Nazhruna: Jurnal Pendidikan Islam
Vol. 7 Issue 3, 2024. pp. 531-553 E-ISSN: 2614-8013
DOI: https://doi.org/10.31538/nzh.v7i3.13

Integration of Artificial Intelligence in Islamic Higher Education: Comparative Responses between Indonesia and Thailand

Fatah Syukur[1], **Ahmad Maghfurin**[2], **Uswatun Marhamah**[3], **Phaosan Jehwae**[4]
Universitas Islam Negeri Walisongo Semarang, Indonesia[1, 2]
Sekolah Tinggi Agama Islam Walisembilan Semarang Indonesia,[3]
Fatoni University, Patani, Thailand[4]
Email correspondence: fyukur@walisongo.ac.id

Received: 26-04-2024 Revised: 20-08-2024 Accepted: 22-10-2024

Abstract

This study aims to compare the responses of Islamic Universities in Indonesia and Thailand to the adoption of artificial intelligence (AI) in Islamic education learning. This comparative qualitative research collected data from in-depth interviews, participatory observation, and analysis of relevant documents at UIN Walisongo Semarang (Indonesia) and Darul Maarif Islamic College Patani (Thailand). The collected data were analyzed thematically using triangulation, member checking, and audit trail validation models. The findings of this study show similarities and differences; both institutions have not specifically incorporated AI into the formal curriculum as a course, only integrating it implicitly in the hidden curriculum such as research, workshops, and seminars. Indonesian Islamic universities view AI as an important tool for modernizing Islamic education, especially in distance learning and the digitalization of Qur'anic teaching. In contrast, although AI is not explicitly banned in Thailand, there are concerns about its impact on the role of traditional teachers and Islamic cultural values. Regarding ethics, Indonesian students are less likely to consider the potential bias of AI towards Islamic religious information. In contrast, Thai students are more wary of the impact of technology on their religious values. Mastery of AI technology also showed significant differences, with Indonesian students being more advanced.

Keywords: Islamic University, Indonesia, Thailand, Artificial Intelligence, Islamic Education

Abstract

Penelitian ini bertujuan untuk membandingkan respon Universitas Islam di Indonesia dan Thailand dalam mengadopsi kecerdasan buatan (AI) pada Pembelajaran pendidikan Islam. Penelitian kualitatif komparatif ini mengumpulkan data dari wawancara mendalam, observasi partisipatif, dan analisis dokumen yang relevan di UIN Walisongo Semarang (Indonesia) dan Perguruan Tinggi Islam Darul Maarif Patani, (Thailand). Data yang terkumpul di analisis secara tematik dengan model validasi berupa triangulasi, member cheking, dan Audit Trail. Temuan penelitian ini menunjukkan adanya kesamaan dan perbedaan, kedua institusi belum secara khusus memasukkan AI ke dalam kurikulum formal sebagai mata kuliah, hanya mengintegrasikannya secara implisit dalam kurikulum tersembunyi seperti penelitian, workshop, dan seminar. Perguruan tinggi Islam Indonesia memandang AI sebagai alat penting untuk memodernisasi pendidikan Islam, khususnya dalam konteks pembelajaran jarak jauh dan digitalisasi pengajaran Al-Qur'an. Sebaliknya, di Thailand, meskipun AI tidak secara eksplisit dilarang, terdapat kekhawatiran tentang dampaknya terhadap peran pengajar tradisional dan nilai-nilai budaya Islam. Dari segi etika, mahasiswa Indonesia cenderung kurang mempertimbangkan potensi bias AI terhadap informasi agama Islam, sedangkan mahasiswa Thailand lebih

waspada terhadap dampak teknologi terhadap nilai-nilai keagamaan mereka. Penguasaan teknologi AI juga menunjukkan perbedaan signifikan, dengan mahasiswa Indonesia lebih maju karena pelatihan yang disediakan oleh universitas, sementara mahasiswa Thailand belajar secara mandiri dan memiliki pemahaman terbatas. Selain itu, infrastruktur teknologi di Indonesia lebih mendukung integrasi AI dibandingkan dengan Thailand yang masih menghadapi keterbatasan dukungan pemerintah. Perbedaan-perbedaan ini mencerminkan variasi pendekatan terhadap AI dalam pendidikan Islam di Indonesia dan Thailand, dengan Indonesia lebih berfokus pada modernisasi, sedangkan Thailand menekankan pelestarian budaya.

***Kata Kunci**: Universitas Islam, Indonesia, Thailand, Kecerdasan Buatan, Pendidikan Islam*

INTRODUCTION

The rapid development of the internet in Indonesia and Thailand has become a major driver of AI technology advancement in both countries, especially in the higher education sector. In 2023, Indonesia recorded more than 213 million internet users,[1] making it the country with the third most AI users in the world, with around 1.4 million visits related to this technology.[2] On the other hand, Thailand shows a similar trend, where the generative AI market is predicted to grow by 23.46% per year, reaching a market value of about 1.084 billion US dollars or about 38 billion baht by 2030.[3] Universities in Thailand are beginning to respond to this trend by integrating AI into learning, aiming to prepare students for the increasingly advanced digital era.[4] However, this opportunity is also accompanied by significant challenges in the aspect of job availability for higher education graduates. In Indonesia, around 17% of jobs are at risk of being automated by AI, which demands curriculum changes in anticipation of transformation in the world of work.[5] In addition, the poorly managed use of AI, as in the case of autonomous weapons and automated credit scoring, raises ethical and regulatory concerns.[6] This phenomenon requires universities in Indonesia and Thailand to play an active role in ensuring that the development of AI runs in harmony with the application of ethical principles and responsibilities, both inside and outside the campus environment.

For higher education, the focus on AI development contributes to overcoming the complexity of education services. This is evidenced by the number of researchers highlighting AI's role in the learning process. Kandlhofer Martin, Gerald Steinbauer, Sabine Hirschmugl-Gaisch, and Petra Huber have explored the relationship between artificial intelligence and student competence.[7] The analysis is in line with the arguments of Zhai Chunpeng and Santoso Wibowo who prove that the artificial intelligence dialogue system has succeeded in improving the interactive competence of United Kingdom students in universities.[8] While Chan Cecilia Ka

[1] Yusriadi, Yusriadi, Rusnaedi Rusnaedi, N. Siregar, Suci Megawati, and Geminastiti Sakkir. "Implementation of artificial intelligence in Indonesia." *International Journal of Data and Network Science* 7, no. 1 (2023): 283-294

[2] https://data.goodstats.id/statistic/10-negara-pengguna-ai-terbanyak-indonesia-salah-satunya-RLlmC

[3] Wongwatkit, Charoenchai, Nontawat Thongsibsong, Titiya Chomngern, and Soraya Thavorn. "The Future of Connectivist Learning with the Potential of Emerging Technologies and AI in Thailand: Trends, Applications, and Challenges in Shaping Education." *Journal of Learning Sciences and Education* 2, no. 1 (2023): 122-154.

[4] Nuankaew, Pratya, Patchara Nasa-Ngium, Tinnakorn Kunasit, and Wongpanya Sararat Nuankaew. "Implementation of Data Analytics and Machine Learning in Thailand Education Sector." *International Journal of Emerging Technologies in Learning* 18, no. 5 (2023).

[5]. Maqsood, Asia, Ahyousha Khan, and Muhammad Usama Siddiqi. "US-China Competition in Artificial Intelligence: Implications on Global Governance." *Journal of Asian Development Studies* 12.4 (2023): 481-493.

[6] Zhao, Bohan. "Analysis on the negative impact of AI development on employment and its countermeasures." In *SHS web of conferences*, vol. 154, p. 03022. EDP Sciences, 2023.

[7] Kandlhofer, Martin, Gerald Steinbauer, Sabine Hirschmugl-Gaisch, and Petra Huber. "Artificial intelligence and computer science in education: From kindergarten to university." In *2016 IEEE frontiers in education conference (FIE)*, pp. 1-9. IEEE, 2016.

[8] Zhai, Chunpeng, and Santoso Wibowo. "A systematic review on cross-culture, humor and empathy dimensions in conversational chatbots: the case of second language acquisition." *Heliyon* 8, no. 12 (2022).

Yuk emphasizes that artificial intelligence can be used to analyze the impact of patriarchal capitalist value systems in the concepts of agency and federation, both of these trends open the door to a deeper understanding of the complex interactions between the influence of AI and its impact on individuals collectively.[9] This supports Zao Bohan's research which states that the power of AI in analyzing data is very complex, even users are encouraged to gain deeper insights into nuances that may be missed in conventional research.

Meanwhile, other research has succeeded in recording an increase in awareness of the usefulness of AI in education to maintain student interest.[10] They focused on measuring the effectiveness of AI in improving academic interest and competence, as reported by Crawford Joseph, Michael Cowling, and Kelly-Ann Allen.[11] However, Marsan Giulia Ajmone's suggestion that qualitative research is important in Southeast Asian higher education has not yet been fully realized.[12] In fact, it is important to see a deeper phenomenon so that it is closer to the real situation. Moreover, the role of ASEAN countries has become increasingly crucial in the development of higher education in Asia, especially Indonesia and Thailand as leaders in the development of educational technology in the region.[13] Although this paper's approach is somewhat similar to the previous one, we take it a step further to illustrate how AI is adopted and integrated into the identity of two religious characters from a country that berbeda. ini is unique in that it combines advanced technology with religious traditions that have deep values and strict rules. For example, the use of AI in providing interpretation of the Qur'an or Hadith must be done carefully so as not to reduce the essence of the teachings of Islam itself.[14]

This study aims to analyze how Islamic universities respond to the development of artificial intelligence in Islamic Religious Education learning. The main focus of this research includes responses to the sustainability of AI in learning, ethics and potential bias in the use of technology, the level of training and understanding of technology among educators, and the goals and strategies of AI implementation. The selection of Islamic universities in Thailand and Indonesia is based on their strategic role in Islamic education in Southeast Asia, as well as the large Muslim populations in both countries.[15] Universities in Thailand and Indonesia are actively developing innovations in learning, including in the integration of technologies such as AI. Additionally, the socio-cultural differences between these two countries offer varied perspectives on the application of AI in Islamic education, making it an interesting case study.[16]

---

[9] Chan, Cecilia Ka Yuk. "A comprehensive AI policy education framework for university teaching and learning." *International journal of educational technology in higher education* 20, no. 1 (2023): 38.

[10] Mikhaylov, Slava Jankin, Marc Esteve, and Averill Campion. "Artificial intelligence for the public sector: opportunities and challenges of cross-sector collaboration." *Philosophical transactions of the royal society a: mathematical, physical and engineering sciences* 376, no. 2128 (2018): 20170357.

[11] Crawford, Joseph, Michael Cowling, and Kelly-Ann Allen. "Leadership is needed for ethical ChatGPT: Character, assessment, and learning using artificial intelligence (AI)." *Journal of University Teaching & Learning Practice* 20, no. 3 (2023): 02.

[12] Marsan, Giulia Ajmone. "Artificial Intelligence in South East Asia: Upskilling & Reskilling to Narrow Emerging Digital Divides in the Post-Pandemic Recovery." (2021).

[13] Darojat, Ojat. "Quality assurance in distance teaching universities: A comparative study in Thailand, Malaysia, and Indonesia." (2013).

[14] Ibrahim A. El-Hussari, "Allegorical Language in the Holy Quran A Semiotic Interpretation of Surat Al-Hujurat," *Tafkir: Interdisciplinary Journal of Islamic Education* 3, no. 2 (24 Juni 2022): 105–18, https://doi.org/10.31538/tijie.v3i2.132; Mariam Abd Majid dkk., "Fuzzy Delphi Method for Developing Model of Islamic Self-Identity in Malaysian Delinquent Adolescents," *Jurnal Ilmiah Peuradeun* 12, no. 2 (30 Mei 2024): 695–716, https://doi.org/10.26811/peuradeun.v12i2.1002.

[15] Baki, Nordahlia Umar, et al. "Employee Competencies in the Age of Artificial Intelligence: A Systematic Review from Southeast Asia." *International Journal of Academic Reserach in Economics and Management Sciences* 12.1 (2023).

[16] Alkaff, Syed Huzaifah Bin Othman, and Muhammad Haziq Bin Jani. "Shi'i Communities in Southeast Asia: Religious Harmony Institutions and Peaceful Sunni-Shia." *ISLAM NUSANTARA: Journal for the Study of Islamic History and Culture* 4.1 (2023): 1-18.

This research is important to understand how Islamic universities can face challenges and take advantage of the opportunities offered by AI, so that the relevance of PAI learning in the digital era is maintained.[17] The results of this study are expected to provide in-depth insights into more inclusive and technology-based Islamic education policies, as well as identify best practices that can be applied by Islamic universities around the world.

RESEARCH METHODS

This study is a qualitative comparative study with a case study method to compare the response of Islamic universities in Indonesia and Thailand in adopting artificial intelligence (AI) in Islamic education learning. The type of case study chosen is Multi-site means where this research is conducted in several different places or locations, but still in the context of one case.[18] The data collection includes in-depth observations, structured interviews, and document analysis. The first step of the research was to identify Islamic educational institutions that host undergraduate programs in Islamic religious education in both countries. The results of the identification determined that the research was conducted at Walisongo State Islamic University (UIN) Semarang, Indonesia, and Darul Maarif University (Petidam) Thailand. The selection of this location is based on their status as a higher education institution that makes Islamic ideology the basis of educational goals. Primary and secondary data were collected through in-depth interviews, participatory observations, and document analysis. The interviews involved lecturers and undergraduate students in related study programs at both research locations. Participants were selected based on their educational history, experience in education, and active participation in the development of AI for Islamic education. The interviews were conducted directly with 10 lecturers and 10 students from both universities, selected through the purposive sampling method, lasting for 200 minutes with a time allocation of 10 minutes per informant. The interview process was carried out face-to-face by visiting both countries. The documents analyzed in this study include various courses to assess the extent to which technology and AI are integrated in Islamic religious education lectures, as well as how lecture materials and curriculum are adapted to the demands of AI needs. Meanwhile, participatory observation was carried out to observe how lecturers and students responded to the use of AI on each campus.

Table 1 : Respondent Profiles

It	Initials	Origin of Higher Education	Status	Regional Origin	National
1	DI1	UIN Walisongo Semarang	Lecturer	Semarang	Indonesian
2	DI2	UIN Walisongo Semarang	Lecturer	Demak	Indonesian
3	DI3	UIN Walisongo Semarang	Lecturer	Palembang	Indonesian
4	DI4	UIN Walisongo Semarang	Lecturer	Pesawaran	Indonesian
5	DI5	UIN Walisongo Semarang	Lecturer	Semarang	Indonesian
6	DT1	Darul Maarif Patani College	Lecturer	Yala	Thailand
7	DT2	Darul Maarif Patani College	Lecturer	Naratiwat	Thailand
8	DT3	Darul Maarif Patani College	Lecturer	Bangkok	Thailand
9	DT4	Darul Maarif Patani College	Lecturer	Patani	Thailand
10	DT5	Darul Maarif Patani College	Lecturer	Yala	Thailand
11	MI1	UIN Walisongo Semarang	Student	Semarang	Indonesian
12	MI2	UIN Walisongo Semarang	Student	Demak	Indonesian
13	MI3	UIN Walisongo Semarang	Student	Kendal	Indonesian
14	MI4	UIN Walisongo Semarang	Student	Lampung	Indonesian

[17] Diana, Amirotu, Mohammad Zakki Azani, and M. Mahmudulhassan. "The Concept and Context of Islamic Education Learning in the Digital Era: Relevance and Integrative Studies." *Profetika: Jurnal Studi Islam* 25.01 (2024): 33-44.

[18] Yin, Robert K., et al. "Case study methods." *Handbook of complementary methods in education research*. Routledge, 2012. 111-122.

15	MI5	UIN Walisongo Semarang	Student	West Kalimantan	Indonesian
16	MT1	Darul Maarif Patani College	Student	Patani	Thailand
17	MT2	Darul Maarif Patani College	Student	Patani	Thailand
18	MT3	Darul Maarif Patani College	Student	Yala	Thailand
19	MT4	Darul Maarif Patani College	Student	Yala	Thailand
20	MT5	Darul Maarif Patani College	Student	Naratiwat	Thailand

The analysis was carried out using thematic coding methods to identify relevant patterns and themes from the collected data. Through data classification, summary of findings, and interpretation of meaning, this study explores the differences in strengthening technological competencies between students in Indonesia and Malaysia. This method allows for further insight into the influence of religious lectures on the practice and development of AI skills among students. The instruments used include questionnaires, interview guides, and observation sheets. The questionnaire is designed to evaluate students' perceptions of the relevance and effectiveness of the course in dealing with the needs of the labor market. The interview guide contains open-ended questions that encourage informants to describe their experiences in detail, while observation sheets serve to record development activities in lectures. To ensure the validity of the instrument, a trial was conducted with lecturers and students of Islamic education study programs in Indonesia and Malaysia, followed by improvements based on the feedback received. Further validation is carried out through consultation with experts in educational technology and Islamic religious education curriculum to ensure that the instrument is appropriate and accurate in the context of this research.

RESULT AND DISCUSSION

Response of Islamic Universities in Indonesia to the Integration of Artificial Intelligence in Islamic Education Learning

This study finds that the response of lecturers and students in Indonesia to the use of AI refers to positive aspects, even though it has not been formally integrated into the curriculum. In the context of Islamic higher education in Indonesia, the use of AI is not prohibited and is even considered an important tool for the modernization of Islamic education, especially in distance learning and the digitization of Qur'anic teaching. Lecturers and students see AI as an opportunity to improve the quality of Islamic education in the digital era. However, there are concerns regarding ethical aspects, especially the lack of student attention to the bias of Islamic religious information that can arise from the use of AI. Nonetheless, students' understanding of AI is relatively advanced because institutions provide various forms of training that support their technological literacy. In terms of infrastructure, UIN Walisongo Semarang is better prepared to support AI integration compared to many other institutions, which strengthens optimism about the application of this technology. While AI integration is still limited to hidden curricula, there is hope that AI could play a greater role in formal curricula in the future, as there is a growing need for a more inclusive and technology-based modernization of Islamic education.[19] This general view of AI in the campus environment reflects an effort to bridge tradition with innovation, although ethical challenges remain a concern to be addressed.

[19] Mohsen Soori, Behrooz Arezoo, dan Roza Dastres, "Artificial intelligence, machine learning and deep learning in advanced robotics, a review," *Cognitive Robotics* 3 (1 Januari 2023): 54–70, https://doi.org/10.1016/j.cogr.2023.04.001; Manuel Woschank, Erwin Rauch, dan Helmut Zsifkovits, "A Review of Further Directions for Artificial Intelligence, Machine Learning, and Deep Learning in Smart Logistics," *Sustainability* 12, no. 9 (Januari 2020): 3760, https://doi.org/10.3390/su12093760.

The integration of Artificial Intelligence in learning at UIN Walisongo Semarang has become a key element in improving the quality of teaching. The Open Learning Theory put forward by David Wiley states that technology facilitates wider access to educational resources and allows for more dynamic interactions between lecturers and students.[20] This is in line with the statement of the DI5 informant who stated, "The use of AI in the classroom helps students to understand the material faster, especially in the context of online learning which often feels rigid," supports this view. AI-based Natural Language Processing technology enriches the learning experience by providing additional resources and accelerating the learning process. The student's perspective also reinforces this, as MI1 revealed, "*Chat GPT, Poe, and Gemini really helped me in preparing for tasks more effectively*." This reflects Lev Vygotsky's view of social constructivism, where technology serves as a mediator in the learning process, allowing students to access information and build knowledge independently.[21]

The motivation of UIN Walisongo Semarang lecturers to adopt AI in teaching Islamic education can also be explained through B.F. Skinner's theory of Behaviorism, which emphasizes the importance of feedback in learning.[22] This is in line with the phrase of DI2's informant, "*AI allows me to provide faster and more specific feedback to students*." DI2's admission shows that AI provides lecturers with an opportunity to reinforce students' desired responses through timely feedback. The proposal's implementation is in line with Priyahita Rissia's argument that AI has a role as a facilitator.[23] This view is reinforced by MI2 students, who say, "*With quick feedback from Chat GPT and other AI platforms, I can instantly correct my mistakes before it's too late*." This reflects the importance of technology in creating an adaptive and responsive learning environment, allowing for the optimization of technology to achieve optimal learning outcomes. DI4 said that cultural factors affect how lecturers and students utilize AI technology in learning. He noted, "*In a highly competitive academic environment, AI is becoming a necessary tool to provide a more adaptive learning experience*." Meanwhile, an MI3 informant shared his experience, "*AI technology helps me better adjust my way of learning. I can focus on the weak areas and strengthen them to be more structured, AI gives me ideas*." Both of these views suggest that the use of AI in Islamic education in Indonesia involves a deep understanding of the cultural context that influences how technology is received and used.[24]

The study also found that using artificial intelligence in higher education in Indonesia not only encourages better collaboration between lecturers and students, but also creates a more interactive and adaptive learning environment. As expressed by DI5, *"With the help of AI, I can easily track students' progress in real-time and tailor my teaching approach to suit their needs*," which reflects the application of Collaboration and Open Learning theory by Etienne Wenger. Wenger argues that effective collaboration and continuous learning occur in communities of practice where members can share information with each other and solve problems together.[25] The MI4 student also added, "*AI facilitates groupwork more efficiently because we can share information and resources quickly*,"

[20] Mott, Jon, and David Wiley. "Open for learning: The CMS and the open learning network." *in education* 15.2 (2009).

[21] Vygotsky, L., and M. Cole. "Lev Vygotsky: Learning and social constructivism." *Learning Theories for Early Years Practice. UK: SAGE Publications Inc* (2018): 68-73.

[22] Skinner, B. F. "Herrnstein and the evolution of behaviorism." (1977): 1006.

[23] Priyahita, Rissia. "The utilization of e-learning and artificial intelligence in the development of education system in Indonesia." *2nd Jogjakarta Communication Conference (JCC 2020)*. Atlantis Press, 2020.

[24] Rizqi Anfanni Fahmi, Ris'an Rusli, dan Amilda Sani, "Digital Nomad Influence on Malay Work Ethics: Exploring Cultural Dynamics," *Jurnal Ilmiah Peuradeun* 12, no. 2 (30 Mei 2024): 741–62, https://doi.org/10.26811/peuradeun.v12i2.974; Asrizal Saiin dkk., "Walking Together: Dynamics of Muslim Wives Dual Role in Rural Areas Pursuing Career and Household Responsibilities," *El-Mashlahah* 14, no. 1 (30 Juni 2024): 127–48, https://doi.org/10.23971/el-mashlahah.v14i1.7827.

[25] Lave, Jean, and Etienne Wenger. "Learning and pedagogy in communities of practice." *Learners and pedagogy* (1999): 21-33.

which is in line with Vygotsky's theory of Technology and Social Engagement, which emphasizes the importance of social interaction and tools in the learning process.[26] AI-driven collaboration allows for the creation of a more dynamic and responsive learning environment, which supports students' academic and social development simultaneously.

In addition to improving collaboration, AI plays an important role in educational evaluation. DI2 explains, "*With AI, I can analyze exam and assignment results more deeply, understand trends, and provide timely interventions*." This view supports the theory of Formative Evaluation by Paul Black and Dylan Wiliam, who emphasized the importance of fast and detailed feedback to provide educational services to students. MI5 added, "*The results of the evaluation become more objective and transparent, so I know what I need to improve*," reflecting the principles of transparent evaluation in the theory of Assessment for Learning. The recognition of DI2 and MI5 underlines that with AI, evaluation not only becomes more efficient but also provides students with clear insights into areas that need improvement, ultimately driving more targeted and effective learning. AI, in this context, serves as a tool that enriches the evaluation process by improving the accuracy and openness of information.[27]

Despite AI's significant potential to enhance Islamic education in Indonesia, technical challenges and limited resources remain unresolved obstacles. As DI4 noted, "Sometimes, the implementation of AI is hampered by infrastructure limitations, especially for students in areas with unstable internet access." According to Robert Reiser's theory of educational technology, sufficient infrastructure is essential for the successful integration of technology in education. This aligns with Mishra and Koehler's findings that technical constraints can hinder the effectiveness of technology integration. Issues such as unreliable internet and inadequate devices lead to delays in AI-based learning, frustrating users, as MI1 expressed: "Sometimes, I get frustrated when AI technology doesn't work properly or takes too long to process." Thus, while AI holds promise for improving education, technical issues must be resolved for it to be effectively utilized. Furthermore, digital literacy among both lecturers and students plays a crucial role in optimizing AI use. DI5 remarked, "Not all lecturers have sufficient digital skills to fully utilize AI in teaching." This is consistent with Paulina Borko's Digital Competency Theory, which emphasizes the necessity of digital competence to effectively leverage technology. MI2 students added, "Not all of my classmates are accustomed to using advanced technology, making it difficult for them to follow AI-based material." According to Albert Bandura's Social Learning Theory, individual skills affect the ability to learn and adapt to new technologies, underscoring the need for training to enhance tech skills for optimal AI application in education.

Although it has not been included as a course in a row, the training provided to lecturers and students in developing AI skills is very diverse, ranging from seminars, workshops, to research funding, as conveyed by DI5 Informant. According to him, "To equip AI capabilities, lecturers and students are given various forms of training from institutions given to lecturers and students to develop AI skills, ranging from seminars, workshops, and even research funding with themes around AI for Islamic religious education learning." These trainings are designed so that lecturers and students not only understand the basics of AI, but also be able to apply it in the context of education, especially in learning Islamic religious education. In addition, this training program is part of the institution's strategy to strengthen the competence of teaching

[26] Cicconi, Megan. "Vygotsky meets technology: A reinvention of collaboration in the early childhood mathematics classroom." *Early Childhood Education Journal* 42 (2014): 57-65.

[27] Imaddudin Abil Fadha, "Occupational Therapy Approaches in Supporting Students With Sensory Disorders in Islamic Education," *Dirasah International Journal of Islamic Studies* 2, no. 1 (22 Juni 2024): 96–105, https://doi.org/10.59373/drs.v2i1.26; Hasan Basri dan Alamin Abdullah, "Curriculum Integration Constructs in Integrated Islamic Elementary School," *Tafkir: Interdisciplinary Journal of Islamic Education* 5, no. 1 (6 Februari 2024): 79–99, https://doi.org/10.31538/tijie.v5i1.873.

staff and students in the digital era. Furthermore, this is related to the implementation of a hidden curriculum, where institutions indirectly instill AI-related values and skills through non-academic activities. DI1 informant stated, "This is a form of implementation of a hidden curriculum to support the advancement of AI." This hidden curriculum serves as a strategy to ensure that the understanding and use of AI is not only limited to the classroom, but also spreads to all aspects of academic life, so that lecturers and students can make the most of it. The combination of formal training and hidden curriculum is expected to create an environment that supports innovation and AI development in the field of Islamic religious education.

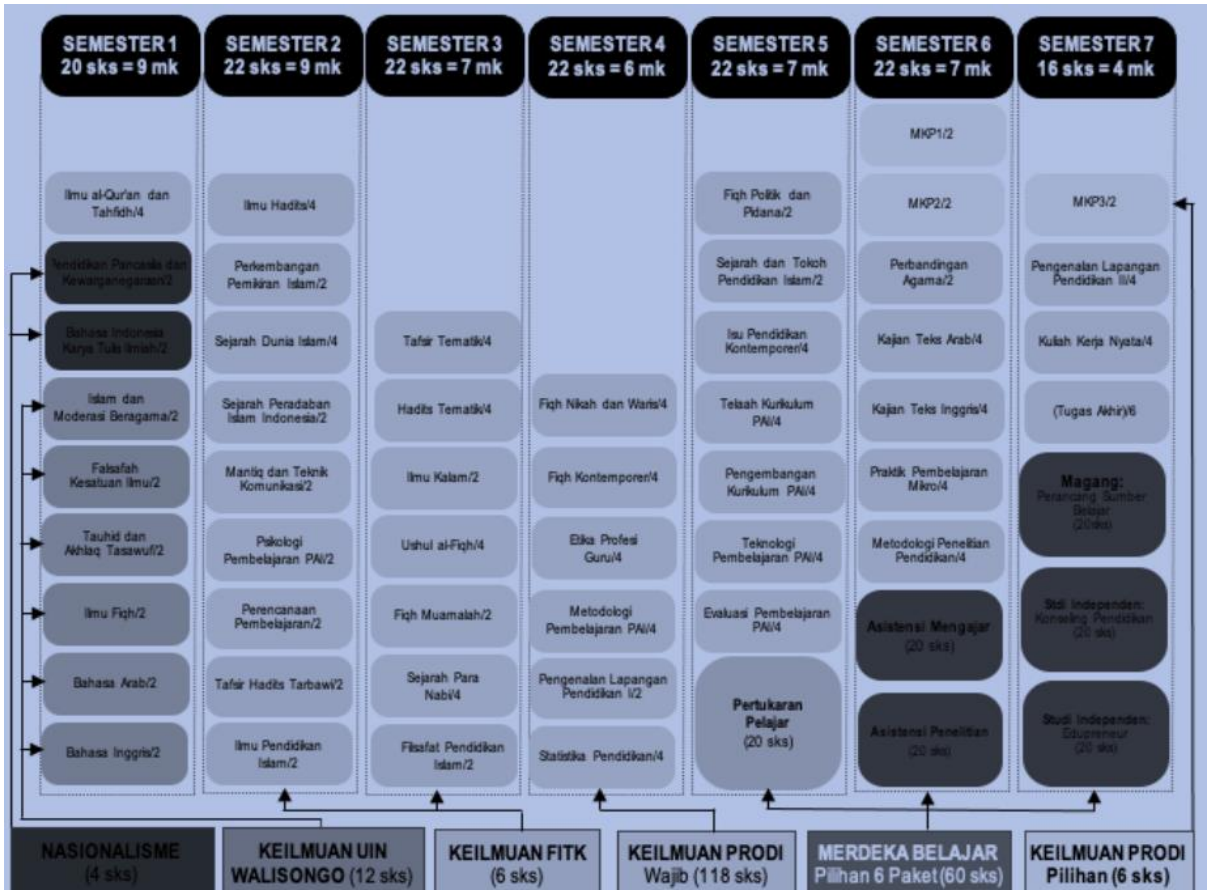

Figure 1: Islamic Religious Education curriculum document of UIN Walisongo Semarang that does not include AI as a course

Other findings in the study are also suggestive that the use of artificial intelligence in the teaching of Islamic education opens up in-depth discussions on ethical issues, especially related to data privacy and security. As revealed by DI2, "I am often concerned about how student data is stored and used by AI platforms. Privacy protection must be a priority." Similar concerns were raised by MI3 students, who felt "uncomfortable if my personal data is used without explicit consent." These issues underscore the importance of ethical considerations in the application of AI in education, as explained by Shoshana Zuboff in *The Age of Surveillance Capitalism*, which discusses how personal data is often exploited without an individual's knowledge.[28] In this context, Langdon Winner's theory of Technology Ethics can be applied, which emphasizes the need for policies and practices that protect privacy and individual rights

[28] Zuboff, Shoshana. "The age of surveillance capitalism." *Social theory re-wired*. Routledge, 2023. 203-213.

from data misuse.[29] Previous research has also supported this view, suggesting that while AI offers efficiency, privacy-related risks require serious attention to maintaining user trust.[30]

On the other hand, observations on June 12, 2024 show that lecturers see AI as an opportunity to enrich learning approaches with better personalization and adaptation. This can be seen with the use of various platforms such as Gamma.ai, AI-integrated Canva, Khan Academy, and various other AI NLPs. According to DI4, "*AI allows me to tailor learning materials to the individual needs of students, which is not possible with traditional methods*." This is in line with Albert Bandura's views on the theory of Social Learning, which emphasizes the importance of tailoring teaching to meet the unique needs of each individual.[31] The MI4 student also stated, "*I feel more involved in the learning process because the AI adapts the way the material is delivered according to my learning style*." Brusilovsky Peter and Eva Millán's research shows that personalized learning can improve student motivation and learning outcomes.[32] By leveraging AI to tailor content to individual preferences and needs, religious education can become more effective and inclusive, reflecting a constructivist approach that supports student-centered learning.[33]

Smith and Johnson show that AI technology can improve the effectiveness of teamwork by providing tools for organizing tasks and communicating.[34] In line with these findings, DI5 stated, "*AI helps students share ideas and work together more efficiently in group projects*." AI technology enables better project management through integrated collaboration platforms, such as Google Workspace and Microsoft Teams, that support real-time sharing of documents and tasks. The MI5 student added, "We can work together more effectively because AI helps us organise tasks and provide relevant recommendations." Vygotsky's Social Collaboration Theory also supports this statement by emphasizing that technology-assisted social interaction can expand students' proximal development zones, thereby improving group work outcomes. Previous research by Brown and Green has also shown that the use of AI in this context can strengthen group dynamics and facilitate more effective communication,[35] ultimately contributing to improved collaborative work outcomes.

In addition to increasing collaboration, AI also plays an important role in overcoming time constraints in learning religious education in Indonesia. As DI2 reveals, *"With AI, I can provide more additional materials and exercises that students can access at any time*." Hsieh Ronan, et al point out that the use of AI in education can expand access to learning materials and provide additional exercises that can be accessed flexibly.[36] The MI1 student added, "*I appreciate the flexibility provided by AI because I can study religion outside of college hours*." This flexibility reflects the adaptive learning principle popularized by Piaget's theory of Constructivism, where students can

---

[29] Winner, Langdon. "Upon opening the black box and finding it empty: Social constructivism and the philosophy of technology." *Science, technology, & human values* 18.3 (1993): 362-378.

[30] Culnan, Mary J., and Robert J. Bies. "Consumer privacy: Balancing economic and justice considerations." *Journal of social issues* 59.2 (2003): 323-342.

[31] Pederiva, Alice Martins, Amanda Aliende da Matta, and Antonio Sagrado Lovato. "Contributions of Vigotski to Thinking about Intercultural Education." *Educação & Realidade* 47 (2022): e116915.

[32] Brusilovsky, Peter, and Eva Millán. "User models for adaptive hypermedia and adaptive educational systems." *The adaptive web: methods and strategies of web personalization*. Berlin, Heidelberg: Springer Berlin Heidelberg, 2007. 3-53.

[33] Le, Nguyen-Thinh, et al. "A review of AI-supported tutoring approaches for learning programming." *Advanced computational methods for knowledge engineering* (2013): 267-279.

[34] Smith, Dywanna, et al. "Announcing the 2019–2020 Alan C. Purves Award Recipients: Inspiring Transformative Literacy Pedagogies: The 2020 Alan C. Purves Award Committee." *Research in the Teaching of English* 55.3 (2021): 322-328.

[35] Brown, Abbie H., and Timothy D. Green. *The essentials of instructional design: Connecting fundamental principles with process and practice*. Routledge, 2019.

[36] Hsieh, Ronan W., et al. "Association of Patient and Tumor Characteristics With Outcomes in Young Head and Neck Squamous Cell Carcinoma Patients." *Clinical Otolaryngology* (2024).

tailor their learning process according to their needs and rhythm.[37] Along with this theory, research by Zhao and Kim confirms that AI technology can improve student engagement by providing opportunities for independent and flexible learning, contributing to improved overall learning outcomes.[38]

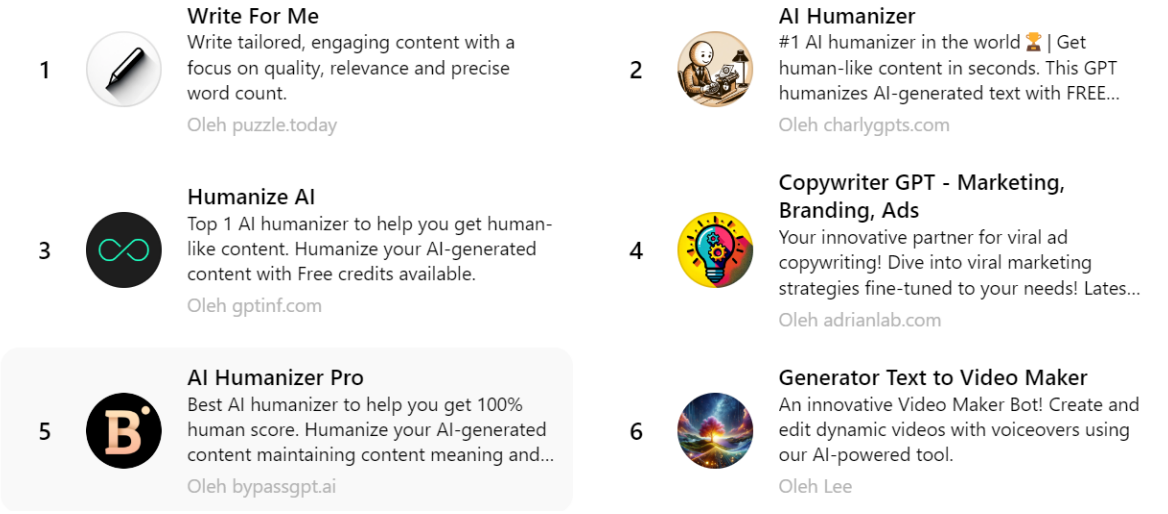

Figure 2: AI widely used by Indonesian students in Islamic religious education lectures

The use of AI in religious education does present great potential, but it also raises concerns regarding its impact on personal interactions between lecturers and students in Indonesia. As DI4 said, "*Relying too much on AI can make us lose important personal relationships in education.*" These concerns are in line with Howard Gardner's view in his theory of Multiple Intelligences, which emphasizes the importance of learning experiences that involve direct human interaction for the development of students' social and emotional skills.[39] Hattie and Timperley also point out that direct feedback from teachers significantly impacts student learning outcomes, which technology may not fully replace.[40] The MI2 student added, "*I feel that some aspects of learning, such as in-depth discussions, are difficult to replace with technology.*" This highlights the need for a balance between the use of technology and face-to-face interaction to achieve optimal educational outcomes.

The successful application of AI in education is highly dependent on institutional support, as stated by DI5, "*Support from universities in the form of infrastructure and training is essential to ensure the successful implementation of AI.*" Implementation Theory by Pressman and Wildavsky (1984) underscores the importance of support and resources in the successful implementation of policies, including in the context of educational technology.[41] MI3 students also admitted, "We feel more motivated to use AI if the campus provides adequate facilities and the right training." This is in line with the findings of research by Wiranto, Erham Budi, and Sri Suwartini

[37] Islami, Chitra Charisma, and Eva Gustiana. "Cognitive constructivism of early childhood based on Jean Piaget's thinking." *Indonesian Journal of Education Teaching and Learning (IJETL)* 1.1 (2021): 7-13.

[38] Zhao, Dan-Dan, et al. "Identification of a major locus for lodging resistance to typhoons using QTL analysis in rice." *Plants* 12.3 (2023): 449.

[39] Nicholson-Nelson, Kristen. *Multiple intelligences*. New York: Scholastic Professional Books, 1998.

[40] Aryana, Suhud, Dida Firmansyah, and Ratna Muthia. "Hattie's Visible Learning Evaluation Model in Learning Strategies and Publication of Scientific Work of IKIP Siliwangi Students." *JLER (Journal of Language Education Research)* 7.1 (2024): 17-26.

[41] Pressman, Jeffrey L., and Aaron Wildavsky. *Implementation: How great expectations in Washington are dashed in Oakland; Or, why it's amazing that federal programs work at all, this being a saga of the Economic Development Administration as told by two sympathetic observers who seek to build morals on a foundation*. Vol. 708. Univ of California Press, 1984.

which shows that adequate institutional support and training increase technology adoption among students.[42] Strong support from educational institutions is a key factor in ensuring that technologies, such as AI, can be integrated effectively and provide maximum benefits in the learning process.

Continuous evaluation of the use of AI in education is key to ensuring that these technologies remain relevant and effective. DI4 states, "We need to continue to evaluate how AI is impacting the teaching and learning process and make adjustments if necessary." This is in line with the principles of formative evaluation theory proposed by Scriven, which emphasizes the importance of continuous evaluation to improve the educational process. The MI5 student added, "I hope AI can continue to evolve, but still pay attention to the needs and preferences of students," underlining the need for responsive adjustments to user needs. Research by Becker and Park also shows that the right technology adaptation can improve learning effectiveness.[43] Therefore, collaboration between lecturers and students in assessing and adjusting the use of AI will ensure that this technology is used optimally and in accordance with the development of dynamic educational needs.

Response of Islamic Universities in Thailand to the Integration of Artificial Intelligence in Islamic Education Learning

This study found that the response of Darul Maarif University (Petidam) in Thailand to the integration of AI in Islamic education is still limited. Lecturers acknowledge that AI has not been formally incorporated into the curriculum and specific training for the use of AI is also not yet available. College students learn about AI through social media like Instagram and YouTube, but they don't fully understand that the technologies they use, such as Gemini AI and Chat GPT, are part of AI. The use of AI is allowed if it is in accordance with academic ethics, but it is prohibited if students do not include references. There are concerns from lecturers regarding the threat of AI to the role of traditional teachers and Islamic cultural values, especially because AI is considered incapable of conveying religious teachings with deep feelings. On the other hand, students complained that some lecturers are still angry if assignments are done with the help of AI, although they hope that lecturers can be more objective and see AI as a tool, not a means for plagiarism. Another challenge is the lack of technological infrastructure that supports AI integration, as well as high attention to the impact of AI on Islamic values, especially related to students' honesty and critical thinking skills which tend to decline due to the use of AI.[44]

DT1 revealed, "We have not incorporated AI into the official curriculum, and special training on AI has not been held either." This statement reflects that institutions have not fully understood or integrated AI technology in their formal education. Selwyn argues that the slow response of higher education to technology adoption is due to the absence of a supportive educational infrastructure.[45] MT1 states, "*I learned about AI through social media like Instagram and YouTube, but I didn't know that Gemini.ai and ChatGPT that I use a lot belong to AI technology*." This ignorance indicates a lack of support among Petidam students about AI. In addition, Warschauer Mark and Meei-Ling Liaw's opinion that the understanding and integration of

[42] Wiranto, Erham Budi, and Sri Suwartini. "Artificial Intelligence and Trustworthy Principles in Global Islamic Education." *Ushuluddin International Conference (USICON)*. Vol. 6. 2022.

[43] Hartono Hartono, "Learning Achievements at Graduate Level: Bloom's Taxonomy Analyze," *Munaddhomah: Jurnal Manajemen Pendidikan Islam* 3, no. 3 (2022): 294–305, https://doi.org/10.31538/munaddhomah.v3i3.275.

[44] Muhammad Isa, Neliwati Neliwati, dan Yusuf Hadijaya, "Quality Improvement Management in Teacher Professional Development," *Munaddhomah: Jurnal Manajemen Pendidikan Islam* 5, no. 2 (12 Februari 2024): 136–47, https://doi.org/10.31538/munaddhomah.v5i2.782.

[45] Selwyn, Neil. *Is technology good for education?*. John Wiley & Sons, 2016.

technology in education is often hampered by the lack of digital literacy, seems relevant to this study.[46]

Figure 3: Undergraduate Program in Islamic Religious Education provided by Darul Maarif Patani College, Thailand (Personal document)

On the other hand, although the use of AI on campus is not prohibited if it is in accordance with academic ethics, lecturers in Thailand still experience concerns about the impact of AI on academic integrity. DT2 emphasizes, "*We allow the use of AI in academic assignments, provided students include clear references*." This is why MT2 complains, "Some lecturers get angry when I use AI in assignments, when I think AI helps complete tasks faster and more efficiently." This reflects the tension between technological innovation and the principles of academic integrity upheld by some lecturers. Miftachul Huda revealed that while AI can be an efficient tool, its use in an academic context often poses ethical dilemmas and challenges related to academic validity.[47] Students feel that AI can be an effective tool if used correctly, but this problem requires a better ethical and pedagogical approach.

DT1 revealed, "*We have not incorporated AI into the official curriculum, and special training on AI has not been held either."* These findings are in line with research by Zhang Hongzhou and Shaleen Khanal which shows that many universities in Southeast Asia have not fully integrated AI into their curricula.[48] Their research underscores that formal curricula are often late in accommodating new technologies due to limitations in infrastructure and training. MT1 revealed, "*I learned AI through social media like Instagram and YouTube, but I didn't know that the Gemini.ai and ChatGPT that I use a lot include AI technology*." This suggests that there is a gap between

[46] Warschauer, Mark, and Meei-Ling Liaw. "Emerging Technologies in Adult Literacy and Language Education." *National Institute for Literacy* (2010).

[47] Huda Miftachul. "Empowering application strategy in the technology adoption: insights from professional and ethical engagement." *Journal of Science and Technology Policy Management* 10.1 (2019): 172-192.

[48] Zhang, Hongzhou, and Shaleen Khanal. "To Win the Great AI Race, China Turns to Southeast Asia." *Asia Policy* 19.1 (2024): 21-34.

students' knowledge of the technology they use and their deep understanding of AI, which is consistent with research by Krammer et al. that highlights a lack of understanding of advanced technology among college students even though they are often exposed to such technology through social media.[49]

The limited understanding of students about AI in Petidam is a significant issue, as revealed by DI4, who learns about AI independently through the YouTube platform because the campus has not provided training or special materials about AI. MT5 adds, "*Limitations in understanding AI make us often confused in its use in college assignments*," pointing to the direct impact of a lack of understanding on students' academic performance. DT5 acknowledged that the lack of training on AI is a major obstacle, stating, "*We need more support from institutions to integrate AI well in the learning process*." These findings are consistent with Vygotsky's theory of the Zones of Prospective Development, which emphasizes the importance of support and instruction in learning. Without adequate institutional support, students cannot develop their AI skills optimally.[50] In fact, Krumsvik pointed out that the integration of technology in education requires proper training and institutional support so that the technology can be used effectively.[51]

The recognition of these respondents is supported by the results of observations carried out on September 2, 2024, it can be seen that religious education learning at Darul Maarif University in Thailand is still very traditional. Students listen more to lectures from lecturers without any significant interaction in the learning process. M2 admits, "*We rarely use technology in our daily academic activities*." The lack of technological approaches, including the application of artificial intelligence (AI), is also evident from the campus administration system that is still manual. The process of filling in data and academic records has not used the website in full, which makes work efficiency on campus limited. This shows that AI has not yet become an integral part of the educational and management infrastructure on the campus. Limited human resources in mastering modern technology are one of the main obstacles. In addition, the absence of training or initiatives to integrate new technologies into the learning process further strengthens the technology gap on this campus. In fact, the application of technology in education, including AI, can open up great opportunities to enrich teaching methods and make it easier for students to access information.[52]

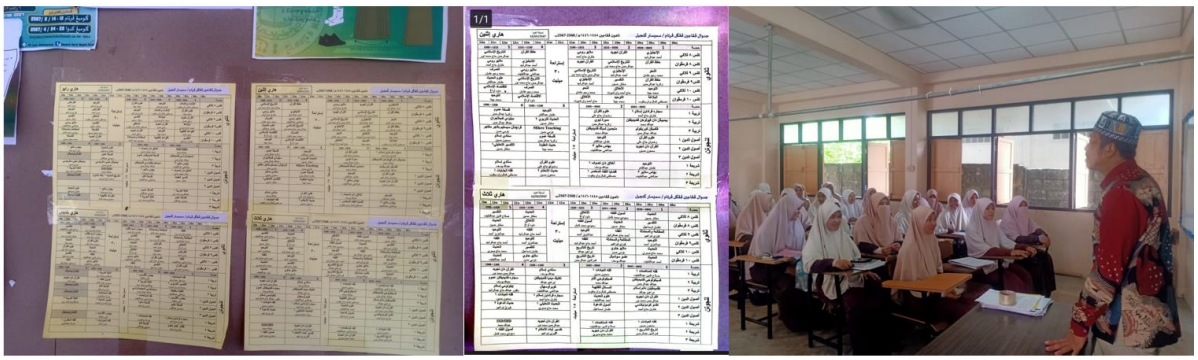

Figure 4: The learning process and campus administration system at Darul Ma'arif University

[49] Beckman, Karley, Sue Bennett, and Lori Lockyer. "Understanding students' use and value of technology for learning." *Learning, Media and Technology* 39.3 (2014): 346-367.

[50] Ness, Ingunn Johanne. "Zone of proximal development." *The Palgrave Encyclopedia of the Possible*. Cham: Springer International Publishing, 2023. 1781-1786.

[51] Urlaub, Per, and Eva Dessein. "Kasparov, Vygotsky, and ChatGPT: What a Chess Prodigy and Child Psychologist Can Teach Us about AI in Education."

[52] Yilmaz, Ramazan, and Fatma Gizem Karaoglan Yilmaz. "The effect of generative artificial intelligence (AI)-based tool use on students' computational thinking skills, programming self-efficacy and motivation." *Computers and Education: Artificial Intelligence* 4 (2023): 100147.

in Thailand which is manually pasted on the notice board

However, the use of AI on the Petidam campus is not prohibited as long as it is in accordance with academic ethics. DT2 states, "*We allow the use of AI in academic assignments, provided students include clear references*." This reflects a policy that supports the integration of technology while maintaining academic ethical principles. However, concerns about the impact of AI on academic integrity remain. MT2 complained, "Some lecturers get angry when I use AI in assignments, when I think AI helps complete tasks faster and more efficiently." This points to a similar strain to the findings in Anderson and Rainie that suggest that while AI could improve efficiency, some academics are still concerned about the potential negative impact on academic integrity and learning quality.[53] In other words, despite the recognition of the benefits of AI, concerns about its impact on academic standards remain an issue that must be addressed.

The ethical aspect of using AI is also a major concern. DT4 emphasized the importance of academic integrity, saying, "We must ensure that the use of AI does not reduce the honesty of students in completing academic tasks." MT4 added, "I fear that the use of AI without proper guidance can make students lose the ability to think critically and violate academic ethics," while DI3 reminded, "*AI does make tasks easier, but we must still try to maintain integrity in every task we do.*"

The findings also show that, in Petidam, the challenges in integrating AI in education stem not only from infrastructure problems, but a lack of support from the government and educational institutions. As stated by DT2, *"We have not received full support from the government to develop technology infrastructure on campus*," in fact, the role of institutions is very important in the adoption of new technologies in the educational environment.[54] Hargreaves and Shirley stated that government policy support and investment in technology infrastructure are crucial factors in the integration of technology in education.[55] MT2 also highlights the limitations of external support, "*Without support from the government, it is difficult for us to integrate AI to the maximum extent in the curriculum*," underscoring the importance of the role of institutional support in facilitating the effective use of AI.[56]

In addition, the study found that lecturers' views on the use of AI in Petidam show concerns about the potential replacement of the role of teachers and the impact on spiritual and moral aspects of learning. DT3 expressed concern that "AI could replace the role of teachers, especially in Islamic religious learning that requires a heartfelt approach," while MT3 added, "As a student, I find AI very helpful, but I am also worried if AI replaces the role of lecturers in the spiritual and moral aspects of learning." This tension was also felt by DI2 who stated, "AI can speed up the learning process, but I also want to continue to interact directly with students." This view reflects the tension between technological advances and traditional values in education, which is relevant to the theory of technology and education as put forward by Neil Postman in *Technopoly: The Surrender of Culture to Technology*. JakobseN et al., argue that technology

---

[53] Bakiner, Onur. "What do academics say about artificial intelligence ethics? An overview of the scholarship." *AI and Ethics* 3.2 (2023): 513-525.

[54] Smirnov, Vladimir A. "Youth policy and educational activities in Russian universities: stages of development and key contradictions." *www. vovr. elpub. ru; www. vovr. ru Журнал издаётся с 1992 года* 32.5 (2023): 10.

[55] Hargreaves, Andy, and Dennis Shirley. "Beyond standardization: Powerful new principles for improvement." *Phi Delta Kappan* 90.2 (2008): 135-143.

[56] M. Ikhsan, Sutji Rochaminah, dan Ayu Mastura, "The Development of Geo-Math Application by Integrating Geo-Gebra Applets to Improve Students' Spatial Ability," *Jurnal Ilmiah Peuradeun* 12, no. 3 (30 September 2024): 1129–54, https://doi.org/10.26811/peuradeun.v12i3.1492; Muhammad Aditya Firdaus, Moh Yusup Saepuloh Jamal, dan Bambang Samsul Arifin, "Improving Student Learning Outcomes Through Project-Based Learning in Islamic Religion Lessons," *Tafkir: Interdisciplinary Journal of Islamic Education* 4, no. 2 (13 Juni 2023): 241–54, https://doi.org/10.31538/tijie.v4i2.400.

often affects underlying cultural and social values, and this seems to be the case in the context of education in Petidam.[57]

On the other hand, the resistance to AI in Petidam also reflects the tension between technological innovation and the preservation of cultural and religious values. DT3 stated, "*We are concerned that AI could undermine the cultural and religious values that have long been the basis of our education,*" indicating concerns about new technologies' social and cultural impact. MT3 added, "*I fear that AI technology is replacing the important role of teachers in imparting moral and spiritual values*," reflecting fears that technology may threaten the role of traditional education. DI4 expressed a similar hope, "*I hope technology doesn't make us forget important values in learning*," underscoring concerns that technology could overlook important aspects of value-based education. Research by Selwyn shows that this tension often arises in the adoption of technology, where concerns regarding social and cultural impacts often hinder technological innovation in education.[58] This demonstrates the need for a careful approach to integrating AI, considering not only technical aspects but also existing values and cultures. Limited understanding of AI also makes students feel isolated in the learning process. DI5 revealed, "*Many times I feel confused about using AI because there is no clear guidance from lecturers or campuses*." MT4 adds, "*Students have to learn independently, and this makes it difficult for many of us*." Lecturers such as DT4 also admitted, "*The lack of training on AI for students is one of the main factors hindering their development*." This shows the need for better strategies in teaching AI to students so that they can use it effectively and ethically.

Unclear policy issues regarding the use of AI on the Petidam campus can be seen in the context of Policy Implementation theory. Van Meter and Van Horn explained that effective policy implementation requires certainty and clarity in order to be properly adopted.[59] DT5 mentioned, "*We do not yet have a clear policy regarding the use of AI on campus," and MT5 added,* "The lack of policy clarity makes many students hesitant to use AI for their assignments." This ambiguity creates uncertainty among students, which is in line with Van Meter and Van Horn's findings that uncertainty in regulation can hinder the implementation of new technologies. To address this issue, the campus needs to develop clear guidelines and policies so that students can use AI more confidently.[60] Another study, O'Connor Allan, also shows that good policy can support technology adoption by providing the needed direction and support.[61]

The future of AI integration at Petidam will largely depend on collective efforts to address the various challenges that exist. DT3 stated, "*We must adapt to technological developments without forgetting the values we uphold*," highlighting the importance of maintaining a balance between innovation and institutional values. Christensen reminded the importance of adapting to technology while maintaining the organization's core identity.[62] MT3 hopes, "*Hopefully in the future there will be more support and guidance in the use of AI, so that students can make better use of it,*" highlighting the need for clear guidance. DI5's hopefulness is optimistic about the potential of AI if it gets

[57] Jakobsen, Kine, Marius Mikalsen, and Grethe Lilleng. "A literature review of smart technology domains with implications for research on smart rural communities." *Technology in Society* (2023): 102397.

[58] Ayu Asmarani, Sukarno Sukarno, dan Minnah El Widdah, "The Relationship of Professional Competence with Teacher Work Productivity in Madrasah Aliyah," *Nidhomul Haq : Jurnal Manajemen Pendidikan Islam* 6, no. 2 (2 Juli 2021): 220–35, https://doi.org/10.31538/ndh.v6i2.1365; Siti Muawanatul Hasanah dkk., "Forging Qur'anic Character: A School Principal Leadership Model-Insights," *Nidhomul Haq : Jurnal Manajemen Pendidikan Islam* 9, no. 1 (17 Februari 2024): 28–42, https://doi.org/10.31538/ndh.v9i1.4380.

[59] Van Meter, Donald S., and Carl E. Van Horn. "The policy implementation process: A conceptual framework." *Administration & society* 6.4 (1975): 445-488.

[60] Hartawan, Rolifola Cahya, and Fitriyani Kosasih. "Implementation of the van meter and van horn zoning system policies model." *International Journal Of Humanities Education and Social Sciences* 2.4 (2023).

[61] O'Connor, Allan. "A conceptual framework for entrepreneurship education policy: Meeting government and economic purposes." *Journal of business venturing* 28.4 (2013): 546-563.

[62] Christensen, Clayton M. *The innovator's dilemma: when new technologies cause great firms to fail*. Harvard Business Review Press, 2015.

enough support: "*I believe AI could be a very useful tool if we get enough support*," reflecting confidence in the great potential of AI for education. Despite the many challenges, the desire to effectively utilize AI shows strong hopes for advancement in the digital age.

Comparison of the Response of Islamic Universities in Indonesia and Thailand to the Integration of Artificial Intelligence in Islamic Education Learning

The findings of this study successfully illustrate the comparison between UIN Walisongo Semarang, Indonesia, and Darul Maarif University (Petidam), Thailand, in terms of the integration of AI in Islamic education. Both institutions have not formally integrated AI in specialized courses, but are doing so implicitly through a hidden curriculum through AI research activities, workshops, and seminars. At UIN Walisongo, AI is considered an important tool for the modernization of Islamic education, especially in distance learning and the digitization of Qur'an teaching, while in Petidam, although it is not banned, AI has sparked concerns about its impact on the role of traditional Islamic religious teachers and cultural values. Ethically, UIN Walisongo students pay less attention to the bias of Islamic religious information from AI, while Petidam students are very careful about the impact of technology on Islamic values. In terms of mastery of AI technology, students at UIN Walisongo look more advanced in understanding AI thanks to the training provided by the university, while at Petidam, students only have a limited understanding and learn AI independently through social media. In terms of technology infrastructure, UIN Walisongo is more ready to support AI integration, while Petidam faces limitations due to a lack of support from the government. Overall, the differences between these two institutions reflect the variety of approaches to AI in Islamic education in the region, with a focus on modernization in Indonesia and cultural preservation in Thailand.

Table 2: Comparison of the Response of Islamic Universities in Indonesia and Thailand to the Integration of Artificial Intelligence in Islamic Education Learning

Aspects	UIN Walisongo Semarang, Indonesia	Darul Maarif College (Petidam), Thailand
Integration of AI in the Curriculum	It has not been formally integrated, but there is a hidden curriculum	Not yet formally integrated
Lecturer's Views	Positively, seeing AI as an opportunity to modernize Islamic education	Hesitant, worried that AI threatens the role of traditional teachers and Islamic values
Student Views	Positive, understanding AI as an essential tool in education	Positive but limited, not fully understanding the AI technology used
Ethics and Concerns	Worried about the bias of Islamic religious information that may arise from AI	Fears AI undermines Islamic cultural values and academic honesty
Technology Training and Literacy	Various forms of training are available from institutions	Special training not yet available, learning AI through social media
Technology Infrastructure	Better equipped to support AI integration	Minimal, technology infrastructure does not support AI integration
Future Expectations	Optimistic about the increasing role of AI in formal curricula	It is hoped that lecturers will be more objective about AI and see it as a tool

Use of AI in Academic	It is considered an important tool to improve the quality of Islamic education	Allowed if it is in accordance with academic ethics, it is prohibited if it does not include references

This reveals significant differences from previous research, especially related to the integration of AI in Islamic educational institutions. Although there has not been a formal incorporation of AI in the curriculum, UIN Walisongo Semarang has implemented a "hidden curriculum" that integrates AI elements indirectly. This finding refutes the statement of Spivakovsky Oleksan V., et al. who stated that without the subject of AI courses, students would have difficulty integrating AI technology knowledge.[63] In contrast, Williamson Ben's argument that adequate technological infrastructure in Indonesia influences a positive view of AI as a modernization opportunity seems more relevant.[64] Meanwhile, Darul Maarif College Thailand showed greater concern about AI, particularly in terms of potential threats to the traditional teaching role and Islamic cultural values. This concern is in line with Baiti's view, which highlights that the lack of infrastructure and training is an obstacle to the integration of AI in Islamic education.[65] These differences underscore the importance of infrastructure, technological literacy, and cultural views in determining the level of AI adoption in Islamic education.[66] It provides new insights into the urgency of technological readiness and institutional support in addressing AI-related ethical and cultural concerns among Islamic educational institutions.[67]

These findings show that strategic steps need to be taken by UIN Walisongo and Petidam Thailand to ensure that the use of AI is not only academically beneficial, but also respectful and supportive of social and religious values in Islamic education. First, the development of a curriculum that integrates a deep understanding of AI with an emphasis on religious teachings is crucial. This aims to make students understand AI as a learning tool that reinforces, not replaces, traditional values.[68] Second, teaching staff need to be equipped with special training so that they can guide students in using AI responsibly, so that this technology functions to deepen religious understanding without damaging the moral foundation.[69] Third, close collaboration is needed between academics, religious leaders, and technologists to ensure that the development of AI on campus remains in line with religious principles. In addition, open dialogue on the ethics of using AI must be carried out regularly, involving students, lecturers, and the wider community, in order to increase critical awareness of the positive and negative impacts of AI.[70] Finally, it is important to ensure that the technological infrastructure at both institutions supports the inclusive use of AI, ensuring that all students have equitable

[63] Spivakovsky, Oleksan V., et al. "Institutional policies on artificial intelligence in university learning, teaching and research." *Information Technologies and Learning Tools* 97.5 (2023): 181.

[64] Williamson, Ben. "The social life of AI in education." *International Journal of Artificial Intelligence in Education* 34.1 (2024): 97-104.

[65] Perchik, J. D., et al. "Artificial intelligence literacy: developing a multi-institutional infrastructure for AI education." *Academic radiology* 30.7 (2023): 1472-1480.

[66] Aithal, P. S., and Shubhrajyotsna Aithal. "How to increase emotional infrastructure of higher education institutions." *International Journal of Management, Technology, and Social Sciences (IJMTS)* 8.3 (2023): 356-394.

[67] Zohaib Hassan Sain dkk., "Benefits and Drawbacks of Leveraging ChatGPT to Enhance Writing Skills in Secondary Education," *At-Tadzkir: Islamic Education Journal* 4, no. 1 (2025): 40–52, https://doi.org/10.59373/attadzkir.v4i1.79.

[68] Yirdaw, Arega. "Quality of education in private higher institutions in Ethiopia: The role of governance." *SAGE open* 6.1 (2016): 2158244015624950.

[69] Okem, Eche Samuel, et al. "Advancing infrastructure in developing nations: a synthesis of AI integration strategies for smart pavement engineering." *Engineering Science & Technology Journal* 4.6 (2023): 533-554.

[70] Kim, Jinhee. "Leading teachers' perspective on teacher-AI collaboration in education." *Education and Information Technologies* 29.7 (2024): 8693-8724.

access regardless of their social and religious background. Thus, AI can be an effective tool to improve the quality of education without sacrificing religious identity.

CONCLUSION

The conclusion of this study shows a clear comparison between UIN Walisongo Semarang, Indonesia, and Darul Maarif University (Petidam), Thailand, in integrating AI in Islamic education. Both institutions have not formally included AI in specialized courses, but AI has been implicitly integrated through a hidden curriculum that includes research activities, workshops, and seminars. UIN Walisongo views AI as an important tool to modernize Islamic education, especially in the context of distance learning and digitization of Qur'an teaching. In contrast, although in Petidam AI is not explicitly banned, there are concerns about its impact on the role of traditional teachers and Islamic cultural values. In terms of ethics, UIN Walisongo students tend to be less concerned about the potential bias of AI towards Islamic religious information, while Petidam students are more aware of the impact of technology on their religious values. The mastery of AI technology also shows significant differences, with UIN Walisongo students being more advanced due to the training provided by the university, while Petidam students learn independently and have limited understanding. In addition, the technology infrastructure at UIN Walisongo is more supportive of AI integration compared to Petidam which still faces limited government support. These differences reflect the variety of approaches to AI in Islamic education in Indonesia and Thailand, with UIN Walisongo focusing more on modernization, while Petidam emphasizing cultural preservation.

Although this study succeeded in presenting the findings in a thematic and detailed manner, there are significant weaknesses that need to be noted. The study was conducted in only two Islamic educational institutions located in coastal areas in each country, so the findings may not be fully representative for the context of Indonesia and Thailand. The unique characteristics of these institutions, located in coastal areas, cannot describe the different geographical, social and cultural conditions in various other regions. This limitation makes it difficult to generalize the findings to other Islamic educational institutions, especially those in non-coastal areas or with different education systems. In order to gain a deeper and more comprehensive understanding of how AI can be effectively integrated in Islamic education, it is recommended that future researchers expand the reach of this study by involving more Islamic educational institutions from different regions and countries. A broader comparative approach will help in identifying the factors influencing the success of AI integration and provide a more holistic insight into the challenges and opportunities faced by Islamic educational institutions around the world.

REFERENCES

Aithal, P. S., and Shubhrajyotsna Aithal. "How to increase emotional infrastructure of higher education institutions." International Journal of Management, Technology, and Social Sciences (IJMTS) 8.3 (2023): 356-394.

Alkaff, Syed Huzaifah Bin Othman, and Muhammad Haziq Bin Jani. "Shi'i Communities in Southeast Asia: Religious Harmony Institutions and Peaceful Sunni-Shia." ISLAM NUSANTARA: Journal for the Study of Islamic History and Culture 4.1 (2023): 1-18.

Aryana, Suhud, Dida Firmansyah, and Ratna Muthia. "Hattie's Visible Learning Evaluation Model in Learning Strategies and Publication of Scientific Work of IKIP Siliwangi Students." JLER (Journal of Language Education Research) 7.1 (2024): 17-26.

Asmarani, Ayu, Sukarno Sukarno, dan Minnah El Widdah. "The Relationship of Professional Competence with Teacher Work Productivity in Madrasah Aliyah." Nidhomul Haq :

Jurnal Manajemen Pendidikan Islam 6, no. 2 (2 Juli 2021): 220–35. https://doi.org/10.31538/ndh.v6i2.1365.

Baki, Nordahlia Umar, et al. "Employee Competencies in the Age of Artificial Intelligence: A Systematic Review from Southeast Asia." International Journal of Academic Reserach in Economics and Management Sciences 12.1 (2023).

Bakiner, Onur. "What do academics say about artificial intelligence ethics? An overview of the scholarship." AI and Ethics 3.2 (2023): 513-525.

Basri, Hasan, dan Alamin Abdullah. "Curriculum Integration Constructs in Integrated Islamic Elementary School." Tafkir: Interdisciplinary Journal of Islamic Education 5, no. 1 (6 Februari 2024): 79–99. https://doi.org/10.31538/tijie.v5i1.873.

Beckman, Karley, Sue Bennett, and Lori Lockyer. "Understanding students' use and value of technology for learning." Learning, Media and Technology 39.3 (2014): 346-367.

Brown, Abbie H., and Timothy D. Green. The essentials of instructional design: Connecting fundamental principles with process and practice. Routledge, 2019.

Brusilovsky, Peter, and Eva Millán. "User models for adaptive hypermedia and adaptive educational systems." The adaptive web: methods and strategies of web personalization. Berlin, Heidelberg: Springer Berlin Heidelberg, 2007. 3-53.

Chan, Cecilia Ka Yuk. "A comprehensive AI policy education framework for university teaching and learning." International journal of educational technology in higher education 20, no. 1 (2023): 38.

Christensen, Clayton M. The innovator's dilemma: when new technologies cause great firms to fail. Harvard Business Review Press, 2015.

Cicconi, Megan. "Vygotsky meets technology: A reinvention of collaboration in the early childhood mathematics classroom." Early Childhood Education Journal 42 (2014): 57-65.

Crawford, Joseph, Michael Cowling, and Kelly-Ann Allen. "Leadership is needed for ethical ChatGPT: Character, assessment, and learning using artificial intelligence (AI)." Journal of University Teaching & Learning Practice 20, no. 3 (2023): 02.

Culnan, Mary J., and Robert J. Bies. "Consumer privacy: Balancing economic and justice considerations." Journal of social issues 59.2 (2003): 323-342.

Darojat, Ojat. "Quality assurance in distance teaching universities: A comparative study in Thailand, Malaysia, and Indonesia." (2013).

Diana, Amirotu, Mohammad Zakki Azani, and M. Mahmudulhassan. "The Concept and Context of Islamic Education Learning in the Digital Era: Relevance and Integrative Studies." Profetika: Jurnal Studi Islam 25.01 (2024): 33-44.

El-Hussari, Ibrahim A. "Allegorical Language in the Holy Quran A Semiotic Interpretation of Surat Al-Hujurat." Tafkir: Interdisciplinary Journal of Islamic Education 3, no. 2 (24 Juni 2022): 105–18. https://doi.org/10.31538/tijie.v3i2.132.

Fadha, Imaddudin Abil. "Occupational Therapy Approaches in Supporting Students With Sensory Disorders in Islamic Education." Dirasah International Journal of Islamic Studies 2, no. 1 (22 Juni 2024): 96–105. https://doi.org/10.59373/drs.v2i1.26.

Fahmi, Rizqi Anfanni, Ris'an Rusli, dan Amilda Sani. "Digital Nomad Influence on Malay Work Ethics: Exploring Cultural Dynamics." Jurnal Ilmiah Peuradeun 12, no. 2 (30 Mei 2024): 741–62. https://doi.org/10.26811/peuradeun.v12i2.974.

Firdaus, Muhammad Aditya, Moh Yusup Saepuloh Jamal, dan Bambang Samsul Arifin. "Improving Student Learning Outcomes Through Project-Based Learning in Islamic Religion Lessons." Tafkir: Interdisciplinary Journal of Islamic Education 4, no. 2 (13 Juni 2023): 241–54. https://doi.org/10.31538/tijie.v4i2.400.

Hargreaves, Andy, and Dennis Shirley. "Beyond standardization: Powerful new principles for improvement." Phi Delta Kappan 90.2 (2008): 135-143.

Hartawan, Rolifola Cahya, and Fitriyani Kosasih. "Implementation of the van meter and van horn zoning system policies model." International Journal Of Humanities Education and Social Sciences 2.4 (2023).

Hartono, Hartono. "Learning Achievements at Graduate Level: Bloom's Taxonomy Analyze." Munaddhomah: Jurnal Manajemen Pendidikan Islam 3, no. 3 (2022): 294–305. https://doi.org/10.31538/munaddhomah.v3i3.275.

Hasanah, Siti Muawanatul, Agus Maimun, Marno Marno, dan Ahmad Barizi. "Forging Qur'anic Character: A School Principal Leadership Model-Insights." Nidhomul Haq : Jurnal Manajemen Pendidikan Islam 9, no. 1 (17 Februari 2024): 28–42. https://doi.org/10.31538/ndh.v9i1.4380.

Hsieh, Ronan W., et al. "Association of Patient and Tumor Characteristics With Outcomes in Young Head and Neck Squamous Cell Carcinoma Patients." Clinical Otolaryngology (2024).

https://data.goodstats.id/statistic/10-negara-pengguna-ai-terbanyak-indonesia-salah-satunya-RLlmC

Huda Miftachul. "Empowering application strategy in the technology adoption: insights from professional and ethical engagement." Journal of Science and Technology Policy Management 10.1 (2019): 172-192.

Ikhsan, M., Sutji Rochaminah, dan Ayu Mastura. "The Development of Geo-Math Application by Integrating Geo-Gebra Applets to Improve Students' Spatial Ability." Jurnal Ilmiah Peuradeun 12, no. 3 (30 September 2024): 1129–54. https://doi.org/10.26811/peuradeun.v12i3.1492.

Isa, Muhammad, Neliwati Neliwati, dan Yusuf Hadijaya. "Quality Improvement Management in Teacher Professional Development." Munaddhomah: Jurnal Manajemen Pendidikan Islam 5, no. 2 (12 Februari 2024): 136–47. https://doi.org/10.31538/munaddhomah.v5i2.782.

Islami, Chitra Charisma, and Eva Gustiana. "Cognitive constructivism of early childhood based on Jean Piaget's thinking." Indonesian Journal of Education Teaching and Learning (IJETL) 1.1 (2021): 7-13.

Jakobsen, Kine, Marius Mikalsen, and Grethe Lilleng. "A literature review of smart technology domains with implications for research on smart rural communities." Technology in Society (2023): 102397.

Kandlhofer, Martin, Gerald Steinbauer, Sabine Hirschmugl-Gaisch, and Petra Huber. "Artificial intelligence and computer science in education: From kindergarten to university." In 2016 IEEE frontiers in education conference (FIE), pp. 1-9. IEEE, 2016.

Kim, Jinhee. "Leading teachers' perspective on teacher-AI collaboration in education." Education and Information Technologies 29.7 (2024): 8693-8724.

Lave, Jean, and Etienne Wenger. "Learning and pedagogy in communities of practice." Learners and pedagogy (1999): 21-33.

Le, Nguyen-Thinh, et al. "A review of AI-supported tutoring approaches for learning programming." Advanced computational methods for knowledge engineering (2013): 267-279.

Majid, Mariam Abd, Abur Hamdi Usman, Nurzatil Ismah Azizan, Noor Hafizah Mohd Haridi, Noraini Mohamad, Zainab Ismail, dan Aisyah Humairak Abdul Rahman. "Fuzzy Delphi Method for Developing Model of Islamic Self-Identity in Malaysian Delinquent Adolescents." Jurnal Ilmiah Peuradeun 12, no. 2 (30 Mei 2024): 695–716. https://doi.org/10.26811/peuradeun.v12i2.1002.

Maqsood, Asia, Ahyousha Khan, and Muhammad Usama Siddiqi. "US-China Competition in Artificial Intelligence: Implications on Global Governance." Journal of Asian Development Studies 12.4 (2023): 481-493.

Marsan, Giulia Ajmone. "Artificial Intelligence in South East Asia: Upskilling & Reskilling to Narrow Emerging Digital Divides in the Post-Pandemic Recovery." (2021).

Mikhaylov, Slava Jankin, Marc Esteve, and Averill Campion. "Artificial intelligence for the public sector: opportunities and challenges of cross-sector collaboration." Philosophical transactions of the royal society a: mathematical, physical and engineering sciences 376, no. 2128 (2018): 20170357.

Mott, Jon, and David Wiley. "Open for learning: The CMS and the open learning network." in education 15.2 (2009).

Ness, Ingunn Johanne. "Zone of proximal development." The Palgrave Encyclopedia of the Possible. Cham: Springer International Publishing, 2023. 1781-1786.

Nicholson-Nelson, Kristen. Multiple intelligences. New York: Scholastic Professional Books, 1998.

Nuankaew, Pratya, Patchara Nasa-Ngium, Tinnakorn Kunasit, and Wongpanya Sararat Nuankaew. "Implementation of Data Analytics and Machine Learning in Thailand Education Sector." International Journal of Emerging Technologies in Learning 18, no. 5 (2023).

O'Connor, Allan. "A conceptual framework for entrepreneurship education policy: Meeting government and economic purposes." Journal of business venturing 28.4 (2013): 546-563.

Okem, Eche Samuel, et al. "Advancing infrastructure in developing nations: a synthesis of AI integration strategies for smart pavement engineering." Engineering Science & Technology Journal 4.6 (2023): 533-554.

Pederiva, Alice Martins, Amanda Aliende da Matta, and Antonio Sagrado Lovato. "Contributions of Vigotski to Thinking about Intercultural Education." Educação & Realidade 47 (2022): e116915.

Perchik, J. D., et al. "Artificial intelligence literacy: developing a multi-institutional infrastructure for AI education." Academic radiology 30.7 (2023): 1472-1480.

Pressman, Jeffrey L., and Aaron Wildavsky. Implementation: How great expectations in Washington are dashed in Oakland; Or, why it's amazing that federal programs work at all, this being a saga of the Economic Development Administration as told by two sympathetic observers who seek to build morals on a foundation. Vol. 708. Univ of

California Press, 1984.

Priyahita, Rissia. "The utilization of e-learning and artificial intelligence in the development of education system in Indonesia." 2nd Jogjakarta Communication Conference (JCC 2020). Atlantis Press, 2020.

Saiin, Asrizal, Firdaus Firdaus, Maulana Yusuf, Supani Supani, Muchimah Muchimah, dan Anwar M. Radiamoda. "Walking Together: Dynamics of Muslim Wives Dual Role in Rural Areas Pursuing Career and Household Responsibilities." El-Mashlahah 14, no. 1 (30 Juni 2024): 127–48. https://doi.org/10.23971/el-mashlahah.v14i1.7827.

Sain, Zohaib Hassan, Razvan Serban, Nurulannisa Binti Abdullah, dan Chanda Chansa Thelma. "Benefits and Drawbacks of Leveraging ChatGPT to Enhance Writing Skills in Secondary Education." At-Tadzkir: Islamic Education Journal 4, no. 1 (2025): 40–52. https://doi.org/10.59373/attadzkir.v4i1.79.

Selwyn, Neil. Is technology good for education?. John Wiley & Sons, 2016.

Skinner, B. F. "Herrnstein and the evolution of behaviorism." (1977): 1006.

Smirnov, Vladimir A. "Youth policy and educational activities in Russian universities: stages of development and key contradictions." www. vovr. elpub. ru; www. vovr. ru Журнал издаётся с 1992 года 32.5 (2023): 10.

Smith, Dywanna, et al. "Announcing the 2019–2020 Alan C. Purves Award Recipients: Inspiring Transformative Literacy Pedagogies: The 2020 Alan C. Purves Award Committee." Research in the Teaching of English 55.3 (2021): 322-328.

Soori, Mohsen, Behrooz Arezoo, dan Roza Dastres. "Artificial intelligence, machine learning and deep learning in advanced robotics, a review." Cognitive Robotics 3 (1 Januari 2023): 54–70. https://doi.org/10.1016/j.cogr.2023.04.001.

Spivakovsky, Oleksan V., et al. "Institutional policies on artificial intelligence in university learning, teaching and research." Information Technologies and Learning Tools 97.5 (2023): 181.

Urlaub, Per, and Eva Dessein. "Kasparov, Vygotsky, and ChatGPT: What a Chess Prodigy and Child Psychologist Can Teach Us about AI in Education."

Van Meter, Donald S., and Carl E. Van Horn. "The policy implementation process: A conceptual framework." Administration & society 6.4 (1975): 445-488.

Vygotsky, L., and M. Cole. "Lev Vygotsky: Learning and social constructivism." Learning Theories for Early Years Practice. UK: SAGE Publications Inc (2018): 68-73.

Warschauer, Mark, and Meei-Ling Liaw. "Emerging Technologies in Adult Literacy and Language Education." National Institute for Literacy (2010).

Williamson, Ben. "The social life of AI in education." International Journal of Artificial Intelligence in Education 34.1 (2024): 97-104.

Winner, Langdon. "Upon opening the black box and finding it empty: Social constructivism and the philosophy of technology." Science, technology, & human values 18.3 (1993): 362-378.

Wiranto, Erham Budi, and Sri Suwartini. "Artificial Intelligence and Trustworthy Principles in Global Islamic Education." Ushuluddin International Conference (USICON). Vol. 6. 2022.

Wongwatkit, Charoenchai, Nontawat Thongsibsong, Titiya Chomngern, and Soraya Thavorn.

"The Future of Connectivist Learning with the Potential of Emerging Technologies and AI in Thailand: Trends, Applications, and Challenges in Shaping Education." Journal of Learning Sciences and Education 2, no. 1 (2023): 122-154.

Woschank, Manuel, Erwin Rauch, dan Helmut Zsifkovits. "A Review of Further Directions for Artificial Intelligence, Machine Learning, and Deep Learning in Smart Logistics." Sustainability 12, no. 9 (Januari 2020): 3760. https://doi.org/10.3390/su12093760.

Yilmaz, Ramazan, and Fatma Gizem Karaoglan Yilmaz. "The effect of generative artificial intelligence (AI)-based tool use on students' computational thinking skills, programming self-efficacy and motivation." Computers and Education: Artificial Intelligence 4 (2023): 100147.

Yin, Robert K., et al. "Case study methods." Handbook of complementary methods in education research. Routledge, 2012. 111-122.

Yirdaw, Arega. "Quality of education in private higher institutions in Ethiopia: The role of governance." SAGE open 6.1 (2016): 2158244015624950.

Yusriadi, Yusriadi, Rusnaedi Rusnaedi, N. Siregar, Suci Megawati, and Geminastiti Sakkir. "Implementation of artificial intelligence in Indonesia." International Journal of Data and Network Science 7, no. 1 (2023): 283-294

Zhai, Chunpeng, and Santoso Wibowo. "A systematic review on cross-culture, humor and empathy dimensions in conversational chatbots: the case of second language acquisition." Heliyon 8, no. 12 (2022).

Zhang, Hongzhou, and Shaleen Khanal. "To Win the Great AI Race, China Turns to Southeast Asia." Asia Policy 19.1 (2024): 21-34.

Zhao, Bohan. "Analysis on the negative impact of AI development on employment and its countermeasures." In SHS web of conferences, vol. 154, p. 03022. EDP Sciences, 2023.

Zhao, Dan-Dan, et al. "Identification of a major locus for lodging resistance to typhoons using QTL analysis in rice." Plants 12.3 (2023): 449.

Zuboff, Shoshana. "The age of surveillance capitalism." Social theory re-wired. Routledge, 2023. 203-213.