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A Survey Study on AI Literacy of Nakhon Sawan Rajabhat University's Digital Technology Teacher Students in Thailand

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Abstract
In the realm of education, the integration of AI literacy into computer science teaching is becoming increasingly crucial (Walsh et al., 2023; Voulgari et al., 2022; Velander et al., 2023). Teachers play a pivotal role in bridging the gap between research and practical knowledge transfer of AI-related skills, necessitating a solid foundation in AI-related technological, pedagogical, and content knowledge (TPACK) (Velander et al., 2023). As AI systems permeate various aspects of society, including education, teachers must adapt and develop competencies in AI to effectively impart these skills to students (Kreinsen & Schulz, 2023). The incorporation of AI ethics into the curriculum requires teachers to navigate complex issues such as biases related to race, gender, and social class, challenging both computer science and humanities educators to step out of their comfort zones and collaborate to provide high-quality instruction (Walsh et al., 2023). By leveraging their expertise in different domains and receiving support from research teams, teachers can create engaging learning experiences that prepare students for the ethical and technical challenges posed by AI systems (Walsh et al., 2023).
This article aimed to study the AI literacy level of teacher students major in digital technology who study at Nakhon Sawan Rajabhat University in Thailand. There were 98 students responded the AI literacy questionnaire which contained of 4 factors (Knowledge and Use of AI 24 questions, Creation of AI 3 questions, AI Self-Efficacy 6 questions, and AI Self-Competency 7 questions). The results showed that, 1) there were no statistically significant differences in gender among Knowledge and Use, AI Self-Efficacy, and AI Self-Competency while has statistically highly significant as $P < 0.05$ in Creation of AI factor, 2) there were no statistically significant different in level of study and use of time used of computer among AI literacy factors, and 3) there was relationship between AI literacy factors with statistically highly significant as $P < 0.01$.
Keywords: AI Literacy, Teacher Students, Nakhon Sawan Rajabhat University

Introduction

Artificial Intelligence (AI) is a science and engineering that creates intelligence in machines. Therefore, it can be said that AI is a science that creates intelligence in machines, especially computer systems, so that they can calculate, reason, and learn like the human brain. This is to help computer

systems work instead of humans efficiently. Originally, the study of AI focused on producing machines that can work automatically. However, after technology slowly developed and eventually, technology has played a role in daily life.

AI will enhance the efficiency and functionality of nearly every tool, device, and vehicle made today. Students will need to learn to understand and manage AI and related technologies to be successful today and in the future. Students will need to build the skills, knowledge, and digital literacy to enable them to use technology responsibly and effectively. The term 'digital readiness' describes the combined attitudes, tools, and skillsets that will prepare students for the future. As today's K–12 students enter the workforce, the demand for employees with skills in AI, machine learning, data analytics, and other computer science specialties will continue to grow now and in the years to come.

The World Economic Forum (2020) estimates that AI alone could create 97 million new jobs by 2025.To support students' digital readiness and future success, educators should introduce AI concepts, demonstrate AI use cases, and help students understand the ethical issues surrounding AI. This learning can begin as early as elementary school to lay the foundation for building more advanced skills in middle school and high school. To better prepare students for the changing job market, educators and primary schools can help students engage more with AI in education by tailoring lessons to students' current abilities and integrating hands-on learning experiences.

Educators can build a deeper understanding of this advanced technology and prepare students for a data-driven future. AI skills and understanding can be incorporated into the core curriculum, making them engaging and practical, even for the youngest students. Many, if not most, students will not pursue or pursue a career in computer science. However, understanding AI will be a key factor in their future success. According to the World Economic Forum (2020), the top skills and skill sets that employer are looking to prioritize by 2025 are critical thinking and analysis, as well as problem-solving and self-management skills such as active learning, resilience, stress tolerance and flexibility. AI education can foster critical thinking and foster emotional intelligence as students explore AI applications and analyze the social and ethical implications of AI, even for students who have never written a line of code before. However, let's look back at the core curriculum currently being used by the Ministry of Education in Thailand. The teaching of Computer Science is specified in the national core curriculum in the Science and Technology core content area, content area 4 (Technology), Standard 4.2 (Computing Science), in which the teaching of AI is only available in Grade 12.

Currently, education focuses on developing teaching and learning to enable students to have knowledge and skills that are an important force in developing the country. Active Learning is a learning management that emphasizes learner participation and is a learning management that develops brain potential, including thinking, problem solving, and applying knowledge. It is a learning management that allows learners to participate in the learning process to the maximum. Learners can create knowledge and organize the learning process by themselves. Learners participate in learning in terms of knowledge creation and mutual interaction. Learners learn about shared responsibility, work discipline, and division of responsibilities. Learners will organize their own learning system. It is a learning management that emphasizes high-level thinking skills, allowing learners to integrate information or data and principles of summarizing (Imthap et al., 2024).

Teachers need to have key competencies to integrate technology and teaching methods to provide learners with hands-on learning experiences. Su et al. (2022) highlighted the increasing popularity of AI as a subject among educators and researchers and noted that there is a rising demand for effective teaching strategies and curricula to integrate AI into K-12 education. He also pointed out a significant gap in the literature regarding AI curriculum development specifically for K-12 classrooms in the Asia-Pacific region. Most existing studies focus on the United States and European countries, leaving a lack of localized research that addresses the unique educational contexts and needs of the Asia-Pacific region by using a meta-review of existing research on

AI curricula for K-12 education in the Asia-Pacific region by analyzing 14 research papers from 2018 to 2021, and seek to identify key components such as content knowledge, tools, platforms, activities, theories, assessment methods, and learning outcomes related to AI education.

The research highlights that while AI education is gaining traction globally, there is a significant gap in studies focusing on the Asia-Pacific region. Most existing literature primarily examines AI curricula in the United States and Europe, leaving a need for more localized research The review of 14 research papers indicates that well-designed AI curricula can effectively enhance students' knowledge and skills related to AI. This includes fostering positive learning attitudes and increasing student interest in the subject. The findings suggest that further research is needed to explore effective AI learning designs and activities specifically tailored for the Asia-Pacific context. This could help in developing more effective teaching strategies and resources for educators (Su et al., 2022).

There are few studies on AI education research, particularly in Thailand. One research focused on designing tool named AIThaiGen which was a web-based learning platform for Grade 7th and 8th students to study the introduces AI concepts. It can communicate with remote hardware stations, allowing students to test their AI models in real-world scenarios (Aung et al., 2022). Other two research related to teaching and learning AI were 1) try-out of AI learning innovation which used 5 learning modules (Module 1: Perception, Module 2: Representation & Reasoning, Module 3: Machine learning, Module 4: Interaction, and Module 5: Societal impacts) (Sudjitjoon et al., 2022), and 2) study on the effects of Artificial Intelligence Technology and STAD cooperative learning method on learning achievement, attitude towards Physics and attitude towards technology for Grade 10th students (Sangwaranatee et al., 2022) while other research about AI in education based on using as a learning tools and no research paper focused on the competencies or AI literacy of teachers. Since teacher students will grow up to be teachers or instructors in the future, preparing or developing the competence of teacher students is very important. This article aimed to study the AI literacy level of teacher students major in digital technology who study at Nakhon Sawan Rajabhat University in Thailand which students in this field must graduate in order to teach AI in both primary and secondary schools.

Research Design

This study used the quantitative research method by survey. The target group were 197 Digital Technology teacher students of the Faculty of Education, Nakhon Sawan Rajabhat University who enrolled to study in Academic Year 2024, first semester and there were 98 students responded the AI literacy questionnaire. The research tool was AI literacies questionnaire which adapted by MAILS - Meta AI Literacy Scale (Carolus et al., 2023). The MAILS was contained of 4 factors (Knowledge and Use of AI 24 questions, Creation of AI 3 questions, AI Self-Efficacy 6 questions, and AI Self-Competency 7 questions) and used to measure AI literacy and include other psychological competencies that might be helpful in predicting the prolonged and sustainable use of AI (Carolus et al., 2023).

The survey conducted by using the google form which sent to students by invited them to responded without any rewards and special things. Students will feel free to answer all questions and that was why 98 students responded from 197 students. The survey collected from June to July (4 weeks) and after researchers got the information in time limited, the data will used to calculated by using statistical software package. The statistics used were mean, standard deviation, t-test, ANOVA, and Pearson Correlation.

Results

The study participants in Table 1 included 98 respondents (male 53; female 45) from 197 total number of Digital Technology teacher students at Nakhon Sawan Rajabhat University.

Table 1 Gender of Students

Gender	Frequency	Percent
Male	45	45.9
Female	53	54.1
Total	98	100.0

Table 2 shows that first year (27 students from 59 students=45.76%) and fourth year students (27 students from 54 students=50%) responded at 27.6% followed by second year (22 students from 41 students=51.22%) & third year students (22 students from 43 students=51.16%) responded at 22%.

Table 2 Level of Study

Level	Frequency	Percent
First year	27	27.6
Second year	22	22.4
Third year	22	22.4
Fourth year	27	27.6
Total	98	100.0

Table 3 shows that students used the digital devices more than 4 hrs. at 32.7% followed by used 1 – 2 hrs. (29.6%), Less than 1 hr. (21.4%), and 3 - 4 hrs. (16.3%) respectively.

Table 3 Frequency of Used

Used	Frequency	Percent
Less than 1 hr.	21	21.4
1-2 hrs.	29	29.6
3-4 hrs.	16	16.3
More than 4 hrs.	32	32.7
Total	98	100.0

Table 4 shows the t-test of gender difference (male and female) towards AI literacies. It was found that there was gender different between male and female on Creation of AI at .05 statistical level of significance which male have higher mean score than female, while other three AI literacies factors (Knowledge and Use of AI, AI Self-Efficacy, and AI Self-Competency) not performed the significance level.

Table 4 Gender Difference towards AI Literacies (N=98)

Variables	Gender	N	Mean	Standard Deviation	Std. Error Mean	Sig	t
Knowledge and Use of AI	Male	45	3.66	.75895	.11314	.172	1.935
	Female	53	3.38	.65342	.08975		
Creation of AI	Male	45	3.11	.90775	.13532	.043*	.149
	Female	53	3.09	.65495	.08996		
AI Self-Efficacy	Male	45	3.59	.82389	.12282	.283	1.323
	Female	53	3.38	.73480	.10093		
AI Self-Competency	Male	45	3.59	.79865	.11906	.181	1.599
	Female	53	3.35	.65383	.08981		

*P < .05

Table 5 shows the ANOVA test between level of study (First year/ Second year/ Third year/ Fourth year) towards AI literacies (Knowledge and Use of AI, Creation of AI, AI Self-Efficacy, and AI Self-Competency). It demonstrated that the level of study not affect the AI literacies of Digital Technology teacher students at Nakhon Sawan Rajabhat University.

Table 6 shows the ANOVA test between frequency of using time (Less than 1 hr./ 1 – 2 hrs./ 3 - 4 hrs./ More than 4 hrs.) towards AI literacies (Knowledge and Use of AI, Creation of AI, AI Self-Efficacy, and AI Self-Competency). It demonstrated that the level of study not affect the AI literacies of Digital Technology teacher students at Nakhon Sawan Rajabhat University.

Table 5 ANOVA of Level of Study towards AI Literacies (N=98)

Variables	Sum of Squares	df	Mean Square	F	Sig.
Knowledge and Use of AI					
Between groups	2.782	3	.927	1.869	.140
Within groups	46.619	94	.496		
Total	49.401	97			
Creation of AI					
Between groups	1.247	3	.416	.682	.566
Within groups	57.330	94	.610		
Total	58.577	97			
AI Self-Efficacy					
Between groups	1.814	3	.605	.994	.399
Within Groups	57.186	94	.608		
Total	59.000	97			

AI Self-Competency					
Between groups	.878	3	.293	.542	.655
Within Groups	50.757	94	.540		
Total	51.635	97			

Table 6 ANOVA of Frequency of using Time towards AI Literacies (N=98)

Variables	Sum of Squares	df	Mean Square	F	Sig.
Knowledge and Use of AI					
Between groups	3.665	3	1.222	2.511	.063
Within groups	45.736	94	.487		
Total	49.401	97			
Creation of AI					
Between groups	1.558	3	.519	.856	.467
Within Groups	57.019	94	.607		
Total	58.577	97			
AI Self-Efficacy					
Between groups	3.206	3	1.069	1.800	.152
Within groups	55.794	94	.594		
Total	59.000	97			
AI Self-Competency					
Between groups	1.141	3	.380	.708	.550
Within groups	50.494	94	.537		
Total	51.635	97			

Table 7 Correlation Coefficient between 4 Dimensions of AI Literacies (N=98)

Variables	Mean	S.D.	Knowledge and Use of AI	Creation of AI	AI Self-Efficacy	AI Self-Competency
Knowledge and Use of AI	3.51	.71	1			
Creation of AI	3.10	.78	.674**	1		
AI Self-Efficacy	3.47	.79	.798**	.720**	1	
AI Self-Competency	3.46	.73	.714**	.598**	.776**	1

** Correlation is significant at the 0.01 level (2-tailed).

Table 7 shows the correlation coefficient between Knowledge and Use of AI, Creation of AI, AI Self-Efficacy, and AI Self-Competency. The results showed that the 4 factors of AI literacies have the relationship between them with lower than 0.01 level significant (2-tailed).

Conclusions

The results show that there were 98 students responded the questionnaire which female higher than male and first year and fourth year students were majority. They often used the digital devices more than 4 hrs. and gender difference affects AI literacy on the creation of AI. There was not significance difference between level of study and time used towards 4 factors of AI literacies. The results also demonstrated that there was relationship between AI literacies (Knowledge and Use of AI, Creation of AI, AI Self-Efficacy, and AI Self-Competency) with lower than 0.01 level significant.

Gender differences significantly influence the development and creative output of AI systems. Research indicates that the underrepresentation of women in AI design leads to biased algorithms that reinforce stereotypes, particularly in anthropomorphic AI, where female entities are often feminized and associated with normative roles (Antonopoulou, 2023). Additionally, studies show that female researchers in AI tend to have fewer citations and exhibit distinct linguistic styles in their publications, such as using more positive emotion words and catchy titles (Ding et al., 2023). This disparity in recognition and representation can perpetuate gender biases in AI-generated content, as seen in imagery where female figures are sexualized while male figures are depicted as authoritative (Foka, 2024). Addressing these biases through inclusive design practices and promoting gender diversity in AI research is crucial for creating equitable and representative AI systems.

The creation and integration of AI technologies significantly influence the development of AI self-efficacy and self-competency among users, particularly in educational settings. Research indicates that engaging with AI tools enhances computational thinking and self-efficacy, as students experience personalized learning and adaptive feedback, which fosters confidence in their abilities to tackle complex problems (Massaty et al., 2024). Furthermore, collaborative creation

with AI, rather than mere editing, has been shown to enhance creative self-efficacy, suggesting that active participation in the creative process with AI leads to greater confidence and competence in using these technologies (McGuire et al., 2024). In the context of teacher training, findings reveal that while anxiety regarding AI learning exists, it negatively correlates with self-efficacy, indicating that increased familiarity through training can improve confidence levels (Hsu et al., 2023). Additionally, pre-service teachers demonstrated enhanced self-efficacy when utilizing AI-supported applications, highlighting the importance of technology acceptance and usability in fostering competency (Chou et al., 2023). Overall, consistent practice with AI tools leads to improved self-efficacy and competency over time (Gardella et al., 2024).

The relationship between an individual's knowledge of AI creation and their perceived ability to create AI is multifaceted. Individuals with greater knowledge about AI tend to exhibit a phenomenon known as 'risk blindness', where they underestimate the risks associated with AI applications, potentially leading to overconfidence in their creative capabilities with AI tools (Said et al., 2023). This overconfidence can be exacerbated by the Dunning-Kruger Effect, where less competent individuals overestimate their skills, hindering their appropriate reliance on AI systems for creative tasks (He et al., 2023). Conversely, those who possess strong divergent-thinking skills and generate more creative prompts for AI art generators produce higher-quality outputs, indicating that human creativity remains crucial in guiding AI-generated content (Orwig et al., 2024). Furthermore, the collaboration between human knowledge and AI is essential for effective knowledge creation, as AI accelerates human understanding but does not replace the need for human judgment and creativity (Ichijo, 2022; Tao et al., 2023). Thus, an individual's knowledge of AI significantly influences their perceived ability to engage in AI creation.

The integration of artificial intelligence (AI) in classrooms significantly enhances teaching methodologies and learning experiences. Generative AI facilitates personalized learning by automating tasks such as lesson planning and feedback, thereby allowing educators to focus on student engagement and interaction (Alali et al., 2024). Moreover, initiatives aimed at developing AI literacy among educators empower them to design innovative, AI-enhanced learning activities that promote critical thinking and collaboration (Romero, 2024). Tools like GenClassroom leverage AI's capabilities to transform lessons into engaging visual content, which enhances retention and understanding (Nambiar et al., 2024). Additionally, the use of AI in analyzing classroom dialogues fosters a culture of transparency and continuous improvement in pedagogical strategies, ultimately enriching the educational environment (Li et al., 2024). Collectively, these advancements illustrate AI's potential to revolutionize traditional teaching practices, making learning more dynamic and effective.

This research also recommends that the evolution of AI literacy among teacher students is crucial for adapting to the demands of modern education, particularly as AI technologies become increasingly integrated into teaching practices. Research indicates that teachers must develop profound AI literacy and ethical knowledge to effectively incorporate AI into their curricula, thereby enhancing the quality of teacher education (Rütti-Joy et al., 2024). Preservice teachers or teacher students initially exhibit limited understanding of AI, but targeted educational interventions significantly boost their confidence and awareness, although concerns about AI's impact on teaching roles persist (Hur, 2024). Furthermore, the concept of professional capital is essential, as it empowers teachers to redefine their professional identities in the AI era, emphasizing the importance of human, social, and decisional capital in navigating AI integration (Liu & Li, 2022). Teachers who engage with AI curricula report expanded knowledge and a deeper understanding of AI's societal implications, highlighting the need for ongoing professional development and support (Ravi et al., 2023). This collective insight underscores the necessity for continuous adaptation in teacher education to foster effective AI literacy.

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