 individuals) being male teachers and 77% (40 individuals) being female teachers. The findings of this study are as follows:

The study revealed that teachers face various challenges in their readiness to integrate digital technology into their teaching practices. Table 2 shows that 53.8% of teachers feel uncomfortable using traditional methods compared to digital technology (Mean=3.23, SD=1.14), indicating the need to adapt to modern teaching methods. Nearly half (48%) believe that using digital technology increases their workload (Mean=3.54, SD=1.33), which may hinder motivation for integrating digital technology into their teaching. A significant 90.4% of teachers acknowledge the importance of digital technology skills for integration into teaching (Mean=4.06, SD=0.697), yet 53.9% admit to experiencing difficulties in incorporating this technology into their classrooms (Mean=3.75, SD=1.31). Additionally, 53.9% of teachers struggle with skills related to using digital technology tools (Mean=3.58, SD=1.22). Furthermore, 50% of teachers feel unskilled in preparing digital learning materials, such as videos, teaching slides, and interactive instructional content (Mean=3.52, SD=1.31). While 78.9% of teachers believe that digital technology enhances teaching effectiveness (Mean=4.15, SD=0.946), 78.8% consider integrating technology into the curriculum a significant challenge (Mean=3.96, SD=0.904). Experienced teachers tend to be less prepared to use digital technology compared to new teachers, with 80.8% agreeing with this statement (Mean=4.08, SD=1.00).

Table 2
Challenges in Teacher Readiness

No.	Item	SD	D	N	A	SA	Mean	SD
1	I am more comfortable practicing teaching using traditional methods rather than integrating Digital Technology	5.8%	28.8%	11.5%	44.2%	9.6%	3.23	1.14
2	The use of Digital Technology in teaching increases my workload.	11.5%	26.9%	13.5%	28.8%	19.2%	3.54	1.33
3	Digital Technology skills influence the integration of technology-based teaching among teachers in schools.	-	5.8%	3.8%	69.2%	21.2%	4.06	.697
4	I find it very difficult to integrate Digital Technology into my teaching.	7.7%	30.8%	7.7%	32.7%	21.2%	3.75	1.31
5	I face difficulties in terms of skills to use Digital Technology tools in my teaching.	5.8%	34.6%	5.8%	40.4%	13.5%	3.58	1.22
6	The level of awareness regarding the use of Digital Technology to enhance teaching and learning effectiveness is low among teachers in schools.	-	9.6%	11.5%	40.4%	38.5%	4.15	.946
7	I am not proficient in preparing digital learning materials such as videos, slide presentations, and interactive content.	11.5%	25.0%	13.5%	32.7%	17.3%	3.52	1.31
8	Integrating Digital Technology into the curriculum is a major challenge for teachers in schools.	-	11.5%	9.6%	53.8%	25.0%	3.96	.904
9	Teachers with longer teaching experience are less prepared to use Digital Technology compared to new teachers, who are more open to innovation.	1.9%	11.5%	5.8%	50.0%	30.8%	4.08	1.00
10	The use of Digital Technology affects the effectiveness of my teaching.	-	-	13.5%	51.9%	34.6%	4.21	.666

The study findings indicate that teachers face various challenges in integrating digital technology into their teaching. Table 3 shows that 88.5% of teachers agree that digital technology equipment, such as laptops and projectors, is not provided to every teacher in schools (Mean=4.42, SD=1.03). Meanwhile, 82.7% feel that the school's internet network is not strong and stable enough to support digital teaching (Mean=4.27, SD=0.921). Similarly, 88.5% acknowledge that their schools lack comprehensive digital technology infrastructure for teaching needs (Mean=4.31, SD=0.871). A significant proportion of teachers (53.8%) feel unprepared to use digital technology in the classroom (Mean=3.60, SD=1.26), while 80.7% state that the lack of digital technology equipment hinders effective technology integration (Mean=4.13, SD=1.08). Additionally, 86.5% of teachers recognize the lack of teaching aids, such as interactive software and learning applications, as a challenge (Mean=4.15, SD=0.837). Moreover, 82.6% state that insufficient technology infrastructure negatively impacts their teaching quality (Mean=4.17, SD=1.04).

Table 3
Challenges in the Availability of Digital Technology Infrastructure

No.	Item	SD	D	N	A	SA	Mean	SD
1	Digital Technology equipment such as laptops and projectors are not provided to every teacher in school.	3.8%	5.8%	1.9%	38.5%	50.0%	4.42	1.03
2	The internet network in my school is not strong and stable enough to support digital teaching.	-	7.7%	9.6%	34.6%	48.1%	4.27	.921
3	My school lacks a comprehensive Digital Technology infrastructure for classroom teaching needs.	1.9%	3.8%	5.8%	48.1%	40.4%	4.31	.871
4	I feel unprepared to use Digital Technology in my teaching.	7.7%	26.9%	11.5%	36.5%	17.3%	3.60	1.26
5	I am not provided with adequate Digital Technology equipment, which hinders the effective integration of digital technology.	5.8%	7.7%	5.8%	53.8%	26.9%	4.13	1.08
6	The lack of Digital Technology teaching aids, such as interactive software and learning applications, is a challenge in integrating technology-based teaching.	1.9%	3.8%	7.7%	57.7%	28.8%	4.15	.837
7	The unavailability of Digital Technology infrastructure affects my teaching quality.	3.8%	9.6%	3.8%	53.8%	28.8%	4.17	1.04
8	The Digital Technology equipment provided in schools does not match the total number of students.	1.9%	3.8%	-	48.1%	46.2%	4.40	.834

9	Projectors are essential digital tools that should be available in every classroom for teaching and learning.	-	3.8%	-	40.4%	55.8%	4.48	.700
`10	Technical issues often hinder the use of Digital Technology in classroom teaching.	-	-	7.7%	34.6%	57.7%	4.50	.642

The study findings indicate that teachers emphasize the importance of school support in utilizing digital technology for teaching. Referring to Table 4, 98.1% of teachers believe that schools should provide support and guidance in using digital technology (Mean=4.40, SD=0.534), while 88.4% think that schools should regularly monitor the use of digital technology (Mean=4.40, SD=0.729). A large majority of teachers (90.4%) feel that adequate training from school management can boost their confidence in using digital technology (Mean=4.35, SD=0.706). However, only 63.5% agree that their school has a clear long-term plan to improve digital technology facilities (Mean=3.85, SD=0.802). Additionally, 92.3% of teachers believe that integrating digital teaching can enhance students' academic achievement (Mean=4.29, SD=0.605), and almost all teachers (98.1%) agree that schools should provide sufficient digital infrastructure (Mean=4.54, SD=0.541). Moreover, 94.2% of teachers feel that regular training can improve their skills in using digital technology for teaching (Mean=4.35, SD=0.590), and 100% of teachers believe that schools must ensure the consistent maintenance of digital technology equipment (Mean=4.58, SD=0.499). Furthermore, 92.3% of teachers emphasize the importance of providing high-quality digital learning resources (Mean=4.37, SD=0.627), while 98.1% state that the Principal or Headmaster plays a crucial role in influencing the level of digital technology integration in teaching (Mean=4.48, SD=0.542).

Table 4
Challenges in School Support

No.	Item	SD	D	N	A	SA	Mean	SD
1	The school should provide support and guidance to teachers in using Digital Technology for teaching.	-	-	1.9%	55.8%	42.3%	4.40	.534
2	The school should regularly monitor teachers' use of Digital Technology in teaching.	-	1.9%	9.6%	44.2%	44.2%	4.40	.729
3	Providing adequate training from school management can enhance teachers' confidence and readiness in using Digital Technology.	-	1.9%	7.7%	46.2%	44.2%	4.35	.706
4	My school has a clear long-term plan to improve Digital Technology facilities.	-	1.9%	34.6%	40.4%	23.1%	3.85	.802 .
5	The school should recognize that integrating digital-based teaching can enhance students' academic achievement.	-	-	7.7%	55.8%	36.5%	4.29	.605
6	The school should provide adequate digital infrastructure,	-	-	1.9%	42.3%	55.8%	4.54	.541

	such as computers and high-speed internet.							
7	The school should provide regular training to enhance teachers' skills in using Digital Technology for teaching.	-	-	5.8%	53.8%	40.4%	4.35	.590
8	The school should ensure that Digital Technology equipment is consistently maintained.	-	-	-	42.3%	57.7%	4.58	.499
9	The school should provide high-quality digital learning resources such as e-books and educational applications.	-	-	7.7%	48.1%	44.2%	4.37	.627
10	The Principal or Headmaster plays a crucial role in influencing the level of digital-based teaching integration in teachers' classrooms.	-	-	1.9%	48.1%	50.0%	4.48	.542

Table 5
Mann-Whitney U Test Statistics for Teachers' Readiness Challenges Based on Gender

Test Statistic	**Value**
Mann-Whitney U	175.00
Wilcoxon W	995.00
Z	-1.415
Asymp. Sig. (2-tailed)	0.157

The Mann-Whitney U test results show a U value of 175.000 and a Z value of -1.415. The obtained Asymp. Sig. (2-tailed) or p-value is 0.157, which is higher than the significance level of 0.05. This indicates that there is no statistically significant difference in the readiness of male and female teachers to integrate digital technology into teaching. Therefore, the null hypothesis (H_o) is accepted.

Table 6
Mann-Whitney U Test Statistics for Challenges in the Availability of Digital Technology Infrastructure Based on Gender

Test Statistic	**Value**
Mann-Whitney U	132.000
Wilcoxon W	952.000
Z	-2.353
Asymp. Sig. (2-tailed)	0.019

The Mann-Whitney U test shows a U value of 132.000 and a Z value of -2.353. The obtained Asymp. Sig. (2-tailed) or p-value is 0.019, which is lower than the significance level of 0.05. This indicates that there is a significant difference in the availability of digital technology infrastructure between male and female teachers in secondary schools in the Petaling Perdana District. Therefore, this study rejects the null hypothesis (H_o) and accepts the alternative hypothesis (H_1).

Table 7
Mann-Whitney U Test Statistics for Challenges in School Support Based on Gender

Test Statistic	Value
Mann-Whitney U	159.000
Wilcoxon W	979.00
Z	-1.768
Asymp. Sig. (2-tailed)	0.77

The Mann-Whitney U test yielded a U value of 159.000 and a Z value of -1.768. The obtained Asymp. Sig. (2-tailed) or p-value is 0.770, which is higher than the significance level of 0.05. This indicates that there is no statistically significant difference in the challenges related to school support between male and female teachers in secondary schools in the Petaling Perdana District. Therefore, the null hypothesis (H_o) is accepted.

Discussion

Findings from the Mann-Whitney U test show a U value of 175.000 and a Z value of -1.415, with an Asymp. Sig. (2-tailed) or p-value of 0.157. This p-value is higher than the significance level of 0.05, indicating that there is no significant difference in the readiness of male and female teachers to integrate digital technology in teaching. These findings align with the study by Arredondo Trapero et al. (2021), which stated that both genders have similar levels of readiness and perception towards the use of digital technology. Additionally, Poobalan & Mahmud (2022), also found that while there may be slight differences in lesson planning, gender is not a primary determinant of teachers' readiness to adopt digital technology. The results of this study also indicate that both groups of teachers have a positive attitude toward using digital technology in teaching. Therefore, the null hypothesis (H_o) is accepted in this study, which examines the challenges of teacher readiness in integrating digital technology in secondary schools.

In the aspect of digital technology infrastructure availability, the Mann-Whitney U test recorded a U value of 132.000 and a Z value of -2.353, with an Asymp. Sig. (2-tailed) or P value of 0.019. Since this P value is lower than the significance level of 0.05, it indicates a significant difference in the availability of digital technology infrastructure between male and female teachers. Male teachers were found to have better access to digital technology facilities such as laptops, internet connectivity, and learning applications compared to female teachers (Adeoye, 2023). This highlights an imbalance in digital technology availability, which can pose a challenge for female teachers. A study by Jalil and Moi (2023) also suggested that teachers, particularly female teachers, should demonstrate a high level of commitment in planning and implementing teaching while considering the requirements of digital technology infrastructure. Therefore, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted.

Next, regarding the challenges of school support, the Mann-Whitney U test yielded a U value of 159.000 and a Z value of -1.768, with an Asymp. Sig. (2-tailed) or P-value of 0.77. Since the obtained P-value is higher than the significance level of 0.05, this indicates that there is no significant difference in the perception of male and female teachers regarding the challenges of support from the school administration. This result suggests that both groups of teachers face similar challenges in obtaining support from the school administration. The study by Kadir and Jamaludin (2022) also highlighted that school leadership plays a crucial

role in supporting technology-based teaching. Therefore, school administrators are recommended to provide adequate technological facilities and learning resources to ensure that teachers can integrate digital technology regardless of gender.

The findings of this study highlight both differences and similarities between male and female teachers in the aspects examined. While there is a significant difference in access to digital technology infrastructure, readiness to integrate digital technology and perceptions of school support do not show notable differences. Therefore, school management should ensure a more balanced development of digital technology infrastructure and provide equitable support to all teachers. Additionally, greater emphasis should be placed on teacher training and professional development to maximize the effectiveness of digital technology integration in teaching.

The Malaysia Education Blueprint (PPPM) 2013-2025, through its 11th shift, Digital Technology Integration, emphasizes the importance of developing the capabilities of students and teachers in adopting information and communication technology as a learning aid (Ministry of Education Malaysia, 2013). Therefore, the findings of this study are expected to provide guidance to stakeholders in the education sector in formulating more effective policies and initiatives to support teachers in overcoming challenges related to digital technology integration. By gaining a comprehensive understanding of the barriers, more effective intervention measures can be designed to enhance the quality of education in secondary schools.

Conclusion

The findings of this study indicate that there is no significant difference in the readiness of male and female teachers to integrate digital technology into teaching. Both groups of teachers exhibit similar attitudes and levels of readiness toward the use of digital technology. However, a significant difference exists in the availability of digital technology infrastructure between male and female teachers, with female teachers facing greater challenges in accessing the same equipment and technological support. On the other hand, no significant difference was found in teachers' perceptions of challenges related to school support, indicating that both male and female teachers experience similar difficulties in obtaining support from the school administration. While gender does not influence teachers' readiness to integrate digital technology into teaching, there remains an imbalance in the availability of digital technology infrastructure, particularly among female teachers.

Overall, the integration of technology-based teaching should be implemented by all teachers to ensure that all students can benefit from it. The integration of digital technology in teaching requires a high level of commitment from teachers, as they need to identify and understand how to effectively incorporate digital technology into their classroom instruction. Previous studies related to this topic have demonstrated that the need to integrate digital technology into teaching has become increasingly essential in line with the evolving times. Therefore, teachers must be prepared and committed to integrating digital technology into their teaching practices.

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