



Ethical and Policy Issues in Applying AI to the Design and Implementation of University Training Programs in the Digital Transformation Era

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ARTICLE INFO	ABSTRACT
Published Online: 20 December 2025	This paper provides a comprehensive analysis of the role and challenges of Artificial Intelligence (AI) in designing and implementing university curricula during the digital transformation era. The author highlights AI applications in personalized learning, progress assessment, and automated feedback, while identifying ethical risks such as privacy violations, algorithmic bias, and lack of transparency. By benchmarking against international policy frameworks (EU, UNESCO, OECD), the study reveals gaps in Vietnam's legal landscape and proposes recommendations on ethics, oversight, and AI policy development in higher education, aiming towards a humanistic and sustainable education system.
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I. INTRODUCTION

In the context of global digital transformation, Artificial intelligence (AI) is gradually restructuring higher education by supporting personalized learning, enhancing training management efficiency, and innovating teaching methods. Intelligent tutoring systems, learning analytics, AI tutors, and automated assessment platforms have been widely implemented in advanced education systems such as those in the United States, Singapore, and Finland (UNESCO, 2021; Luckin et al., 2016). Within universities, AI not only facilitates the design of curricula tailored to learners' needs but also contributes to greater flexibility, efficiency, and accessibility in education (OECD, 2021).

In Vietnam, the development of university curricula aligned with international standards and digital transformation has become a strategic orientation explicitly stated in the directives of the Ministry of Education and Training. However, the application of AI in designing and implementing higher education programs remains limited, particularly in terms of awareness of ethical risks and accompanying policy gaps. While developed countries have issued ethical guidelines and established legal frameworks specific to AI in education, Vietnam's regulatory environment in this field is still unclear and lacks consistency (European Commission, 2023).

Alongside its remarkable potential, AI in education raises a series of ethical risks, including violations of student data privacy, algorithmic bias in learning assessment, lack of transparency in automated decision-making, and excessive

dependence on technology (Floridi et al., 2018). If not properly managed, these risks may undermine fairness, humanistic values, and the overall quality of higher education.

Therefore, examining and clarifying ethical and policy issues in applying AI to the design and implementation of university curricula has become imperative. This effort not only provides a foundation for ensuring sustainable development of higher education in the digital era but also contributes to building a learner-centered education system that leverages technology while remaining faithful to core humanistic values.

II. APPLICATION OF AI IN CURRICULUM DESIGN

2.1 Forms of AI application

2.1.1. Input data analysis for curriculum design

In the context of higher education facing constant pressure to innovate in response to labor market demands and international standards, curriculum design must be grounded in reliable and multidimensional data. AI, particularly big data analytics tools, is opening new approaches to systematically and effectively harness information from diverse sources to support this process.

Machine learning models and data mining techniques enable universities to collect and process data from multiple channels: student learning outcomes, recruitment needs from enterprises, future career trends, alumni feedback, and information from digital learning platforms (Holmes et al., 2019). Such data allow curriculum designers to identify skill

gaps and shifts in core competencies across professions, thereby adjusting training content to align with real-world requirements.

AI also facilitates learning behavior analytics, which can predict learning needs across different student groups—such as by region, social context, or learning style. This information supports personalized curriculum design tailored to target student populations, consistent with outcome-based education models such as CDIO and OBE (Kumar et al., 2022). Applying AI at the initial stage of curriculum design not only enhances the scientific and objective basis of program development but also contributes to improving the quality, adaptability, and international relevance of higher education curricula in the digital era.

2.1.2. Personalizing learning content according to learners' competencies

Personalized learning is one of the central objectives in modernizing university curricula towards a learner-centered approach. AI plays a pivotal role in realizing this goal by analyzing learners' behaviors, academic performance, learning styles, and personal preferences to adjust content, learning pathways, and instructional formats tailored to each individual (OECD, 2021).

Adaptive learning systems powered by AI dynamically adjust content in real time based on learners' comprehension levels and competencies. For instance, when a student struggles with a particular topic, the system can automatically provide supplementary materials, customized exercises, or recommend timely instructor intervention. This model optimizes individual learning trajectories, reducing the risks of cognitive overload or insufficient foundational knowledge (Zawacki-Richter et al., 2019).

In the context of outcome-based education (OBE), personalization supports the assurance that all learners achieve the core competencies stipulated in the curriculum. AI enables continuous monitoring of each student's progress toward learning outcomes and automatically adjusts learning activities to ensure objectives are effectively met (Xie et al., 2021). Moreover, with the integration of multimedia learning and instant feedback systems, AI personalizes not only the content but also the modes of delivery, creating a comprehensive and flexible learning experience.

Thus, AI-driven personalization of learning content not only enhances training quality but also promotes equity in higher education, ensuring that every student learns in a way that aligns with their own abilities and needs.

2.2 Potential for integration with international standard

The development of university curricula aligned with international standards such as CDIO (Conceive – Design – Implement – Operate), OBE (Outcome-Based Education), and AUN-QA (ASEAN University Network – Quality Assurance) has become an inevitable trend in the context of globalization and digital transformation. These frameworks emphasize systematic design, relevance to practical demands,

and a learner-centered approach. In the process of modernizing curriculum design according to these standards, AI can play a pivotal role in data analysis, program structuring, and evaluating the extent to which learning outcomes are achieved.

For the CDIO model, AI can support the analysis of input competencies and output requirements of training programs by leveraging data from labor markets, enterprises, and alumni feedback. Based on this information, AI systems can recommend appropriate courses and program structures aligned with the “Conceive – Design – Implement – Operate” competency chain, while also enabling personalized learning pathways for different student groups (Crawley et al., 2014). Within the OBE model, which focuses on learning outcomes and practical competencies, AI can automatically analyze the alignment between training objectives, course content, teaching methods, and assessment formats. Smart learning systems powered by AI can suggest adjustments to learning materials or recommend program improvements when misalignments are detected or when intended competencies are not sufficiently achieved (Miao et al., 2021).

Regarding the AUN-QA quality assurance framework, AI can contribute to the preparation of self-assessment reports by analyzing the strengths and weaknesses of curricula through learning resources, student feedback, output statistics, and academic data. Furthermore, learning analytics platforms can provide quantitative evidence for AUN-QA evaluation criteria such as learning outcomes, continuous improvement, student assessment, and teaching effectiveness (AUN-QA, 2020).

The integration of AI into curriculum design models not only automates processes and reduces administrative burdens but also enhances accuracy and objectivity in evaluating compliance with international standards, thereby fostering sustainable improvements in training quality.

2.3 Ethical issues in AI design

2.3.1. Governance of learner data

AI in education relies heavily on data, ranging from grades, study time, and online behaviors to emotional responses and learner interactions. However, most educational institutions still lack robust and transparent data governance systems. Collecting and using data without explicit consent from learners poses risks of privacy violations and breaches of educational ethics (Williamson & Eynon, 2020).

Moreover, many AI systems employ personal data to train models without clear mechanisms to safeguard identities or allow learners to control their own information. According to UNESCO (2021), learners must be fully informed about the purpose, scope, and methods of data usage, and they should retain the right to request modifications or deletion of their data when necessary. This forms the foundation of human-centered data governance, ensuring the protection of learners' rights in the digital education context..

2.3.2. Avoiding algorithmic bias in content design

AI algorithms learn from past data to generate recommendations and make educational decisions. However, if training data contains social biases or is collected in a non-comprehensive manner, AI models may reproduce or even amplify existing prejudices (Binns, 2018). In higher education, this can lead to invisible discrimination in learning material design, assessment practices, or allocation of teaching resources.

For example, a content recommendation system based on prior academic performance may consistently favor students with strong backgrounds, leaving weaker students “behind” and exacerbating learning disparities. To mitigate this risk, AI developers must establish fairness auditing procedures, employ diverse and representative datasets, and adopt principles of explainable AI in system design (Floridi & Cows, 2019).

Higher education is not only about transmitting knowledge but also about shaping values. Therefore, any AI application in this field must be designed with a clear ethical commitment, oriented towards fairness, transparency, and humanistic principles.

III. APPLICATION OF AI IN PROGRAM IMPLEMENTATION

3.1 AI in organization and teaching

3.1.1. AI teaching assistants and academic chatbots

The advancement of AI has facilitated the emergence of AI teaching assistants and academic chatbots, tools capable of interacting with students in real time, answering questions, guiding learning, and providing rapid explanations of concepts. These systems help reduce the workload for lecturers, particularly in large classes, while offering 24/7 learning support for students (Chen et al., 2020).

Several platforms have successfully deployed academic chatbots, such as Jill Watson, an AI teaching assistant developed by Georgia Tech, which interacts with students through learning forums and answers thousands of questions each semester without direct human intervention (Goel & Polepeddi, 2016). In other institutions, chatbots are also applied to support report writing, guide research orientation, or recommend suitable academic resources.

However, the effectiveness of virtual teaching assistants depends on natural language processing (NLP) capabilities, the accuracy of knowledge bases, and the reliability of machine learning algorithms. Therefore, chatbot development must be accompanied by content control mechanisms, lecturer feedback loops, and regular knowledge updates to avoid misunderstandings or the dissemination of inaccurate information (Følstad & Brandtzaeg, 2017).

3.1.2. Smart learning and blended/online models

AI is driving the development of flexible learning models such as smart learning and blended learning by integrating with learning management systems (LMS) to analyze learner

behavior and personalize learning pathways in real time (Hwang & Fu, 2020).

In blended learning models, AI supports the integration of online and traditional teaching, enabling the monitoring of learning progress, detecting signs of declining motivation, and recommending timely interventions, particularly effective in the post-COVID-19 context (Zawacki-Richter et al., 2019).

Additionally, smart learning platforms provide personalized content recommendations, adaptive testing, and multimedia learning resources, thereby enhancing learning efficiency and expanding access opportunities for students beyond full-time formal education.

3.2 AI in assessment and feedback

3.2.1. Automating the assessment of learning progress

AI contributes to innovation in higher education assessment through its ability to monitor and analyze personalized learning progress. Unlike traditional evaluation methods that rely primarily on end-of-term results, AI systems can collect behavioral data from digital platforms, such as study duration, interaction frequency, and task completion rates, to assess levels of improvement (Ifenthaler & Yau, 2020).

In addition, learning analytics and natural language processing (NLP) technologies enable automated grading of essays and academic projects, enhancing objectivity while reducing lecturers’ workload (Liu et al., 2022). More importantly, AI supports the evaluation of self-learning capacity, critical thinking, and creativity, key competencies aligned with the holistic development of learners in modern education.

3.2.2. Deep learning based feedback system

Feedback is a crucial element of the learning process. With the support of deep learning, modern feedback systems can interpret context, analyze comprehension levels, and deliver instant, personalized responses to individual learners (Yang et al., 2021).

Unlike preformatted feedback, these systems employ artificial neural networks to identify recurring errors, explain the causes of mistakes, and recommend appropriate learning resources in real time. Some systems even integrate emotion and confidence analysis, enabling early detection of declining motivation or academic stress (Chen et al., 2020).

As a result, academic feedback becomes continuous, adaptive, and in-depth, not only supporting learning but also enhancing personalized experiences in contemporary higher education environments.

3.3 Ethical and legal issues in implementation

3.3.1. Security of learning information

AI in education relies on personal learner data such as academic results, online behaviors, and classroom interactions. If the collection and processing of such data lack transparency, they risk violating privacy rights, especially

when students are not clearly informed about the purposes and methods of data usage (Slade & Prinsloo, 2013).

While sectors such as healthcare and finance already have strict data protection regulations (e.g., GDPR in the EU), higher education still lacks an equivalent legal framework (Williamson & Eynon, 2020). Therefore, universities must establish internal data security policies, apply encryption, implement access controls, and clearly define responsibilities in data governance to effectively safeguard learners.

3.3.2. Transparency in AI-based assessment

Transparency is a core principle in implementing AI for learning assessment. However, many current models, particularly deep learning, are highly complex, leading to the phenomenon of “black-box AI,” which makes it difficult to explain outcomes (Weller, 2019).

In higher education, when AI is used to grade, classify competencies, or recommend learning content, a lack of transparency can generate disputes, complaints, and diminish student trust. Hence, priority should be given to developing explainable AI models, ensuring transparency in data training processes, and establishing mechanisms for academic decision review.

At the same time, independent auditing procedures must be developed for AI-based assessment systems to guarantee fairness, accountability, and ethical compliance within higher education environments.

IV. POLICY MANAGEMENT OF AI APPLICATIONS IN HIGHER EDUCATION

4.1 Overview of domestic and international policies

4.1.1. Current policies in Vietnam

In recent years, Vietnam has issued several strategic policies to promote the development of AI and digital transformation in education, notably the National Strategy on AI to 2030 (Decision No. 127/QĐ-TTg) and the digital transformation program for the education sector (Decision No. 131/QĐ-BGDĐT). These documents emphasize the role of AI in enhancing training quality, developing open databases, and building intelligent learning systems.

However, current policies remain largely at the strategic orientation level, without specific legal regulations on AI ethics, learner data protection, or mechanisms for system accreditation. The implementation of AI in universities is still spontaneous, lacking supervision and standardization, which creates significant policy gaps in managing ethical risks and safeguarding learners’ rights.

Therefore, Vietnam needs to urgently establish a comprehensive legal framework for AI in higher education, with cross-sectoral coordination to ensure a balance between technological innovation and the legal and ethical requirements of the academic environment.

4.1.2. Comparison with advanced models

AI policy in education in Vietnam currently remains at a general orientation level, lacking specific regulations on

ethics, data governance, and system oversight. In contrast, international organizations such as the EU, UNESCO, and OECD have developed comprehensive and binding policy frameworks that can serve as valuable references for Vietnam.

In the EU, the AI Act (2023) classifies AI systems in education as “high-risk,” requiring transparency, accountability, and the protection of learners’ rights (European Commission, 2023). UNESCO (2021) has issued global ethical recommendations, emphasizing privacy, inclusiveness, and mechanisms for ethical impact assessment prior to implementation. Meanwhile, the OECD (2021) has proposed principles for responsible AI, highlighting human rights, explainability, and independent oversight, while also supporting the enhancement of digital competencies among educators.

Compared with these models, Vietnam still lacks: (i) a dedicated ethical framework for education, (ii) a risk classification system for AI, and (iii) clear regulations on data governance and algorithmic transparency. Selective localization of principles from advanced models is therefore essential to develop appropriate policies that ensure safety, fairness, and quality in education in the AI era.

4.2 Policy gaps and limitations

4.2.1. Absence of a specific legal framework for AI in education

Currently, Vietnam does not have a dedicated legal system regulating the design, implementation, and oversight of AI applications in higher education. Existing documents such as the National AI Strategy and the digital transformation program for the education sector remain largely directional, without technical standards, risk assessment mechanisms, or safeguards for learners.

As a result, universities operate AI systems in a spontaneous manner, lacking independent supervision and formal output accreditation. Compared with countries such as France, Germany, or Singapore, where specific guidelines and sanctions for AI in education have already been established—Vietnam faces a significant legal gap (OECD, 2021).

This situation poses risks of technological misuse and complicates the distinction between genuine innovation and violations of ethics or individual rights in academic environments.

4.2.2. Managing ethical responsibility when AI malfunctions

A major challenge today is the absence of clear regulations on ethical and legal responsibility when AI systems in education make erroneous decisions that negatively affect learners. The question of accountability, whether it lies with developers, lecturers, or institutions, remains unresolved.

According to UNESCO (2021), the principle of “human-in-the-loop” must be ensured, particularly for decisions that directly impact the right to education. However, in Vietnam, human oversight of AI has not been clearly defined, nor are

there established procedures for complaint handling and post-implementation review in cases where systems cause harm. To address this gap, it is necessary to develop national ethical principles and assign explicit responsibilities to all stakeholders throughout the entire lifecycle of educational AI systems, from design to implementation and monitoring. This will ensure transparency, fairness, and the protection of learners' rights.

4.3 Policy recommendations for regulation and oversight

4.3.1. Establishing a national ethical code for AI in education

The application of AI in higher education in Vietnam necessitates the urgent development of a dedicated national ethical code to guide the responsible, fair, and human-centered implementation of technology. While many international organizations such as the OECD (2019), UNESCO (2021), and the EU have issued general ethical frameworks, Vietnam has so far remained at the level of strategic orientation under the National AI Strategy, without specific standards tailored to the education sector.

AI systems in education must adhere to core principles such as respect for human rights, transparency, data security, fairness, and accountability (Floridi & Cowls, 2019). This is particularly critical in academic environments, where vulnerable groups such as students are concentrated, and where ethical risks related to automated assessment, learning management, and data usage must be strictly controlled.

The process of developing such a code should involve the participation of all stakeholders and clearly define the responsibilities of developers, institutions, and learners, as well as establish mechanisms for ethical review both prior to and after implementation. This will serve as a vital foundation for building social trust and guiding the sustainable development of higher education in the digital era.

4.3.2. Strengthening accreditation and oversight capacity for educational AI

To ensure that the application of AI in higher education is transparent and responsible, it is essential to establish specialized accreditation and oversight systems for AI technologies. At present, Vietnam lacks independent accreditation mechanisms for educational AI systems, resulting in spontaneous implementation, insufficient standardization, and potential risks such as algorithmic bias, unfair assessment, or data usage beyond educational purposes (Zawacki-Richter et al., 2019).

According to OECD (2021) and UNESCO (2021), oversight systems should include: (i) dedicated accreditation standards for educational AI, (ii) an authorized supervisory body with appropriate expertise, (iii) ex-ante and ex-post evaluation procedures, and (iv) mechanisms for receiving feedback and complaints. In addition, it is necessary to train a cadre of AI accreditation specialists in education and establish independent accreditation centers to ensure quality and mitigate technological risks.

Enhancing accreditation capacity not only contributes to protecting learners' rights but also serves as a foundation for strengthening public trust and fostering the sustainable development of the educational AI ecosystem.

V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Artificial Intelligence (AI) is opening breakthrough opportunities for higher education, particularly in the design and implementation of curricula that are personalized, flexible, and aligned with international standards. AI supports universities not only in analyzing input data and identifying labor market skill demands, but also in developing programs tailored to learners' competencies, while optimizing teaching, assessment, and feedback processes. From virtual teaching assistants and intelligent learning systems to automated assessment tools and instant feedback mechanisms, AI is restructuring the entire training process towards learner-centered and outcome-oriented education.

However, alongside these potentials lie serious ethical and policy challenges. The application of AI in education raises critical questions regarding data privacy, transparency in assessment, risks of algorithmic bias, and the lack of accountability when errors occur. While many countries and international organizations have established comprehensive policy and ethical frameworks for AI in education, Vietnam still lacks a clear legal corridor and appropriate accreditation systems. Without strict oversight, the deployment of AI in education may lead to far-reaching consequences, undermining learners' rights and the quality of higher education.

Therefore, for AI to truly become a tool that enhances quality and equity in higher education, technological innovation must be coupled with policy refinement. Strategic directions such as establishing a national ethical code, strengthening independent accreditation capacity, and developing transparent feedback mechanisms will form a solid foundation for the effective, humanistic, and sustainable application of AI in Vietnam's higher education system

5.2 Recommendations

5.2.1. For universities

Develop a comprehensive strategy for integrating AI into the design, organization, and evaluation of curricula. This strategy should be concretized through clear action plans, involve multiple stakeholders, and be closely aligned with the broader digital transformation agenda in the education sector. Establish internal monitoring and control mechanisms for AI systems used in training activities. Regular evaluation of pedagogical effectiveness, reliability, and fairness is a prerequisite to ensuring both quality and the protection of learners' rights.

Enhance digital competence and AI ethics awareness among lecturers and administrators. This is a critical factor in ensuring that AI operations in educational environments are

conducted in a humanistic, transparent, and responsible manner.

5.2.2. For state management agencies

Regulatory agencies should urgently develop and promulgate a national ethical code for AI in education, formulated through cross-sectoral consultation to provide a foundation for responsible implementation. At the same time, the legal framework and technical standards governing the design, deployment, and oversight of AI systems must be completed, particularly in areas such as risk classification, data protection, and accountability.

In addition, strengthening independent accreditation and oversight capacity is essential, either through specialized units or by expanding the role of existing accreditation centers. Finally, international cooperation and controlled open research should be promoted, enabling Vietnam to flexibly absorb experiences from UNESCO, OECD, and EU models while ensuring contextual relevance to the national education system.

5.2.3. For AI technology developers

Technology developers play a crucial role in building AI systems that serve higher education. Ethical principles must be embedded from the design stage, including transparency, non-bias, data protection, and the safeguarding of the right to education. Systems should be explainable, traceable, and allow for human oversight.

Moreover, AI development must be closely aligned with educational practice through strong collaboration with universities and lecturers. Training data should be comprehensive, representative, and contextually appropriate to avoid distortions. Developers must also ensure algorithmic transparency, establish independent auditing mechanisms, and commit to advancing equitable and sustainable educational goals rather than pursuing purely commercial interests.

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