

Surveying Thai Secondary School Teachers' Self-Reported Confidence and Demand for Digital Technology

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Abstract

This study investigates the confidence levels of Thai secondary teachers in using digital technology and their demand for professional development (PD) programs. A questionnaire was designed, covering four key areas: digital literacy, practical application of digital technology, problem-solving skills, and adaptability. The results revealed that teachers generally demonstrated either moderate or strong confidence in their digital skills, alongside a notably high demand for PD programs. Interestingly, these findings remained consistent across various demographic variables, such as age, teaching experience, gender, and educational background. Consequently, the study suggests an immediate need for in-service training programs for Thai teachers. However, it's important to note potential limitations, including the sampling method used and concerns about the questionnaire's validity and reliability.

Keywords: digital technology, Professional Development program, survey

1. Introduction

1.1 Overview of the Study

Given the rapid advancement of technologies like artificial intelligence and smartphones, equipping citizens with high-tech skills has become a top priority on the education agendas of many countries. Simultaneously, digital technologies are widely recognized as key tools for enhancing teaching efficiency among educators and fostering improved academic outcomes for students (Puriwat & Tripopsakul, 2020). Numerous studies have underscored the potential of digital technologies to boost student motivation, increase engagement in learning, and enhance academic performance across various subjects, including language, mathematics, and science (Boonmoh, Jumpakate, & Karpklon, 2021, 2022; Chen, Gao, & Wang, 2023; Kessler, 2018; Saenkhote & Boonmoh, 2019).

Research suggests that teachers in advanced countries generally have positive attitudes toward the role of digital technology in facilitating personalized learning and improving learning efficiency, actively incorporating it into their teaching practices (e.g., Fraillon, Ainley, Schulz, Friedman, & Duckworth, 2019; Williams, Christensen, McElroy, & Rutledge, 2023). High-tech solutions have been increasingly utilized to enhance teaching effectiveness. For instance, in the USA, computer software is employed to deliver instructional content and provide students with incentives for achieving desired learning outcomes (Gray, Thomas, & Lewis, 2010).

In Thailand, the government has outlined significant initiatives aimed at establishing digital classrooms, improving students' digital literacy, and supporting teachers in adopting digital technologies (Dipendra, 2023; Boonmoh, Jumpakate, & Karpklon, 2022). However, within Thai educational settings, technology tends to be primarily utilized for gaming and testing purposes, often lacking in opportunities for higher-order cognitive skills and advanced technological tools such as interactive whiteboards or learning management systems (Boonmoh, Jumpakate, & Karpklon, 2022). Additionally, Thai educators express an urgent need for training programs focused on identifying suitable digital technologies, accessing media resources, and effectively integrating digital tools into the teaching process (Voratitipong, Wannapiroon, & Nilsook, 2019).

Therefore, this study aimed to provide a comprehensive overview of Thai secondary teachers' confidence levels in utilizing digital technology and to assess any existing demands for professional development (PD). This information is crucial for designing tailored professional development programs for educators. To achieve this

objective, the following research questions were formulated:

- 1) What levels of confidence did Thai secondary teachers self-report in their ability to use digital technologies?
- 2) What were the specific professional development needs expressed by Thai secondary teachers regarding digital technology skills?
- 3) Were there any significant differences observed between Thai secondary teachers' proficiency levels in digital technology and their corresponding professional development demands?
- 4) To what extent did background factors influence Thai secondary teachers' self-reported confidence in using digital technology and their expressed demands for digital technology professional development?

2. Literature Review

An insightful examination of the obstacles hindering teachers' adoption of technology can be categorized into two main areas: external and internal barriers (Ertmer, 1999). External factors, such as available resources, play a significant role in shaping teachers' ability to integrate digital technology into their practices. For instance, the adequacy of infrastructure significantly impacts Thai teachers' willingness to incorporate digital tools. Saenkhot and Boonmoh (2019) emphasize that in certain schools, teachers' adoption of digital practices is hindered by factors like poor internet connectivity, insufficient infrastructure, and a lack of technical support. Consequently, this situation has led to disparities in digital access among Thai students (Voratitipong, Wannapiroon, & Nilsook, 2019).

Furthermore, the school culture significantly influences teachers' readiness to embrace digital technology (Lerdwichian & Wongwanich, 2020; Vermeulen, Van Acker, Kreijns, & van Buuren, 2015; Williams, 2023). A lack of support from school leadership and insufficient resources can diminish teachers' confidence in utilizing digital tools effectively. Conversely, proactive principals can play a pivotal role in fostering a conducive environment for digital integration. They can lead by example by incorporating technology themselves, organize professional development sessions to enhance teachers' digital skills, allocate adequate resources, promote collaborative teaching initiatives, support innovative pedagogical approaches, and articulate a clear vision for technology integration (Schmitz, Antonietti, Consoli, Cattaneo, Gonon, & Petko, 2023).

The influence of age and teaching experience on teachers' proficiency and confidence in integrating digital technologies remains a topic of ongoing debate, whereas gender's impact appears to be more settled. Dipendra (2023) suggests that younger Thai teachers exhibit greater proficiency in digital technology use compared to their older counterparts. Additionally, teaching experience is proposed to enhance teachers' confidence, recognition of technology's value, and utilization of digital tools (Boonmoh, Jumpakate, & Karpklon, 2021). In contrast, Mahdi and Al-Dera (2013) present contrasting results, indicating that teaching experience and age are not significantly correlated with teachers' adoption of digital technology. These divergent findings may stem from cultural disparities and evolving backgrounds. For instance, the millennial generation, having grown up with more exposure to technology during childhood, tends to demonstrate higher proficiency levels (Buabeng-Andoh, 2012). Conversely, female teachers often report higher levels of anxiety, lower confidence, and a greater need for technology training (Dipendra, 2023; Gómez-Trigueros, & Yáñez de Aldecoa, 2021).

Bandura (1997) defines self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Essentially, digital technology self-efficacy reflects an individual's confidence in their ability to effectively utilize digital tools to support students' academic achievement. Self-efficacy emerges as a crucial factor influencing teachers' integration of digital technologies (Bakar, Maat, & Rosli, 2020; Caner & Aydin, 2021; Maat & Rosli, 2020; Song, 2018). Studies indicate that teachers who perceive themselves as more proficient in technology are more likely to incorporate it into their teaching practices (Nikolopoulou & Gialamas, 2015; Gurer, 2021; Williams et al., 2023).

It's important to note that various factors at the individual, school, and district levels interact to shape teachers' digital technology skills (Hsu & Kuan, 2013), rather than any single factor acting alone (Lucas, Bem-Haja, Siddiq, Moreira, & Redecker, 2021). Petko, Prasse and Cantieni (2018) observe that teachers' motivation, school resources, and professional development opportunities are intertwined. However, while teacher motivation is undeniably crucial, it alone may not be sufficient to determine their proficiency in digital technology. Additionally, systemic inequalities persist due to the intersectionality of factors such as race, gender, and access to technology (Campbell, 2020; Martin, Wassell, & Scantlebury, 2013).

Ultimately, the effectiveness of technology lies not just in its presence but in its integration into the learning process itself (Higgins, Xiao, & Katsipataki, 2012; Jack & Higgins, 2019). For instance, collaborative and consistent use of technology tends to yield more positive learning outcomes compared to sporadic or individual use. Hence,

teachers must consider factors such as students' socioeconomic backgrounds, learning styles, and individual abilities when incorporating technology to enhance learning outcomes (Zinger, Tate, & Warschauer, 2017). However, despite the potential benefits, some teachers still harbor concerns about their ability to effectively utilize digital technology (Aulpaijikul, Songkram, & Tantrarungroj, 2022), often due to inadequate training and limited personal experiences in this domain (Aulpaijikul, Songkram, & Tantrarungroj, 2022).

3. Method

The research methodology section of a quantitative study acts as a roadmap, delineating the approach, procedures, and techniques utilized for data collection and analysis. Here, we elucidate the research design, participants, instrumentation, data collection procedures, and data analysis methods employed in the study. This comprehensive overview enables readers to assess the validity and reliability of the study's findings. Consequently, we conducted a survey study to explore the confidence levels and digital technology needs of secondary school teachers.

3.1 Participants

A purposive and convenient sampling method was employed in secondary schools located in Maha Sarakham province, Thailand, where the researcher's affiliated university is situated. Invitations were extended to the principals of each school, and upon their agreement to participate, they were asked to nominate two teachers from their respective schools to take part in the survey. As a result, 330 schools and 660 teachers consented to complete the questionnaire. Subsequently, 618 teachers returned the completed questionnaire, resulting in a response rate of 93.63%.

The demographic profile of the respondents is outlined in Table 1. Of the participants, 55% were female and 45% were male. Approximately half of the respondents held a bachelor's degree, while the remaining half held a graduate degree. Nearly 30% of the teachers had less than 10 years of teaching experience, with similar proportions for those with teaching experience ranging between 10 to 20 years and 21 to 30 years, while nearly 9% had over 30 years of teaching experience. In terms of age distribution, approximately 35% of the respondents were aged between 31 to 40, 28% were over 51 years old, 24% were between 41 to 50 years old, and 13% were under 30 years old.

Table 1. Background of respondents

Feature	Frequency	%
Gender		
male	275	44.50
Female	343	55.50
Age		
No more than 30 years	79	12.78
31–40 years	219	35.44
41–50 years	147	23.79
Over 50 years	173	27.99
Degree		
Graduate	305	49.35
University	313	50.65
Teaching experience		
No more than 10 years	198	32.04
11–20 years	190	30.74
21–30years	176	28.48
Over 30years	54	8.74
Total	618	100

3.2 Instrumentations

regarding both their proficiency levels and their professional development (PD) needs concerning digital technology. To ensure the questionnaire's relevance and comprehensiveness, a thorough literature review was conducted on Thai studies focusing on digital technology. This review helped identify the key dimensions and corresponding indicators of secondary teachers' technological competency. Subsequently, eight experts specializing in educational technology and working in educational administration were invited to review and refine these dimensions and indicators.

The questionnaire is structured into four components, each comprising several indicators that informed the

development of specific questions. The first component, technology literacy, encompasses four indicators: knowledge retrieval, problem explanation, information integration, and communication skills. Questions within this component aim to assess teachers' overall familiarity and proficiency with digital technology, including their ability to use technology to address and elucidate student learning challenges. The second component, technology practice, evaluates teachers' capacity to apply their digital skills in the classroom. Its four indicators include lesson planning, technology implementation, creating an engaging learning environment, and ongoing lesson enhancement. The final two components, problem-solving and adaptability, focus on assessing teachers' ability to tackle practical challenges, overcome obstacles, and continuously learn throughout their teaching careers. For example, a question related to problem-solving might ask respondents about their willingness to try various approaches to address issues encountered with digital technology, while adaptability might inquire whether teachers are interested in pursuing further learning opportunities in digital technology.

The questionnaire consists of 67 items, presented on a 5-point Likert Scale. Teachers were asked to select the response that best reflects their abilities or needs concerning digital technology, choosing from the options: strongly disagree, disagree, neutral, agree, and strongly agree. Each response, ranging from strongly disagree (1) to strongly agree (5), was assigned a corresponding numerical code. The total score achievable on the questionnaire is 335.

3.3 Statistic

Descriptive statistics were utilized to provide an overview of the participants' backgrounds and their current as well as self-perceived levels of digital technology competency. Additionally, an independent t-test was employed to assess whether significant differences existed based on various background factors among the participants.

4. Results

The findings of this section presents the results of the data analysis, providing a detailed account of the patterns, trends, and relationships identified in the data. In this section, we interpret and discuss the quantitative findings in relation to the research questions or hypotheses. Through statistical analysis and data visualization, we elucidate the key findings, highlight significant correlations, and offer insights into the implications of the results. This section aims to provide a clear and coherent narrative of the study's empirical outcomes, facilitating an understanding of the research findings and their implications for theory, practice, and future research.

4.1 Teachers' Confidence

Table 2 presents the mean and standard deviation (SD) of teachers' proficiency levels and demands regarding digital technology. Overall, the mean score of 3.60 with an SD of 0.82 across the full scale suggests a moderate to high level of confidence in their digital technology abilities. Among the specific competencies, teachers scored highest in problem-solving (Mean = 3.79, SD = 0.93), indicating their confidence in utilizing digital technology to address students' learning needs effectively. This was closely followed by adaptability, with a mean of 3.63 and SD of 1.22, indicating teachers' willingness to embrace new knowledge and skills in digital technology. The mean and SD for practicing technology were 3.57 and 0.96, respectively, reflecting teachers' confidence in implementing digital technology in their teaching practices and integrating it into their lessons. However, the lowest scores were observed in technology literacy (Mean = 3.28, SD = 1.36), suggesting a moderate level of confidence among teachers in their digital technology abilities.

4.2 Teachers' Demand for PD Program

Regarding the overall demand for professional development (PD) programs, teachers attained an average score of 4.62 with a standard deviation (SD) of 0.52, indicating a robust desire for initiatives aimed at enhancing their digital technology abilities. Specifically, within the technology literacy component, teachers achieved an average score of 4.70 (SD = 0.59), signifying a strong consensus on the necessity of improving their literacy skills in technology. Similarly, in practical technology skills, the average score was 4.61 with an SD of 0.64, reflecting a unanimous agreement among respondents regarding the imperative to enhance their proficiency in digital technology skills. Furthermore, teachers scored an average of 4.57 with an SD of 0.68 in the problem-solving skills subscale, and 4.59 with an SD of 0.66 in adaptivity, indicating a strong inclination towards improving their abilities in problem-solving and adaptability.

Table 2. Mean and SD of the survey result

Component	Confidence Mean (SD)	Demand Mean (SD)
1. Technology Literacy	3.28 (1.36)	4.62 (.61)
2. Practicing technology	3.57 (.96)	4.61 (.64)
3. Problem-solving skills	3.79 (.93)	4.57 (.68)
4. Adaptivity	3.63 (1.22)	4.59 (.66)
Full scale	3.60 (.82)	4.62 (.52)

4.3 Difference Between Ability and Demand

Table 3 presents the t-test results of teachers' confidence in using digital technology compared to their demand for digital technology. Across the full scale, a noteworthy difference emerged between confidence and demands among the teachers, with a statistically significant result of $t(617) = 28.88, p < .000$. Similarly, significant differences were observed in the technology literacy component, $t(617) = 20.34, p < .000$, as well as in practicing technology and problem-solving skills, with $t(617) = 19.37, p < .000$, and $t(617) = 22.54, p < .000$, respectively. Additionally, a significant difference was found in adaptability, with a t-test result of $t(617) = 26.84, p < .000$.

Table 3. T-test between ability and demand for digital technology

	Mean	SD	Std Error Mean	95% confidence interval of difference		t	df	sig.
				Lower	Upper			
Full scale	68.27	58.75	2.36	63.63	72.91	28.88	617	.000***
Tech literacy	15.36	18.77	.75	13.87	16.84	20.34	617	.000***
Practicing tech	12.30	15.80	.64	11.06	13.55	19.37	617	.000***
Problem-solving skills	13.97	15.40	.62	12.75	15.18	22.54	617	.000***
Adaptability	26.65	24.68	.99	24.70	28.60	26.84	617	.000***

4.4 Background Factors and Confidence and Demand

Table 4 presents the results of an F test conducted on the full scale of confidence in technology ability and PD demand according to gender. The analysis revealed no significant difference between males and females in their self-reported confidence in using digital technology, with an F value of 0.84 and p-value of 0.36. Likewise, no statistically significant gender differences were observed in the teachers' demand for professional development programs related to digital technology, as indicated by an F value of 1.42 and p-value of 0.23

Table 4. ANOVA of full scale by gender

		Sum of Squares	df	Means Square	F	P
Full scale of confidence	SSb	2574.08	1	2574.08	.84	.36
	SSw	1885532.94	616	3060.93		
	SSt	1888107.01	617			
Full scale of demand	SSb	1728.37	1	1728.37	1.42	.23
	SSw	749562.77	616	1216.82		
	SSt	751291.14	617			

Table 5 presents the results of an F test conducted on the full scale of confidence in digital technology ability and PD demands across different age groups. The analysis revealed that respondents across four age categories did not significantly differ in their overall confidence levels, with an F value of 1.53 and p-value of 0.12. Similarly, no statistical significance was found in the demand for digital technology professional development programs across various age categories, as indicated by an F value of 0.65 and p-value of 0.59.

Table 5. ANOVA of full scale by teaching experience

		Sum of Squares	df	Means Square	F	P
Full scale of confidence	SSb	1494.90	3	498.30	.16	.92
	SSw	1886612.11	614	3072.66		
	SSt	1888107.01	617			
Full scale of demand	SSb	3784.52	3	1261.51	1.04	.38
	SSw	747506.62	614	1217.44		
	SSt	751291.15	617			

Table 6. ANOVA of full scale by educational degree

		Sum of Squares	df	Means Square	F	P
Full scale of confidence	SSb	845.13	1	845.13	.28	.60
	SSw	1880573.15	615	3057.84		
	SSt	1881418.28	616			
Full scale of demand	SSb	247.44	1	247.44	.20	.65
	SSw	750772.56	615	1220.77		
	SSt	751020.00	616			

As depicted in Table 6, the results of the ANOVA test indicated that there were no significant differences in digital technology confidence and demand between teachers holding Bachelor's degrees and those with postgraduate degrees. The F values were found to be 0.29 and 0.20, with corresponding p-values of 0.60 and 0.65, respectively.

4. Discussion

This study investigated the self-reported confidence levels of Thai secondary teachers in using digital technologies and their perceived needs for professional development (PD) programs. The findings indicated that, overall, Thai teachers expressed moderate to strong confidence in their practical application of digital technology, problem-solving skills, and adaptability. However, confidence levels were relatively lower in the domain of digital literacy. Despite this perceived competence in several areas, there was a notable demand for PD programs across all aspects of digital technology skills. Significant differences were observed between teachers' self-reported confidence and their demand for PD in these various domains. Additionally, background variables such as age, teaching experience, gender, and educational level did not appear to significantly influence either teachers' confidence in digital technology or their demand for PD.

These findings indicate that although Thai secondary teachers generally demonstrate moderate to strong confidence in using digital technologies, they still express a strong desire to enhance their skills and knowledge in this domain. Moreover, background variables such as age, teaching experience, gender, and educational level do not appear to significantly impact teachers' confidence in their digital technology skills or their demand for professional development (PD) programs. This suggests that Thai teachers, irrespective of their backgrounds, exhibit a high level of confidence and a keen interest in pursuing professional development opportunities in digital technology.

However, the impact of teacher background factors on digital technology confidence and PD demands requires deeper investigation. Existing literature offers conflicting findings in this regard. While some studies suggest that factors like gender (Deepika et al., 2017), educational level (Kent & Giles, 2017; Njiku et al., 2022), and teaching experience (Njiku et al., 2022) significantly influence teachers' utilization of digital technologies in their teaching, others have failed to establish such correlations (Giordano, 2007; Hernandez-Ramos, 2005).

One plausible reason for the conflicting findings regarding background factors is that contextual variables might wield more influence than personal characteristics, even if the latter do have some impact. For instance, studies by Saenkhot and Boonmoh (2019) and Wong (2016) suggest that while age and teaching experience modestly affect teachers' adoption of digital technologies, this influence can be overshadowed by factors like resource availability and administrative support. Moreover, research conducted by Afari et al. (2023) proposes that self-efficacy might serve as a mediating factor, shaping the relationship between personal characteristics and teachers' utilization of digital technologies in practice. Future studies are needed to delve deeper into this intricate dynamic. Additionally, Buabeng-Andoh (2012) points out the potential moderating role of generational differences, positing that younger teachers, who have grown up immersed in the digital era, may inherently possess a higher level of digital fluency, thereby potentially mitigating the impact of teaching experience or age.

Finally, it's important to acknowledge several limitations that need to be considered when interpreting and

applying the findings of this study. Firstly, the use of purposive and convenience sampling methods raises concerns about the generalizability of the results to the broader population of Thai secondary teachers. Purposive sampling involves selecting participants based on specific criteria, while convenience sampling relies on selecting participants who are readily available. These methods may result in samples that are not fully representative of the entire population. Secondly, the study did not assess the validity and reliability of the questionnaire, which was developed based on a literature review. Without a pilot test to evaluate the instrument's psychometric properties, the robustness of the questionnaire remains uncertain. Future research should employ random sampling techniques to ensure a more representative sample and conduct a pilot test to establish the validity and reliability of the research instrument.

5. Conclusion

This study aimed to explore the confidence of Thai secondary teachers in using digital technologies and their perceived need for professional development (PD) programs. A questionnaire was developed, covering four key domains: digital literacy, practical application of digital technology, problem-solving skills, and adaptability. The findings indicated that teachers demonstrated moderate to strong confidence across all these domains. Interestingly, despite this perceived competence, the study revealed an exceptionally high demand for PD programs. Moreover, the analysis found that background variables such as age, teaching experience, gender, or educational level did not significantly influence these results. Consequently, the study underscores the pressing necessity for comprehensive in-service training programs to enhance Thai secondary teachers' digital technology skills, regardless of their background or self-reported confidence levels. However, it's essential to acknowledge potential limitations to the study's rigor. Concerns about the representativeness of the participants and the validity of the research instrument warrant further investigation in future research endeavors.

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Data sharing statement

No additional data are available.

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