



The impact of Artificial Intelligence (AI) on high school students' learning autonomy (a case study of high schools in Thai Nguyen Province)

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Abstract

The article “The Impact of Artificial Intelligence (AI) on the Learning Autonomy of High School Students” examines the dual role of AI technologies in the educational context of Thai Nguyen. The study acknowledges that AI-through widely used tools such as ChatGPT and Canva Magic Studio-serves as a powerful assistant that enables students to access knowledge more rapidly and expand their creative capabilities. However, it also highlights a major concern: excessive reliance on AI may weaken students' autonomy, independent thinking, and sense of responsibility in learning. In this study, learning autonomy is defined as the learners' capacity to self-direct, self-regulate, and self-evaluate their entire learning process. The research identifies six specific components of learning autonomy in the context of AI use, including the ability to set personal goals, select appropriate AI tools, and apply AI creatively. Survey findings reveal that students' overall level of learning autonomy is rated at a Moderately Good level (mean scores ranging from 2.35 to 2.70). The most notable weakness lies in the component “Self-monitoring and self-evaluating AI-assisted learning outcomes,” which received the lowest ratings from both students and teachers. This result indicates that many students still lack critical thinking skills and the ability to verify information effectively. In conclusion, the study argues that fostering learning autonomy is essential to ensuring that students can use AI responsibly and creatively while maintaining their own independent thinking in the era of rapid technological advancement.

Keywords: Impact, Artificial Intelligence (AI), Learning Autonomy, High School Students, Thai Nguyen

1. Introduction

Humanity is witnessing an unprecedented breakthrough in science and technology, particularly in the field of Artificial Intelligence (AI). The emergence and widespread adoption of AI have generated a profound transformation across all aspects of life—from economics, healthcare, and communication to education. Within the school environment, AI is not merely a supporting tool but is gradually becoming a learning companion that assists students in acquiring knowledge and developing their cognitive abilities. Intelligent software, applications, and learning platforms such as ChatGPT, Notion AI, Grammarly, Canva, and Gamma AI have created numerous opportunities for students to access information more rapidly, expand creative expression, and enhance their capacity for self-directed learning.

However, alongside these benefits come new challenges related to learning methods, thinking processes, and students' ability to master technology. Passive, unfocused, or overly dependent use of AI may diminish students' capacity for independent learning, creativity, and accountability for their academic performance. Thus, in the context of contemporary education, learning autonomy has emerged as a core competency that every student must develop in order to pursue lifelong learning and adapt to the knowledge society and fast-changing technological environment.

At the high school level-where students must be equipped with autonomy in values, ethics, behavior, critical thinking, and independent learning skills-the development of learning autonomy becomes especially crucial. This stage represents a transition from teacher-dependent learning to self-directed and self-responsible learning. With the integration of AI into school life, the relationship between students and technology becomes more diverse and complex: AI can serve as an intelligent guide, yet it may also become a tempting shortcut that encourages student dependency. This raises an urgent question: Does the use of AI truly enhance students' learning autonomy, or does it inadvertently diminish their ability to learn independently?

In Thai Nguyen province, high schools are actively promoting digital transformation in education, resulting in increasingly widespread access to AI-based tools. Many students use ChatGPT to solve assignments, rely on Grammarly to correct English errors, and employ Canva or Gamma to design presentations. However, significant disparities remain in the effective and responsible use of these technologies. While some students utilize AI as a cognitive support tool-allowing them to actively explore knowledge and strengthen learning skills-many others rely heavily on such tools, leading to copying, reduced creativity, and even violations of academic integrity.

2. Theoretical framework

Artificial Intelligence (AI), derived from the field of computer science, refers to systems capable of simulating human intelligence. AI is characterized by advanced technologies such as cloud computing, the Internet of Things (IoT), big data, blockchain, and cyber-physical systems (Zeba *et al.*, 2021). In the field of education, AI is being integrated to revolutionize teaching and learning methods, enhance learning outcomes, and improve educational quality (Elhajji *et al.*, 2020) [6].

AI can positively influence academic performance through personalized learning and rapid feedback (Zawacki-Richter *et al.*, 2019) [14], although its effectiveness may vary depending on context. According to Chiquet *et al.* (2023) [2], AI can enhance academic achievement by providing diversified access to information. AI use is positively associated with students' academic performance (Grájeda *et al.*, 2024) [8]. Researchers such as Bilquise *et al.* (2023) emphasize AI's capacity to identify and remediate knowledge gaps, thereby supplying the data needed for students to develop self-awareness and adjust their learning strategies. This technology also enables personalized learning pathways, allowing students to access knowledge more efficiently (Mejeh & Rehm, 2024) [10]. In Vietnam, the study by Hoàng Thị Thu Hiền (2025) demonstrates-through structural modeling-that self-regulated learning serves as the key mediating variable: AI improves learning outcomes by strengthening learners' autonomy. However, scholars such as Tôn Quang Cường warn that overreliance on AI may lead to dependency, reduced initiative, and weakened critical thinking, thereby exerting negative long-term effects on academic achievement.

The term autonomy originates from the Greek word *autonomia*. In *The Adult's Learning Projects: A Fresh Approach to Theory and Practice in Adult Education* (1971), Allen Tough provided early conceptualizations of learning autonomy. Dearden (1972) defined autonomy as independence and self-determination in performing tasks. Holec (1981) [9] asserted that learning autonomy is one's ability to manage their own learning. O'Brien and Guiney (2001) further noted that autonomous learners depend less on external control or direction. Across subsequent studies, learning autonomy is commonly understood as the capacity to make decisions in learning without external control, or simply the freedom to act independently within the learning process.

Self-regulated learning (SRL), closely related to learning autonomy, originates from motivational learning theories (Schunk & Zimmerman, 1997) [12]. Learning styles, metacognition, and learner-related theories also influence learners' autonomy. Schunk and Zimmerman (1997) [12] identified a direct link between learning motivation and autonomy/self-regulation. Self-regulated learners are inherently motivated and autonomous individuals who proactively pursue their learning goals and take control of their learning processes. Azevedo (2009) [1] argued that effective learning requires a range of self-regulatory processes, including planning, activating prior knowledge, metacognitive monitoring, self-adjustment, and self-evaluation. SRL is an active, constructive process that requires scaffolding and explicit instruction as students develop regulatory skills.

In summary, learning autonomy refers to learners' ability to make independent decisions and take responsibility for their learning. It is the capacity to self-direct, self-regulate, and self-evaluate one's learning process to achieve intended goals. Autonomous learners are those who actively set goals, select appropriate learning methods, monitor their progress, and assess their outcomes, rather than relying entirely on teachers or instructors.

2.1. Learning autonomy

Learning autonomy was conceptualized by Holec (1981) [9] as the learner's ability to take responsibility for their own learning. Little (1991) expanded Holec's view by emphasizing learning autonomy as an essential learner competence, expressed not only in how individuals learn but also in how they apply what they have learned. According to Little, autonomous learners make decisions and act independently throughout the learning process. Fundamentally, the perspectives of Holec and Little converge in defining learning autonomy as the capacity to assume responsibility and make self-directed decisions regarding one's learning.

Dickinson (1995) described learning autonomy as the state in which learners are fully responsible for all decisions related to their learning and for implementing those decisions. Similarly, Dam (1995) viewed learning autonomy as a willingness to take responsibility for one's learning in order to meet personal needs and goals. Benson and Voller (1997) highlighted the learner's ability to control their learning, including the management of learning activities, cognitive processes, and learning content. Freire (1996) specified two essential components of learning autonomy: the ability and the awareness to act autonomously. Autonomous learners have the capacity to select learning content, evaluate their learning process, and engage in independent study with a proactive learning mindset. Benson (1996) further argued that learning autonomy is reflected through several dimensions: the ability to learn entirely on one's own, the possession of skills for self-directed learning, the willingness to assume responsibility for one's learning, and the right to make decisions regarding the learning process. Hsu (2005) similarly asserted that learning autonomy encompasses responsibility, process, readiness, and freedom in learning.

Victori and Lockhart (1995) [13] affirmed that autonomous learning plays a crucial role in educational success by making the learning process more personalized and focused. Zimmerman (2002) argued that self-regulated learners are more likely to achieve academic success and maintain optimism about their futures, highlighting the importance of SRL for lifelong learning. Learners with strong self-regulation skills typically exhibit higher motivation and demonstrate more effective learning behaviors (Pintrich, 2003) [11]. Self-regulation is a teachable and learnable skill through goal-oriented engagement. When learners are taught self-regulatory strategies and encouraged to assess their own work through self-evaluation and goal-setting, they can develop personalized strategies that significantly enhance their learning performance. Learning autonomy has been linked to higher

grades and improved academic achievement (Duckworth & Seligman, 2015) [5]. Dignath (2008) [4] found that children and adolescents with higher levels of SRL are more likely to succeed academically than those with lower levels, reinforcing the critical role of self-regulation in education.

Learning autonomy is a dynamic process in which learners deliberately apply cognitive, emotional, and behavioral efforts to optimize learning outcomes. This process includes self-motivation, time management, adjustment of learning strategies, and perseverance in the face of challenges.

According to Holec (1981) [9], learning autonomy is demonstrated when learners: identify learning goals; determine learning content and processes; select learning methods and techniques; monitor their learning progress; and evaluate what they have achieved. Nguyễn Thị Phương Thảo *et al.* (2020) [17] identified the structure of learning autonomy in chemistry education as comprising several components: self-reliance; emotional, attitudinal, and behavioral self-regulation; adaptability; career orientation; and self-improvement.

In Vietnam, the current general education curriculum follows a competency-based approach. The goal of the 2018 General Education Curriculum is to develop students' qualities and competencies. To form both general and subject-specific competencies, students must not only acquire scientific knowledge but also engage actively in self-study, self-training, and independent inquiry. Students play dual roles: they are both recipients and creators of knowledge. Through autonomous learning and research, they apply knowledge to real-life situations in a proactive manner to achieve their learning objectives. Learning autonomy is manifested through students' performance of learning tasks, requiring them to transform knowledge, skills, and attitudes into effective problem-solving during the learning process.

2.2. Specific competencies of learning autonomy when students use AI

In the era of Industry 4.0, artificial intelligence is increasingly integrated into education, enabling students to access knowledge more easily and develop essential learning skills. However, AI-supported learning is only truly effective when students demonstrate learning autonomy—that is, the ability to actively control how AI is used, what learning goals are pursued, and what outcomes are achieved.

Based on theoretical research on learning autonomy, AI adoption in education, and the learning characteristics of high school students, we identify the following specific competencies that constitute students' learning autonomy in the context of AI use:

- a) **Ability to set learning goals and orientations when using AI:** Autonomous students do not use AI randomly or simply follow trends; instead, they clearly define their learning goals before engaging with AI. For example, when using ChatGPT to study Literature, a student may set the goal of “understanding the structure of a social argumentative essay” rather than merely asking AI to “write the essay.” Establishing explicit goals helps students orient their use of AI appropriately, avoid

dependency, and ensure that AI genuinely serves their learning purposes.

- b) **Ability to select appropriate AI tools for specific learning tasks:** With a wide range of AI tools available—such as ChatGPT, Notion AI, Gamma, Canva, or Perplexity—autonomous students choose tools that best fit the learning task and subject area. For instance, Canva or Gamma may be used to design presentations, Grammarly to refine grammar, and Perplexity to search for reliable sources with verifiable citations. Such intentional tool selection reflects students' self-direction in digital learning and helps them develop adaptability and independent decision-making.
- c) **Ability to monitor and evaluate AI-supported learning outcomes:** A key indicator of learning autonomy is the ability to evaluate the information or outputs generated by AI. Students should not accept AI results passively; rather, they must verify the information, cross-check with other sources, or consult teachers for confirmation. For example, when AI suggests a solution to a math problem, autonomous students re-check the steps to ensure conceptual understanding instead of accepting the answer immediately. This behavior demonstrates critical thinking and self-evaluation skills, fostering deep rather than superficial learning.
- d) **Ability to adjust learning strategies through interaction with AI:** Since AI provides rapid and diverse feedback, students need to adjust their learning strategies accordingly. For instance, if AI identifies errors in a student's writing, the learner analyzes the cause, learns from the mistake, and applies the correction in future assignments. Such adjustments demonstrate adaptive learning and behavioral self-regulation—both central components of learning autonomy.
- e) **Ability to regulate behavior and maintain a positive, responsible attitude when using AI:** Autonomous learners understand not only how to use AI but also the ethical limits of its use. They recognize that AI should function as an assistant, not as a means to cheat, plagiarize, or complete assignments on their behalf. This competency reflects academic responsibility, integrity, and self-respect foundational attributes for developing long-term, sustainable learning capacity in the digital age.
- f) **Ability to use AI creatively to expand and generate knowledge:** Finally, autonomous students use AI as a creative tool to explore and generate new knowledge. Examples include using DALL·E to create illustrations for presentations, Pika Labs to generate experimental simulation videos, or ChatGPT to propose new research directions. Such creative integration of AI demonstrates self-exploration, innovation, and the ability to transform knowledge—turning AI into a learning partner rather than a substitute for student effort.

2.3. Levels of learning autonomy among high school students when using ai in learning

To quantify and assess the learning autonomy of high school students in the context of AI-supported learning, the

component competencies of learning autonomy can be operationalized into a system of criteria accompanied by

observable indicators. These indicators are classified into four levels, as presented in Table 1:

Table 1: Levels of learning autonomy among high school students in the context of AI-supported learning

Criteria	Level			
	Level 1	Level 2	Level 3	Level 4
Ability to set learning goals and orientations when using AI	Has not set any learning goals or specific orientations when using AI in learning.	Has not actively set clear, detailed learning goals or orientations when using AI, and limitations remain unaddressed.	Actively sets specific learning goals and orientations for AI use, but has not fully addressed existing limitations.	Proactively sets detailed and specific learning goals and orientations when using AI, effectively addressing limitations.
Ability to select appropriate AI tools for learning tasks	Unable to select AI tools suitable for the learning task.	Identifies relatively appropriate AI tools for the learning task, but in a passive manner.	Actively identifies relatively appropriate AI tools for the learning task.	Proactively identifies AI tools that are fully suitable for the learning task.
Ability to monitor and evaluate AI-supported learning outcomes	Lacks autonomy in monitoring and evaluating AI-supported learning outcomes.	Monitors and evaluates AI-supported learning outcomes passively.	Actively monitors and evaluates AI-supported learning outcomes.	Conducts monitoring and evaluation of AI-supported learning outcomes in a positive, proactive, and autonomous manner.
Ability to adjust learning methods when interacting with AI	Unable to adjust personal learning methods appropriately when interacting with AI.	Adjusts learning methods passively and not promptly when interacting with AI.	Actively adjusts personal learning methods to suit learning conditions when interacting with AI.	Proactively and promptly adjusts personal learning methods to suit learning conditions when interacting with AI.
Ability to regulate positive learning behaviors and attitudes when using AI	Unable to regulate personal positive learning behaviors and attitudes when using AI.	Able to recognize personal learning behaviors and attitudes but unable to regulate them when using AI.	Able to evaluate and regulate personal positive learning behaviors and attitudes when using AI.	Able to evaluate and regulate personal positive learning behaviors and attitudes; demonstrates confidence, proactiveness, and responsibility when using AI.
Ability to use AI creatively to expand knowledge	Shows no creativity and does not use AI to expand knowledge for learning purposes.	Begins to use AI to expand knowledge for learning purposes but lacks creativity.	Uses AI to expand knowledge with initial signs of creativity, though not yet proactive.	Uses AI to expand knowledge in a creative, proactive, and timely manner to support learning.

- Ability to set learning goals and orientations when using AI (Level 1: Does not set learning goals or specific orientations when using AI for learning. Level 2: Has not actively set clear, detailed learning goals or orientations when using AI, and limitations remain unaddressed. Level 3: Actively sets specific learning goals and orientations for AI use, but has not fully addressed existing limitations. Level 4: Proactively sets detailed and specific learning goals and orientations when using AI, and effectively addresses limitations.)
- Ability to select appropriate AI tools for learning tasks (Level 1: Unable to select AI tools appropriate for the learning task. Level 2: Identifies relatively appropriate AI tools in a passive manner. Level 3: Identifies relatively appropriate AI tools but remains passive in the selection process. Level 4: Proactively selects AI tools that are well suited to the learning task.)
- Ability to monitor and evaluate AI-supported learning outcomes (Level 1: Lacks autonomy in monitoring and evaluating AI-supported learning outcomes. Level 2: Monitors and evaluates AI-supported learning outcomes passively. Level 3: Actively monitors and evaluates AI-supported learning outcomes. Level 4: Conducts monitoring and evaluation in a positive, proactive, and autonomous manner.)
- Ability to adjust learning methods when interacting with AI (Level 1: Unable to adjust personal learning methods appropriately when interacting with AI. Level 2: Adjusts learning methods passively and not promptly when interacting with AI. Level 3: Actively adjusts personal learning methods to suit learning conditions when interacting with AI. Level 4: Proactively and promptly adjusts learning methods to match learning conditions during AI interaction.)
- Ability to regulate positive learning behaviors and attitudes when using AI (Level 1: Unable to regulate positive learning behaviors and attitudes when using AI. Level 2: Acknowledges personal learning behaviors and attitudes but cannot regulate them effectively when using AI. Level 3: Evaluates and regulates positive learning behaviors and attitudes when using AI. Level 4: Evaluates and effectively regulates positive learning behaviors and attitudes; uses AI confidently, proactively, and responsibly.)
- Ability to use AI creatively to expand knowledge (Level 1: Does not use AI creatively or to expand knowledge for learning purposes. Level 2: Begins to use AI to expand knowledge but lacks creativity. Level 3: Uses AI to expand knowledge with initial signs of creativity, though not yet

fully proactive. Level 4: Uses AI creatively, proactively, and promptly to expand knowledge in support of learning.) Summary, in the context of AI-assisted learning, learning autonomy is demonstrated not only through students' ability to self-learn, self-monitor, and self-evaluate, but also through their responsible, creative, and critical engagement with technology. As AI continues to advance, the role of learning autonomy becomes increasingly important, as it enables students to maintain their individual learning identity and develop independent thinking skills in the era of artificial intelligence.

Research questions

Question 1: Which AI tools do high school students in Thai Nguyen use for learning, and to what extent do they use them?

Question 2: How does AI influence the level of learning autonomy among high school students in Thai Nguyen?

Question 3: How can AI be used effectively to promote students' autonomous learning and creativity?

3. Research methodology

To collect data evaluating the current status of AI tool usage in students' learning and the influence of AI on the learning autonomy of high school students in Thai Nguyen province, we conducted a survey with 1,001 students and 117 teachers from high schools across the province. The participating schools

included: Thai Nguyen High School for the Gifted, Luong Ngoc Quyen High School, Chu Van An High School, Thai Nguyen High School, and Duong Tu Minh High School.

Two questionnaire forms were designed: Form 1 for teachers and Form 2 for students. Social science statistical methods were employed, including percentage distribution and calculation of mean scores. A 5-point Likert scale was used to assess the current situation, with score values assigned as follows: 1 = 1 point; 2 = 2 points; 3 = 3 points; 4 = 4 points; 5 = 5 points. The interval value was calculated as: $\{(Maximum - Minimum)\}/n = (5 - 1)/5 = 0.8$. Accordingly, the interpretation of mean scores aligned with the following levels: 1.0 – 1.80: Level 1; 1.81 – 2.60: Level 2; 2.61 – 3.40: Level 3; 3.41 – 4.20: Level 4; 4.21 – 5.00: Level 5. Excel was used to analyze quantitative data, forming the basis for evaluating the actual situation through both quantitative and qualitative findings. In addition, we conducted interviews with several education administrators, teachers, and students to gather supplementary insights that further supported the survey results.

4. Research findings and discussion

4.1. Current status of AI software use in learning among high school students in Thai Nguyen province

To examine this aspect, we collected and analyzed students' self-assessments regarding their use of AI tools in learning. The results are presented below:

Table 2: Students' self-assessment of the level of AI software use in learning at high schools in Thai Nguyen Province

Content	Levels of Frequency										Mean	Rank
	Never		Rarely		Occasionally		Frequently		Very frequently			
	n	%	n	%	n	%	n	%	n	%		
1. ChatGPT – A virtual learning assistant that supports explaining concepts, generating written texts, summarizing materials, and planning learning activities.	49	5.00	95	9.69	492	50.20	291	29.69	53	5.41	3.21	1
2. Grammarly – A tool for checking English grammar, spelling, and writing style.	369	37.54	191	19.43	264	26.86	138	14.04	21	2.14	2.24	3
3. QuillBot – A tool for paraphrasing sentences, summarizing texts, and suggesting alternative writing styles.	505	51.58	150	15.32	215	21.96	101	10.32	8	0.82	1.93	6
4. Khanmigo (Khan Academy) – An AI tutor that provides personalized learning support in Mathematics, Science, History, and Languages.	550	56.12	136	13.88	184	18.78	96	9.80	14	1.43	1.87	8
5. Notion AI – A tool for note-taking, summarizing lessons, planning study activities, and managing time.	518	52.80	158	16.11	190	19.37	98	9.99	17	1.73	1.92	7
6. Perplexity AI - Tìm kiếm thông tin, tài liệu học tập có trích dẫn rõ ràng	510	52.09	118	12.05	203	20.74	130	13.28	18	1.84	2.01	5
7. Gamma – An AI-powered platform for generating presentations, summaries, and structured learning or research content.	451	45.97	185	18.86	232	23.65	99	10.09	14	1.43	2.02	4
8. Canva Magic Studio – A tool for creating slides, posters, infographics, short videos, and educational illustrations using AI.	131	13.33	156	15.87	327	33.27	294	29.91	75	7.63	3.03	2
9. Pika Labs – A tool for generating illustrative videos, short animations, or explanatory videos from text-based descriptions.	577	59.30	152	15.62	158	16.24	77	7.91	9	0.92	1.76	9
10. Runway ML – A platform for editing and creating educational videos, simulating experiments, and producing AI-powered scientific presentations.	596	60.82	156	15.92	153	15.61	67	6.84	8	0.82	1.71	11

Based on the survey data collected from students at five high schools in Thai Nguyen Province (Table 2), there is a clear

variation in the frequency of AI tool usage for learning. ChatGPT is the most frequently used tool, with the highest

mean score of 3.21 (Rank 1). This result reflects the versatility and effectiveness of ChatGPT in supporting tasks such as explaining concepts, generating written assignments, summarizing materials, and planning study activities.

In contrast, more specialized or less widely known tools tend to be used less frequently. Khanmigo (Khan Academy) and Gamma AI (used for generating presentation slides) show the lowest mean scores, 1.87 (Rank 8) and 1.85 (Rank 9) respectively. This indicates that most students seldom use personalized learning platforms or advanced creative-support tools in their daily academic routines.

Among English-support tools, Grammarly is used more frequently (Mean = 2.24, Rank 3) than QuillBot (Mean = 1.93, Rank 6), suggesting that students prioritize grammar and spelling correction over paraphrasing or text summarization. Despite its capabilities in note-taking and time management,

Notion AI also shows only moderate usage (Mean = 2.05, Rank 4), without a particularly strong presence.

In summary, students in Thai Nguyen tend to prioritize AI tools that have broad applications and offer direct support for essential academic tasks, with ChatGPT as the most prominent example. However, overall usage levels remain largely at the “Occasionally” or “Rarely” range for many applications. This pattern suggests that students’ habits and skills in integrating AI into learning in a consistent and advanced manner have not yet been fully developed.

4.2. Current status of AI’s impact on learning activities of high school students in Thai Nguyen province

4.2.1. Students’ assessment of positive impacts

Regarding this aspect, students’ self-assessments are presented in the following table:

Table 3: Students’ evaluation of the positive impacts of AI use on learning at high schools in Thai Nguyen Province

Content	Levels of Frequency										Mean	Rank
	Strongly disagree		Disagree		Neutral		Agree		Strongly agree			
	SL	%	SL	%	SL	%	SL	%	SL	%		
1. AI helps me select learning content, pace, and methods that align with my abilities and personal needs.	45	4.58	33	3.36	344	34.99	391	39.78	170	17.29	3.62	1
2. Learning with AI allows me to more easily monitor my progress and learning outcomes, rather than relying entirely on the teacher.	44	4.49	60	6.13	374	38.20	350	35.75	151	15.42	3.51	4
3. AI helps me deepen my understanding of lesson content through instant feedback and personalized suggestions.	38	3.91	56	5.76	367	37.72	361	37.10	151	15.52	3.55	2
4. AI supports me in identifying specific learning goals and developing more effective study plans.	44	4.52	58	5.95	383	39.32	353	36.24	136	13.96	3.49	6
5. AI helps me improve my time management skills and organize my learning activities in a systematic way.	46	4.70	62	6.34	415	42.43	330	33.74	125	12.78	3.44	10
6. When learning with AI, I am able to self-monitor, self-evaluate, and adjust my learning strategies when necessary.	42	4.31	65	6.67	391	40.10	334	34.26	143	14.67	3.48	7
7. AI encourages me to ask questions, analyze, and verify information, thereby developing my critical thinking skills.	45	4.60	65	6.65	380	38.85	350	35.79	138	14.11	3.48	7
8. Using AI enhances my ability for self-directed learning and creativity in accessing new knowledge.	36	3.68	64	6.55	366	37.46	367	37.56	144	14.74	3.53	3
9. Thanks to AI, I find learning more engaging, dynamic, and relatable.	41	4.19	56	5.73	392	40.08	350	35.79	139	14.21	3.50	5
10. AI increases my intrinsic motivation and fosters a proactive attitude in exploring knowledge.	40	4.10	62	6.35	395	40.47	344	35.25	135	13.83	3.48	7
Mean											3.51	

According to the survey results, the majority of students agreed with the statements “AI helps me select learning content, pace, and methods that match my abilities and personal needs” (11.1%) and “Using AI increases my capacity for self-directed learning and creativity in accessing new knowledge” (10.4%). However, relatively few students believed that “AI helps me improve time management skills and organize my learning activities in a systematic way” (9.3%). This indicates that students’ learning autonomy is currently developed at the levels of awareness and orientation, but has not yet fully progressed to behavioral management and self-regulation.

Findings in Table 3 show that high school students in Thai Nguyen have a strong consensus regarding the positive impacts of Artificial Intelligence (AI) on their learning, with an overall mean score of 3.51, corresponding to the Agree level. The most

prominent positive influence relates to AI’s ability to personalize learning pathways; the item “AI helps me select learning content, pace, and methods suitable for my abilities and needs” has the highest mean score of 3.62 (Rank 1). This highlights AI’s role as an effective tool for adjusting and optimizing individual learning trajectories.

Students also highly valued AI’s support in deepening understanding through instant feedback and personalized suggestions, which reached a mean score of 3.55 (Rank 2). AI was further perceived as enhancing self-directed learning and creativity (Mean = 3.53, Rank 3), demonstrating its role in fostering students’ active engagement with new knowledge.

Although all positive impacts were rated favorably, items related to soft skills and self-management received slightly lower scores. Specifically, the statement “AI helps me improve

time management and organize my learning activities scientifically” ranked lowest with a mean score of 3.44 (Rank 10). Items pertaining to setting learning goals (Mean = 3.49, Rank 6) and encouraging critical thinking (Mean = 3.48, Rank 7) were also among the lower-rated aspects. These findings suggest that while AI is an excellent knowledge-support tool, students still need to improve the ways they utilize AI to better

manage their time and develop complex cognitive skills—such as critical thinking—more consistently and effectively.

4.2.2. Students’ assessment of negative impacts

The results of the student survey on the limitations they encounter when using AI in learning are presented in the following table:

Table 4: Students’ evaluation of the limitations experienced when using AI in learning at high schools in Thai Nguyen Province

Content	Levels of Frequency										Mean	Rank
	Strongly disagree		Disagree		Neutral		Agree		Strongly agree			
	SL	%	SL	%	SL	%	SL	%	SL	%		
1. I rely too heavily on AI, often letting it complete assignments for me instead of thinking on my own.	223	22.28	265	26.47	343	34.27	127	12.69	43	4.30	2.50	5
2. I make less effort and am less proactive in learning since AI became available.	216	21.58	288	28.77	330	32.97	125	12.49	42	4.20	2.49	6
3. I often complete assignments with AI without truly understanding the underlying concepts.	245	24.48	292	29.17	293	29.27	123	12.29	48	4.80	2.44	7
4. I feel that I am becoming more dependent and passive in my learning because of AI.	206	20.58	258	25.77	345	34.47	146	14.59	46	4.60	2.57	2
5. AI reduces my natural motivation to learn, as learning becomes too easy and lacks challenge.	245	24.72	283	28.56	289	29.16	128	12.92	46	4.64	2.44	7
6. I learn to obtain quick results rather than to deeply understand the subject matter.	220	22.20	236	23.81	335	33.80	145	14.63	55	5.55	2.58	1
7. I rarely ask questions or critically examine the information provided by AI.	206	20.79	261	26.34	339	34.21	140	14.13	45	4.54	2.55	3
8. I trust AI-generated information completely without verifying its accuracy.	281	28.36	282	28.46	285	28.76	99	9.99	44	4.44	2.34	10
9. Using AI sometimes leads me to be less honest or to violate academic integrity (e.g., copying content, failing to cite sources).	242	24.42	277	27.95	310	31.28	117	11.81	45	4.54	2.44	7
10. I am easily distracted or lose focus when learning with AI tools online (due to social media, advertisements, games, etc.).	215	21.70	261	26.34	337	34.01	128	12.92	50	5.05	2.53	4
Mean											2.49	

The survey results indicate that AI does not exert entirely positive effects on students’ learning, with an overall mean score of 2.49, suggesting that students’ agreement with these risks falls mostly within the Neutral or Disagree range. However, several prominent issues were identified. The most significant limitation acknowledged by students is the tendency to “learn to obtain quick results rather than to deeply understand the subject matter”, which received the highest mean score of 2.58. This reflects a shift in learning motivation toward efficiency rather than depth of comprehension. At the same time, students reported that they are “becoming more dependent and passive in their learning because of AI” (Mean = 2.57) and tend to “ask fewer questions or critically examine AI-generated information” (Mean = 2.55). These findings highlight the risk of diminishing autonomy and critical thinking when the learning process becomes overly mechanized. Other problematic behaviors such as “completing assignments with AI without truly understanding the underlying knowledge” and the potential for “academic dishonesty or violations of integrity” (both Mean = 2.44) also remain noteworthy concerns. Interestingly, the statement “I completely trust AI-generated information without verifying

it” received the lowest level of agreement (Mean = 2.34), suggesting that students retain some awareness of the need to cross-check information for accuracy.

Overall, the limitations primarily revolve around reduced intrinsic motivation, decreased initiative, and weakened independent thinking.

Additionally, 11.4% of students reported that they “feel increasingly passive and dependent on AI,” indicating that a considerable proportion of learners recognize the negative consequences of overreliance on AI specifically, a decline in their ability to think critically, explore independently, and make their own decisions. Conversely, a relatively smaller percentage (7.7%) “completely trust AI-generated information without verification,” demonstrating that most students maintain a certain level of caution and do not rely entirely on AI outputs.

4.3. Current status of learning autonomy among high school students in Thai Nguyen Province

To investigate this aspect, we conducted surveys with both teachers and students. The results are presented in the following two tables:

Table 5: Students' self-assessment of their level of learning autonomy when using AI in learning

Criteria	Level								Mean	Rank
	Level 1		Level 3		Level 3		Level 4			
	n	%	n	%	n	%	n	%		
1. Ability to set learning goals and orientations when using AI	75	7.5	439	43.9	335	33.5	152	15.2	2.57	4
2. Ability to select appropriate AI tools for learning tasks	83	8.3	349	43.9	407	40.7	162	16.2	2.65	2
3. Ability to monitor and evaluate AI-supported learning outcomes	109	10.9	444	44.4	332	33.2	116	11.6	2.45	6
4. Ability to adjust learning methods when interacting with AI	87	8.7	410	41.0	360	36.0	144	14.4	2.56	5
5. Ability to regulate positive learning behaviors and attitudes when using AI	80	8.0	345	34.5	373	37.3	203	20.3	2.7	1
6. Ability to use AI creatively to expand knowledge	91	9.1	368	36.8	378	37.8	164	16.4	2.62	3

The results presented in Table 5 indicate that, overall, the level of learning autonomy among high school students when using AI falls within the Moderately Good range, with mean scores ranging from 2.45 to 2.70. Approximately 52% of students demonstrate Active learning autonomy (Levels 3 & 4) across the various criteria.

The highest-rated criterion is "Ability to regulate positive learning behaviors and attitudes when using AI" (Mean = 2.70), suggesting that students possess a relatively strong capacity for self-awareness and behavioral adjustment. More than 20% of students reached Level 4, indicating confidence, initiative, and responsibility when engaging with AI. Following this is the criterion "Ability to select appropriate AI tools for learning tasks" (Mean = 2.65), with over 56% of students achieving Levels 3 and 4. This demonstrates that many students are becoming proficient in identifying and choosing suitable AI tools to support their learning. However, nearly 35% still operate at a passive level (Level 2), indicating room for improvement.

Ranked third is "Ability to use AI creatively to expand knowledge" (Mean = 2.62). Although 54.2% of students

reached Active levels, the high percentage at Level 2 (36.8%) suggests that most students are only applying AI functionally rather than creatively.

The mid-ranking criteria include "Ability to set learning goals and orientations when using AI" (Mean = 2.57) and "Ability to adjust learning methods when interacting with AI" (Mean = 2.56). Notably, around 41–44% of students scored at Level 2 for these criteria, indicating that many students are not yet proactive in setting detailed learning goals or adjusting learning strategies promptly and independently.

The lowest-performing criterion is "Ability to monitor and evaluate AI-supported learning outcomes" (Mean = 2.45). With 55.3% of students falling into Levels 1 and 2, this reflects a significant weakness in students' capacity to critically examine, verify, and evaluate AI-generated information. This lack of critical oversight suggests that students may be overly reliant on AI outputs, highlighting a substantial challenge in fostering critical thinking skills within AI-supported learning environments.

*** Teachers' evaluation of students' learning autonomy when using AI**

Table 6: High school teachers' assessment of the current level of students' learning autonomy when using AI in Thai Nguyen Province

Criteria	Level								Mean	Rank
	Level 1		Level 3		Level 3		Level 4			
	n	%	n	%	n	%	n	%		
1. Ability to set learning goals and orientations when using AI	10	8.55	50	42.74	46	39.32	11	9.4	2.5	2
2. Ability to select appropriate AI tools for learning tasks	9	7.69	58	49.57	42	35.90	8	6.84	2.43	3
3. Ability to monitor and evaluate AI-supported learning outcomes	20	17.09	48	41.03	39	33.33	10	8.55	2.35	6
4. Ability to adjust learning methods when interacting with AI	12	10.26	54	46.15	44	37.61	7	5.98	2.38	5
5. Ability to regulate positive learning behaviors and attitudes when using AI	18	15.38	45	38.46	45	38.46	9	7.69	2.39	4
6. Ability to use AI creatively to expand knowledge	16	13.68	35	29.91	54	46.15	12	10.26	2.54	1

The survey results in Table 6 indicate that teachers generally assess the learning autonomy of high school students when using AI as being at a Moderate to Fairly Good level, with mean scores ranging narrowly from 2.35 to 2.54 (on a 4-point scale). The strongest competency is Criterion 6 (Mean = 2.54): Ability to use AI creatively to expand knowledge, suggesting that students show relatively strong capacity for exploration and application of AI in innovative ways. Learning goal-setting (Criterion 1, Mean = 2.50) is also rated fairly well, ranking second. However, the remaining criteria fall within the Moderate range (Mean < 2.43), indicating that several aspects of learning autonomy still require improvement. The lowest-rated competency is Criterion 3 (Mean = 2.35): Ability to

monitor and evaluate AI-supported learning outcomes. This reflects students' limited skills in critical analysis, oversight, and evaluation of the quality of AI-generated results. Similarly, Criterion 5 (Mean = 2.38): Ability to regulate positive learning behaviors and attitudes, and Criterion 2 (Mean = 2.43): Ability to select appropriate AI tools, are also rated only at an average level.

Overall, although students demonstrate relatively strong abilities in engaging with AI creatively, schools need to focus on strengthening students' capacities for self-evaluation, quality control, and strategic adjustment of learning methods to ensure that AI use truly enhances learning autonomy in an optimal manner. More broadly, the findings reveal a noticeable

discrepancy between students' and teachers' perceptions of students' learning autonomy when using AI. Students (N = 1001) consistently rated themselves higher than teachers (N = 117) across all criteria. Students' self-evaluations ranged from 2.45 to 2.70, corresponding to the Fairly Good level, whereas teachers' evaluations ranged from 2.35 to 2.54, corresponding to the Moderate to Fairly Good level. The largest gap appears in Criterion 5 (regulating learning behaviors and attitudes), where students rated themselves 0.31 points higher than teachers (Students: 2.70; Teachers: 2.39). Furthermore, students ranked this criterion first, whereas teachers ranked it fourth, indicating a substantial divergence in perceived strengths.

Differences in prioritization also emerged. Teachers ranked Criterion 6 (creative use of AI) as the strongest competency (Rank 1, Mean = 2.54), whereas students placed it at Rank 3. The only point of consensus lies in the weakest competency: both groups ranked Criterion 3 (monitoring and evaluating AI-supported learning outcomes) last (Rank 6). This shared perception strongly suggests that this competency should be prioritized for development in educational programs. Taken together, the perceptual gap between students and teachers may indicate that students tend to overestimate their own autonomy, or that teachers apply higher standards when evaluating effective integration of AI into learning. This discrepancy highlights the need for clearer expectations and targeted interventions to help students develop realistic self-awareness and stronger critical evaluation skills in the AI-supported learning environment.

5. Conclusion

This study conducted a comprehensive analysis of the impact of artificial intelligence on the learning autonomy of high school students in Thai Nguyen Province, with the objective of clarifying the role of AI technologies in educational settings. The findings confirm that AI through tools such as ChatGPT, Notion AI, and Grammarly serves as a powerful support mechanism that enables students to access knowledge more rapidly, expand their creative capacity, and strengthen their self-directed learning. AI contributes positively to tasks such as information searching, personalized study planning, and preliminary self-assessment, thereby improving learning performance and demonstrating its potential to enhance the planning and execution phases of autonomous learning. However, the study also reveals several risks and challenges associated with AI adoption. Excessive reliance on large language models can significantly diminish learners' cognitive effort and critical thinking abilities. In particular, self-monitoring and self-regulation core components of learning autonomy are at risk of erosion when students place too much dependence on technological tools. Thus, the key lies in equipping students with the competence to use AI responsibly and in fostering strong self-regulatory awareness.

This study contributes to educational theory by outlining a framework that illustrates the interaction between emerging technologies and intentional learning behaviors. Practically, the findings provide a foundation for educators and educational

administrators to design effective AI-integrated teaching policies and practices, shifting the teacher's role toward that of a facilitator who empowers students to master AI tools. Despite its significant contributions, the study has certain limitations regarding sample scope and the diversity of AI tools examined. Future research should expand the survey scale and explore intervention programs aimed at strengthening metacognitive skills in AI-supported learning environments.

In conclusion, AI is a double-edged sword; only through careful pedagogical and ethical preparation can we transform this technology into a powerful driver for the sustainable development of learning autonomy in the twenty-first century.

6. Recommendations

For school administrators: Establish clear ethical guidelines and regulations regarding the use of AI tools in learning, assignments, and assessments to prevent misuse or academic dishonesty; Organize specialized training programs on AI literacy and effective, controlled integration of AI into subject-specific curricula; Invest in and provide access to verified, licensed educational AI tools and software to ensure that students engage with safe and high-quality learning resources; Develop systems for regular monitoring and evaluation to measure students' learning autonomy in AI-supported learning environments.

For high school teachers: Integrate AI into teaching as a supportive tool to foster students' self-learning and independent research skills. Teachers should guide students in selective and responsible use of AI while designing open-ended learning activities that encourage verification, discussion, and evaluation rather than passive information reception; Incorporate instruction on self-regulation and metacognitive strategies into daily teaching. Encourage students to reflect on their learning processes rather than focusing solely on final outcomes; Use AI to support personalized learning pathways and to provide timely and constructive feedback to students.

For high school students: Develop self-directed learning skills and critical thinking when using AI. Students should learn to verify information, manage their time effectively, and use technology with clear academic purpose. AI should be viewed as a learning companion a smart assistant not as a tool for completing tasks or thinking on behalf of the student; Actively cultivate critical thinking by analyzing and evaluating the accuracy of AI-generated information. Focus on synthesizing and creating content based on AI assistance rather than depending on it entirely; Set clear learning goals (planning phase) and consistently monitor and evaluate one's own learning progress (self-regulation phase), using AI to check understanding rather than to generate content; Stay informed and regularly update skills in using new AI tools to optimize personal learning efficiency.

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