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# A Framework for the Application of Artificial Intelligence in School Education: Understanding, Using, and Unleashing

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**Abstract**

This study aims to investigate strategies for integrating Artificial Intelligence (AI) into school education. Facing the rapid development of AI technology and its potential impact on education, this study proposes a three-stage framework—"Understanding," "Using," and "Unleashing"—as a theoretical pathway to guide students in effective learning and thereby to unlock their potential as human beings. The "understanding" dimension focuses on fostering a conceptual understanding of AI technologies among students and teachers, ensuring informed engagement. The "using" dimension explores practical applications of AI to enhance efficiency and effectiveness of learning and teaching, such as through individualized learning. The final dimension, "unleashing," addresses the transformative opportunities AI in equipping future generations to create meaningful value as human beings while working alongside AI. This study emphasizes that AI should serve as an empowering tool, with the aim of fostering students to become independent and passionate thinkers, rather than leading to technological dependence. The goal of this study is to assist educators in systematically planning strategies for integrating AI into learning and teaching, thereby cultivating students' to be future leader in an AI-permeated society. The framework also highlights the challenges of utilising generative AI to enhance students' capabilities in education.

**Keywords:** AI in education; framework; passionate thinkers; school education; student; potential

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**Introduction**

With the rapid advancement of artificial intelligence (AI) technologies, particularly the widespread adoption of generative AI tools, the field of education is undergoing unprecedented changes and challenges. How to effectively integrate these powerful emerging technologies into primary and secondary education systems—harnessing their advantages to enhance learning while ensuring that the cultivation of students' core competencies is not undermined—has become a key issue that contemporary educators must consider. In Hong Kong, teacher professional development in this area is still in its infancy, making early planning and strategic thinking critical.

**Background of Study**

Traditional education emphasises guiding students to actively explore, question, synthesise information, and construct knowledge. However, generative AI tools, which are based on large language models, operate in a markedly different manner. These tools no longer merely serve as sources of information for users to filter and organise. Instead, they can directly generate seemingly complete and “intelligent” answers—whether in text or image form—tailored to specific questions. While this "answer-driven" response approach is convenient and efficient, it also carries the potential risk of weakening students' abilities for independent thinking and inquiry (Kong, in press).

One of the goals of education is to cultivate students' ability to pose meaningful, in-depth questions and deepen their understanding through inquiry. If students become accustomed to easily obtaining ready-made answers from generative AI, their motivation and opportunities for deep thinking, independent evaluation of information, and proactive questioning may diminish. Recent trends in generative AI development, such as tools that automatically break down user queries into multiple sub-questions and provide options, may appear supportive but further take over the thinking and questioning processes that students should undertake themselves. This trend is in contrary to the goal of education, which is to inspire thinking and foster a spirit of independent inquiry. Education aims to nurture individuals who proactively think, seek answers, and solve problems, rather than passive recipients who merely select from the options provided by generative AI.

It is essential for students in school education, who’s cognitive and thinking abilities are developing, to provide opportunities for them to practice. Uncritically applying AI tools designed for adults to students in primary and secondary schools, and over-relying on the "support" they provide, could hinder the development of thinking skills. The education sector must remain cautious to prevent the "over-response" of generative AI from depriving students of the necessary cognitive struggles required to build deep understanding and skills.

Therefore, the application of generative AI in primary and secondary education must be carefully designed, ensuring that the agency for thinking and inquiry remains firmly in students' hands. The role of generative AI tools should be to assist, not replace. When the support

provided by generative AI exceeds students' actual abilities or the needs of their developmental stage, educators need to create an environment that encourages and ensures sufficient space for student thinking. Opportunities should be provided for students to pose questions and seek answers based on their own learning contexts and needs. In this process, even if generative AI provides options or preliminary responses, students must still take responsibility for synthesising, evaluating, and deepening this information, transforming it into an integral part of their own knowledge system. Without thorough consideration and planning for the appropriate use of generative AI tools at the primary and secondary education levels, this will pose significant challenges for teachers.

## A Framework for the Application of AI in School Education

To address the challenges mentioned above and responsibly integrate generative AI into school education, a framework encompassing three core dimensions is proposed: Understanding Technology: promoting basic conceptual understanding of AI; Using Technology: effectively using generative AI in teaching and learning; Unleashing potential of human: enhancing self-regulating learning, developing independent thinking and creating meaningful value as human beings while working alongside AI. AI brings profound opportunities for transformation in primary and secondary education but also presents serious challenges to traditional educational practices. The education sector must adopt a positive and practical attitude, focusing on the long-term development of students. By building a systematic AI education framework around the three dimensions of "understanding technology", "using technology", and " unleashing potential of human ", we can foster students who not only know how to use generative AI but also understand and critically assess it. Ultimately, this will enable them to become passionate thinkers and able to create meaningful value as human beings while working alongside AI.

### *Understanding Technology: Conceptual understanding of AI*

Schools have a responsibility to ensure that students have a fundamental understanding of AI, rather than blindly revering the term “artificial intelligence”. Students need to grasp the basic concepts and operation principles behind it, especially the concepts of machine learning, deep learning, and their algorithms. Understanding how these technologies work and how they generate content forms the foundation for students to critically evaluate AI outputs (Kong et al., 2024). This awareness should be an essential part of school education, not necessarily as a standalone subject, but its importance should not be overlooked.

### *Using Technology: By means of AI for learning and teaching*

Merely understanding AI is not enough—both teachers and students must learn how to use AI tools critically and effectively. Teachers can utilise AI to support lesson planning and instructional design, while students can use AI as a learning tool (Kong & Yang, 2024). The key lies in “using it well” rather than “abusing it.” For example, when AI provides an answer, students should not stop there but instead be encouraged to use multiple AI tools to query the same question, compare the differences in responses, and assess their depth and accuracy. This

comparative process itself is a valuable exercise in critical thinking. If the answers provided by various tools are of high quality, students can synthesise an understanding through comparative analysis. If there are unexpected outcomes after prompting, the process of verification and discovery strengthens their critical thinking and judgement, while also making them aware of the limitations of AI tools such as reliance on existing databases and the inability to process non-existent or incorrect information. Through practical application, students can gain a deeper understanding of AI's strengths and weaknesses (Kong & Yang, 2025).

***Unleashing Potential of Human: Enhancing higher-order thinking, and creating meaningful value as human beings while working alongside AI***

This is the goal of AI in school education. Under the guidance of teachers, students, through understanding and applying AI tools, should ultimately improve their metacognitive abilities, including self-regulated learning (SRL), independent learning, and problem-solving skills. AI should not be the endpoint of learning but rather a catalyst to help students "learn how to learn." Students should leverage AI as a tool to acquire and analyse information more effectively and then engage in higher-order thinking, creativity, and critique. If school education fails to achieve this goal, it represents a failure of educational efforts (Kong & Yang, 2025).

Emphasising the importance of metacognition and thinking skills does not mean neglecting the accumulation of foundational knowledge. As Confucius said: "Thinking without learning is perilous." Thinking without any foundational knowledge is hollow and dangerous. Students' minds cannot be empty, relying solely on AI for information retrieval with every query. Mastery of language, mathematical sensitivity, and even a sense of programming must be internalised through struggle and practice. These internalised forms of knowledge enable intuitive judgement, quick estimation, and the ability to draw analogies, forming the basis for effective questioning and evaluation of AI responses. For instance, "coding sense" does not emerge out of just seeing the codes but is built through hands-on programming experience. With this sense, students can know when and how to effectively query AI for programming-related assistance.

Therefore, future education should not abandon knowledge acquisition and conceptual understanding. Students need to establish a solid foundation of knowledge while also learning to use external tools such as AI to expand their cognitive boundaries. Internal knowledge and external tools should complement each other.

## Conclusion

Artificial intelligence brings profound opportunities for transformation in school education but also presents significant challenges to traditional educational practices. The education sector must adopt a cautious yet proactive approach, prioritising students' long-term development, and construct a systematic AI in education framework around the three dimensions of "understanding technology", "using technology", and "unleashing potential of human".

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We need to cultivate students who not only know how to use AI but can also understand and critically evaluate it, using it to become passionate, independent thinkers, and able to create meaningful value as human beings while working alongside AI. This requires teachers to possess the necessary skills and strategies to guide students in navigating in the AI era—mastering technology while preserving and enhancing uniquely human intelligence and judgement. This is a daunting yet vital task that concerns the core competitiveness of the next generation and the future development of the AI-permeated society.

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