Applying AI in Academic Activities: An Interdisciplinary Approach and Some International Experiences in the Context of Vietnamese Education

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ABSTRACT
This article analyzes the applications of Artificial Intelligence (AI) in academic activities from an interdisciplinary perspective, focusing particularly on teaching and scientific research. The author synthesizes and evaluates global trends, with case studies from Singapore and other developed countries, to draw practical lessons relevant to the context of higher education in Vietnam. The paper highlights the importance of integrated policies, academic ethics, digital competency development, and interdisciplinary collaboration in addressing the challenges that AI poses to the academic ecosystem.

Keywords: *AI, interdisciplinary approach, international experience, higher education, Vietnam*

1. INTRODUCTION

In recent years, Artificial Intelligence (AI) has emerged as one of the core technologies reshaping all aspects of social life — from manufacturing, healthcare to finance, education, and scientific research. Across universities, research institutes, and academic organizations worldwide, AI has gradually penetrated professional activities, not only supporting but fundamentally transforming teaching, learning, knowledge creation, and scholarly publishing.

AI is not merely a technical tool but increasingly an agent of innovation — giving rise to new pedagogical models, research methodologies, and unprecedented academic ethical dilemmas. In this context, the application of AI in academic activities must be approached through an interdisciplinary lens — integrating insights from technology, pedagogy, sociology, psychology, and philosophy — to fully understand the nature and implications of this transformation.

Alongside technological advancements, many countries are implementing policies, pilot programs, and national strategies to integrate AI into their educational and research systems methodically. International experience underscores the importance of developing academic data infrastructure, enhancing digital competencies for faculty and researchers, and establishing ethical standards suited to this evolving landscape.

Based on this foundation, the article aims to analyze the specific applications of AI in academic activities, from teaching to scientific research. At the same time, it proposes an interdisciplinary approach to assess comprehensively the impact of AI on the academic ecosystem. By synthesizing and analyzing selected international best practices, the article also offers practical suggestions for Vietnam in its digital transformation of education and scientific research.

2. THEORETICAL FOUNDATION AND RESEARCH APPROACH

Artificial Intelligence (AI) is a field of study focused on developing computer systems capable of performing intellectual tasks such as learning, reasoning, natural language processing, and creative thinking. According to Russell and Norvig (2021), AI can be classified into four main categories: systems that think like humans, systems that act like humans, systems that think rationally, and systems that act rationally. In the context of higher education and scientific research, AI is typically deployed through machine learning algorithms, deep learning, and, more recently, generative AI models such as ChatGPT, Claude, or Gemini.

In academia, AI applications can be categorized into two types: assistive AI—which optimizes teaching, research, and administrative processes—and interactive AI—which can respond to and learn from users, opening up opportunities for human-machine collaboration in knowledge creation. These applications are driving significant transformations in

teaching models, flexible assessment methods, personalized learning pathways, and big-data-driven research approaches.

However, AI is not only a technology but also a social phenomenon, having multidimensional impacts on academic ethics, critical thinking, and the structure of knowledge power. Therefore, the study and application of AI in academia require an interdisciplinary approach that integrates computer science, educational theory, sociology of education, and epistemology. Floridi and Cowls (2022) argue that all AI applications must adhere to five core ethical principles: beneficence, non-maleficence, autonomy, justice and explicability. These principles form the theoretical foundation for understanding the nature and limitations of AI in the modern academic environment.

3. APPLICATIONS OF AI IN TEACHING AND ACADEMIC RESEARCH

AI is increasingly becoming a comprehensive support tool in academic activities, ranging from personalized learning and automated assessments to data analysis and academic writing. Platforms such as Knewton, Squirrel AI, and Gradescope assist instructors in identifying knowledge gaps, generating adaptive learning pathways, grading automatically, and providing instant feedback (Luckin et al., 2016; OECD, 2021). Additionally, tools like ChatGPT, Grammarly, Writefull, and DeepL support the writing, translation, and editing of research texts, thereby accelerating the academic publication process (Nature Editorial, 2023).

Nonetheless, the application of AI raises important questions about ethics and academic responsibility: Is AI merely a support tool, or can it be considered a co-author? How can transparency and accountability be ensured in AI-assisted academic outputs? According to Floridi & Cowls (2022), five core ethical principles must be respected: beneficence, non-maleficence, autonomy, justice and explicability.

Leading universities such as Harvard, Cambridge, and ETH Zurich have issued ethical guidelines for AI usage and incorporated digital ethics into their postgraduate curricula. These serve as exemplary models for Vietnam in developing legal frameworks and academic environments suited to the AI era.

4. INTERNATIONAL EXPERIENCE IN AI APPLICATION IN ACADEMIA: IMPLICATIONS FOR VIETNAM

In the context of globalized education and digital transformation, many countries have adopted strategic, systematic approaches to integrating AI into their academic ecosystems, emphasizing not only technical but also ethical and humanistic considerations.

China leads in AI-powered personalized education through real-time learning behavior monitoring systems. However, this model has raised concerns about privacy and over-surveillance (Zhao et al., 2020).

Finland adopts a liberal arts-inspired approach with its free national “Elements of AI” course aimed at fostering critical thinking and social understanding of AI (University of Helsinki & Reaktor, 2020). The United States and the United Kingdom have heavily invested in AI infrastructure at universities (e.g., MIT Schwarzman College of Computing), promoting interdisciplinary research and open data sharing (MIT, 2021; UKRI, 2022).

Australia and the European Union (EU) emphasize AI sustainability by building clear ethical and policy frameworks. Australia requires transparency in the use and purpose of AI in research (ARC, 2021), while the EU promotes a "trustworthy AI" strategy, encouraging the validation of tools, personal data control, and ethical risk assessments (European Commission, 2021). At the institutional level, universities such as Harvard, Cambridge, and ETH Zurich have established AI ethics committees, conduct regular training, and implement reporting systems to ensure transparency and academic integrity in teaching and research.

Beyond Western models, the ASEAN region, with its young population, rapid digital adoption, and developing education systems, provides practical lessons for Vietnam. Among these, Singapore stands out as a pioneer in developing an integrated academic AI ecosystem linking government, universities, and technology enterprises.

Since 2019, Singapore’s National AI Strategy has prioritized education and research. Universities such as NUS and NTU have collaborated with A*STAR and the government to implement adaptive learning platforms, national-level research performance analytics tools, and advanced training programs. Notably, the AI Singapore (AISG) initiative coordinates national AI research, supports practical training programs such as the AI Apprenticeship Programme (AIAP), and promotes interdisciplinary academic–industry engagement (Cheng et al., 2021; Smart Nation Office, 2019).

From Singapore and ASEAN experiences, four key recommendations emerge for Vietnam:

1. Develop a national policy on AI in academia, aligned with the broader digital transformation strategy, emphasizing investment in data infrastructure and innovation in universities.
2. Enhance interdisciplinary digital capacity for lecturers, researchers, and students through integrated training in technology, critical thinking, and academic ethics.
3. Establish a national code of ethics for AI use in teaching and research to ensure transparency, integrity, and accountability.
4. Promote cross-sector and regional collaboration, especially within ASEAN, through academic networks, open-access platforms, and expert exchanges on AI and digital ethics.

Learning from other country in the region will not only strengthen Vietnam's academic capabilities but also play a strategic role in fostering digital integration and building a human-centered ASEAN knowledge community.

5. DISCUSSION

Artificial Intelligence (AI) is playing an increasingly vital role in the academic ecosystem, offering opportunities for educational and research innovation while also posing challenges in terms of ethics, human capacity, and institutional structure. This section focuses on three key aspects: (1) opportunities and challenges for Vietnamese higher education, (2) conditions for effective AI integration, and (3) shaping a human-centered academic model.

5.1. Opportunities and Challenges for Vietnamese Higher Education

AI has the potential to address longstanding limitations such as a lack of personalized learning, overloaded curricula, and fragmented research data. However, uneven digital competency, underdeveloped data infrastructure, and the absence of clear guidelines on AI ethics are hampering effective implementation. According to the Ministry of Education and Training (2023), only 38% of university lecturers in Vietnam have received formal training on AI—highlighting the urgent need for structured training and policy development.

5.2. Conditions for Effective AI Integration in Academia

To ensure sustainable AI adoption, Vietnam needs to:

- Develop open, secure, and internationally compatible data systems.
- Strengthen interdisciplinary AI capacity building by integrating technological skills with ethics and critical thinking.
- Establish an innovation-friendly yet well-regulated policy ecosystem, with collaboration among government, academia, and industry.

4.3. The "AI + Human" Academic Model

While AI can enhance efficiency and generate ideas, it cannot replace critical thinking and creativity—qualities inherent to human intellect. Therefore, the future academic model in the AI era should follow an "AI-assisted and human-centered" approach, in which humans retain control over the direction, evaluation, and interpretation of knowledge creation processes. As Floridi and Cowls (2022) emphasized, "AI should be designed to serve human flourishing, not to replace humanity."

CONCLUSION AND RECOMMENDATIONS

Artificial Intelligence (AI) is profoundly transforming the global academic ecosystem. Beyond optimizing teaching and research processes, AI is reshaping how humans access, generate, and disseminate knowledge. From personalized learning environments to generative writing tools, AI is no longer a futuristic trend—it has become embedded in every aspect of the education–research value chain.

However, this potential is accompanied by systemic challenges: the lack of a clear legal framework, disparities in digital literacy, and the risk of dependency on tools at the expense of independent academic thinking. International and ASEAN regional experiences affirm that the key to effective AI application lies not solely in technology, but in interdisciplinary thinking, ethical governance, and humanistic orientation.

Based on theoretical insights, international practices, and the Vietnamese context, this article proposes several strategic directions:

- Develop a national strategy on AI in academia, aligned with the digital transformation of education, with investments in data infrastructure and open-source academic AI tools.
- Foster interdisciplinary AI capacity among lecturers, researchers, and students—not only in technical skills but also in ethics, critical thinking, and scholarly creativity.
- Establish academic AI ethics codes at both institutional and national levels, ensuring transparency, integrity, and accountability in research, teaching, and publication.
- Promote multi-stakeholder collaboration among universities, research institutes, and tech enterprises to develop and pilot AI tools adapted to academic environments.
- Shape a human-centered academic model, where AI serves as a thinking assistant rather than a thinking substitute—a catalyst for innovation without replacing the critical and creative roles of humans.

In the near future, deeper research into AI's long-term impacts on academic culture, university structures, and educational philosophy will be essential. This article aims to contribute to ongoing interdisciplinary discussions on developing a responsible, humanistic, and adaptive academic ecosystem in the age of artificial intelligence.

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