

AI Literacy Needs Assessment and Development Guidelines for Secondary School Administrators in Thailand

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Abstract

This study aimed to (1) study the needs assessment for developing artificial intelligence (AI) literacy among secondary school administrators under the Office of the Basic Education Commission in Thailand, and (2) study the guidelines for developing AI literacy among secondary school administrators in Thailand. The sample consisted of administrators from secondary schools under the Office of the Basic Education Commission (OBEC). Using Yamane's formula (1973) at a 95% confidence level, a sample of 342 schools was determined. Multi-stage sampling was employed by stratifying schools by region and school size. Data were collected using a needs assessment questionnaire on AI literacy and semi-structured interview guidelines for exploring development approaches. Quantitative data were analyzed using descriptive statistics and the Modified Priority Needs Index ($PNI_{Modified}$), while qualitative data were analyzed through content analysis. The research results were found as follows.

1. The overall needs assessment for developing AI literacy among secondary school administrators in Thailand showed a needs index ($PNI_{Modified} = 0.351$). When considered by individual aspects, the area with the highest need for development was using AI ($PNI_{Modified} = 0.361$), followed by knowing AI ($PNI_{Modified} = 0.360$), understanding AI ($PNI_{Modified} = 0.353$), evaluating AI ($PNI_{Modified} = 0.352$), and AI ethics ($PNI_{Modified} = 0.327$), respectively.

2. A study on guidelines for developing AI literacy among secondary school administrators in Thailand derived from this research encompassed four key components: a development principle grounded in the 70–20–10 learning model; three development methods comprising expert briefing, workshop, and field study trip; a four-level evaluation framework based on the

Kirkpatrick Model; and success conditions including adequate resource allocation, continuous professional learning, and a culture of embracing innovation.

Keywords: AI literacy; Needs assessment; Educational administration; Artificial intelligence in education; Professional development

Introduction

Artificial Intelligence (AI) has become a transformative force in nearly every sector of modern society, with education being one of the fields that must adapt. UNESCO (2023) has observed that AI is fundamentally transforming the essence of pedagogy, institutional administration, and the regulation of international educational policies. According to Microsoft Thailand (2025), the Thai government has set strategic goals to build an integrated AI ecosystem by 2030. One of these goals is to teach AI to the public. In 2025, the Office of the Basic Education Commission (OBEC) and Microsoft worked together to start the “AI for Teachers” project across the country. The goal was to improve the AI skills of teachers and other educational staff (Microsoft Thailand, 2025). Thailand has also been chosen to host the first UNESCO Global Forum on the Ethics of AI in Asia in 2025. This shows that the highest levels of government in Thailand understand how important AI is for education (UNESCO, 2025).

Even though there is a push for these kinds of policies, most of the programs that are already in place only help teachers in the classroom. This means that school leaders, who are in charge of making decisions, giving out resources, and making rules for the school, don’t have any organized way to learn about AI (Schrum & Levin, 2016). This presents a significant challenge, as research indicates that the sustained integration of technology within educational institutions hinges on school leaders’ proficiency in AI, specifically their capacity to employ it judiciously and effect meaningful transformations (Anderson & Creighton, 2021). A study examining AI competence among educators in Thailand, employing the UNESCO framework, revealed considerable shortcomings across all assessed areas; notably, older administrators demonstrated considerably lower competency levels relative to their younger counterparts (Watanapruksa & Kulophas, 2026). Furthermore, investigations into the development of digital competencies among Thai school administrators suggest a lack of a structured model tailored to this specific group (Porananond et al., 2024).

In academic discourse, Long and Magerko (2020) characterized AI literacy as a collection of skills that empower individuals to critically assess, articulate, and interact with AI technologies. Ng et al. (2021) developed a four-dimensional AI literacy framework that includes knowing and understanding AI, using and applying AI, evaluating and creating with AI, and AI ethics. Ng et al. (2024) later confirmed these dimensions in the areas of emotions, behavior, thought, and morality, showing that they are complete for use in schools. Almatrafi et al. (2024) conducted a systematic review of 87 empirical studies and discovered that the predominant focus of AI literacy research is on teachers and students, while school administrators are notably underrepresented. Tan et al. (2025) found that a major obstacle to effectively using AI in schools is the lack of AI knowledge among educational leaders. This is because administrators who don't understand AI can't make good decisions, allocate resources wisely, or create a culture of responsible AI use in their schools. In addition, Cukurova (2024) suggested that a framework for AI skills for teachers and school staff should include more than just teaching skills; it should also cover leadership and management skills. While AI literacy frameworks have been widely applied to teachers and students, the leadership dimension of AI literacy remains underexplored. In particular, there is a lack of empirical research examining how school administrators develop and apply AI competencies in real-world educational settings.

Within the Office of the Basic Education Commission, which oversees over 2,360 secondary schools nationwide during the 2025 academic year, the role of school administrators is crucial for effectively and ethically integrating AI. Adams (2025) found, in a comprehensive examination of AI and school leadership, that administrators with strong AI competencies are substantially better positioned to guide institutional adaptation to technological change, foster cultures of responsible innovation, and produce measurable improvements in student learning outcomes. Crompton and Burke (2023) also observed that the rapid growth of artificial intelligence requires educational leaders to continuously improve their skills to remain effective in their roles. Despite this, a review of the current research shows a notable lack of studies based on evidence that assess the AI literacy needs of Thai secondary school administrators. Consequently, there are no development guidelines that have been validated for this specific group. This gap constitutes the empirical and practical motivation for the present study. Accordingly this study employed a mixed methods design, combining quantitative survey data with qualitative interviews to assess AI literacy needs and develop context-specific guidelines.

Research Objectives

1. To study the needs assessment for developing artificial intelligence (AI) literacy among secondary school administrators under the Office of the Basic Education Commission in Thailand.
2. To propose evidence-based guidelines for developing AI literacy among secondary school administrators in Thailand.

Literature Review

1. Definition and Conceptualization of AI Literacy

A synthesis of relevant research and scholarly literature reveals that AI Literacy refers to a set of competencies enabling individuals to recognize, understand, use, evaluate, and make responsible, critical judgments about artificial intelligence. Several scholars have proposed frameworks that share similar core ideas. Long and Magerko (2020) identified four main AI literacy skills. Ng et al. (2021), through a systematic review of existing research, developed a four-part framework that includes knowledge and ethical considerations. Additionally, UNESCO (2022) created an AI competency framework for educators, which is divided into three levels of expertise. Combining these perspectives with the work of Holmes et al. (2022) and Miao et al. (2021), we can organize AI Literacy for secondary school administrators into five connected areas: Knowing AI, Understanding AI, Using AI, Evaluating AI, and AI Ethics.

2. Principles of Developing AI Literacy for Secondary School Administrators

The development of AI literacy for secondary school administrators in this research is grounded in the 70–20–10 Learning Model, developed by Lombardo and Eichinger (1996) from studies of leadership development in high-performing organizations. The model proposes that 70% of competency development arises from on-the-job experience, 20% from social and peer learning, and 10% from formal instruction. Jennings (2011) and Kajewski and Madsen (2012) confirmed that this framework promotes continuous learning with particular effectiveness in fast-changing knowledge domains, a characteristic that directly matches the rapid evolution of AI. Kolb's (1984) experiential learning theory provides theoretical support for the 70% component, Bandura's (1986) social learning theory underpins the 20% component.

3. Methods for Developing AI Literacy for Secondary School Administrators

The development methods for AI literacy in this research comprise three approaches: Expert Briefing, Workshop, and Field Study Trip. For expert briefing, Nonaka and Takeuchi (1996) identified explicit knowledge transfer from specialists as an essential mechanism for building new

organizational competencies, and Darling–Hammond et al. (2017) confirmed that experts can share specialized knowledge as coaches, facilitators, or mentors using technology to communicate with learners in various ways. For workshops, Guskey (2000) found that practice-oriented workshops produce greater behavioral change than lecture-only approaches, and Timperley et al. (2007), synthesizing more than 100 studies, reported that workshops emphasizing active learning yield the highest positive impact on changes in professional practice. For field study trips, Lave and Wenger (1991) argued through situated learning theory that the most powerful learning occurs in contexts where knowledge is applied in practice, and Darling–Hammond et al. (2017) confirmed that field study trips designed to enable observation, questioning, and reflection are among the most effective methods of professional development for educational leaders.

4. Guidelines for Evaluating AI Literacy for Secondary School Administrators

The evaluation framework for assessing AI literacy within this study is structured around the four-tiered Kirkpatrick Model. This model, initially conceived by Kirkpatrick (1994), was designed to gauge the efficacy of training initiatives and comprises Level 1 Reaction, Level 2 Learning, Level 3 Behavior, and Level 4 Results. Kirkpatrick and Kirkpatrick (2006) subsequently refined the original model, underscoring the value of a thorough evaluation across all four levels, as this approach yields complementary insights that are unattainable through a singular level of assessment. Furthermore, Alliger and Janak (1989), in their review of three decades of research utilizing the Kirkpatrick framework, concluded that a four-level evaluation facilitates the precise identification of areas in need of enhancement. Bates (2004) confirmed that despite theoretical critiques, the model remains the most widely accepted practical evaluation framework in organizational settings, and Ng et al. (2021) proposed AI literacy assessment indicators that map directly onto each Kirkpatrick level, making the model well-suited for systematic evaluation of AI literacy programs for school administrators.

5. Conditions for Success

Three conditions are critical to the success of any program aimed at developing AI literacy for secondary school administrators: adequate resource allocation, continuous professional learning, and a culture of embracing innovation. Regarding the first condition, Louis et al. (2004) identified resource support—encompassing budget, time, technology, and expert facilitation—as the single strongest predictor of successful administrator development, and Darling–Hammond et al. (2017) confirmed that well-resourced professional development programs produce significantly greater impact on practice than under-resourced ones. Regarding continuous professional learning,

Fullan (2007) argued that ongoing learning is an essential condition for sustainable organizational development, and Hargreaves and Fullan (2015) proposed that professional capital must be developed through learning that is embedded in daily practice rather than confined to discrete events. Regarding innovation culture, Rogers (2003) demonstrated in Diffusion of Innovations Theory that leaders who act as early adopters exert the strongest influence on organizational acceptance of innovation, Schein (2010) established that leaders are the primary architects of organizational culture, and Dweck (2006) confirmed that administrators who hold a growth mindset form the cultural foundation from which sustained AI literacy development and innovative application can flourish.

In summary, the existing literature provides a strong theoretical foundation for understanding AI literacy, its development, and its evaluation. However, most studies have focused on teachers and students, with limited attention given to school administrators, particularly in developing country contexts.

Despite the growing importance of AI in education, there is a lack of empirical research examining the current and desired states of AI literacy among secondary school administrators in Thailand. Furthermore, there is an absence of context-specific development guidelines that integrate theoretical frameworks with practical implementation strategies for this group.

Conceptual Framework

The 70–20–10 Learning Model was selected, given that empirical evidence suggests experiential and social learning, rather than solely formal instruction, is the most efficacious approach for adult professionals, particularly school administrators, to cultivate competencies (Lombardo & Eichinger, 1996). Because assessing AI literacy advancement within an organizational context presents challenges, the Kirkpatrick Model was adopted as the evaluative framework; this model facilitates a systematic evaluation of training outcomes across four distinct levels: reaction, learning, behavior, and results (Kirkpatrick & Kirkpatrick, 2006). Here are the specifics. It is evident that the culture of accepting change and innovation has also become a problem.

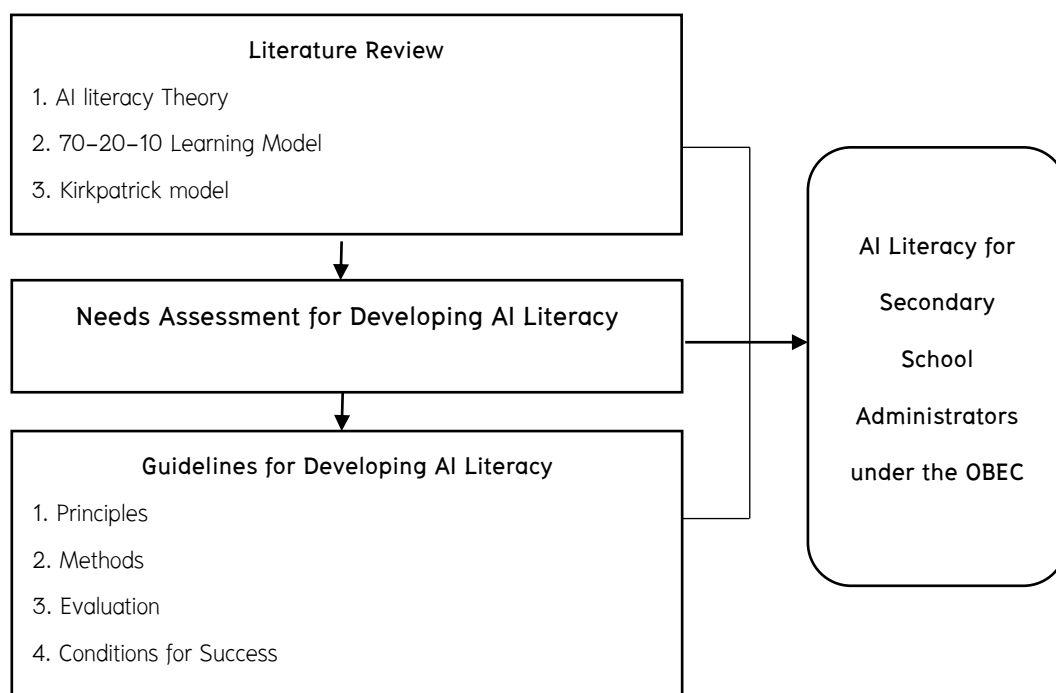


Figure 1 Conceptual Framework

Research Methodology

This research is a mixed methods study. The researcher conducted the research as follows:

Phase 1: Study the needs assessment for developing artificial intelligence (AI) literacy among secondary school administrators under the Office of the Basic Education Commission in Thailand.

1.1 Population and samples

1.1.1 Population: Consists of 2,360 secondary school administrators under the Office of the Basic Education Commission in the 2025 academic year.

1.1.2 Sample: Consists of 342 secondary school administrators under the Office of the Basic Education Commission. The sample size was determined using Yamane's formula (1973) at a 95% confidence level, resulting in a sample size of 342 schools. Multi-stage sampling was used, divided by region, and then using school size as a stratification criterion for sampling according to the sample size.

1.2 Research tools

The research tool used was a questionnaire assessing the current state, desired state, and needs for developing Artificial Intelligence (AI) literacy among secondary school administrators under the Office of the Basic Education Commission. It was divided into three parts:

Part 1: General information of the respondents, presented in a checklist format.

Part 2: Inquiring about the current state and desired state of AI literacy development for secondary school administrators under the Office of the Basic Education Commission in five areas: 1) Knowing AI, 2) Understanding AI, 3) Using AI, 4) Evaluating AI, and 5) AI ethics. This section used a 5-level rating scale as follows:

5 means the current/desired state is at the highest level.

4 means the current/desired state is at a high level.

3 means the current/desired state is at a moderate level.

2 means the current/desired state is at a low level.

1 means the current/desired state is at the lowest level.

Part 3: Suggestions, presented in an open-ended questionnaire format.

Item objective congruence index (IOC) of the questions was assessed by 5 experts, and the Cronbach's Alpha coefficient test was used to test the reliability of the questionnaire. The test results showed that the Cronbach α coefficient of the current state questionnaire was as high as 0.993, and the desired state questionnaire had a value of 0.985, thus considering it to be a reliable tool.

1.3 Data Analysis

1.3.1 General information about the respondents was collected using a checklist format, analyzed by frequency distribution and percentage.

1.3.2 Data on the current and desired state of artificial intelligence for secondary school administrators under the Office of the Basic Education Commission were analyzed using the mean and standard deviation (SD). The interpretation of the mean was based on the following criteria:

4.51–5.00 means the current/desired state is at the highest level.

3.51–4.50 means the current/desired state is at a high level.

2.51–3.50 means the current/desired state is at a moderate level.

1.51–2.50 means the current/desired state is at a low level.

0.51–1.50 means the current/desired state is at the lowest level.

The needs analysis uses Vongvanich (2015) formula based on the priority modified index as follows:

$$PNI_{Modified} = (I - D) / D$$

Where $PNI_{Modified}$ is the needs index

I is the mean of the desired state

D is the mean of the current state.

Phase 2: Study the guidelines for developing AI literacy among secondary school administrators in Thailand.

2.1 Informant Group

The informant group consists of five qualified individuals with expertise, knowledge, and experience in integrating AI into learning management in educational institutions, school administration, educational technology, or human resource development. They were selected using purposive selection and are divided into three groups based on their qualifications:

Group 1: Current or former school administrators with at least five years of experience in integrating AI into learning management (2 individuals).

Group 2: Academics or experts in school administration and educational technology with at least five years of experience (2 individuals).

Group 3: Current or former educational administrators under the Ministry of Education with expert-level academic credentials or a doctoral degree with at least ten years of experience (1 individual).

2.2 Research tool

The data collection tool was a semi-structured interview focusing on the development of AI literacy among secondary school administrators under the Office of the Basic Education Commission. It was divided into two parts:

Part 1: Interviewee information.

Part 2: Interviews on development approaches covering six topics: 1) Principles, 2) Objectives, 3) Content, 4) Development guidelines, 5) Evaluation guidelines, and 6) Conditions for successful implementation of the model.

2.3 Data Analysis

After the researchers had completed collecting the data, they analyzed the data using content analysis and drew conclusions.

Research Results

Needs assessment for developing AI literacy among secondary school administrators under the Office of the Basic Education Commission in Thailand.

The results showed that data was collected from 331 individuals out of a total sample of 342, representing 96.78%. General information about the respondents is detailed in the following table 1

Table 1 Number and percentage of respondents for each status, categorized by position, age, school administrator experience, highest level of education, and school size.

The general status of secondary school administrators	n = 331	
	Number (people)	Percentage
1. Position		
School director	95	28.70
Deputy school director	236	71.30
Total	331	100
2. Age		
Under 30 years old	2	0.60
30–40 years old	105	31.60
41–50 years old	137	41.50
More than 51 years old	87	26.30
Total	331	100
3. Experience as a school administrator		
Under 5 years	157	47.40
5–10 years	77	23.40
11–15 years	45	13.50
More than 15 years	52	15.80
Total	331	100
4. Highest level of education		
Bachelor's degree	4	1.20
Master's degree	284	86.00
Doctorate	43	12.90
Total	331	100
5. School size		
Small school	23	7.00
Medium-sized school	134	40.40
Large school	83	25.10
Extra-large school	91	27.50
Total	331	100

Table 1 shows that the majority of respondents were deputy school principals (71.30%), the most common age range was 41–50 years (41.50%), the most common had less than 5 years of school administration experience (47.40%), the most common educational attainment was a master's degree (86.00%), and the largest group consisted of administrators of medium-sized schools (40.40%).

The current state of AI literacy development for secondary school administrators under the Office of the Education Commission is, overall, at a high level (Mean = 3.495, SD = 0.959). Considering each component individually, ranked from highest to lowest mean score, the top 5 components were: AI ethics (Mean = 3.567, SD = 0.050), Understanding AI (Mean = 3.499, SD = 0.148), Using AI (Mean = 3.492, SD = 0.096), Evaluating AI (Mean = 3.483, SD = 0.111), and Knowing AI (Mean = 3.434, SD = 0.172), respectively.

The desired state of AI literacy development for secondary school administrators under the Office of the Education Commission was at the highest level (Mean = 4.720, SD = 0.536). Considering each component individually, ranked from highest to lowest mean score, the top five were: Using AI (Mean = 4.755, SD = 0.041), AI ethics (Mean = 4.735, SD = 0.019), Understanding AI (Mean = 4.733, SD = 0.044), Evaluating AI (Mean = 4.709, SD = 0.022), and Knowing AI (Mean = 4.670, SD = 0.115), respectively.

The overall needs assessment for developing AI literacy among secondary school administrators under the Office of the Basic Education Commission showed a needs index ($PNI_{Modified} = 0.351$), representing 35.10%. When considered by individual aspects, the area with the highest need for development was Using AI ($PNI_{Modified} = 0.361$), followed by Knowing AI ($PNI_{Modified} = 0.360$), Understanding AI ($PNI_{Modified} = 0.353$), Evaluating AI ($PNI_{Modified} = 0.352$), and AI ethics ($PNI_{Modified} = 0.327$), respectively. As shown in Table 2.

Table 2 The current state, desired state, and essential needs for developing AI literacy among secondary school administrators, in general.

AI Literacy for Secondary School Administrators	Current state			Desired state			Needs assessment	
	Mean	SD	Level	Mean	SD	Level	PNI _{Modified}	Rank
1. Knowing AI	3.434	0.172	Moderate	4.670	0.115	Highest	0.360	2
2. Understand AI	3.499	0.148	Moderate	4.733	0.044	Highest	0.353	3
3. Using AI	3.492	0.096	Moderate	4.755	0.041	Highest	0.361	1
4. Evaluating AI	3.483	0.111	Moderate	4.709	0.022	Highest	0.352	4
5. AI ethics	3.567	0.050	High	4.735	0.019	Highest	0.327	5
Average	3.495	0.959	Moderate	4.720	0.536	Highest	0.351	

Guidelines for developing AI literacy among secondary school administrators in Thailand.

1. Principles of developing AI literacy for secondary school administrators.

The research findings indicate that the appropriate development principle for secondary school administrators is the 70–20–10 Learning Model, which is a framework that explains that most learning and professional growth occur from real work experiences rather than classroom training.

Interviewee E, an expert in educational personnel development, said, "School administrators learn best through hands-on practice in their own context. Theoretical training alone is not enough; administrators must apply the knowledge in real school settings and reflect on the results with their professional peers."

Interviewee C, who holds the position of school principal with experience in using AI for administration, added, "What truly helped me understand AI was not reading books or listening to lectures, but applying AI to solve real problems in the school, such as using it to gather information for decision-making."

From the interview data, it can be concluded that the 70–20–10 development principle is suitable for the context of school administrators. This is because 70% of learning should occur through real work practice, the use of AI in administrative tasks, various projects, and practical training. 20% should come from learning through others, such as consulting and knowledge exchange from real locations. Finally, 10% should be from formal courses or training, or receiving advice from experts.

2. Methods for developing AI literacy for secondary school administrators.

The research findings indicate that there are three main appropriate development methods, namely:

2.1 Expert Briefing

Interviewee B, an academic in educational technology policy, commented, "School administrators do not need to be programmers, but they must understand the trends and impacts of AI on education at the policy level. Listening to experts will help them make planning decisions more quickly."

From the information provided, it can be concluded that expert briefings are a method that helps administrators receive important information about AI in the educational context concisely and directly. This approach aims to enhance strategic understanding so that administrators can make decisions, plan, and manage the use of AI in schools appropriately and responsibly.

2.2 Workshop

Interviewee D, an AI scholar, said, "Training that only involves listening is ineffective. However, if participants actually use AI tools during the training, such as typing prompts and observing the results, and then discussing whether the outcomes are reliable, this helps them remember and apply the knowledge in practice."

From the information provided, it can be concluded that practical training is an effective method for developing AI literacy because it involves hands-on learning, experimenting with AI tools, and real practice, such as selecting AI tools, writing prompts, checking results, evaluating the reliability of information, and reducing AI bias.

2.3 Field Study Trip

Interviewee A, expert in OBEC, added, "Seeing how other schools or organizations practically use AI and talking to the people who actually work with it will give a better overall picture and understanding of the context than studying it on your own, especially regarding ethics and data management."

From the information provided, it can be concluded that study visits offer school administrators the opportunity to learn by observing best practices and exchanging experiences with organizations or educational institutions that effectively use AI.

3. Guidelines for evaluating AI literacy for secondary school administrators.

The research findings indicate that the appropriate evaluation approach is the Kirkpatrick model, which most interviewees agreed is the most comprehensive and systematic method. It can

be applied to AI literacy development at four levels: reaction, learning, behavior, and organizational results, as detailed below.

3.1 Reaction: assessing administrators' satisfaction and perceived relevance of AI content, development methods, and learning processes, to inform program improvements.

3.2 Learning: measuring changes in knowledge, skills, and understanding, including the ability to use AI tools appropriately, evaluate AI outputs, and demonstrate ethical awareness.

3.3 Behavior: evaluating whether administrators apply AI-related knowledge and skills in their actual work, such as using AI for decision-making, promoting responsible AI use among staff, and establishing institutional AI guidelines.

3.4 Results: examining organizational impact, including improvements in management efficiency, learning quality, and the development of a culture of responsible innovation within the school.

4. Conditions for Success

From the interview with the experts, the conditions for success include adequate resource allocation, continuous professional learning, and a culture of embracing innovation. The following key points were identified:

4.1 Adequate Resource Allocation

Interviewee B said, "If there are a budget and the necessary tools, the implementation of the policy will be truly effective. Additionally, we should prioritize the efficient management of resources to ensure they are valuable and suited to the context of the educational institution."

It shows that successful operations require proper allocation of resources, including budget, technology, and personnel.

4.2 Continuous Professional Learning

Interviewee A said, "The world is changing rapidly. School administrators must continuously learn, especially in the areas of technology and educational innovation, such as training, knowledge exchange, and learning from professional networks. Otherwise, they will not be able to move the organization forward."

It reflects that continuous professional learning is a crucial factor in enhancing the potential of secondary school administrators.

4.3 Culture of Embracing Innovation

Interviewee E said, "If the organization allows for trial and error, it will lead to new innovations in learning management."

Therefore, encouraging teachers and staff to think creatively, experiment, and not be afraid of failure, and to cultivate a culture of embracing innovation within the organization, will help promote sustainable development.

Discussions

Needs assessment for developing AI literacy among secondary school administrators under the Office of the Basic Education Commission in Thailand.

The current state of AI literacy development among secondary school administrators under the Office of the Basic Education Commission was, overall, at a high level (Mean = 3.495, SD = 0.959). This result aligns with the conceptual framework proposed by Ng et al. (2021), who defined AI literacy as encompassing four core dimensions: know and understand AI, use and apply AI, evaluate and create with AI, and AI ethics. The high overall level indicates that school administrators possess a foundational awareness and understanding of AI, yet a systematic developmental gap remains before achieving the highest level of competency. When examined by individual components, AI ethics recorded the highest mean score (Mean = 3.567, SD = 0.050), followed by Understanding AI (Mean = 3.499, SD = 0.148), Using AI (Mean = 3.492, SD = 0.096), Evaluating AI (Mean = 3.483, SD = 0.111), and Knowing AI (Mean = 3.434, SD = 0.172), respectively. These findings are consistent with Long and Magerko (2020), who found that educational personnel tend to demonstrate stronger awareness of AI ethics than practical application skills, largely because ethical considerations—including privacy, fairness, and transparency—have been extensively discussed in educational discourse (Cukurova, 2024). The fact that Knowing AI recorded the lowest mean among all five components (Mean = 3.434) may be attributed to many administrators lacking deep understanding of the technical mechanisms and underlying structures of AI systems. This is consistent with Chee et al. (2025), who noted that technical AI knowledge is often the least developed competency among leadership-level learners, particularly in contexts outside the discipline of computer science. Furthermore, Ng et al. (2024) argued that a comprehensive AI literacy measurement instrument encompassing behavioral, affective, cognitive, and ethical dimensions is essential for holistic assessment and development of AI competencies. This suggests that AI literacy among school administrators may remain at a surface level, lacking the depth required for leading AI integration at the organizational level.

The desired state of AI literacy development among secondary school administrators was at the highest level overall (Mean = 4.720, SD = 0.536). The component with the highest desired mean was Using AI (Mean = 4.755, SD = 0.041), followed by AI ethics (Mean = 4.735, SD = 0.019), Understanding AI (Mean = 4.733, SD = 0.044), Evaluating AI (Mean = 4.709, SD = 0.022), and Knowing AI (Mean = 4.670, SD = 0.115), respectively. The prioritization of the desired state across all components by administrators unequivocally demonstrates their awareness of AI's significant impact on educational administration and learning management. This observation is consistent with the UNESCO AI Competency Framework for Teachers (2024), which underscores the necessity for educational professionals to cultivate a broad spectrum of AI competencies. These competencies encompass application, ethical considerations, fundamental understanding, instructional methodologies, and professional growth, all of which are indispensable for the responsible and effective incorporation of AI into educational settings. Furthermore, the highest desired mean for Using AI (Mean = 4.755) supports the AI literacy framework proposed by Mills et al. (2024). This framework identifies Using AI as a primary mode of engagement, encompassing interaction with AI, creation with AI, and problem-solving with AI. The notably low standard deviation in this component (SD = 0.041) further indicates strong consensus among administrators that developing practical AI application skills constitutes an urgent priority. The extremely high desired levels across all components may also reflect an aspirational perception rather than a realistic assessment of achievable competencies, particularly given existing constraints in training, resources, and institutional support. This gap between aspiration and current capability highlights a potential misalignment between policy expectations and the actual readiness of school administrators.

The needs assessment analysis utilizing the Modified Priority Needs Index ($PNI_{Modified}$) revealed an overall needs index of $PNI_{Modified} = 0.351$, representing 35.10%. This figure indicates a significant gap between the current and desired states across all components. When examined individually, the area with the highest development need was Using AI ($PNI_{Modified} = 0.361$), followed by Knowing AI ($PNI_{Modified} = 0.360$), Understanding AI ($PNI_{Modified} = 0.353$), Evaluating AI ($PNI_{Modified} = 0.352$), and AI ethics ($PNI_{Modified} = 0.327$), respectively. These findings carry important implications for policy and professional development program design. The highest need for development in Using AI is consistent with Ng et al. (2021), who found that educational personnel frequently possess lower practical and applied AI skills than desired. This observation further underscores the "theory-practice gap" highlighted by Allen and Kendeou (2024), which poses a

significant obstacle to fostering AI literacy within educational settings; specifically, students might acquire a conceptual grasp of AI but be deprived of genuine opportunities to implement it in real-world scenarios. The second-highest priority identified in Knowing AI ($PNI_{Modified} = 0.360$) suggests that school administrators necessitate considerable enhancement of their fundamental comprehension of AI concepts, principles, and system functionalities. This is consistent with the systematic review by Almatrafi et al. (2024), which found that "recognizing and understanding AI" constitutes the most fundamental competency in AI literacy development across all levels and populations. Although AI ethics recorded the lowest needs index ($PNI_{Modified} = 0.327$), the remaining gap is nonetheless significant and should not be overlooked. Ethical knowledge alone is insufficient if administrators lack the capacity to apply ethical principles in organizational practice. This is consistent with Yang et al. (2025), who demonstrated that AI ethics knowledge most effectively translates into ethical competence when systematic ethical knowledge bases are constructed through appropriate curricula. The prominence of "Using AI" as the highest priority need suggests that existing professional development programs may be overly focused on theoretical knowledge rather than practical application opportunities.

Guidelines for developing AI literacy among secondary school administrators in Thailand.

1. Principles of AI Literacy Development for Secondary School Administrators

The selection of the 70–20–10 model reflects the need for flexible, practice-oriented learning approaches that align with the complex and evolving nature of AI integration in educational leadership. However, reliance on experiential learning alone may not be sufficient for developing technical AI competencies, which may require more structured and intensive training components.

Collectively, these three methods provide a balanced development approach that integrates knowledge acquisition, experiential learning, and contextual application. This combination is particularly important for AI literacy development, which requires both conceptual understanding and practical competence

2. Methods for AI Literacy Development for Secondary School Administrators

The findings indicate that three primary development methods are appropriate: expert briefing, workshops, and field study trips. Each method aligns with a specific proportion of the 70–20–10 model and addresses different dimensions of AI literacy identified in the research.

The first method, Expert Briefing, involves AI experts or experienced practitioners presenting key information, trends, and policy issues related to AI in the educational context to strengthen administrators' strategic understanding. This is consistent with Long and Magerko (2020), who found that educational personnel require credible expert sources to build the trust and understanding necessary for AI adoption. This method aligns with the 20% social learning component of the 70–20–10 model, emphasizing learning from knowledgeable others.

The second method, Workshop, focuses on hands-on learning, experimenting with AI tools, and collaborative activities under instructor guidance—addressing Using AI and Evaluating AI, which were identified as the dimensions with the highest development need ($PNI_{Modified} = 0.361$ and 0.352 , respectively). This corresponds to the 70% experiential learning component of the model and is supported by Almatrafi et al. (2024), who found that hands-on, practice-oriented strategies are the most effective approach for developing AI competencies among educational personnel.

The third method, Field Study Trip, provides administrators with opportunities to observe best practices and exchange experiences with organizations or educational institutions that effectively apply AI, fostering systemic perspective and contextual understanding—particularly relevant to AI Evaluation and AI Ethics content areas. This method corresponds to the 20% social learning component of the 70–20–10 model and aligns with McCall et al. (1988), who confirmed that learning from organizations with established best practices is a critical driver of leadership development in complex technological contexts.

3. Guidelines for Evaluating AI Literacy Development for Secondary School Administrators.

The findings indicate that the appropriate assessment approach is the Kirkpatrick Evaluation Model, a four-level framework for evaluating development and training outcomes developed by Kirkpatrick (1994), comprising Reaction, Learning, Behavior, and Results. Kirkpatrick and Kirkpatrick (2006) confirmed this model as the most widely used evaluation framework in organizational and educational contexts, as it comprehensively examines outcomes from participants' satisfaction levels through to organizational impact.

Level 1, Reaction, assesses the feelings, opinions, and satisfaction of participating administrators regarding the content, methods, and learning processes provided. In the context of AI literacy development, this level examines whether administrators perceive the AI content as appropriate, aligned with their roles and responsibilities, and applicable to school administration.

Data from this level informs the appropriateness of the development model and serves as a foundation for improving future activities.

Level 2, Learning, examines whether administrators demonstrate changes in knowledge, skills, and understanding following participation in the development program. In the AI literacy context, this includes assessing administrators' ability to explain basic AI concepts, use AI tools appropriately, evaluate AI system outputs, and demonstrate ethical awareness and responsibility in using AI—corresponding directly to all five AI literacy dimensions identified in this research.

Level 3, Behavior, evaluates whether administrators can apply the knowledge and skills gained from development in actual practice. In the AI context, this involves observing or analyzing behavioral changes such as selecting and using AI tools to support decision-making, promoting appropriate AI use among teachers and staff, verifying the accuracy of AI-generated data, and establishing guidelines for ethically responsible and secure AI use. Behavioral change at this level confirms that development has moved beyond knowledge acquisition to impact actual work performance, which Kirkpatrick and Kirkpatrick (2006) identify as the most important indicator of development program success.

Level 4, Results, evaluates the organizational impact of administrator development. Within the context of AI literacy development, this phase examines the effects of AI integration, as managed by school administrators, on management effectiveness, the improvement of learning outcomes, and the fostering of a culture of responsible innovation within schools. This encompasses, for example, the utilization of AI for data analysis in educational planning, the encouragement of safe and ethical AI practices, and the enhancement of technological skills among educators and staff. This level serves to illustrate the cost-effectiveness and overall efficacy of the development model, aligning with the findings of Almatrafi et al. (2024), who emphasize that evaluating organizational outcomes is central to designing responsible AI development programs.

4. Conditions for Success of the AI Literacy Development Guidelines.

The findings indicate that the conditions for success of the AI literacy development guidelines for secondary school administrators include adequate resource allocation, continuous professional learning for administrators, and a culture of embracing innovation. Regarding continuous professional learning, UNESCO (Cukurova, 2024) emphasizes that the cultivation of AI competencies among educational staff is not a singular event; instead, it constitutes an ongoing process that must adapt to the swift advancements in AI technology. This is especially relevant

given the significant gap between the current and desired states across all AI literacy dimensions (overall $PNI_{Modified} = 0.351$) found in this research, indicating that systematic, sustained development will be urgently needed in the Thai educational context. With respect to a culture of innovation, Banerjee et al. (2021) argue that visionary leadership is the most critical factor in driving effective AI integration in educational institutions. School administrators with high AI literacy will be better positioned to cultivate environments conducive to responsible innovation, ultimately producing positive outcomes for teachers, staff, and learners alike.

New Knowledge from Research

The knowledge generated from this research follows a sequential, cyclical flow of five interconnected stages.

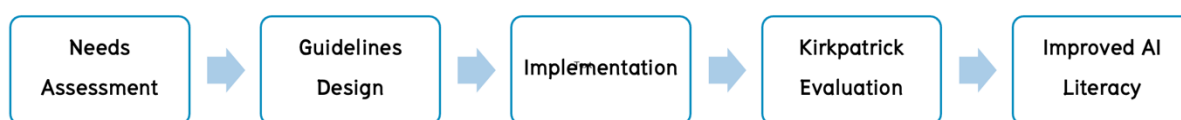


Figure 2 Knowledge Flow

This study's contribution goes beyond just proving that systematic AI literacy development is useful. The application of the PNI Modified diagnostic tool to a previously under-researched population, specifically secondary school administrators in Thailand, yields empirical evidence regarding the most significantly underdeveloped dimensions of AI literacy within this context. The integrated framework, which combines experiential learning design with four-level outcome evaluation, is a new way to develop AI at the administrator level in Thailand. The study transitions from descriptive analysis to prescriptive recommendations, yielding actionable, evidence-based guidelines instead of merely generalizable principles.

Conclusion

1. The results of a study on the needs assessments for developing AI literacy among secondary school administrators under the Office of the Basic Education Commission in Thailand revealed that the need for AI development is high in all aspects. The priorities for AI literacy development in each area are ranked as follows: (1) Using AI, (2) Knowing AI, (3) Understanding AI, (4) Evaluating AI and (5) AI Ethics

2. The guidelines for AI literacy development for secondary school administrators derived from this research encompass four key components: a development principle grounded in the 70–20–10 Learning Model; three development methods comprising expert briefing, workshop, and field study trip; a four-level evaluation framework based on the Kirkpatrick Model; and success conditions including adequate resource allocation, continuous professional learning, and a culture of embracing innovation. These guidelines are relevant and can be used as a professional development framework within the Thai educational system. This framework supports the global effort to prepare educational leaders for the age of artificial intelligence.

Suggestions

1. Suggestions for Implementation

1.1 The Office of the Basic Education Commission should prioritize AI literacy development as a key organizational goal. This involves including AI competency development for school administrators in a structured and ongoing personnel development plan. The plan should particularly focus on the "Using AI" and "Knowing AI" dimensions, which this research identified as the most important.

1.2 Educational Service Area Offices should adopt the AI literacy development guidelines derived from this research to design professional development programs that integrate the 70–20–10 principle, ensuring that activities primarily enable administrators to learn through authentic practice within their own school contexts.

1.3 A professional learning network in AI should be established for school administrators to promote knowledge exchange among those with experience in applying AI to school management, corresponding to the 20% social learning component of the 70–20–10 model, and to build a community of practice that sustains AI competency development beyond formal training events.

2. Suggestions for Further Research

2.1 To evaluate the efficacy of the AI literacy development guidelines proposed in this study, experimental or quasi-experimental research should be undertaken. This research should compare outcomes between an intervention group and a control group to determine causal relationships between the development program and observable shifts in AI literacy competencies across all five dimensions.

2.2 Longitudinal studies are recommended to determine the temporal impact of AI literacy development on school management effectiveness, student learning quality, and the existing organizational culture. This approach aligns with the Results level of the Kirkpatrick evaluation model, thus providing a more thorough assessment of programmatic impact than that derived from short-term studies.

2.3 The research scope should be broadened to include administrators from various educational levels, such as primary, vocational, and higher education. This expansion would facilitate a comparative analysis of the current state and developmental requirements for AI literacy across diverse educational contexts, thereby informing the design of level-specific professional development programs.

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