

An Investigation Into The AI Literacy Of High School Students

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Abstract:

Despite the increasing global emphasis on integrating AI education into high school curricula, AI literacy among high school students remains underexplored, particularly within the context of AI's growing prevalence in Viet Nam. In reality, the use of AI in Vietnamese education has been uneven. The level of AI usage has gradually increased across educational levels, from primary school to university, and very few studies have investigated the literacy of AI in high school. This study aimed to examine the current state of students' AI literacy and provide recommendations for integrating AI into high school curricula. It was a quantitative study conducted with the participation of 150 students from three grades (10, 11, and 12), who were randomly selected. Participants were asked to take part in a survey designed on Google Forms. The results indicated that students had fairly good levels of AI literacy, with the highest levels observed in Grade 10, possibly due to earlier exposure to technology. The standard deviation showed moderate dispersion; however, there were still differences among students.

Key Word: AI literacy, high school students, educational technology, quantitative research.

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I. Introduction

The world has entered the era of digital transformation (Henriette et al., 2015). In recent years, Artificial Intelligence (AI) is becoming increasingly popular and is used in many fields, including education, communication, entertainment, and employment (Luckin et al., 2016; Russell & Norvig, 2021). In particular, in education, AI designed in conjunction with smart tutoring systems, recommendation algorithms, automatic translation tools, and generative AI applications have become more accessible to students, specifically at the high school level (Holmes et al., 2019; Zawacki-Richter et al., 2019). These days, many educational institutions worldwide are actively integrating AI into teaching and learning processes (UNESCO, 2021). As a result, high school students are no longer simply users of technology but active participants in AI-driven environments (Long & Magerko, 2020). In the context of rapid digital transformation, Artificial Intelligence (AI) literacy has been increasingly emphasized as a core competency for learners in Vietnam. This orientation is reflected in national educational policies, particularly in the *General Education Curriculum* issued by the Ministry of Education and Training (MOET) under Circular No. 32/2018/TT-BGDĐT, which defines competency as a combination of knowledge, skills, attitudes, and personal attributes enabling individuals to effectively perform tasks in specific contexts.

Despite the increasing global emphasis on integrating AI education into high school curricula, AI literacy among high school students remains underexplored, particularly within the context of AI's growing prevalence in Viet Nam.

In order to address the existing gaps, this study was conducted with the primary purposes of examining the current state of students' AI literacy and providing recommendations to improve the AI literacy levels of high school students.

Research Questions

Based on these purposes, the research question was formulated as follows:

1. What is the current state of AI literacy among high school students?

II. Literature Review

AI literacy

Artificial intelligence (AI) refers to the capability of computational systems to perform tasks typically associated with human intelligence, such as learning, reasoning, problem-solving, perception, and decision-making. AI is a field of research in computer science that develops methods and software enabling machines to perceive their environment, use learning and intelligence, and take actions to achieve specific goals (Wikipedia, n.d.). Long and Magerko (2020) emphasize that AI literacy should empower learners to interact with AI not merely as users, but also as informed participants who can question, adapt, and creatively engage with AI

technologies in real-world contexts. AI literacy includes the knowledge and skills that enable people to critically understand, evaluate, and use AI systems and tools to safely and effectively participate in an increasingly digital world (UNESCO, 2023).

The OECD (2021) defines AI literacy as the set of knowledge, skills, and attitudes that enable individuals to understand, evaluate, and use AI safely and responsibly. This perspective is expanded upon by UNESCO (2024), which views AI literacy as part of education for sustainable development, linked to humanistic values, equity, and social responsibility. DigComp 2.2 also integrates AI into digital competencies, emphasizing the ability to consciously interact with AI systems in daily life (European Commission, 2022).

Many organizations and scholars around the world have approached artificial intelligence from the perspective of developing AI literacy as a core set of competencies necessary for learners and citizens in a digital society. Competency frameworks like OECD (2019), UNESCO (2023) do not focus on in-depth training in AI technology or programming, but rather emphasize the ability to understand, evaluate, and use AI consciously, safely, and responsibly. According to the OECD (2019), AI literacy is regarded as a foundational competence that enables individuals to participate effectively in the digital society. In this view, learners are expected to possess a basic understanding of how AI systems operate, the ability to critically evaluate AI-generated outputs, and an awareness of the social and ethical implications associated with the use of AI. The OECD competency framework highlights several core dimensions of AI-related competence, including a general understanding of data and algorithms, the ability to use and evaluate AI applications in real-world contexts, critical thinking in relation to AI-assisted decision-making, and awareness of the ethical, legal, and social implications associated with AI use (OECD, 2019; OECD, 2021). AI literacy extends beyond the technical ability to use AI tools to include the capacity to identify risks, biases, and ethical responsibilities arising from human - AI interactions (Ng et al., 2021; OECD, 2019). Similarly, UNESCO (2023) approaches AI literacy from a human-centered perspective, emphasizing the link between AI and fundamental human rights such as privacy, equality, non-discrimination, and freedom of expression. According to UNESCO's framework, AI literacy includes a basic understanding of AI and data, awareness of AI's impacts on privacy, equality, non-discrimination, and freedom of expression, as well as the ability to critically assess risks, biases, and broader social consequences associated with AI systems. In addition, learners are expected to actively participate in the ethical and sustainable co-creation of AI technologies. The framework highlights values, responsibility, and social justice as core principles guiding AI education (UNESCO, 2023). The UNESCO AI competency framework for students aims to help educators in this integration, outlining 12 competencies based on two dimensions are four interlinked aspects of AI competencies and three levels of progression or mastery. The framework defines four essential constituent elements of students' AI competency: Human-centred mindset, Ethics of AI, AI techniques and applications, and AI system design. These competencies span three progression levels: Understand, Apply, and Create, which are designed to reflect levels of mastery across all four aspects outlined above. Meanwhile, the European Union's DigComp 2.2 integrates AI literacy with digital capabilities, focusing on assessing the credibility of AI-generated content, protecting personal data, and using technology responsibly (European Commission, 2022).

Students at high school contexts require an AI literacy oriented approach that aligns with students' cognitive development and educational needs, focusing on foundational understanding, critical evaluation, and responsible use of AI rather than advanced technical implementation (UNESCO, 2023). Besides AI literacy frameworks specifically designed for students, several broader AI competency frameworks have been proposed to meet the needs of various target groups. The OECD-EU AILit framework divides AI literacy into four domains of interaction with AI: interaction, co-creation, management, and AI design. While the Barnard College framework presents AI literacy as a pyramid-shaped developmental roadmap, moving from foundational understanding of AI to its use, critical analysis, evaluation, and ultimately the creation of AI-related outputs (Barnard College, 2021). These characteristics show a clear similarity to AI literacy frameworks for high school students in emphasizing the cognitive process and the active role of learners when interacting with AI. AI literacy with a focus on understanding, critical thinking, and responsible use of AI, is a more appropriate concept for assessing the AI competence of high school students.

In the context of general education, especially in high school students do not develop AI as engineers or AI experts, but primarily interact with AI as users, decision-makers, and digital citizens in their learning and daily lives. By contrast, AI competence frameworks tend to prioritize technical proficiency, including the development, deployment, and optimization of AI systems in professional or occupational contexts, which exceeds both the educational objectives and cognitive characteristics of high school students (European Commission, 2022). Therefore, AI literacy was selected as the central conceptual framework for assessing high school students' understanding and use of AI, while AI competence frameworks oriented toward technical and professional domains were employed only as reference points to clarify the scope and orientation of the research.

According to the circular on digital competencies for learners issued by the Vietnamese Ministry of Education and Training in March 2025, with 6 competency domains and 24 component competencies, the assessment of artificial intelligence is one of the 24 component competencies according to the levels of the digital

competency framework for learners. This framework aims to assess and filter information from sources created or processed by AI, to better understand the reliability and use of that information. It also aims to evaluate AI in terms of transparency, safety, ethics, and impact. The component levels of this competency are divided into 8 levels from basic to advanced, with each level consisting of 2 sub-levels. At the basic level, learners can identify the fundamental elements of the AI system to be assessed, describe the main functions of the AI system, explain how the AI system works in a simple way, and summarize the characteristics and applications of the AI system. Students can analyze the effectiveness of AI systems in solving specific problems and compare the performance of different AI systems. Based on their own needs and with clearly defined and infrequent problems, learners can independently assess the accuracy and reliability of AI systems and review results, providing feedback on AI system effectiveness at an intermediate level. At an advanced level, based on their own and others' experiences in complex contexts, learners can make recommendations for improving AI systems based on evaluation results, and develop standards and guidelines for evaluating AI systems. Meanwhile, at an advanced level, learners can evaluate AI application strategies in organizations and develop long-term plans; they can also assess and validate complex AI systems. Finally, at the highest level of expertise, learners can research and develop new evaluation methods for AI systems, lead AI system evaluation projects, and produce detailed reports. In conclusion, this study uses the Vietnamese Digital Competency Framework, issued by the Ministry of Education and Training (2025), as a foundation to invest students' Artificial Intelligence (AI) literacy since this framework was chosen because it provides a comprehensive, context-appropriate, and officially recognized structure, while also aligning with educational goals and policy transformations in Vietnam.

Previous studies

Research with Finnish upper secondary (K-12) students has demonstrated that students' self-reported AI competence is associated with how they perceive AI-related risks: those with lower competence tend to focus on personal and learning-related risks, while students with higher competence emphasize systemic and institutional risks (Heilala et al., 2025). In Vietnam, there is currently no official national digital competency framework specifically for Vietnamese citizens. However, many studies have been conducted based on foreign digital competency frameworks to adapt and develop digital competency frameworks for different target groups in Vietnam. For students, Do Van Hung and colleagues (2022), based on a comparison of international digital competency frameworks, have initially developed the basic DigiLit 1.0 digital competency framework for students, comprising 7 competency groups with 26 standards. For high school students, Le Anh Vinh and colleagues (2021) also proposed a digital competency framework with seven main competency groups. Recently, based on the European DigComp digital competency framework, the Ministry of Education and Training has added the field of "Application of Artificial Intelligence (AI)" to create a digital competency framework for learners consisting of 6 fields and 24 component competencies.

III. Methods

Background of the study

The study was conducted at a specialized high school in Thai Nguyen, Vietnam, involving students aged between 16 and 18. Within this educational context, the school has shown a growing emphasis on integrating artificial intelligence (AI) into teaching and learning activities. Students are provided with opportunities to utilize AI tools, particularly through personal devices such as smartphones and laptops, to search for information, evaluate sources, and generate ideas for academic tasks. However, the extent of AI use is guided and moderated by teachers to ensure that students engage critically rather than rely passively on AI-generated content. In terms of instructional practices, teachers have begun to incorporate AI at a moderate level, primarily as a supportive tool for lesson preparation, resource design, and occasionally classroom interaction.

Ethical consideration

Before implementing the study, the researchers asked for permission from the high school managers to conduct it. All students who participated in the study were informed about the study process. An introduction section was included at the beginning of the questionnaire, clearly explaining the objectives of the research, assuring confidentiality, and emphasizing that participation was entirely voluntary. Students were required to read this information carefully and indicate their consent before proceeding to complete the survey.

Instruments

In this study, a structured questionnaire is employed as the key instrument to collect the quantitative data. A five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree) was used to measure students' responses. The questionnaire was developed based on the Digital Competency Framework (2025) issued by the Ministry of Education and Training of Vietnam. Prior to the main implementation, the instrument was reviewed by three experts in the field to ensure its content validity. In addition, a pilot study was conducted with

30 students to examine the clarity and comprehensibility of the items. The reliability of the questionnaire was assessed using Cronbach's Alpha ($\alpha = 0.896$), indicating that the question items are highly reliable and suitable for conducting a survey to investigate the AI literacy of high school students.

Data collection procedure

The survey was conducted from 12/03/2026 to 27/03/2026, this is an important step when students have finished the first semester and are familiar with the school schedule. This choice helped researchers capture student psychology in response to a survey about investigating the AI literacy of high school students. To ensure comprehensive data collection, researcher created a questionnaire in the link on Google Forms and then distributed it to students at Thai Nguyen specialized high school in the second semester of the 2026-2027 school year. By gathering feedback from different student groups, the study aims to build a more comprehensive understanding of the current state of students' AI understanding.

Data analysis

The data analysis were analyzed by calculating the mean (M) and standard deviation (SD) for each item. According to Creswell (2012) and Sekaran & Bougie (2016), the average scores on the Likert scale can be computed by this formula:

Average Score = $\frac{\sum(fi \times \text{Likert Item Score})}{\text{Number of Respondents}}$

- 1.00 - 1.80: Strongly disagree/Very dissatisfied/Very unimportant
- 1.81 - 2.60: Disagree/ Dissatisfied/ Doesn't matter
- 2.61 - 3.40: No opinion/ Average
- 3.41 - 4.20: Agree/ Satisfied/ Important
- 4.21 - 5.00: Strongly agree/ Very satisfied/ Very important

The computation and data explanation according to this method give way for converting the qualitative to quantitative data, creating good opportunities for data analysis, trend identification, and comparisons among different variables. In addition, the mean and standard deviation were calculated to provide a more precise statistical description of the data.

1. Mean (M)

$$M = \frac{\sum X}{N}$$

2. Standard Deviation (SD)

$$SD = \sqrt{\frac{\sum(X - M)^2}{N - 1}}$$

IV. Results

Participants

A total of 150 students from three grade levels (10, 11, and 12) participated in the study by completing a questionnaire distributed via Google Forms. The students represented a range of academic specializations, primarily within the natural sciences, including mathematics, physics, and biology, as well as English-majored students.

Table no 1: Sampling characteristics

Participants	
Sampling characteristics	
Questionnaires fully completed (suitable for analysis)	150
Female	67 (44,1%)
Male	81 (54,7 %)
Other	2 (1,2%)
Metric age (%)	
Age range	From 16 -18 age

Table no 2: Mean and Standard Deviation for Each Item of the AI Literacy Questionnaire for High School Students

Item	Mean (M)	SD	Interprete
PART 1: AI KNOWLEDGE			
Basic Understanding			
Q1. I can identify basic concepts of AI (e.g., machine learning, generative AI).	3.82	0.88	Agree

Q2. I can recognize AI applications in daily life (e.g., virtual assistants, recommendation systems).	3.75	0.91	Agree
Q3. I understand that AI operates based on learning from data.	3.60	0.97	Agree
Q4. I can explain in simple terms how AI works.	3.95	0.85	Agree
Application and Analysis			
Q5. I can apply basic AI principles to solve simple problems.	3.50	1.02	Agree
Q6. I can explain how AI is applied in a specific field (e.g., education or healthcare).	3.68	0.94	Agree
Q7. I can compare different types of AI tools (e.g., traditional AI vs. generative AI).	3.72	0.96	Agree
Evaluation and Reflection			
Q8. I can evaluate whether an AI tool works effectively for a specific task.	3.90	0.89	Agree
Q9. I can identify some limitations of AI (e.g., bias or misinformation).	3.85	0.92	Agree
Q10. I can suggest simple ways to improve the use of an AI tool.	3.55	1.05	Agree
PART 2: ETHICAL AND RESPONSIBLE USE OF AI			
Basic Use			
Q11. I can identify common AI tools (e.g., text or image generators).	3.88	0.87	Agree
Q12. I can perform basic operations using AI tools (e.g., asking questions, requesting summaries).	3.62	0.98	Agree
Q13. I am aware that using AI involves ethical and legal issues (e.g., data privacy).	3.58	1.01	Agree
Responsible Application			
Q14. I use AI appropriately to support my learning.	3.70	0.95	Agree
Q15. I check and edit AI-generated content before using it.	3.92	0.86	Agree
Q16. I avoid sharing personal or sensitive information when using AI.	4.05	0.82	Agree
Q17. I follow school regulations when using AI for assignments or tests.	3.60	1.00	Agree
Optimization and Risk Awareness			
Q18. I can adjust prompts to obtain better results from AI tools.	3.78	0.93	Agree
Q19. I consider potential risks (e.g., bias, misinformation) when using AI.	3.95	0.88	Agree
Q20. I take responsibility for how I use AI tools.	3.89	0.90	Agree
PART 3: EVALUATION OF AI TOOLS			
Basic Evaluation			
Q21. I check the reliability of AI-generated information.	3.65	0.97	Agree
Q22. I compare AI responses with other sources before using them.	3.40	1.08	No opinion
Analytical Evaluation			
Q23. I can detect misleading or incorrect information generated by AI.	3.55	1.04	Agree
Q24. I can evaluate the accuracy of an AI tool for a specific task.	3.48	1.06	Agree
Q25. I am concerned about the transparency of AI systems (e.g., whether AI explains its answers).	3.52	1.02	Agree
Critical Evaluation			
Q26. I consider the ethical impact of AI on society (e.g., fairness, inequality).	3.80	0.91	Agree
Q27. I can identify risks when AI is used in different fields.	3.58	1.00	Agree
Q28. I can propose basic principles for using AI safely and effectively.	3.75	0.93	Agree

Table no 3: The descriptive statistics revealed noticeable differences in AI literacy levels across the three grade levels

	Grade 10	Grade 11	Grade 12
Means	3.87	3.63	3.60
Standard deviation	0.91	0.99	1.09

To examine differences in AI literacy among students from different grade levels, the mean scores (M) and standard deviations (SD) were calculated for each group. For each question in the questionnaire, students consistently agree with each statement; however, there will be slight differences between grades 10, 11, and 12.

The descriptive statistics revealed that Grade 10 students achieved the highest mean score (M = 3.87, SD = 0.91), followed by Grade 11 (M = 3.63, SD = 0.99), while Grade 12 students obtained the lowest mean score (M = 3.60, SD = 1.09). These results indicate that Grade 10 students demonstrated a higher level of AI literacy compared to the other two groups, whereas Grade 12 students showed the lowest performance.

In terms of variability, Grade 12 students showed the highest standard deviation, suggesting a greater dispersion in their responses. In contrast, Grade 10 students demonstrated more consistency, as reflected by the lower SD value.

Overall, the comparison suggests that younger students tend to exhibit higher and more consistent levels of AI literacy, whereas older students show slightly lower performance and greater variation. This trend may be attributed to differences in exposure, motivation, or curriculum integration of AI-related content across grade levels.

V. Discussion

The findings suggest that high school students generally possess a satisfactory level of AI literacy but not in-depth understanding of AI. Interestingly, Grade 10 students scored slightly higher than their senior counterparts. This may be attributed to their greater exposure to digital technologies at an earlier age, as younger students are often more engaged with emerging technological tools. Similar to previous studies, students can understand basic AI concepts and have a certain level of ethical awareness due to AI's widespread use, with

frequent AI usage (mostly more than 3 times a day) such as GPT chat and Google AI. Students use AI to ask questions and complete assignments, resulting in a consistent level of "Agree" ratings. However, unlike some earlier studies, this survey also revealed that students lacked the habit of verifying AI-generated information. This may be because AI had not been systematically taught in Vietnam. Students know how to use AI, but lack critical thinking skills. Students tend to copy and paste information for questions and answers, rarely verifying sources or analyzing accuracy. Although the results indicated relatively high levels of ethical awareness, these had not yet been translated into practical skills. This variation highlights the need for more structured and inclusive AI education to ensure that all students can develop AI literacy. Therefore, integrating AI-related content into the curriculum could play a crucial role in enhancing students' knowledge and skills.

VI. Conclusion

This study aimed to investigate into AI literacy among high school students, focusing on three main aspects: AI knowledge, ethical and responsible use, and the evaluation of AI tools. The research results show that most students rated "Agree," indicating a fairly good understanding and use of AI. This study is limited by surveying only 150 students at a single high school and focusing on a single educational context, which may affect the generalizability of the findings. Future studies should include a larger and more diverse sample from different regions. They should also incorporate quantitative and qualitative methods, such as interviews or performance-based assessments, to gain a deeper understanding of students' AI literacy, particularly their critical thinking skills.

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