
Teachers' Knowledge and Attitude Towards Digital Assistive Tools in Inclusive Settings

ERWIN RAE C. UGDAMIN

Pangasinan State University, School of Advanced Studies, 2428 Urdaneta, City
ugdaminerwin@gmail.com

ELIZABETH F. EPISCOPE, EdD

Pangasinan State University, School of Advanced Studies, 2428 Urdaneta, City

Abstract — This study examined teachers' knowledge and attitude toward digital assistive tools in inclusive settings in Rayong, Thailand. Guided by the principles of inclusive education and technology integration, the study investigated teachers' levels of knowledge and attitudes toward digital assistive tools, the extent of teachers' needs for assistive technologies, the challenges encountered in technology integration, and the relationship between teachers' profile variables and their competence in utilizing digital assistive tools in inclusive classrooms. A mixed-method descriptive-correlational research design was employed involving 250 teachers from selected public and private schools in Rayong Province, Thailand, who were teaching or had prior experience teaching learners with diverse educational needs. Data were collected using a researcher-developed questionnaire validated by experts and supplemented with qualitative responses from selected participants. Quantitative data were analyzed using descriptive statistics (frequency, percentage, and weighted mean) and inferential statistics (correlation), while qualitative responses were examined using thematic analysis and text mining techniques. Findings revealed that teachers demonstrated high levels of knowledge and positive attitudes toward the utilization of digital assistive tools in inclusive education settings. Female teachers showed slightly higher competence than male teachers, while other profile variables showed only limited significant relationships with competence levels. Teachers also expressed a high need for digital assistive technologies, particularly access to technological devices, training opportunities, and instructional resources. However, challenges such as unstable internet connectivity, insufficient technological resources, limited training opportunities, and technical difficulties affected the effective integration of digital assistive tools in classroom instruction. Despite these challenges, teachers employed various coping strategies, including self-directed learning, collaboration with

colleagues, and participation in professional development activities. The findings underscore the importance of continuous teacher training, institutional support, and improved technological infrastructure in strengthening inclusive education practices and enhancing the effective utilization of digital assistive tools in schools.

Keywords: knowledge, attitude, inclusive settings, ADHD, digital assistive tools, utilization

I. INTRODUCTION

Attention-Deficit/Hyperactivity Disorder (ADHD) is a prevalent neurodevelopmental condition that affects many school-aged children worldwide. It is characterized by persistent patterns of inattention, hyperactivity, and impulsivity that affect learning, behavior, and academic performance (Salari et al., 2023). Students with ADHD commonly experience difficulties related to concentration, organization, motivation, and task completion, which often create challenges in inclusive classroom settings (Tosto et al., 2020). These difficulties may also increase teachers' workload and affect the teaching and learning process (DeShazer et al., 2023).

In Thailand, ADHD remains a significant educational concern. Previous studies reported that many Thai learners experience ADHD-related difficulties that affect classroom participation and academic achievement (Sarisuta et al., 2023). As inclusive education continues to expand, teachers are expected to implement instructional strategies and interventions that support learners with diverse educational needs. This highlights the importance of providing teachers with adequate knowledge, skills, and technological resources to effectively manage inclusive classrooms.

Digital assistive tools have emerged as important resources in supporting learners with ADHD and other special educational needs. These technologies include visual schedules, speech-to-text applications, text-to-speech software, organizational tools, and interactive learning platforms designed to improve focus, participation, motivation, and self-management among learners (Wong et al., 2023). Digital assistive technologies also help teachers personalize instruction and create more engaging and accessible learning environments for diverse learners (Alexopoulou & Batsou, 2023).

Despite the increasing availability of digital technologies in education, teachers continue to struggle to effectively integrate digital assistive tools into classroom instruction. Limited technological resources, insufficient training opportunities, unstable internet connectivity, and inadequate institutional support remain common barriers affecting technology integration in inclusive classrooms (Loveys & Butler, 2023). Teachers' knowledge and attitudes toward digital assistive technologies also influence their competence and willingness to use these tools to support learners with diverse educational needs (Stalmach et al., 2023).

Although previous studies have explored technology integration and inclusive education practices, limited localized research has focused on teachers' knowledge and attitudes toward digital assistive tools in Rayong Province, Thailand. Therefore, this study aimed to examine teachers' knowledge and attitudes toward digital assistive tools in inclusive education settings in Rayong, Thailand. Specifically, the study sought to determine teachers' levels of knowledge and attitudes, identify the challenges encountered in technology integration, assess teachers' needs for digital assistive tools, and examine the relationship between teachers' profile variables and their competence in utilizing these technologies.

Literature Review

Inclusive education promotes equal learning opportunities for all learners, regardless of ability, disability, or background (Yasin et al., 2023). It emphasizes participation, accessibility, and equity within regular classroom settings while ensuring that learners with diverse educational needs receive meaningful educational support (Triviño-Amigo et al., 2022). Among learners in inclusive settings, students with Attention-Deficit/Hyperactivity Disorder (ADHD) commonly experience difficulties related to attention, impulsivity, hyperactivity, organization, and task completion, which often affect academic performance and classroom participation (Koutsoklenis & Honkasilta, 2023; Wagner et al., 2024). Consequently, teachers are required to implement appropriate instructional strategies and interventions that support learners with ADHD and other special educational needs.

Digital assistive tools have become valuable resources in promoting inclusive education and supporting learners with ADHD. These technologies include visual schedules, organizational

applications, speech-to-text software, text-to-speech tools, interactive learning platforms, and other digital resources designed to improve focus, participation, motivation, and self-management skills among learners (Wong et al., 2023; Gkora, 2024). Digital assistive technologies also enable teachers to personalize instruction, enhance accessibility, and provide engaging learning experiences that support diverse learning needs (Alexopoulou & Batsou, 2023). Studies have shown that assistive technologies significantly improve learners' concentration, classroom engagement, and academic performance in inclusive settings.

Teachers' knowledge and attitudes toward digital assistive tools play an important role in the successful integration of technology in inclusive classrooms. Teachers with sufficient technological and pedagogical knowledge are better able to select appropriate digital tools, adapt instructional materials, and implement technology-supported interventions for learners with diverse educational needs (Campado et al., 2023). Likewise, positive attitudes toward assistive technologies encourage teachers to integrate digital tools more effectively into classroom instruction (Pozas et al., 2022). According to the Technological Pedagogical Content Knowledge (TPACK) framework, successful technology integration requires integrating technological, pedagogical, and content knowledge (Davies & West, 2013). Teachers who possess competence in these areas are more likely to create inclusive, engaging, and technology-enhanced learning environments (Mnguni et al., 2024).

Despite the benefits of digital assistive technologies, teachers continue to encounter challenges in technology integration. Common barriers include insufficient training opportunities, limited technological resources, unstable internet connectivity, lack of institutional support, low digital literacy, and technical difficulties (Loveys & Butler, 2023). Time constraints, fear of technical failure, and limited confidence in technology use also affect teachers' willingness to utilize assistive technologies effectively in classroom instruction (Weinhandl et al., 2025). Studies further emphasized that continuous professional development, administrative support, and collaborative learning environments are essential in strengthening teachers' competence and confidence in utilizing digital assistive tools in inclusive education settings (Siyam et al., 2025; Ramadhan et al., 2025).

Previous studies consistently reported that teachers generally demonstrate positive attitudes toward assistive technology despite existing barriers related to training, resources, and

institutional support. Kundu et al. (2025) and Retiro et al. (2025) found that teachers recognized the importance of assistive technologies in improving student engagement and learning outcomes in inclusive classrooms. However, studies also revealed that inadequate access to assistive technologies and insufficient professional training remain major concerns affecting effective implementation (Seiradakis, 2024; Abu-Alghayth, 2020). Although several international and local studies have explored technology integration and inclusive educational practices, limited localized research has focused on teachers' knowledge and attitudes toward digital assistive tools in Rayong Province, Thailand. Therefore, this study was conducted to provide evidence-based insights that may strengthen inclusive education practices and improve the effective integration of digital assistive technologies in schools.

II. METHODOLOGY

This study employed a mixed-method descriptive-correlational design to examine teachers' knowledge and attitudes toward digital assistive tools in inclusive settings in Rayong, Thailand. The quantitative component determined respondents' demographic profiles, levels of knowledge and attitudes, the extent of their need for digital assistive tools, and the challenges encountered in technology integration. The qualitative component explored teachers' experiences and coping strategies for using digital assistive tools in inclusive classrooms.

The respondents consisted of 250 randomly selected teachers from public and private schools in Rayong Province, Thailand. All participants were either currently teaching or had previous experience teaching learners with diverse educational needs in inclusive settings. Stratified random sampling was employed to ensure adequate representation from both public and private schools. For the qualitative phase, 10 teachers were purposively selected to provide in-depth accounts of their experiences and coping strategies regarding the use of digital assistive tools in inclusive education.

Data were collected using a researcher-developed questionnaire validated by experts in inclusive education and educational research. The instrument comprised six sections: demographic profile; teachers' knowledge of digital assistive tools; attitudes toward the use of such tools in inclusive classrooms; the extent of need for digital assistive tools; challenges encountered in their

integration and utilization; and open-ended questions that elicited qualitative responses regarding teachers' experiences and coping strategies.

Prior to data collection, approval to conduct the study was obtained from relevant school administrators and educational authorities. Respondents were informed of the study's objectives, and informed consent was secured before participation. Questionnaires were personally distributed and retrieved upon completion. Follow-up interviews and written responses were also conducted to enrich the qualitative data.

Ethical principles were strictly observed throughout the study. Participation was voluntary, and respondents were informed of their right to withdraw from the study at any stage without penalty. Confidentiality and anonymity were ensured by treating all gathered information with strict confidentiality and using the data solely for academic and research purposes.

Descriptive statistics, including frequency counts, percentages, and weighted means, were used to analyze respondents' profiles, levels of knowledge and attitudes, extent of need for digital assistive tools, and seriousness of challenges encountered. Pearson's correlation, point-biserial correlation, and Spearman's rho were employed to determine the relationships between respondents' profile variables and their competence in using digital assistive tools. Qualitative data were analyzed using thematic analysis and text mining to identify recurring themes and patterns in teachers' experiences and coping strategies in inclusive education settings.

III. RESULTS AND DISCUSSIONS

TABLE 1
PROFILE OF THE TEACHERS IN RAYONG, THAILAND

Profile	Categories	f	%
Age	20 - 29	91	36.4
Sec	Female	179	71.6
Type of School	Public	128	51.2
Grade Level Taught	Primary	99	39.6

The findings revealed that most respondents were teachers aged 20–29 years (36.4%), female (71.6%), from public schools (51.2%), and teaching at the primary grade level (39.6%). These findings indicate that the teaching workforce involved in inclusive education in Rayong, Thailand, is largely composed of young adult female teachers assigned to primary education.

TABLE 2
TEACHERS' LEVEL OF COMPETENCE IN USING DIGITAL ASSISTIVE TOOLS IN TERMS OF KNOWLEDGE AND ATTITUDE

Variables	Overall Mean	Interpretation
Knowledge	4.08	Competent
Attitude	4.38	Highly Competent

Legend: 4.51–5.00 = Highly Competent; 3.21–4.50 = Competent; 2.41–3.20 = Moderately Competent; 1.81–2.40 = Slightly Competent; 1.00–1.80 = Not Competent.

The findings revealed that teachers demonstrated competence in using digital assistive tools in inclusive settings. Teachers' knowledge had an overall mean of 4.08, indicating Competent, indicating that respondents possessed an adequate understanding of the functions, purposes, and applications of digital assistive technologies in supporting learners with diverse educational needs. Meanwhile, teachers' attitudes toward digital assistive tools yielded an overall mean of 4.38, indicating a Highly Competent level, suggesting that respondents generally held positive perceptions of the effectiveness and importance of digital assistive technologies in inclusive classrooms.

The findings imply that teachers are both knowledgeable and receptive toward the integration of digital assistive tools in teaching and learning processes. Their familiarity with technology and willingness to explore emerging educational tools may contribute to more effective inclusive practices. These findings support the studies of Tercero, Delos Reyes, and Nina (2025) which emphasized that teachers' competence in digital assistive technologies enhances inclusive classroom practices. Similarly, the findings are consistent with those of Aldagamseh et al., (2026) who highlighted teachers' positive perceptions of the role of digital assistive technologies in improving learning outcomes and supporting inclusive education.

TABLE 3
CORRELATION ANALYSIS BETWEEN THE TEACHERS' PROFILES AND THEIR
LEVEL OF COMPETENCE IN USING DIGITAL ASSISTIVE TOOLS

Profile		Knowledge	Attitudes
Age	r_p	-0.062	-0.016
	sig	0.333	0.800
Sex	r_{pb}	0.175**	0.134*
	sig	0.006	0.034
Type of School	r_{pb}	-0.116	-0.078
	sig	0.067	0.220
Grade Level Taught	r_s	0.028	-0.003
	sig	0.661	0.961

Legend: ** - Significant at 0.01, * - Significant at 0.05

The findings revealed that only sex showed a statistically significant relationship with teachers' competence in both knowledge ($r_{pb} = 0.175$, $p = 0.006$) and attitude ($r_{pb} = 0.134$, $p = 0.034$). The positive correlation indicates that female teachers demonstrated slightly greater competence in using digital assistive tools than male teachers.

On the other hand, age, type of school, and grade level taught showed no significant relationship with teachers' competence, as indicated by p-values greater than 0.05. This suggests that competence in using digital assistive tools may depend more on teachers' exposure, training, and professional development opportunities rather than demographic characteristics alone.

The findings support the Technology Acceptance Model of Fred Davis, which explains that technology use is influenced by perceived usefulness and ease of use. The results also support

the studies of Teo (2008) and Albirini (2006), which emphasized that positive attitudes toward technology contribute to effective technology integration in educational settings.

TABLE 4
EXTENT OF TEACHERS' NEED FOR DIGITAL ASSISTIVE TOOLS
IN INCLUSIVE SETTINGS

Need	HN		N		MN		SN		NN	
	f	%	f	%	f	%	f	%	F	%
1 Availability of digital assistive tools in schools	124	49.6	94	37.6	28	11.2	4	1.6	0	0.0
2 Training programs for teachers on digital tools	131	52.4	80	32.0	37	14.8	2	0.8	0	0.0
3 Technical support for tool installation and maintenance	146	58.4	73	29.2	30	12.0	1	0.4	0	0.0
4 Reliable internet connection and digital infrastructure	175	70.0	41	16.4	30	12.0	4	1.6	0	0.0
5 Access to updated assistive software and applications	158	63.2	57	22.8	29	11.6	6	2.4	0	0.0
6 Administrative support for technology integration	141	56.4	79	31.6	29	11.6	1	0.4	0	0.0
7 Budget allocation for purchasing digital tools	143	57.2	57	22.8	39	15.6	10	4.0	1	0.4
8 Collaboration opportunities to share best practices	133	53.2	83	33.2	28	11.2	5	2.0	1	0.4
9 Continuous professional development on inclusive technology use	139	55.6	80	32.0	27	10.8	4	1.6	0	0.0
10 Awareness of available assistive technologies	157	62.8	65	26.0	27	10.8	1	0.4	0	0.0

Overall Mean = 4.42 - Highly Needed

Legend: Modal values are in boldface

4.21 – 5.00: Highly Needed (HN); 3.21 – 4.20: Needed (N), 2.41 – 3.20: Moderately Needed (MN), 1.81 – 2.40: Slightly Needed (SC), 1.00 – 1.80: Not Needed (NN)

The finding reveals that teachers demonstrated a high level of need for digital assistive tools in inclusive settings, as reflected by the overall weighted mean of 4.42, interpreted as Highly Needed. Among the indicators, reliable internet connection and digital infrastructure obtained the highest responses under the Highly Needed category, indicating the importance of technological accessibility in supporting inclusive education.

The findings suggest that teachers recognize the value of digital assistive tools in addressing diverse learning needs and improving instructional delivery for learners with disabilities, ADHD, and other learning challenges. These findings support the study of Quiño-Justol (2024), which emphasized that digital assistive technologies help reduce learning barriers, personalize instruction, enhance student engagement, and promote equitable learning opportunities in inclusive classrooms.

TABLE 5
EXTENT OF CHALLENGES ENCOUNTERED BY TEACHERS IN USING DIGITAL ASSISTIVE TECHNOLOGIES

Challenges		VHC		HC		MC		LC		VL	
		f	%	f	%	f	%	f	%	f	%
1	Lack of access to appropriate digital assistive tools or updated software for inclusive teaching	49	19.6	83	33.2	101	40.4	17	6.8	0	0.0
2	Limited training or insufficient technical knowledge to operate digital assistive tools effectively	53	21.2	100	40.0	84	33.6	12	4.8	1	0.4
3	Poor or unstable internet connection that affects the use of online digital tools	31	12.4	84	33.6	103	41.2	31	12.4	1	0.4
4	Inadequate administrative or technical support from the school in implementing digital tools	48	19.2	110	44.0	65	26.0	27	10.8	0	0.0
5	Lack of time to prepare, explore, and integrate digital assistive tools in lesson planning	32	12.8	78	31.2	105	42.0	35	14.0	0	0.0

6	Difficulty adapting or customizing digital tools to meet students' diverse learning needs	27	10.8	94	37.6	101	40.4	24	9.6	4	1.6
7	Limited opportunities for collaboration or sharing of best practices with colleagues	61	24.4	81	32.4	79	31.6	26	10.4	3	1.2
8	Frequent technical issues such as device malfunction, software errors, or compatibility problems	36	14.4	64	25.6	113	45.2	32	12.8	4	1.6
9	Insufficient school funding or budget allocation for acquiring and maintaining digital tools	67	26.8	70	28.0	74	29.6	37	14.8	2	0.8
10	Lack of motivation or confidence in using new technologies for teaching	50	20.0	67	26.8	105	42.0	25	10.0	3	1.2
11	Limited awareness of available digital assistive tools suitable for students with special or diverse needs	53	21.2	69	27.6	101	40.4	25	10.0	2	0.8
12	Overreliance on traditional teaching methods that hinder technology adoption	40	16.0	92	36.8	88	35.2	26	10.4	4	1.6
13	High student-to-teacher ratio that limits time for individualized support using digital tools	46	18.4	92	36.8	66	26.4	44	17.6	2	0.8
14	Difficulty in evaluating the effectiveness of digital assistive tools in improving learning outcomes	37	14.8	98	39.2	90	36.0	22	8.8	3	1.2
15	Lack of continuous professional development opportunities focused on digital inclusion	68	27.2	84	33.6	78	31.2	20	8.0	0	0.0

Overall Mean = 3.59 - High Challenge

Legend: Modal values are in boldface

4.21 – 5.00: Very High Challenge (VHC); 3.21 – 4.20: High Challenge (HC), 2.41 – 3.20: Moderate Challenge (MC), 1.81 – 2.40: Low Challenge (LC), 1.00 – 1.80: Very Low Challenge (VLC)

The findings revealed that teachers experienced a high level of challenge in utilizing digital assistive tools, with an overall mean of 3.59 interpreted as High Challenge. The most common challenges included limited professional development opportunities, insufficient funding, inadequate technical support, limited training, and unstable internet connectivity. The findings suggest that despite teachers' competence and positive attitudes toward digital assistive technologies, institutional and technological barriers continue to affect effective technology integration in inclusive classrooms. These findings support the studies of Ogondiek (2025) and Karanjakwut and Sripicharn (2024), which identified inadequate resources, insufficient training, and unstable technological infrastructure as major barriers to the effective utilization of assistive technologies in education. To further explore these challenges, qualitative findings were presented through a word cloud and topic coherence analysis in Figures 1 and 2.



FIGURE 1
WORD CLOUD OF THE TERMS USED TO DESCRIBE THE CHALLENGES IN THE UTILIZATION OF DIGITAL ASSISTIVE TOOLS IN INCLUSIVE SETTINGS

The prominent terms in the figure, such as “digital,” “tools,” “students,” “internet,” and “training,” indicate that teachers recognize the importance of digital assistive technologies but continue to face challenges with technological resources and professional development. The findings suggest that effective technology integration in inclusive classrooms requires adequate infrastructure, continuous training, and institutional support. These results support the Technology Acceptance Model of Davis (1989), which explains that technology utilization is influenced by perceived usefulness and ease of use.

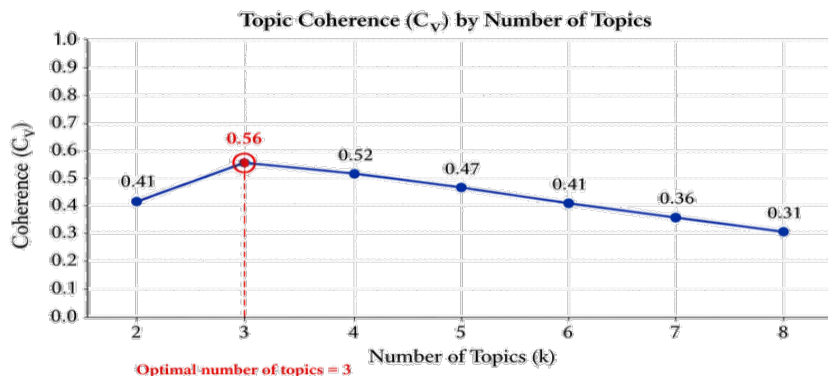


FIGURE 2
TOPIC COHERENCE BY NUMBER OF TOPICS

The findings revealed that the highest topic coherence score was observed at three topics, indicating that the three-topic model provided the clearest organization of the qualitative responses. The identified themes reflected the common challenges, coping strategies, and support needs of teachers in utilizing digital assistive technologies in inclusive classrooms.

TABLE 6
IDENTIFIED TOPIC USING LATENT SEMANTIC INDEXING

Topic	Topic Label (Interpretation)	Top Terms	Key Themes
1	Infrastructure & Resource Constraints	internet, devices, connection, technical, problems, malfunction, software, resources, tools, infrastructure	Challenges related to poor internet connection, limited devices, and technical problems that disrupt teaching and learning.
2	Teacher Adaptation Strategies	materials, prepare, group, activities, backup, practice, applications, collaboration, management, time	Strategies and practices used by teachers to cope with challenges, including preparation, grouping students, and using alternative materials.
3	Support Systems & Professional Needs	training, support, administration, workshops, policies, assistants, parents, professional, development, communication	Need for training, administrative support, clear policies, and parental involvement to enhance digital tool integration.

The findings revealed three major themes regarding teachers' utilization of digital assistive technologies in inclusive classrooms: infrastructure and resource constraints, teacher adaptation strategies, and support systems and professional needs. Teachers identified unstable internet connection, limited technological resources, and technical issues as major barriers affecting technology integration. Teachers also reported using alternative instructional strategies and materials to cope with these challenges, while emphasizing the need for continuous professional development, administrative support, and training opportunities. The findings suggest that effective integration of digital assistive tools requires not only adequate technological resources but also strong institutional and professional support in inclusive settings.

V. CONCLUSION

The study revealed that teachers demonstrated competent knowledge and highly positive attitudes toward the use of digital assistive tools in inclusive settings. The findings indicate that teachers recognize the importance of digital assistive technologies in supporting learners with diverse educational needs and improving inclusive classroom practices. Although sex showed a significant relationship with teachers' competence, other profile variables such as age, type of school, and grade level taught were not significantly related, suggesting that competence in using digital assistive tools may depend more on training, exposure, and institutional support than on demographic characteristics alone.

The study further revealed that teachers have a strong need for digital assistive tools, particularly for reliable internet connections, updated digital resources, professional development opportunities, and institutional support. Despite teachers' competence and positive attitudes, they continue to encounter challenges related to technological infrastructure, limited resources, insufficient training, and technical difficulties that affect the effective integration of digital assistive technologies in inclusive classrooms.

Overall, the findings emphasize the significant role of digital assistive technologies in promoting inclusive education and improving learning opportunities for learners with special educational needs, including those with ADHD. The study highlights the importance of continuous professional development, improved technological infrastructure, adequate funding, and strong

administrative support to strengthen teachers' competence and confidence in integrating digital assistive tools into classroom instruction. Strengthening these support systems may contribute to more effective technology integration and improved inclusive educational practices in schools..

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