Digital Technology for Learning Management of Mathematics Teacher at School Khlongsamwa District Office Bangkok

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ABSTRACT: *This research aimed to study the use of digital technology for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, and to compare the use of digital technology for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, classified by work experience. The sample group consisted of 74 mathematics teachers from medium and large schools under the Khlongsamwa District Office, Bangkok. The research instrument was a 5-level rating scale questionnaire with 27 items. The statistics used for data analysis included descriptive statistics (frequency, percentage, mean, and standard deviation) and inferential statistics (One-Way ANOVA) analyzed with a statistical software package.*

The research findings revealed that: 1. The overall use of digital technology for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, was at a high level (M=3.91, SD=0.80). The aspect with the highest mean was digital technology design, which was at a high level. 2. Work experience of 1-10 years was significantly higher than work experience of 21 years or more, and work experience of 11-20 years was significantly higher than work experience of 21 years or more, at a statistical significance level of .05. Therefore, to promote the development of digital technology in the teaching profession, it is crucial to consider the diversity of target groups and design professional development activities that are appropriate for the context of each teacher group.

Keywords: Digital technology use, Learning management, Mathematics teachers, Digital technology use for mathematics teacher learning management

1. Introduction

Digital technology plays a crucial role in enhancing the learning management of teachers at all levels, particularly in the context of active learning and student-centered learning. Digital technology significantly improves the efficiency of communication, content delivery, and assessment. It also enables teachers to design diverse learning activities that align with the individual learning styles of students (Mouza et al., 2016). Therefore, promoting and supporting teachers in acquiring appropriate digital technology skills is essential to elevate the quality of Thai education to international standards (Office of the Education Council, 2020). The use of digital technology not only enhances the effectiveness of teaching and learning but also fosters students' creativity and analytical thinking. As designers of learning management, teachers must be capable of selecting and integrating technology in a manner consistent with the learning content and student context. Developing knowledge in this area is thus of paramount importance for the professional development of teachers in the digital age.

Mathematics is a fundamental subject for developing logical thinking, analytical skills, and problem-solving abilities, all of which are crucial for living in the digital world. However, mathematics learning management still faces several challenges, including motivating students, connecting content to real life, and creating meaningful learning experiences (Lim & Tay, 2003). The integration of digital technology can make mathematics teaching more engaging, for example, through the use of mathematical software, video-based learning, or virtual models, which aligns with 21st-century skill-based learning approaches (Huang et al., 2019). Therefore, effective mathematics learning management requires both academic knowledge and the ability to design learning experiences that foster student participation. Technology can help overcome limitations in presenting complex content and support diverse learning modalities, such as inquiry-based learning or mathematics game-based learning, which are gaining significant international attention.

Studies of domestic and international research indicate that many mathematics teachers use technology at a basic level or limit its use to certain activities, such as merely displaying teaching materials or searching for information, without employing it for designing interactive activities or collaborative learning (Scherer et al., 2019). Furthermore, there are limitations regarding teacher readiness, such as a lack of confidence in using technology, insufficient training, or excessive workloads (Panthong, 2021). These issues highlight a gap between the potential of technology and its actual use in the classroom, which, if not addressed, could affect the long-term quality of learning in the long term. Therefore, there is a necessity to systematically study teachers' technology usage patterns in real contexts, considering aspects such as usage behavior, supporting factors, and obstacles affecting effective use. This will facilitate the design of targeted teacher development programs and promote educational equity in terms of equitable access to technology.

Given these problems, studying the use of digital technology by mathematics teachers in specific areas, such as the Khlongsamwa District Office, Bangkok, is crucial. This is because it is a district with diverse social and economic contexts, which may influence teachers' readiness to use digital technology. This research aims to study the current state of digital technology-based learning management in a real context, as well as to compare it based on teachers' work experience. This will reveal differences in mathematics teachers' skills or attitudes. The information obtained will be beneficial for school administrators, policy makers, and curriculum developers in designing appropriate promotional measures and developing effective and sustainable approaches to digital technology use for learning in mathematics. Additionally, it can serve as baseline data for formulating policies or planning teacher development in educational areas, tailored to the context and needs of each teacher group based on their work experience, ultimately leading to an improved quality of teaching and learning.

2. Literature Review

The development and application of digital technology in the learning management process are crucial factors in elevating the quality of education, especially in mathematics, which requires efficient teaching and learning that can adapt to the changes of the digital age. This research aims to explore and analyze the use of digital technology in mathematics teachers' learning management in the Khlongsamwa District, Bangkok, to propose guidelines for developing teacher competencies in the digital era.

2.1 The Use of Digital Technology for Mathematics Teachers' Learning Management

The use of digital technology in mathematics learning management is an increasingly important and necessary approach in the context of 21st-century education. As mathematics is a highly abstract subject, traditional teaching methods may not effectively cater to the diverse learning needs of students. Therefore, digital technology plays a vital role in transforming abstract knowledge into concrete forms, promoting in-depth learning, and fostering effective interaction between teachers and students. Research by Kandukoori et al., (2024) demonstrates that digital tools such as Khan Academy and other online learning platforms can significantly improve student academic achievement. This is achieved by presenting content in various formats, including videos, animations, interactive exercises, and immediate feedback, allowing students to learn independently at their own pace and ability level. Furthermore, it facilitates personalized learning, which appropriately addresses individual learning needs.

Specialized technologies in mathematics education, such as GeoGebra, play a crucial role in helping students visualize and understand mathematical concepts more clearly, including geometry, algebra, trigonometry, graphs, statistics, and calculus. Phudee (2020) found that using GeoGebra in the classroom can enhance understanding of mathematics content more effectively than traditional blackboards or handouts. This is because GeoGebra can display animated graphs and real-time parameter changes, which contributes to the development of students' systematic thinking skills. Technologies that support mathematics teaching, such as Virtual Reality (VR) and Augmented Reality (AR), are

increasingly being used to create realistic and highly interactive learning experiences. These are primarily found in international research, for instance, Chen (2019) 's research cite start indicates that AR can help reduce anxiety among students with negative attitudes towards mathematics and make learners more confident and willing to express themselves in the learning process. However, these technologies are not yet widely observed in the context of mathematics teaching in Thailand.

Nevertheless, the effective integration of digital technology into mathematics instruction necessitates teacher preparedness, particularly in digital technology skills and active learning design that aligns with the chosen technology. Research by Mulenga and Marbán (2020) found that teachers with strong technological abilities are more effective at integrating digital tools into learning management. This also requires continuous training and support from school administrators. The integration of digital technology in mathematics teaching and learning can holistically enhance educational quality across dimensions such as academic achievement, conceptual understanding, student attitudes, and teacher competencies. However, technology use must be systematically designed with clear objectives and aligned with student contexts to achieve sustainable outcomes.

2.2 Components of Digital Technology Use for Mathematics Teachers' Learning Management

The use of digital technology for mathematics teachers' learning management has been applied in various aspects, such as being a teaching medium, an additional learning resource, aiding in learning management design, assisting in measurement and evaluation, etc. From the study of relevant documents and research, it was found that the use of digital technology for mathematics teachers' learning management refers to mathematics teachers' teaching and learning where technology is integrated with learning management through electronic devices and applications, such as computers, mobile phones, satellite systems, etc., to facilitate interaction between learners and teachers. This ensures that teaching and learning activities achieve their objectives and result in effective learning management (Pholthawee & Chaipan, 2024). It comprises four dimensions (Thiangtrong, 2021) as follows:

1. Digital Technology Design refers to mathematics teachers' ability to design learning management by planning, setting learning objectives, organizing learning activity steps, designing diverse learning activities and assessments, preparing technology resources, selecting appropriate digital technology media for the content taught, and allowing students to use digital technology in learning at all levels.

2. Digital Technology Development refers to mathematics teachers' ability to produce and develop various media or applications for use in learning management. They can verify the quality of the produced media to ensure effective use in learning management according to the set objectives. Educational institutions promote and support teachers in developing their technological skills and digital technology media suitable for learning management to meet student needs.

3. Digital Technology Implementation refers to mathematics teachers' ability to use various digital technologies that have been designed or prepared for learning management by utilizing electronic tools or devices to enable interaction and communication with students. They organize teaching and learning activities that facilitate student learning according to objectives, employ diverse digital technologies in learning management, utilize e- Learning media, conduct online teaching on websites, use social media for teaching, and incorporate various programs to support effective learning management. They can also flexibly use digital technology according to environmental contexts, leading to effective student learning.

4. Digital Technology Evaluation refers to mathematics teachers' ability to measure the impact of various digital technologies in teaching and learning from student academic achievement, digital technology skills and abilities, and evaluating student work via email and group work via various applications. This allows for rapid assessment results and enables teachers to solicit feedback on learning management to make appropriate improvements.

3. Methodology

The research on the use of digital technology for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, proceeded as follows:

3.1 Population/Sample
The population consisted of 1,123 mathematics teachers under the Bangkok Metropolitan Administration (Bangkok Metropolitan Administration Education Department, 2025).

The sample consisted of 74 mathematics teachers from medium and large schools under the Khlongsamwa District Office, Bangkok. The sample size and sampling method were determined as follows:

1. Sampling: The researcher used multi-stage random sampling. The details are as follows:
Step 1: The researcher randomly selected a school using a simple random sampling method by drawing lots to select a district office under the Bangkok Metropolitan Administration, resulting in the Khlongsamwa District Office out of 50 districts. There are a total of 18 schools under the Bangkok Metropolitan Administration in the Khlongsamwa District Office. Then, Step 2: The researcher used cluster sampling, classified by school size, selecting medium and large schools, which resulted in a total of 8 sample schools.

2. Determining Sample Size
For determining the sample size, this research utilized the G*Power software with an effect size of 0.43 and a test power of 0.95 at a statistical significance level of .05. This yielded a minimum sample size of 87 mathematics teachers. However, the researcher collected data from a total of 74 individuals, representing 85.06% of the minimum required sample size.

3.2 Research Instruments
Instruments and Data Collection
The instrument development process was as follows:

The digital technology uses for learning management questionnaire for mathematics teachers under the Khlongsamwa District Office, Bangkok, comprised two parts:

Part 1: General information of respondents, including gender, highest educational attainment, work experience, and position/academic standing.

Part 2: The digital technology uses for learning management questionnaire for mathematics teachers under the Khlongsamwa District Office, Bangkok. The researcher constructed the questionnaire and verified its quality by studying relevant theories, concepts, documents, and research to establish the conceptual framework and target variables. Questions were written based on operational definitions, using a 5-point rating scale with 27 items, categorized into 4 dimensions: (1) Digital technology design (9 items), (2) Digital technology development (5 items), (3) Digital technology implementation (7 items) and (4) Digital technology evaluation (6 items).

Instrument Quality Verification
1. Content Validity Analysis of the Questionnaire: The researcher verified the content validity of the questionnaire by developing questions based on a review of relevant documents and research on the use of digital technology for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok. Content validity was assessed by three experts: (1) one expert in measurement and evaluation, (2) one expert in digital technology, and (3) one expert in mathematics. This assessment aimed to ensure appropriate content validity and refine the questions. The Index of Item Objective Congruence (IOC) values ranged from 0.67-1.00, indicating that all questions were usable.

2. Reliability Analysis of the Questionnaire: The researcher verified the reliability of the questionnaire by pilot testing it with a sample of 30 individuals similar to the research sample. Internal consistency reliability was analyzed using Cronbach's alpha reliability coefficient. The analysis result showed a value of .962, indicating good quality and usability of the questionnaire.

3. Item-total correlation analysis: The researcher checked the quality of the questions by pilot testing the questionnaire with a sample of 30 individuals. It was found that the 27 items in the questionnaire had item-total correlation values ranging from .507-.802, indicating good quality and usability of all 27 questions.

3.3 Data Collection

The researcher collected data personally using an online questionnaire (Google Form). While the minimum sample size was set at 87 individuals, 74 responses were received, yielding a response rate of 85.06%, which exceeds the 80% threshold and is considered acceptable. The collected data were then analyzed according to the research objectives using statistical software.

3.4 Statistics Used for Data Analysis

The statistics used to analyze the quality of the instruments included content validity, reliability, and item-total correlation.

Statistics used for data analysis according to the research objectives were analyzed using statistical software and included basic statistics such as frequency, percentage, mean (M), standard deviation (S.D.), and One-Way ANOVA.

Criteria for interpreting mean values for the use of digital technology in learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, were set as follows (Srisa-ard, 2017). The following table:

Mean 4.51 - 5.00	Meaning	Highest level of practice
Mean 3.51 - 4.50	Meaning	High level of practice
Mean 2.51 - 3.50	Meaning	Moderate level of practice
Mean 1.51 - 2.50	Meaning	Low level of practice
Mean 1.00 - 1.50	Meaning	Lowest level of practice

4. Results

Results of the study on the use of digital technology for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok.

Table 1. shows the general information, number, and percentage of general information of the respondents.

General Information	Mathematics Teachers (n=74)	
	Number (persons)	Percentage
1. Gender		
Male	18	24.32
Female	56	75.68
Total	74	100.00
2. Education Level		
Bachelor's Degree	43	58.11
Higher than Bachelor's Degree	31	41.89
Total	74	100.00
3. Work Experience		
1 - 10 years	28	37.84
11 - 20 years	25	33.78
21 years or more	21	28.38
Total	74	100.00
4. Position/Academic Standing		
Assistant Teacher and Teacher	21	28.38
Experienced Teacher	31	41.89
Senior Experienced Teacher	22	29.73
Total	74	100.00

From Table 1, it was found that among the respondents, 56 were female (75.68%), and 18 were male (24.32%).

Regarding the distribution of respondents by educational attainment, 43 individuals (58.11%) held a bachelor's degree, while 31 individuals (41.89%) held a degree higher than a bachelor's degree.

The number and percentage of respondents categorized by work experience indicated that 28 individuals (37.84%) had 1-10 years of work experience, 25 individuals (33.78%) had 11-20 years of work experience, and 21 individuals (28.38%) had 21 years or more of work experience.

The number and percentage of respondents categorized by position/academic standing showed that 21 individuals (28.38%) were Assistant Teachers and Teachers, 31 individuals (41.89%) were Experienced Teachers, and 22 individuals (29.73%) were Senior Experienced Teachers.

Table 2. shows the mean, standard deviation, interpretation, and rank of digital technology use for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, overall

No.	Digital technology uses for learning management by mathematics teachers	Mathematics Teachers (n=74)		Interpretation	Rank
		M	***SD***		
1	Digital Technology Design	4.16	0.62	High	1
2	Digital Technology Development	3.85	0.77	High	3
3	Digital Technology Implementation	4.08	0.78	High	2
4	Digital Technology Evaluation	3.56	1.03	High	4
	Total	**3.91**	**0.80**	**High**	

From Table 2, it was found that the overall use of digital technology for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, was at a high level (*M*=3.91, *SD*=0.80). When considering each aspect, the aspect with the highest mean was Digital Technology Design, which was at a high level (*M*=4.16, *SD*=0.62). This was followed by Digital Technology Implementation, also at a high level (*M*=4.08, *SD*=0.78). The aspect with the lowest mean was Digital Technology Evaluation, which was at a high level (*M*=3.56, *SD*=1.03).

Table 3. shows the results of the comparison of digital technology use for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, classified by work experience

Background	N	*M*	*SD*	Levene's test for Equality of Variances		F-test		Pairwise
				F	***P***	**F**	***P***	
Work Experience								
(1) 1 – 10 years	28	4.16	0.54					(1) > (3)
(2) 11 – 20 years	25	4.07	0.58	2.40	0.10	9.75	0.00	(2) > (3)
(3) 21 years or more	21	3.38	0.84					

* $p < .05$

Table 3 shows that the comparative analysis of digital technology use for learning management by mathematics teachers, classified by work experience, revealed a statistically significant difference at the .05 level among different work experience groups. Specifically, mathematics teachers with 1-10 years of work experience demonstrated a significantly higher mean score in digital technology use for learning management compared to those with 21 years or more of experience. Similarly, teachers with 11-20 years of work experience also showed a significantly higher mean score in digital technology use for learning management compared to those with 21 years or more of experience, at a statistical significance level of .05 ($F(2,71) = 9.75$, $p = 0.00$).

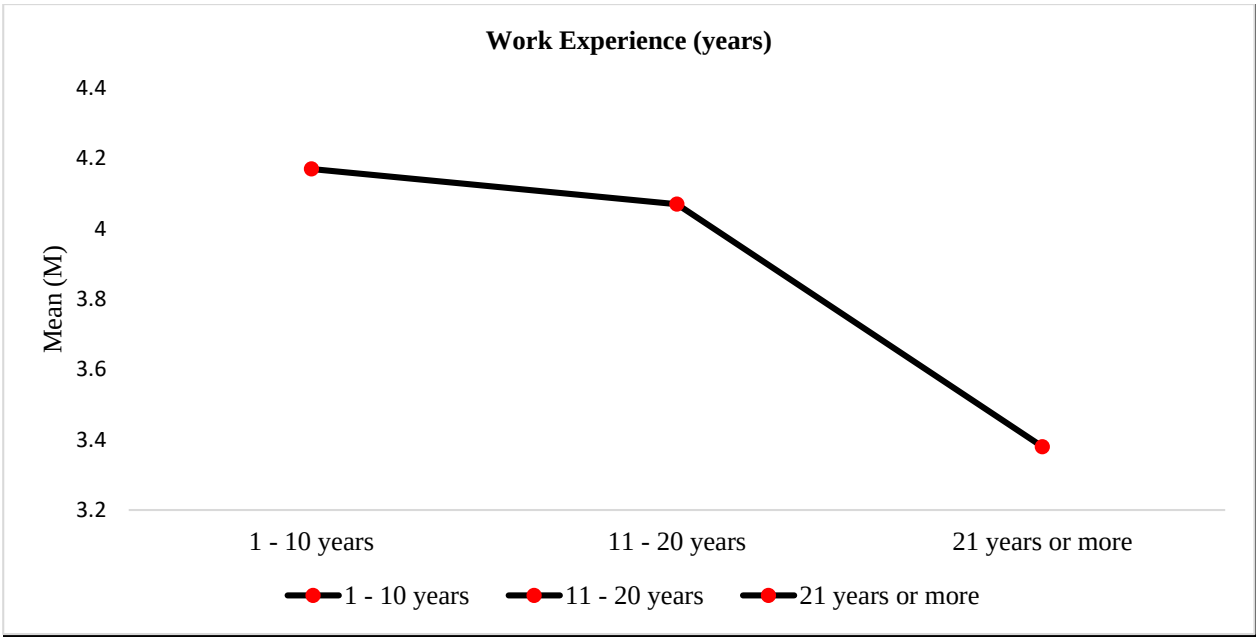

Figure 1. Results of the pairwise mean score difference test for different work experience groups using Scheffe's method.

5. Discussion

The findings from the research titled "Digital Technology Use for Learning Management by Mathematics Teachers Under the Khlongsamwa District Office, Bangkok" can be discussed as follows:

1. Results of the Study on Digital Technology Use for Learning Management by Mathematics Teachers Under the Khlongsamwa District Office, Bangkok
The study on digital technology use for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, revealed that the aspect with the highest mean score was "Digital Technology Design," which was at a high level. This reflects teachers' capability in selecting and planning technology use in a manner consistent with content, student characteristics, and appropriate learning contexts. In this regard, teachers, acting as facilitators in learning management, play a crucial role in developing lesson plans, selecting and organizing subject content that aligns with students' abilities, designing modern instructional media, choosing diverse assessment methods, and integrating technology to match students' behavioral objectives at each grade level. The effective execution of these tasks by teachers may be attributed to their high level of digital technology competency, encompassing knowledge, skills, and attitudes conducive to applying technology for learning management in the context of modern education. This necessitates the ability to plan and design various learning activities that promote student engagement (Hizam et al., 2021). Furthermore, mathematics teachers have continuously engaged in professional development, such as participating in various training courses that apply digital technology in learning management and self-learning on online platforms. This provides mathematics teachers with diverse options and examples, enabling them to adapt these to their own learning management. This aligns with Pholthawee & Chaipan (2024), who state that for mathematics learning management in the 21st century, mathematics instructors must continuously develop themselves to acquire skills as advisors or facilitators of learning, and modern and engaging technology skills that promote learning, thereby fostering more effective learning in mathematics classrooms.

Additionally, it was found that mathematics teachers in the studied area exhibited a continuous tendency for self-development, including participation in workshops, learning through online platforms, engagement in Professional Learning Communities (PLC), and knowledge exchange with colleagues. These processes collectively contribute to teachers' access to educational innovations, examples of best practices, and new digital tools that can be adapted to students' contexts, resulting in more flexible, effective, and responsive learning management to individual differences (Hizam et al., 2021). Teachers' self-development through training and collaborative learning within Professional Learning Communities (PLC) is considered an effective approach to enhancing the quality of learning management.

Teachers can exchange experiences, share knowledge, and collectively resolve problems encountered in the teaching and learning process, consistent with the Teachers Council of Thailand's promotion of teacher development through PLC to elevate professional ethics and the quality of learning management (Teachers Council of Thailand, 2022). This demonstrates that teachers' access to and application of digital technology in learning management is a significant factor contributing to the effectiveness of teaching and learning.

2. Results of the Comparison of Digital Technology Use for Learning Management by Mathematics Teachers Under the Khlongsamwa District Office, Bangkok, Classified by Work Experience

The comparison of digital technology uses for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, revealed that teachers with 1-10 years and 11-20 years of work experience exhibited a higher level of digital technology use in learning management compared to teachers with over 21 years of experience. This indicates a disparity between work experience and the capability to utilize digital technology in the context of learning management. This difference may be attributed to varying digital technology adoption rates among teachers across different age groups. Teachers with less experience are typically younger professionals who have grown up in an era where digital technology plays a significant role in daily life, education, and work. Consequently, they possess a natural familiarity with digital technology usage and can apply it adeptly in learning contexts (Chaowiwat, 2022). Furthermore, a majority of new generation teachers have received preparation at the university level, where current teacher education curricula intensively integrate digital technology into teaching and learning. This provides these teachers with a strong foundation in designing, selecting, and evaluating technology for effective learning. Additionally, continuous support from their affiliated organizations in developing digital skills among new teachers, through training, workshops, and online learning platforms, further enables this group of teachers to continuously develop and adapt (Ngao-sri, 2022). Conversely, teachers with over 21 years of work experience may encounter obstacles in technology adoption due to various factors, including unfamiliarity with digital devices or platforms, unsupportive attitudes towards change, and a preference for traditional practices that have previously proven successful. This often results in a lower propensity to integrate technology into the learning process compared to their younger counterparts (Saenkham, 2022). Therefore, the digital technology proficiency of mathematics teachers across different experience levels reflects the influence of structural factors and distinct social contexts of their respective eras. Teachers with less experience are significantly influenced by high levels of digital technology use in both education and work, whereas more experienced teachers may require tailored support to maximize the effectiveness of technology integration within their specific contexts. To foster the development of digital technology in the teaching profession, it is imperative to consider the diversity of target groups and design professional development activities that are appropriate for the context of each teacher group.

6. Conclusions

The use of digital technology for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, indicates that mathematics teachers utilize digital technology in learning management at a high level. This is particularly evident in the aspect of designing learning activities that integrate technology, demonstrating teachers' capability in planning and selecting appropriate digital tools. However, the aspect of evaluating the impact of digital technology remains an area requiring further development for teachers, reflecting challenges in analyzing data derived from technology use to refine teaching and learning processes. Furthermore, the study revealed that work experience influences mathematics teachers' digital technology use. Teachers with less than 21 years of experience tend to use digital technology more proficiently and adapt better than those with more extensive experience. This may be attributed to younger teachers' familiarity with technology and their initial training, which emphasizes the integration of digital technology in teaching and learning. Therefore, promoting and developing digital technology skills for all groups of mathematics teachers, especially in the area of evaluation, is crucial to maximize the potential of technology in enhancing student learning quality.

7. Limitations and future research

Based on the research findings on digital technology use for learning management by mathematics teachers under the Khlongsamwa District Office, Bangkok, it was observed that most teachers exhibit a high level of digital technology usage, particularly in the design of technology-integrated learning activities. This demonstrates teachers' ability to effectively integrate technology into learning management, considering subject content, student characteristics, and the educational context. This effectiveness stems from teachers' crucial role in planning learning management, selecting modern media, and designing learning processes that effectively address individual differences. Therefore, educational institutions and their affiliated organizations should continuously and systematically promote opportunities

for teachers to develop their digital technology design skills for learning management. This includes organizing practical workshops that emphasize the appropriate integration of technology into lessons, tailored to content, student groups, and classroom contexts. Furthermore, fostering learning through Professional Learning Communities (PLC) should be encouraged to facilitate the exchange of knowledge and experiences derived from actual design practices within schools. It is also recommended to establish systematic learning resources to support digital technology-based lesson design, such as digital media repositories, best practices, lesson design manuals, or accessible resource hubs that teachers can conveniently utilize. Sufficient time and resources should be allocated for teachers to experiment, design, and evaluate their own learning management practices.

Moreover, the research findings indicate that teachers with 1- 10 years and 11- 20 years of work experience demonstrated a higher level of digital technology use in learning management compared to teachers with over 21 years of experience. This reflects the impact of work duration on technology adoption and application in the classroom, potentially stemming from familiarity with traditional teaching methods and limitations in digital skills among highly experienced teachers. Therefore, educational institutions should encourage and support the technological skill development of teachers with over 21 years of experience using strategies appropriate for their learning styles, such as mentorship programs, pairing new teachers with senior teachers, and organizing intergenerational learning exchange platforms. These initiatives would provide opportunities for teachers to learn new technologies in a friendly and non-pressured environment. For school administrators, policies should be established to promote equity in technological capacity development for all teacher experience groups. This should involve designing diverse and flexible activities in terms of format, content, and difficulty level, as well as providing effective support systems for teachers with digital skill limitations, such as technical support teams or technology-leading teachers within the school.

For future research, it is recommended to conduct in- depth studies using qualitative or mixed- methods research approaches to understand the behavioral and attitudinal factors influencing digital technology use among teachers of different age groups. Additionally, the sample size should be expanded to include teachers in other educational areas and across different subject matters to obtain diverse data and enable comprehensive cross- context comparisons. Furthermore, it would be beneficial to investigate the relationship between teachers' digital technology usage levels and student academic achievement to concretely assess the impact of technology-enhanced learning management. This could serve as empirical evidence for national education policy formulation. Finally, the development of teacher professional development models tailored to the specific characteristics of each group should be pursued to ensure continuous, sustainable teacher competency enhancement that genuinely responds to the changes of the digital age.

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