

National education policy: Implementation of Artificial Intelligence in higher education

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Abstract

The application of Artificial Intelligence (AI) in higher education continues to experience rapid development along with the digital transformation in various aspects of life. Universities are required to adapt to technological advances in order to strengthen institutional competitiveness and reputation. This study aims to analyze national education policies in the digital era related to the implementation of AI in universities to build institutional reputation. The methods used are policy analysis and literature study, with the help of Publish or Perish software for searching scientific articles, and VOSviewer for visualization and bibliometric analysis. Results of the study show that national education policy has created a basis for the use of digital technologies such as AI by encouraging adaptive learning, increasing administrative efficiency, and adjusting education services. However, several challenges still hinder the implementation of AI in higher education. To support digital transformation in education, the government, universities, and the industrial sector must work together by creating a supportive ecosystem. Implementation of AI use in higher education can change the paradigm of digital-era education in Indonesia into a more inclusive, responsive, and data-based system.

Keywords: National Education Guidelines, Digital Era, Education Services, Learning Quality

Abstrak

Penerapan Artificial Intelligence (AI) dalam pendidikan tinggi terus mengalami perkembangan pesat seiring dengan transformasi digital di berbagai aspek kehidupan. Perguruan tinggi dituntut untuk beradaptasi dengan kemajuan teknologi guna memperkuat daya saing dan reputasi kelembagaan. Penelitian ini bertujuan untuk menganalisis kebijakan pendidikan nasional di era digital terkait implementasi AI di perguruan tinggi dalam upaya membangun reputasi institusi. Metode yang digunakan adalah analisis kebijakan dan studi literatur, dengan bantuan perangkat lunak Publish or Perish untuk penelusuran artikel ilmiah dan VOSviewer untuk visualisasi dan analisis bibliometrik. Hasil penelitian menunjukkan bahwasannya kebijakan pendidikan nasional telah menciptakan dasar untuk penggunaan teknologi digital seperti AI dengan mendorong pembelajaran adaptif, meningkatkan efisiensi administrasi, dan menyesuaikan layanan pendidikan. Namun, masih ada beberapa tantangan yang menghalangi implementasi penggunaan AI di perguruan tinggi. Untuk mendukung transformasi digital dalam pendidikan, pemerintah, perguruan tinggi, dan sektor industri harus saling bekerja sama diiringi dengan membuat ekosistem yang mendukung. Implementasi penggunaan AI di perguruan tinggi dapat mengubah paradigma pendidikan era digital di Indonesia menjadi sistem yang lebih inklusif, responsif, dan berbasis data.

Kata kunci: Pedoman Pendidikan Nasional, Era Digital, Layanan Pendidikan, Mutu Pembelajaran

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1. Introduction

The current digital revolution has had a significant impact on many sectors, including higher education (Faraasyatul 'alam et al., 2023). Universities must be able to adapt to technological developments, because they are responsible for producing quality human resources ('Alam, Sobri, et al., 2023). The transformation of education in Indonesia focuses on the advancement of digital technology, especially artificial intelligence or what is often referred to as Artificial Intelligence (AI). AI is not only able to increase efficiency, but also offers a variety of new ways that are full of innovation to be able to deliver lessons and help adapt to the needs of digital era education.

One of the main technologies that is changing the world of higher education in the digital era is AI (Rindfleisch, 2020). Universities use it as a center for learning and innovation that is considered capable of improving the quality of education, administrative efficiency, and competitiveness worldwide (Faraasyatul Alam, Imron, Timan, & Sultoni, 2023). Universities can offer a more personalized and adaptive learning experience through this technology ('Alam, Wiyono, et al., 2023). AI-based learning systems have the ability to identify students' unique needs and provide appropriate materials and feedback. This can certainly help create a more effective and in-depth learning process where students can understand topics at their own learning style and pace (Herlambang & Rachmadi, 2023).

AI not only helps the learning process but also automates administrative tasks in higher education (Quy et al., 2023). AI-based chatbots and other technologies can quickly and efficiently answer students' questions about school administration, class schedules, and other information (Dempere et al., 2023). Scheduling lectures, managing student data, and evaluating lecturer performance are all easier with AI-based management systems. Higher education institutions can allocate resources to more strategic goals, such as building academic programs or research by reducing administrative tasks that are still considered manual (Shenkoya & Kim, 2023).

AI is a very powerful tool for increasing innovation and productivity in research (Chaka, 2023). Researchers can generate new insights in various fields thanks to AI's ability to analyze large amounts of data quickly. Scientific simulations, data analysis, and creating algorithms to solve complex problems all use AI technology. The implementation of AI in research will have a positive impact on universities with advantages in terms of scientific publications and collaboration with business partners and other institutions. However, various obstacles hinder the implementation of this technology (Konstantinova et al., 2023). One of the main obstacles is uneven technological infrastructure, limited budget, and the readiness of lecturers and students to use AI. This is because the use of AI requires the collection and analysis of large data, ethical issues and data privacy are also major concerns in today's digital era.

Investment in AI includes not only the purchase of software and hardware, but also workforce training and system maintenance (Nam & Bai, 2023). Without adequate funding, some universities struggle to fully adopt AI. Various efforts have been made to support the digitalization of education in the context of national education policies

(Abulibdeh et al., 2024). The Ministry of Education, Culture, Research, and Technology or Kemendikbudristek has included several developments in Information and Communication Technology (ICT) and the application of artificial intelligence in the educational process. However, to achieve this goal, more specific steps are needed, especially in terms of improving infrastructure, training lecturers, and creating regulations that support the implementation of AI use (Hodgson et al., 2022).

This issue is becoming increasingly important amid growing public concerns about the negative impacts of AI, such as algorithmic bias or unfair automated decisions. If done right, AI can be a catalyst for more innovative, inclusive, and sustainable higher education (Luo, 2022). Specifically, this research aims to: (1) expand on which national education policies support the implementation of AI in higher education, and (2) identify the challenges and opportunities that arise in the implementation process. This study is expected to provide new insights for building education policies that are more in line with the digital era.

2. Research Method

This study analyzes national education policies on the implementation of AI use in higher education. The literature review method was chosen to identify, evaluate, and synthesize relevant research on this topic. The purpose of this study is to provide an in-depth understanding of education policies and issues related to the implementation of AI in higher education. This research was conducted over a period of 8 weeks, starting from the process of collecting literature data to analysis and drafting the manuscript. Exclusion criteria involved non-academic publications and sources that did not focus on policy or higher education. The selected articles were further analyzed using VOSviewer for bibliometric mapping, allowing the identification of research trends, influential authors, and keyword clusters. An interpretative content analysis approach was then applied to explore policy directions, opportunities, and challenges in the implementation of AI in higher education settings. The database search can be seen in Figure 1.

Authors:		Years:	2014	-	2024	Search
Affiliations:						Search Direct
Publication name:		ISSN:				Clear All
Title words:	Implementation of the Use of Artificial Intelligence at Higher Education in National Education Policy					Revert
Keywords:						New

Cites	Per year	Rank	Authors	Title	Year	Publication	Publisher	Type
2	2.00	1	Alma S. Espartinez	Exploring student and teacher per...	2024	Computers and Education...	Elsevier BV	journal-i
0	0.00	2	Dr. Pradip Das	ENHANCING INCLUSIVE EDUCATI...	2020	ARTIFICIAL INTELLIGENCE I...	RED UNICORN PUBLISHING	book-ch
0	0.00	3	Husa Alangari	Disrupting Education: Artificial Inte...	2024	The Evolution of Artificial I...	Emerald Publishing Limited	book-ch
0	0.00	4	Jiawei Qiu	Higher Education Grading System ...	2021	2021 2nd International Co...	IEEE	proceed
8	8.00	5	Mario Konecki, Mla...	Using Artificial Intelligence in High...	2023	Proceedings of the 15th In...	SCITEPRESS - Science and ...	proceed
0	0.00	6		Innovation Plans for the Use of Art...	2024	Advances in Higher Educat...	IGI Global	book-ch
0	0.00	7	Angelika Kaczmarc...	Regulatory Frameworks for the Us...	2024	Human versus Machine: Ac...	Wroclaw University of Eco...	book-ch
8	1.33	8	Ka Ho Mok	Promoting national identity throu...	2018	Journal of Higher Educatio...	Informa UK Limited	journal-i
12	12.00	9	Akhmad Habibi, M...	ChatGPT in higher education learni...	2023	Computers and Education...	Elsevier BV	journal-i
1	0.17	10	Sónia Cardoso, Ma...	European Policy Implementation: ...	2018	European Higher Educatio...	Springer International Pub...	book-ch
3	3.00	11	Yinglong Qiu, Rosa...	Perceptions and use of metaverse ...	2023	Computers and Education...	Elsevier BV	journal-i
26	3.25	12	Miguel Antonio Li...	Active instruments: on the use of ...	2016	Policy Reviews in Higher Ed...	Informa UK Limited	journal-i
0	0.00	13	Shahiem Patel, Mah...	The Implementation of Artificial In...	2024	Technium Education and H...	PLUS COMMUNICATION C...	journal-i
0	0.00	14	Abigail Leffia, Alex...	Implementation Of The Use Of Art...	2024	Blockchain Frontier Technol...	Pandawan	journal-i
2	2.00	15	Marius Vacarelu	Artificial Intelligence and Higher E...	2023	Bridging Human and Mach...	Springer Nature Singapore	book-ch
0	0.00	16	Senad Bećirović, Bo...	Artificial Intelligence in the Transfor...	2024	Digital Transformation in H...	Emerald Publishing Limited	book-ch

Figure 1. Database Search: Implementation of Artificial Intelligence at Higher Education in the National Education Policy

The data collection process uses Publish or Perish and VOSviewers software which functions to obtain bibliographic data from various academic sources, including databases such as Google Scholar and Scopus. Among the keywords used in the search are national education policy, digital era education, AI in higher education, and the shift to digital higher education. Relevant articles and policy documents were coded thematically to identify patterns, key issues, and emerging policy narratives related to AI implementation in higher education. The coding process was conducted manually by establishing initial categories based on conceptual frameworks such as technology applications in education, AI ethics, institutional capacity, and impacts on shared learning. Citation metric data for the implementation of AI use in higher education can be seen in more detail in Table 1.

Table 1. Citation Metric Data: Implementation of Artificial Intelligence in Higher Education to Build Institutional Reputation

Indicator	Metric Data Results
Publication years	: 2014-2024
Citation years	: 10 (2014-2024)
Papers	: 600
Citations	: 4522
Cites/year	: 452.20
Cites/paper	: 7.54
Authors/paper	: 1.70
h-index	: 33
g-index	: 60
hI,norm	: 23
hI,annual	: 2.30
hA-index	: 22
Papers with ACC $\geq 1,2,5,10,20$: 176, 129, 70, 42, 23

Table 1 explains the bibliometric analysis of 600 articles published in 2014–2024 show that the topic of AI application in higher education has experienced significant development. With a total of 4,522 citations and an average of 7.54 citations per article, this literature has a fairly high academic impact. The h-index value of 33 and the g-index of 60 reflect good publication quality and consistency. Around 30% of the articles have been cited at least five times, indicating that this study has received widespread attention in the scientific community. Overall, these data indicate that the topics analyzed have strong relevance and significance to be used as a basis for evaluating national education policies related to AI.

3. Results and Discussion

3.1. Results

The use of AI technology brings a new era in the paradigm transformation of higher education in Indonesia (Subiyantoro, Hartono, Fitriati, & Faridi, 2023). Overall, artificial intelligence has a lot of potential to revolutionize higher education in many ways. Universities can use it strategically to improve the quality of education, increase accessibility, and increase competitiveness worldwide. The successful use of AI requires commitment from all parties, including institutions, governments, and

communities to address current problems and ensure that this modern technology is used properly. Based on the results of the literature study analysis with Publish or Perish and VOSviewer, the study examines national education policies that support the implementation of AI in universities. The results of the network visualization analysis obtained to identify the implementation of AI use in universities in the national education policy of the digital era can be seen more clearly in Figure 2.

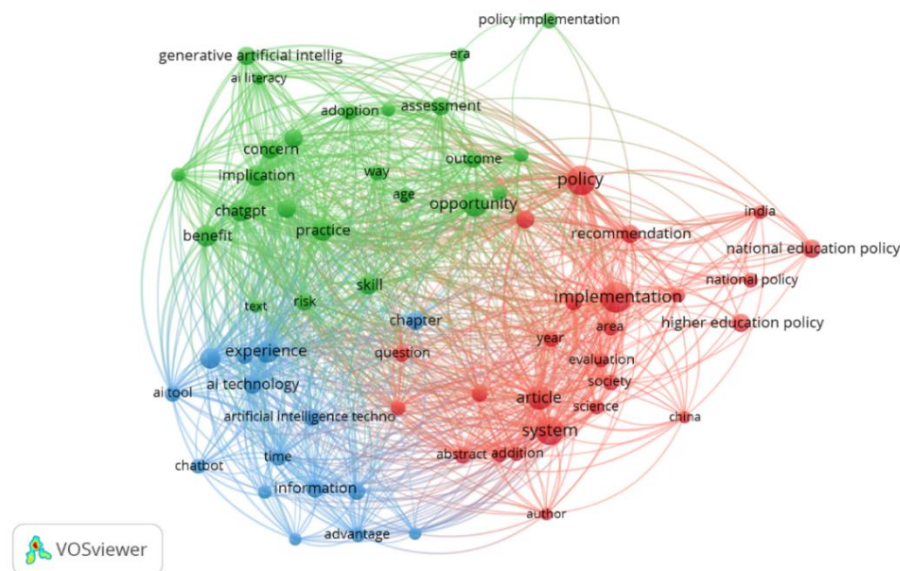


Figure 2. Network Visualization: Implementation of Artificial Intelligence at Higher Education in the National Education Policy

The results of the analysis show that the national education policy, as stated in the Strategic Plan of the Ministry of Education, Culture, Research, and Technology, has created a foundation for incorporating digital technology, including AI, into the education system. One of the main objectives of this policy is to encourage innovation, efficiency, and quality of learning. AI in higher education is used to help better organize academic administration, facilitate more personalized learning, and improve efficiency. Indonesia's national education policy in the digital era increasingly emphasizes the use of technology, including AI, to support educational transformation. AI is a tool that can improve operational efficiency and the quality of education. AI-based learning platforms can help students learn in a more personalized way. AI also enables administrative work such as managing academic data and evaluating lecturer performance in higher education.

Higher education is facing ethical and data privacy issues, because the use of AI often involves collecting personal data from students and lecturers, which raises concerns about data security and misuse. Higher education must create clear policies to protect data privacy and ensure the use of AI algorithms is transparent. Higher education must implement a holistic and sustainable strategy to optimize the use of AI. Increasing digital literacy by lecturers, administrative staff, and students must be balanced with investment in technological infrastructure. In addition, universities should work with governments, industry sectors, and the technology community to

accelerate AI adoption by providing ongoing training. This collaboration can include providing the technology, training, and funding needed to implement AI. In general, the research findings can be seen in Figure 3.

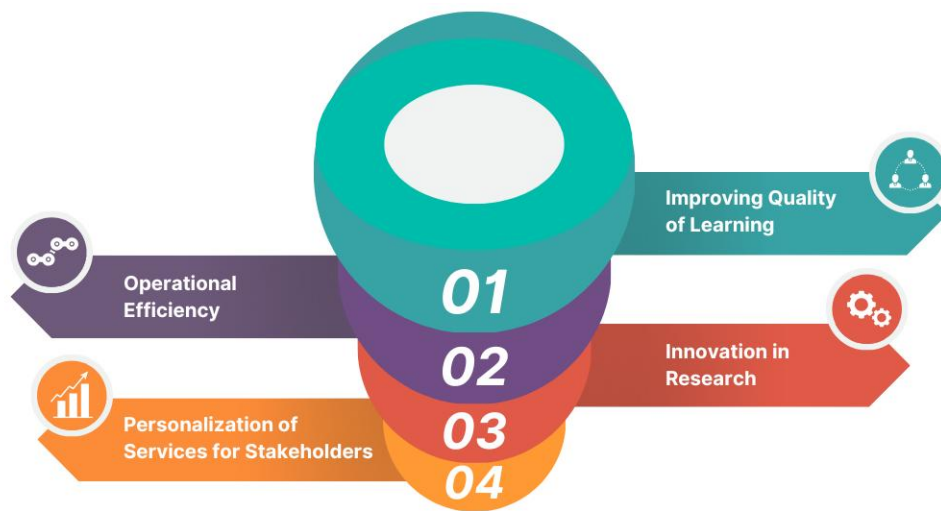


Figure 3. Results of the Implementation of Artificial Intelligence in Higher Education to Build Institutional Reputation

Based on Figure 3, there are four main findings in this study related to improving the quality of learning, operational efficiency, innovation in research, and personalization of services for stakeholders.

3.2. Discussion

AI helps adaptive learning, which allows materials to be tailored to the unique needs of each student (Ratih, 2020). Chatbots and AI-based learning systems allow students to get real-time assistance (Nita et al., 2023). Many educational platforms today also use artificial intelligence algorithms to suggest courses that best suit users. Educational institutions can also implement similar methods. Universities can build an image as institutions that are responsive to student needs by improving the quality of these services.

National education policies must also consider the ethics of using AI because the use of AI often involves personal data of students and lecturers, so it is important to maintain data privacy and security. Clear regulations are needed to ensure that the use of AI in higher education is carried out fairly, transparently, and ethically (Firdhausi, 2023). National education policies can help use artificial intelligence to make higher education more inclusive, creative, and relevant to the demands of the times.

National education policies are essential to drive operational efficiency in higher education institutions through the implementation of AI (Schön et al., 2023). AI is considered to have the ability to automate administrative tasks such as student data management, class scheduling, and lecturer performance evaluation. This reduces manual errors, increases operational efficiency, and gives staff more time to concentrate on strategic tasks (Aler Tubella et al., 2024). A new student registration

system based on artificial intelligence can speed up the process and increase user satisfaction, thereby improving the reputation of the institution.

Higher education institutions can use policy-supported AI to increase productivity and reduce manual errors (Huang et al., 2019). However, the government must help by providing educational investment in the form of modern technology, human resource training, and equitable digital infrastructure development (Alam et al., 2023). National policies should also include ethical guidelines on the use of AI to ensure transparency, fairness, and data privacy protection. This will allow universities to focus on their core missions such as education, research, and community service (Memarian & Doleck, 2023). This increases competition in universities and supports the advancement of national education.

Universities that utilize artificial intelligence in research have a competitive advantage. AI can increase research productivity, as it allows for faster and more accurate data analysis (Brew et al., 2023). Institutions that successfully implement AI in research will be recognized as centers of innovation and can attract more students, international collaborations, and research funds. Amidst the demands of globalization and technological advances, universities must adopt more sophisticated and effective operational strategies. The use of AI can accelerate innovation in universities, make them centers of research excellence, and help solve strategic problems at the national and international levels if there is a strong policy foundation and effective implementation (Sousa et al., 2021).

The government offers strategic support through initiatives such as the development of digital infrastructure, research grants, and international collaborations that focus on advanced technologies, including AI to drive research innovation through the use of AI. This helps universities increase their global competitiveness and relevance (Sweeney, 2023). In addition, national education policies that support the integration of AI in research include improving human resource capabilities through training and continuing education for researchers and the formation of cross-institutional collaboration networks.

Higher education institutions' reputations will improve if they can serve industry partners, students, and faculty personally (Alam, Supriyanto, et al., 2023). AI can be used to customize student experiences for things like academic advising platforms and career recommendation systems (Eager & Brunton, 2023). These individuals create positive experiences that in turn can increase stakeholder satisfaction and create a better institutional image (Zembylas, 2021). Higher education institutions that use AI to meet the unique needs of each individual are in line with national education policies in the digital age. AI allows universities to offer solutions such as adaptive learning and personalized administrative services.

In addition, national education policies that support the use of AI in personalized services must consider strengthening digital literacy and data security to ensure that these services are not only effective but also safe and inclusive. AI also allows universities to more effectively manage relationships with alumni and industry partners

by analyzing data to determine collaboration needs or funding opportunities. Universities can use this strategy to increase the satisfaction of all parties involved while strengthening their reputation as an inventive and user-oriented place of education (Jafari & Keykha, 2024).

From a policy direction perspective, this study reflects that the available literature can be used as a basis for formulating national policies related to AI integration, but also show knowledge gaps, such as the lack of focus on ethical aspects, governance, infrastructure readiness, and digital skills of lecturers or students. AI integration readiness still appears to vary depending on the institutional context, and these results indicate the need for policies that are adaptive, contextual, and based on a more specific analysis of the needs of higher education institutions.

4. Conclusion

The conclusion that can be drawn for the implementation of AI in higher education is that Indonesia must maximize the potential of AI to support inclusive and sustainable higher education transformation through research that focuses on strategic and technical aspects. Strategic steps to answer the challenges of the digital era are very important, because they depend on holistic policy formulation, strengthening infrastructure, and increasing human resource capacity. This study recommends the following policy directions: (1) Formulate a national roadmap for AI in higher education that includes ethical standards, digital literacy programs, and mechanisms for evaluating AI effectiveness in teaching and learning; (2) Integrate AI training modules into faculty development programs, ensuring that educators are equipped not only with technical skills but also with critical understanding of AI's pedagogical and ethical implications; and (3) Establish a centralized data governance framework within higher education institutions to manage AI systems responsibly, especially concerning data privacy, bias mitigation, and transparency. Overall, the adoption of AI in higher education is still very new and requires a more targeted policy strategy to ensure sustainable adoption. To measure the long-term impact of AI implementation on the quality of education, social inequality, and future workforce readiness, in-depth research is still needed in the future. This research will help policymakers understand the broader benefits and risks of digital transformation in higher education.

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