

# TÁC ĐỘNG CỦA TRÍ TUỆ NHÂN TẠO ĐẾN HOẠT ĐỘNG GIẢNG DẠY CỦA GIÁO VIÊN TIỂU HỌC TẠI MỘT SỐ TỈNH/THÀNH PHÍA NAM

## THE IMPACT OF ARTIFICIAL INTELLIGENCE ON PRIMARY SCHOOL TEACHING: PERSPECTIVES FROM TEACHERS IN SOUTHERN VIETNAM

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THÔNG TIN	TÓM TẮT
<p>Ngày nhận: 04/8/2025            Ngày nhận lại: 10/9/2025            Duyệt đăng: 18/10/2025            Mã số: TCKH-S04T10-2025-B06            ISSN: 2354 - 0788</p> <p><b>Từ khóa:</b>            Trí tuệ nhân tạo, giáo viên tiểu học, giảng dạy, tác động, chuyển đổi số.</p> <p><b>Keywords:</b>            Artificial Intelligence, primary school teachers, teaching, impact, digital transformation.</p>	<p><i>Trong bối cảnh chuyển đổi số ngày càng được thúc đẩy trong giáo dục, việc ứng dụng trí tuệ nhân tạo (AI) đang mở ra nhiều cơ hội cải thiện chất lượng giảng dạy ở bậc tiểu học. Nghiên cứu này khảo sát 237 giáo viên tại sáu tỉnh/thành phía Nam Việt Nam, sử dụng phiếu khảo sát kết hợp phân tích định lượng để đánh giá tác động của AI đến hoạt động giảng dạy. Kết quả cho thấy AI hỗ trợ giáo viên trong việc thiết kế bài giảng, tạo học liệu và nâng cao tính sáng tạo, đồng thời cải thiện hiệu quả quản lý lớp học. Tuy nhiên, việc triển khai còn gặp nhiều khó khăn, bao gồm hạn chế thiết bị, kỹ năng CNTT chưa đầy đủ và thiếu tài liệu hướng dẫn. Nghiên cứu đề xuất các giải pháp cụ thể nhằm tối ưu hóa ứng dụng AI, bao gồm tập huấn chuyên môn, cung cấp tài nguyên học liệu, nâng cấp hạ tầng công nghệ, góp phần nâng cao chất lượng giảng dạy và thực hiện hiệu quả chuyển đổi số trong giáo dục tiểu học.</i></p> <p><b>ABSTRACT</b>  <i>In the increasing drive for digital transformation in education, the application of artificial intelligence (AI) offers significant opportunities to enhance the quality of primary school teaching. This study conducted a survey with 237 teachers across six southern provinces in Vietnam, using questionnaires combined with quantitative analysis to assess the impact of AI on teaching activities. The findings indicate that AI assists teachers in lesson design, learning material creation and fostering creativity, while also improving classroom management efficiency. However, there are challenges in implementation, including limited devices, insufficient IT skills and lack of instructional resources. The study proposes targeted solutions to optimise AI application, such as professional training, provision of learning materials and upgrades to technological infrastructure, contributing to improved</i></p>

## 1. Introduction

Artificial Intelligence (AI) is increasingly recognized as a pivotal element in the ongoing global digital transformation (Holmes, Bialik, & Fadel, 2021; Luckin, Holmes, Griffiths, & Forcier, 2016). Within the educational domain, AI offers substantial potential for reimagining pedagogical practices, personalizing learning experiences, optimizing instructional time and enhancing the professional effectiveness of teachers. In the Vietnamese context, the initial adoption of AI has been observed among educators - particularly at the primary education level - who have begun incorporating AI tools into their teaching activities (Ho Sy Toan & Lai Nha Truc, 2024). The incorporation of AI in schools is expected to alleviate the strain of teachers, stimulate pedagogical innovation and support differentiated instructional strategies. However, notable disparities persist in the accessibility and implementation of AI across regions, with remote and underserved areas facing significant limitations (Ministry of Information and Communications, 2021; UNESCO, 2021). This disparity underscores the urgent need for empirical research to assess the current state of AI integration in education and to inform the development of equitable and context-sensitive support mechanisms.

Furthermore, the integration of AI into educational practice is contingent upon a constellation of factors, including technological accessibility, the interaction of cognitive, attitudinal and skill-related dimensions, as well as the presence of a supportive and enabling learning environment (Prime Minister of Vietnam, 2021). Against this backdrop, the present study aims to examine the practical implications of AI utilization in the instructional practices of primary school teachers, with a

particular focus on its impact on teacher motivation, instructional performance, cognitive engagement and professional behavior. Drawing on the empirical findings, the study will propose contextually relevant recommendations to guide future developmental trajectories in AI-supported primary education.

## 2. Research methods

This study examined the current state of artificial intelligence integration in primary school teachers' instructional practices in a few southern Vietnamese regions using a quantitative research design and content analysis. In particular, the research team created an online survey tool with three core sections: (1) Respondents' basic personal and professional data; (2) Core teachers' current AI implementation status and (3) Teachers' Perceptions of AI Integration. Thirteen closed-ended and open-ended questions made up the survey, which focused on important topics such the frequency of AI use, perceived efficacy, expectations for AI in the classroom, attitudes about AI as a possible replacement and the need for professional development.

Primary school teachers now employed in the six southern localities of Ho Chi Minh City, Can Tho, Vinh Long, Tay Ninh, Ca Mau and An Giang made up the target population. The study used convenience and purposive sampling to ensure representation from diverse regions in each province/city. In collaboration with local Departments of Education and Training, the research team distributed the online survey to primary schools across urban, rural and remote areas. A total of 237 valid responses were collected, sufficient for descriptive analysis and group comparisons. Between June and July of 2025, data was gathered and 237 legitimate responses were obtained for examination. Google

Forms and Microsoft Excel were used to aggregate and process the data. Key findings were illustrated using descriptive charts that showed frequency distributions and percentage values. To create suitable recommendations, the research findings were further cross-checked against pertinent theoretical literature and contextual realities.

The foundation for creating focused and context-sensitive policy interventions is provided by this methodological approach, which enables a thorough understanding of primary teachers' attitudes, actions and support requirements when interacting with AI technologies.

Regarding reliability and limitations, it should be noted that the survey instrument was not pre-tested on a pilot group, which may affect its reliability. However, the questions were carefully designed to be clear and easily understood by respondents. Additionally, as the study relied on self-reported data, the findings may be subject to response bias. Despite these limitations, the methodological approach provides a solid foundation for understanding primary teachers' attitudes, practices and support needs when interacting with AI technologies and for proposing targeted, context-sensitive policy interventions.

Although the survey was not pilot-tested due to time and scope constraints, five education and technology experts reviewed its content and format to ensure clarity, relevance to research objectives and appropriateness for primary school contexts, thereby enhancing validity and reducing potential bias.

### **3. Research results**

#### **3.1. Some basic concepts**

##### *3.1.1. AI in Education*

Artificial intelligence (AI) is a subject of computer science that studies the creation of systems capable of doing activities that have historically required human intelligence, such as learning, reasoning, language recognition and decision-making (Nguyen Van Huy & Tran Thi

Minh, 2022). In the context of digital transformation in education, AI is regarded as a foundational tool for reshaping teaching and learning practices. It plays a pivotal role in personalizing learning processes, automating instructional tasks and enhancing students' access to knowledge through more creative and interactive approaches (UNESCO, 2021).

##### *3.1.2. Teaching strategies of primary school teachers in response to educational digitalization*

Teaching activities at the primary level encompass the comprehensive process of designing, organising and facilitating learning experiences aimed at fostering competencies of students. In the era of digital transformation, instructional practices are no longer confined to traditional approaches but increasingly involve the integration of technology, with AI emerging as a critical component. The advent of AI introduces new demands on primary school teachers, requiring a pedagogical shift from the role of content transmitters to that of facilitators and learning guides. Teachers must develop the capacity to effectively integrate AI tools with conventional instructional methods while also maintaining a clear understanding of ethical boundaries in AI utilisation, such as avoiding mechanical reproduction of content, ensuring the accuracy of information and safeguarding data privacy and security.

##### *3.1.3. Application of AI in teaching of primary school teachers*

For primary school teachers, who serve as the frontline educators in foundational general education, the integration of AI offers not only enhanced efficiency in lesson planning but also contributes to improved classroom management and more effective support for individualised learning needs of students. Several notable applications of AI in primary education include:

*AI-assisted lesson planning and material development:* Tools such as ChatGPT, Copilot and Gemini can suggest content aligned with

curricular standards, support the design of creative learning activities and generate assessment items (Pham Van Truong, 2023).

*Support for personalized learning:* AI-driven platforms can analyze student learning behaviors, identify individual strengths and weaknesses and recommend customized learning resources or tasks tailored to each learner (Luckin et al., 2016).

*Assessment and feedback facilitation:* AI technologies assist teachers by automating grading, detecting learning gaps, and providing constructive feedback for content improvement, thereby significantly reducing administrative burdens (Zawacki-Richter et al., 2019).

*Generation of visual learning content:* AI tools can create images, videos and instructional slides that enhance lesson engagement and comprehension - particularly effective for young learners.

Furthermore, to guarantee responsible and equitable deployment, issues pertaining to student data privacy, the moral application of AI and the possible over-reliance on technical systems must be properly addressed.

### 3.2. Overview of the area, subjects and survey content

There are 237 primary school teachers in six southern Vietnamese provinces who participated in the survey, the results are shown in table 1.

**Table 1:** Statistics of the percentage of teachers who participated in the survey in provinces/cities

Province/City	Frequency	%
An Giang	12	3
Ca Mau	69	29
Can Tho	60	26
Tay Ninh	12	5
Vinh Long	51	22
Ho Chi Minh	39	15

To evaluate the effect of AI on primary school teachers, a survey was also conducted on participant characteristics, including gender,

age, seniority and professional expertise. Table 2 displays the specifics of the personal characteristics survey.

**Table 2:** A few traits of survey respondents

Participant characteristics		Frequency	%
<b>Gender</b>	Male	123	46,9
	Female	114	53,1
<b>Age</b>	22 to 30	9	3,7
	31 to 40	57	23,5
	41 to 50	156	64,2
	Over 50	21	8,6
<b>Years of teaching experience</b>	1 to 5	24	9,9
	6 to 10	6	2,5
	Over 10	213	87,7
<b>Field of professional practice</b>	Homeroom teacher	135	55,6
	Professional teacher	51	21,0
	Other	57	23,5

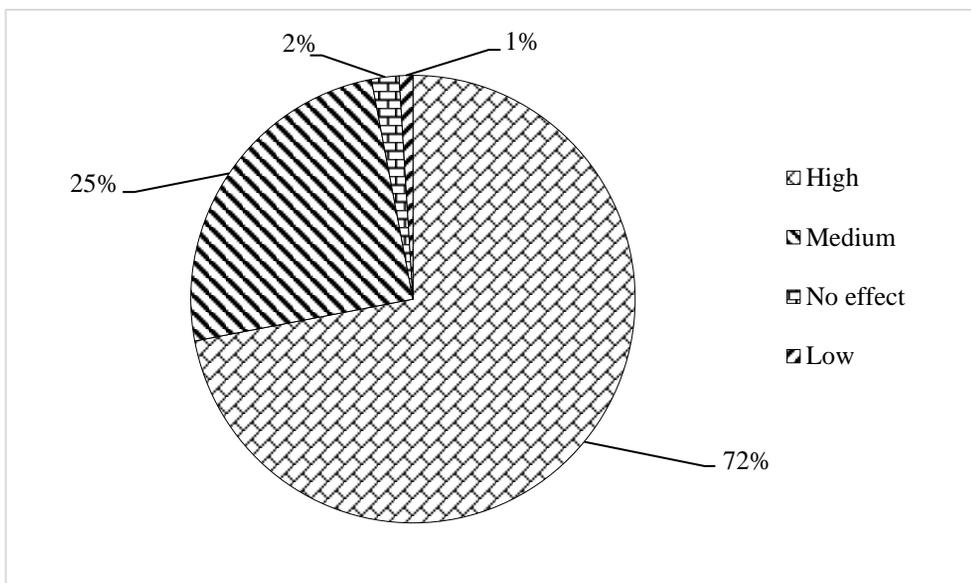
### 3.3. The impact of AI on primary school teachers

#### 3.3.1. The impact of AI on the effectiveness of teaching

Survey findings conducted across six southern provinces in Vietnam indicate that the majority of primary school teachers perceive a significant enhancement in work performance when supported by AI. Specifically, 72% of respondents reported high levels of work efficiency when utilising AI in their teaching practice. This is a highly encouraging figure, suggesting that AI serves as a practical and effective support tool, enabling teachers to save time, personalise learning experiences and

enhance creativity in lesson design. Meanwhile, 25% of teachers assessed their performance as moderate, implying that while AI has yielded certain benefits, there remain unresolved barriers that may prevent full exploitation of its technological potential.

Only 2% of teachers reported no effectiveness and 1% indicated low performance when using AI. Although these proportions are relatively minimal, they warrant attention in order to identify underlying causes, potentially including limited technological proficiency, inadequate infrastructure or a lack of supportive resources (Fig. 1).



**Figure 1:** Assessment of primary school teachers' productivity while utilizing AI to enhance instruction

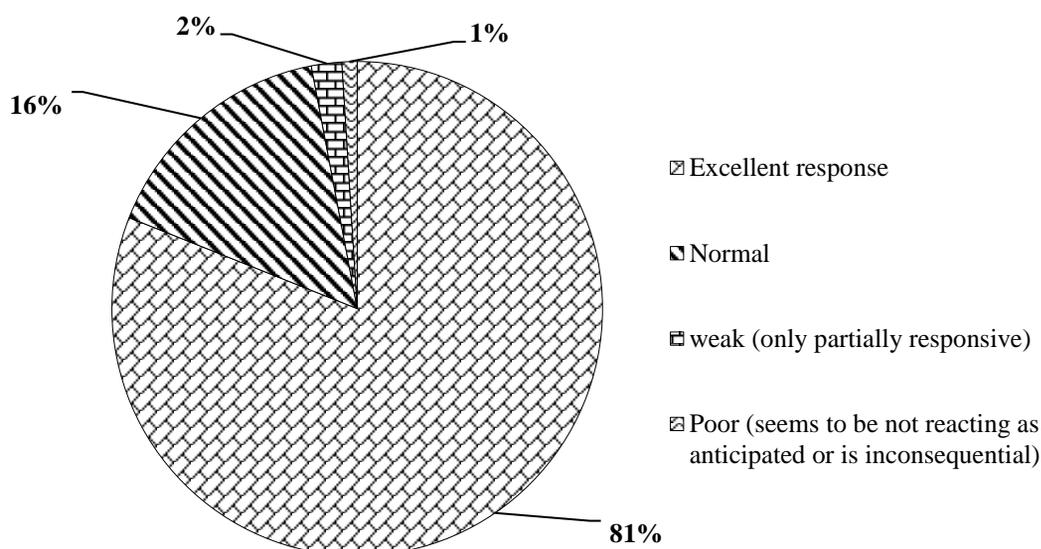
Overall, AI is increasingly perceived as an effective support tool in primary education. This perception reflects a positive shift in teacher productivity resulting from the integration of technology into instructional practice. While AI does not replace the role of the teacher, it serves as a powerful assistive mechanism that enables educators to focus more on student interaction and individualised support. However, in order to further increase the proportion of teachers achieving high instructional performance with AI, targeted policy interventions are needed -

particularly in the areas of professional development, technological infrastructure, and practical guidance for AI implementation in school settings. The high proportion of teachers experiencing improved performance highlights the potential of AI to optimize instructional processes in primary education. Nevertheless, addressing the obstacles for the remaining teachers is critical. Targeted professional development, infrastructure upgrades and comprehensive guidance on AI integration are essential to ensure equitable and effective adoption.

3.3.2. *The impact of AI on the perceptions and professional attitudes of teachers*

According to the results from figure 2, the majority of primary school teachers in the surveyed southern provinces/cities have a positive assessment of the outcomes brought by AI in teaching. 81% of teachers stated that AI “meets expectations well”, reflecting high satisfaction and belief in the effectiveness of this technology. This is a very high rate, showing that most teachers have seen and recognized the practical value that AI brings to teaching, such as support for lesson planning, designing teaching materials, creating

assessment tests and personalizing learning. 16% rated it as "normal" which means that a portion of teachers has not fully exploited the potential of AI or has not had access to all the necessary tools or still feels that the impact of AI is not truly outstanding or is limited in some aspects. 2% said that AI only "partially meets expectations" and 1% rated it as "poor" (almost not meeting expectations). These are small percentages, but they are also warning signs about the need to improve AI application skills for teachers in a synchronized manner, avoiding a digital divide in technological capacity among different groups.



**Figure 2:** The degree to which primary school teachers are meeting the expectations of AI in the classroom

Thus, it can be seen that AI has initially met or exceeded the expectations of the majority of primary school teachers, creating favorable conditions for expanding its application in teaching. However, to increase the level of satisfaction and application effectiveness, it is necessary to focus on training, providing a technological foundation and sharing practical experiences among teachers.

When asked: “What are your aspirations regarding participating in training, professional development and education on AI in teaching

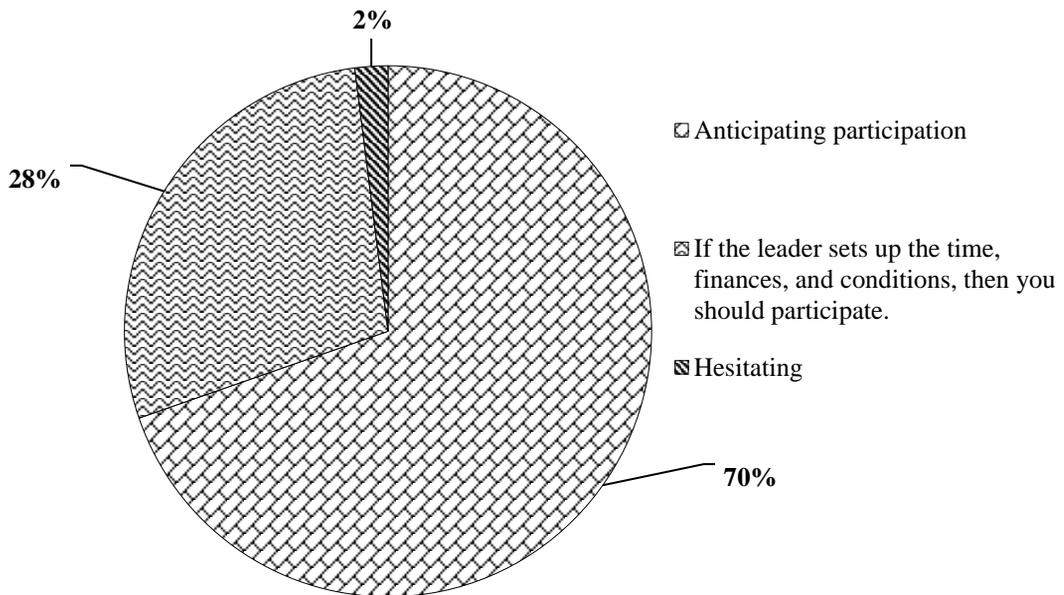
and education in the near future?”, we received the following results: the majority of primary school teachers in 06 southern provinces/cities expressed a positive desire to participate in training and professional development programs on AI in teaching. Among them: 69% of teachers stated they are “very keen to participate”, indicating a high awareness of the importance and benefits of AI for the current teaching process. This is a positive signal showing that the teaching force is ready to adapt to the trend of digital transformation in education; 29% of

teachers affirmed they would participate if suitable conditions were created, including financial support, time arrangement and encouragement from management. This reflects the practical need for specific support policies to promote teacher participation.

Only 2% of teachers were still hesitant, which shows that psychological or cognitive barriers are no longer the main influencing

factors but rather the conditions for participation (Fig.3).

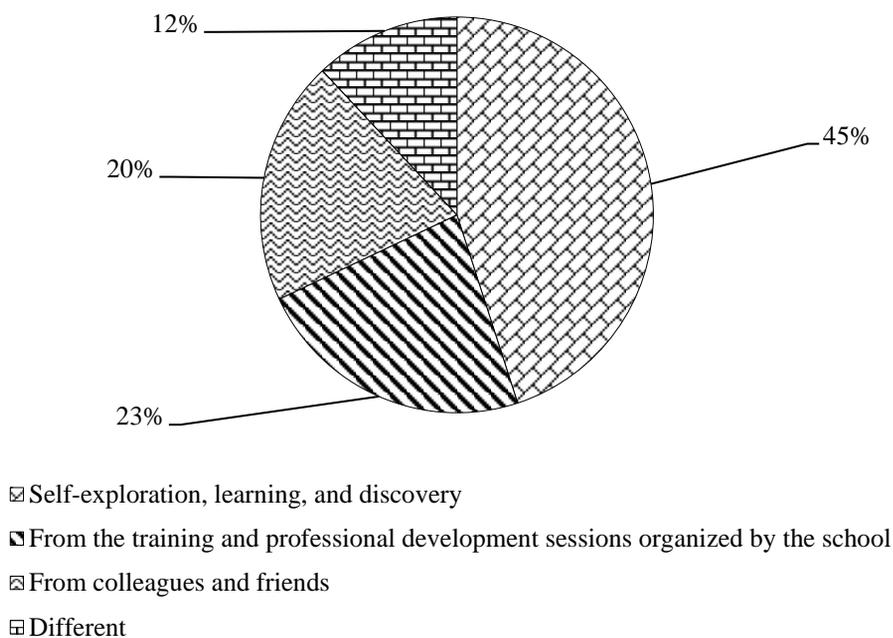
Therefore, it can be said that there is a great deal of promise in putting AI training programs for elementary school teachers into action. The current challenge is to create suitable programs, offer helpful assistance and execute them adaptably so that teachers can efficiently and sustainably acquire new knowledge.



**Figure 3.** The desire of elementary school teachers to take part in AI training in teaching

From the survey data, it is shown that there are 4 main sources through which primary school teachers learn about and use AI tools in teaching. Self-directed learning (45%) accounts for the highest proportion: Nearly half of the teachers approach AI through self-study, indicating a spirit of autonomy, eagerness to learn and awareness of the role of technology in teaching. This reflects the current trend of teachers striving to keep up with the era of digital transformation, even without official intervention from management agencies. Training from the school accounts for 23%. This means that only about 1/4 of teachers have access to AI through official training and professional development sessions. This shows

that training activities on AI in the general education system have not been widely implemented or are still limited in terms of quality/effectiveness. The impact from colleagues accounts for 20%: Thus, the network of friends and colleagues is also an important source of information sharing, demonstrating that collaboration, learning through experience and sharing are effective channels in the educational environment. Other sources account for 12%. This source may include online courses, social networks, specialized books or influence from students/parents. This group needs to be studied more deeply to understand the behavior of accessing technology from teachers.



**Figure 4:** The history of AI tool access and usage among elementary school teachers

In summary, after analyzing the impact of AI on perception and professional attitude, we find that primary school teachers have a very positive attitude towards the ability to apply AI. Specifically: 81% of teachers believe that AI "meets expectations well" with an average score of 3.75/4 (SD: 0.55); 69% of teachers are "very keen to receive further training" on AI; 45% of teachers learn about AI through self-study and personal discovery. These numbers show that the impact of AI is not only limited to the technical aspect but also contributes to promoting the motivation to learn, innovate the profession and approach digital transformation in a proactive way.

These findings suggest that AI adoption not only impacts technical teaching practices but also motivates teachers to innovate and engage in professional development. The high level of self-directed learning reflects proactive adaptation to digital transformation, although limited formal training indicates a gap that requires systematic intervention. Compared with prior studies in other countries, the positive perception of AI among Vietnamese teachers

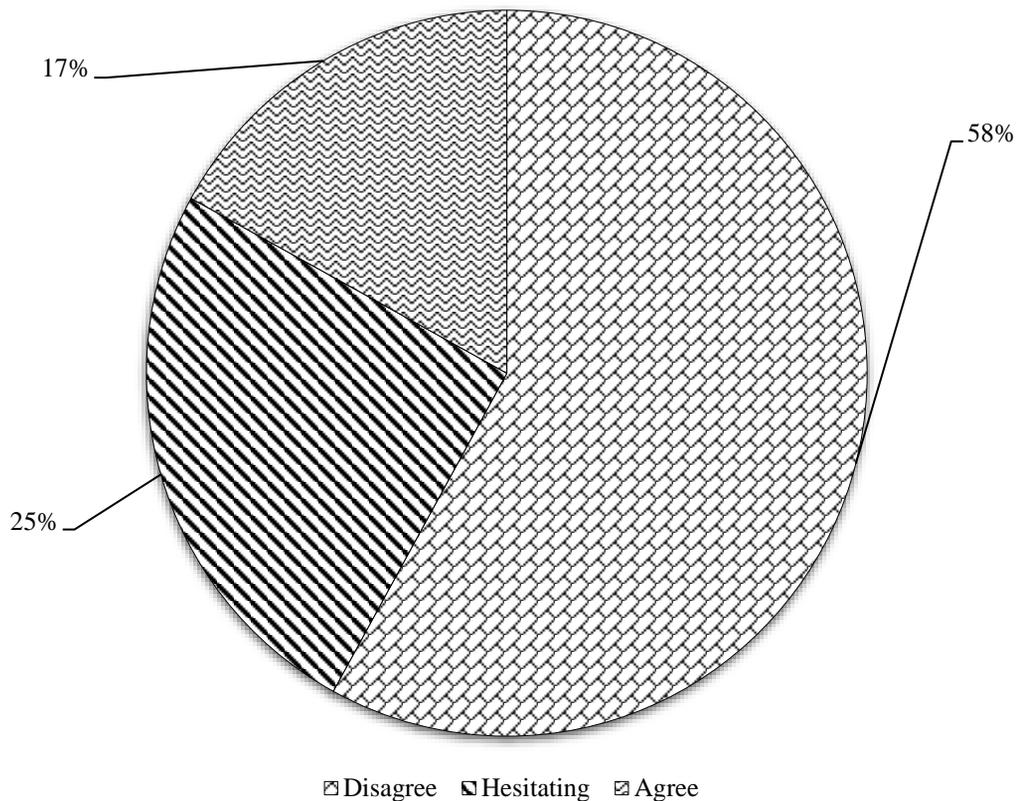
highlights readiness for technological integration while also emphasizing the need for structured training and support (West et al., 2020).

### 3.3.3. Teacher perspectives on the relationship between AI and the role of the teacher

Fig. 5 shows that the majority of primary school teachers disagree with the view that artificial intelligence can completely replace the teaching job of a teacher. Among them, 58% of teachers answered "Disagree" expressing a clear view that AI should only be seen as a support tool and cannot replace the central role of the teacher in the educational process. This also reflects confidence in the value of pedagogical interaction, flexibility and the emotional role that AI currently cannot replace 25% of teachers are at the "Undecided" level, showing hesitation in assessing the replacement ability of AI. This group may be observing the development of technology or has not had enough experience to make a definitive judgment. 17% of teachers believe that AI can replace the teaching job. This is a minority percentage but it also reflects a growing awareness of technological breakthroughs - especially in tasks such as

lesson planning, automated assessment or personalized learning. An interesting and special point here is that no teacher in the survey chose the “completely agree” option with the statement “AI can replace the teacher”. This shows that teachers have a solid awareness of

the value of the human element in education, viewing AI as a support tool rather than a competitor. This correct awareness is the foundation for AI to promote its positive role without eroding professional ethics or causing professional anxiety.



**Figure 5:** Views of elementary school teachers regarding the potential for AI to replace teaching positions

Therefore, it can be said that most educators continue to believe that humans play an indispensable role in education, even though they recognize that AI is a helpful tool rather than a full-fledged substitute. This demonstrates that while teachers acknowledge AI as a useful support tool, they recognize the irreplaceable human role in pedagogy, emotional engagement and flexibility. These insights emphasize that successful AI integration should augment, rather than replace, human instruction, ensuring professional ethics and educational quality remain intact.

#### 3.3.4. *The impact of AI on learning and the innovation of teaching methods*

The survey results (table 3) show a clear disparity in the level of access and use of AI tools in primary school teaching. Among the choices, AI for creating teaching content (such as ChatGPT, Gemini, Copilot, Claude...) is the most popular tool, with 126 selections, accounting for the highest proportion compared to all other tools.

This choice indicates a priority trend for teachers towards applications that are easy to access, capable of quickly assisting with lesson planning, suggesting learning activities, creating test questions and also creating rich teaching scenarios.

**Table 3:** How frequently educators use various forms of AI in the classroom

Type of AI	Frequency	%
- AI produces instructional materials (e.g., ChatGPT, Google Gemini, Microsoft CoPilot, Claude, etc.)	126	37,5
- AI image processing for educational purposes (e.g., Canva Magic Studio, Leonardo, Midjourney, etc.)	57	17,0
- AI facilitates assessment and tailored learning (e.g., Quizizz AI (creating unique exams and learning materials); Quizlet Q-Chat (offering individualized learning experiences); etc.)	33	9,8
- AI assistance for presentation tasks (e.g., Wordtune, Grammarly, Gamma, Briskteaching, etc.)	24	7,1
- Other Ais	30	8,9
- AI was never deployed (If this is your first time using it, you can click Send Feedback to end the survey)	66	19,6

However, the results also show that 66 teachers - equivalent to about 1/4 of the total survey participants - have never used any AI tool in their teaching. This number reflects a worrying reality about the technology access gap, which may stem from many reasons such as lack of equipment, limited technology skills or not having received in-depth training on the application of AI in education. Other AI tools such as AI for image support (creating pictures, diagrams, illustrations...), AI for personalizing learning (through analyzing student data, proposing suitable content), AI for supporting slide design and presentation (such as Tome, Beautiful.ai)... have a much lower usage rate, mainly ranging from 15 - 45 selections depending on the type. This reflects that teachers mainly exploit AI at a basic level, serving directly the task of “planning - teaching” while tools that support content visualization or student analysis - although very potential - have not yet been widely applied.

This clear disparity can be explained by several factors: The popularity and simplicity of content creation tools (easy to use, no installation required, can be manipulated on a phone); Lack of systematic training programs for primary school teachers on more specialized forms of AI;

Differences in digital infrastructure conditions between schools in central and remote areas; Lack of specific pedagogical guidance on how to apply AI effectively and safely.

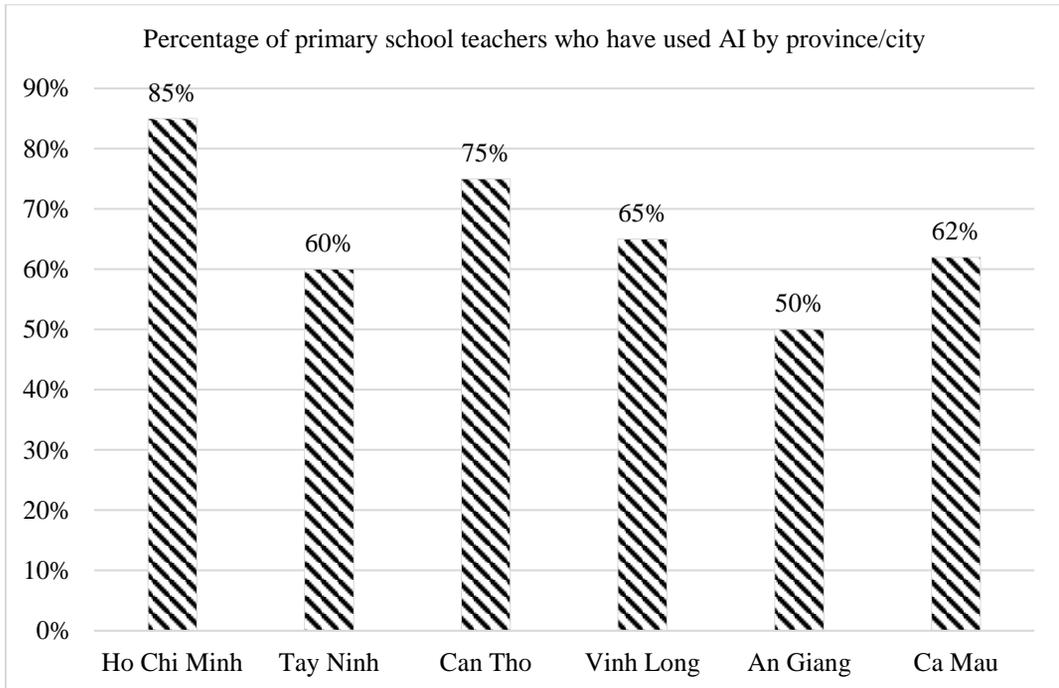
From a management perspective, these results show that primary school teachers have a real need to use AI, especially tools that bring practical benefits in teaching. However, to enhance the capacity to apply AI comprehensively, it is necessary to have policies to develop digital capacity for teachers, integrate AI application content into training programs, and have a mechanism for transferring appropriate technology to each region.

The preference for content creation tools reflects ease of use and immediate applicability, whereas specialized tools for visualization or personalized learning remain underutilized due to lack of training, guidance and infrastructural support. These results underscore the importance of targeted capacity-building initiatives, development of pedagogical guidance for AI and regionally tailored technology transfer policies. Compared to previous international research, this study provides novel empirical evidence of AI adoption patterns among primary school teachers in Vietnam, highlighting both opportunities and inequities in access and usage.

### 3.4. Comparison of the impact of AI on primary school teaching activities by locality

The survey results show that the impact of

AI on the teaching activities of primary school teachers varies significantly among the provinces/cities in Figure 6.



**Figure 6:** Percentage of elementary school teachers by province or city that have implemented AI in their instruction

- Ho Chi Minh (HCM): This is the locality with the highest rate of teachers using AI, at a very frequent level. Tools such as ChatGPT, Canva and Quizizz AI are effectively utilized for lesson planning, assessment and content presentation. Teachers in HCM also demonstrate the highest motivation for self-learning, with over 75% stating they are "very eager" to receive in-depth AI training. This reflects the city's advanced technological environment and clear digital transformation policies in education.

- Tay Ninh: Teachers in Tay Ninh are beginning to approach AI at a basic level. The number of teachers who have used AI is average (60%), but their usage is still simple, mainly for supporting question writing and brainstorming teaching ideas. However, a positive point is the high readiness to learn AI, with over 65% of teachers wishing to participate in training.

- Can Tho: As a centrally-governed city, Can Tho shows a relatively good level of AI usage, especially in downtown schools. However, the disparity between suburban and central schools is still quite clear, reflecting an uneven situation regarding technology infrastructure. The demand for AI training in Can Tho is also high (70%).

- Vinh Long: Teachers in Vinh Long are approaching AI at a moderate level. The rate of using AI for designing visual lectures and organizing tests is predominant. However, the rate of teachers self-learning AI is still low (under 35%) and there are still about 20% of teachers who have never used AI. Most teachers want to have practical training classes for each specific tool.

- An Giang: This province has a higher rate of teachers who have never used AI compared to the general average, especially in rural and

mountainous areas. However, the attitude of teachers in An Giang is very positive: over 80% believe that AI is a necessary tool and wish to be equipped with more usage skills. The main limitation lies in the physical facilities and lack of technical support.

- Ca Mau: As a coastal province far from the center, teachers in Ca Mau show proactivity in approaching AI. The rate of teachers who have used ChatGPT and Canva is quite high (over 60%) but the integration of AI into assessment activities is still limited. Teachers here want to have specific AI guidance materials suitable for their local context.

Through analysis by locality, it can be seen that the rate of primary school teachers using AI has a significant difference between the provinces/cities in the South. Among them, Ho Chi Minh City leads with 85% of teachers having applied AI, clearly reflecting favorable conditions for technology and the capacity to implement innovation. Can Tho (75%) and Vinh Long (65%) follow, showing that the trend of AI application is also quite strong in the urban centers of the Mekong Delta. In contrast, An Giang has the lowest rate (50%), indicating that the level of access to AI here is still limited. Tay Ninh (60%) and Ca Mau (62%) are at an average level. These results point to a regional disparity in the ability to access and apply AI in teaching, which also means that the impact of AI on teaching depends heavily on infrastructure conditions, support policies and the self-learning capacity of teachers. This suggests the need to build appropriate training programs and technical support policies to bridge the digital divide between localities.

#### 4. Discussion

The study results indicate that the application of artificial intelligence in primary school teaching brings numerous positive impacts, while also revealing significant limitations, reflecting the current state of

technology implementation in basic education. First, teachers use AI to design lesson plans, create digital learning materials and enhance creativity in teaching activities. Specifically, a survey of 237 teachers across six southern provinces of Vietnam showed that approximately 62% of teachers used AI for lesson planning, 55% for creating interactive exercises and learning materials and 48% for personalizing learning activities. These findings align with international studies, in which AI is recognized as a tool that enhances teaching effectiveness, reduces manual workload and encourages innovative and flexible teaching methods (Luckin et al., 2016; Holmes et al., 2019).

However, AI implementation still faces numerous barriers. The survey indicated that 45% of teachers encountered difficulties due to limited devices and internet connectivity, 38% due to insufficient guidance or unclear usage instructions and 33% due to inadequate IT skills. These results reflect disparities in infrastructure and technological competence across regions and highlight the critical role of professional training and support from schools, educational departments and the Ministry of Education. Previous studies also indicate that lack of technical infrastructure and IT proficiency are major limiting factors in applying AI in education (West et al., 2020; Chen et al., 2021).

Further analysis shows that teachers with higher IT proficiency or prior participation in educational technology training implemented AI more effectively. Conversely, teachers with less experience or insufficient technical support often struggled to integrate AI into lessons and in some cases used it only minimally or temporarily. This indicates that AI effectiveness depends not only on technology availability but also on human capacity, particularly digital skills and teachers' self-learning ability.

Regional differences are also noteworthy. Teachers in areas with better technical

infrastructure and institutional support implemented AI more actively than those in provinces with limited devices and internet access. This disparity underscores the importance of establishing consistent policies, ensuring equitable infrastructure and providing continuous support from educational authorities to enable all teachers to effectively apply AI.

Moreover, some teachers expressed concerns that AI could partially replace their role. Although this proportion is low (12.6%), it reflects apprehension regarding the balance between technology and teachers in the classroom, suggesting the need to guide teachers to understand AI as a supplementary tool, thereby reducing anxiety and increasing acceptance.

Compared with international studies, the findings of this research show similar trends: AI supports improved teaching quality, but effectiveness depends on multiple factors such as teacher skills, technological infrastructure, and prior preparation (Holmes et al., 2019; Luckin et al., 2016). However, a notable difference in Vietnam is that AI implementation in primary schools is still at an early stage and remains highly uneven across regions, highlighting the need for a coordinated digital transformation strategy in education.

Another important point is that AI not only helps save teachers' time but also supports the development of personalized teaching methods. For instance, teachers can create exercises suitable for each student's level and learning ability, thereby enhancing learning outcomes. To maximize these benefits, structured guidance on AI usage, clear reference materials and regular training sessions are necessary.

Overall, the study confirms that AI is a promising tool in primary education. However, its effectiveness depends heavily on teacher capacity, technical infrastructure, school support and local policies. Coordinated implementation of measures such as skill training, IT

infrastructure upgrades, provision of instructional resources and continuous policy support will create favorable conditions for AI to become an effective educational tool, contributing to the promotion of digital transformation throughout the education system.

## 5. Conclusion and recommendations

This study makes an important contribution to the field of primary education and digital transformation in Vietnam by providing empirical evidence on how artificial intelligence (AI) can enhance teaching effectiveness, foster teacher professional development and identify barriers to AI adoption in diverse educational contexts.

The survey results from six southern provinces/cities (Ho Chi Minh City, Tay Ninh, Can Tho, Vinh Long, Ca Mau and An Giang) indicate that artificial intelligence (AI) is creating significant positive changes in primary school teaching activities. The application of AI not only helps teachers increase work efficiency through support in lesson planning, student assessment and creating dynamic learning materials but also impacts their professional attitudes, fostering proactivity, creativity and a lifelong learning spirit among educators.

AI is gradually redefining the role of the teacher from a knowledge transmitter to a facilitator and organizer of learning activities. Teachers are beginning to adopt support tools such as ChatGPT, Canva, MagicSchool AI and Quillionz to design engaging lessons, personalize learning content and optimize the assessment process. Concurrently, AI also contributes to the formation of a digital professional practice community where teachers can learn, share and develop their expertise together.

However, for AI to truly fulfill its role as an "intelligent academic assistant" in the classroom, several barriers need to be addressed. These include a deficit in digital skills among a segment of the teaching population, limitations in technological infrastructure in some localities

and a lack of synchronized support policies from management levels.

While AI will not replace teachers, it will empower those who know how to use it effectively. This, in turn, will help raise the standard of primary education in the current digital transformation environment. Thus, a more methodical and realistic approach is required in the future to encourage the use of AI in elementary education. The research team made some suggestions to help elementary school instructors become more proficient in using AI.

### **5.1. For educational management agencies**

**Develop a digital competency framework integrating AI for primary school teachers:** The Ministry of Education and Training should issue a digital competency framework tailored for primary school teachers, which clearly defines criteria related to the exploration, operation and integration of AI tools in teaching, assessment and classroom management. This framework will serve as a foundation for orienting training and professional development programs and for evaluating teacher competency.

**Enact policies for financial and time support for learning:** Many teachers currently face difficulties in participating in training courses due to a lack of funding or appropriate time allocation. Therefore, specific support policies are needed, such as allocating budgets for localities to organize training and stipulating official time for professional development within the academic year.

**Develop an AI-integrated educational resource repository:** Invest in building and maintaining a digital resource repository on AI in education. This should be an open, nationwide platform that includes sample AI-integrated lesson plans, user guides for tools, practical video tutorials and a curated selection of software. This repository needs to be regularly updated, validated and categorized by grade level and subject to support teachers in their teaching process.

**Organize practical and in-depth professional development programs:** Departments of education should collaborate with pedagogical universities, research institutes and technology companies to organize and implement AI application training programs for administrators and teachers. These programs should be practical, specifically tailored to the real needs of localities and provide “hands-on” guidance with specific AI tools (ChatGPT, Canva, Quizizz, Copilot, etc.). The courses should be organized flexibly (in-person, online or blended learning models).

**Direct and guide schools in developing AI application plans:** Departments should issue documents guiding the integration of AI technology into professional activities and teaching at the primary school level, aligned with the digital transformation goals of the education sector. They should also encourage schools to proactively propose suitable models and initiatives. Guidance and direction should be provided for primary schools to develop AI application plans that are appropriate for their infrastructure and teacher proficiency levels.

Additionally, successful AI application models in primary school instruction must be observed, assessed and replicated. As a foundation for replication and significant investment, a system for assessing the efficacy of AI use in education at the school level must exist. In the sector, advanced models ought to be respected and promoted.

### **5.2. For primary school administrators**

**Proactively organize in-house training aligned with practical needs:** School leadership should develop a teacher professional development plan that includes organizing professional activity sessions focused on AI applications. They can invite experts, technology companies or leverage the internal resources of teachers with strong technological skills to train or coach on the use of AI tools.

Create motivation and an encouraging environment for teachers to apply AI: Encourage teachers to join professional groups and learning communities that apply technology in teaching. Additionally, the school should create conditions for teachers to access software, have time for experimentation in their teaching and organize competitions and festivals for creative teachers to share exemplary uses of AI.

Improve technological infrastructure: Prioritize upgrading the Internet network, investing in smart teaching equipment, setting up computer labs and ensuring that every teacher has access to the technology needed for AI-integrated teaching and a digital environment that supports effective learning activities.

### 5.3. For primary school teachers

Independently enhance awareness and skills in AI application: Teachers need to be proactive in updating their knowledge by participating in online AI courses (Coursera, EdX, Udemy, etc.) and practicing regularly to become proficient with tools like ChatGPT, Canva, MagicSchool AI and Google AI for Education. They should take the initiative in learning and enhancing their digital awareness and skills, especially the ability to use AI for

professional tasks such as lesson planning, teaching and student assessment.

Share and support colleagues in applying AI: Creating sharing groups within professional teams, schools or on educational forums will help disseminate effective AI integration methods and experiences, thereby building a vibrant community of practice. Moreover, teachers should actively share their experiences and support colleagues in accessing and implementing AI applications in their teaching.

Actively participate in professional development: Teachers should fully engage in AI training courses and communities of practice to enhance expertise, foster lifelong learning and adapt to educational innovation and digital transformation.

Despite its contributions, this study has limitations. The sample of 237 teachers was insufficient for full generalization, the online survey method may have introduced sampling bias and the questionnaire was not pilot-tested. Future research should expand the sample, combine online and in-person methods, apply stratified random sampling and conduct longitudinal studies to track changes in teachers' AI adoption over time.

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