

**CONTEXTUALIZING AI IN EDUCATION: ETHNOPEDAGOGY AS
A PATHWAY TO INCLUSIVE, TRANSFORMATIVE
AND SUSTAINABLE LEARNING**

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Received; January 03, 2026 Revised; January 10, 2026; Accepted: 18 April, 2026

Abstract: *The rapid advancement of Artificial Intelligence (AI) in education has significantly transformed teaching and learning processes across the globe. While AI offers promising opportunities such as personalized learning, efficiency, and accessibility, it also raises critical concerns regarding cultural bias, lack of contextual relevance, and the marginalization of local knowledge systems. This study explores the integration of ethnopedagogy as a framework to contextualize AI in education, aiming to foster inclusive, transformative, and sustainable learning environments. Using a descriptive qualitative approach, this paper analyzes existing literature on AI in education and ethnopedagogy to examine how cultural values and local wisdom can be embedded within AI-driven educational systems. The findings suggest that AI, when combined with ethnopedagogical principles, can enhance student engagement, preserve cultural identity, and promote equitable learning opportunities. Furthermore, this integration supports transformative learning by encouraging critical thinking and contextual understanding, while also contributing to sustainability through the preservation and dissemination of indigenous knowledge. However, challenges such as limited local datasets, digital literacy gaps, and infrastructure constraints remain significant barriers. Therefore, collaborative efforts among educators, policymakers, and communities are essential to develop culturally responsive AI systems. This study concludes that contextualizing AI through ethnopedagogy is not only necessary but also strategic in ensuring that technological advances in education remain inclusive, culturally relevant, and sustainable in the long term.*

Keywords: *Contextualizing AI in Education, Ethnopedagogy as a Pathway to Inclusive, Transformative, and Sustainable Learning*

INTRODUCTION

The development of Artificial Intelligence (AI) in education has brought significant changes to the way teaching and learning is conducted. This technology enables personalized learning, real-time analysis of student data, and efficiency in

material delivery. However, behind this progress, serious challenges arise related to cultural relevance and equity in technology-based education. AI is often developed based on global data dominated by a Western perspective, potentially ignoring local values and cultural wisdom ([Q. I. Journal and Volume 2019](#)).

In this context, ethnopedagogy emerges as an approach that emphasizes the importance of integrating local culture into the educational process. Ethnopedagogy serves not only as a tool for cultural preservation but also as a strategy to increase the relevance of learning for ([W. Journal and Systems 2024](#); [Sukisno; Anwar 2023](#)). By combining AI and ethnopedagogy, education can become more inclusive and contextual.

The development of Artificial Intelligence (AI) in education over the past five years has demonstrated a significant transformation in the way learning is designed and implemented. AI technology, particularly generative AI and learning analytics, has enabled personalized learning, increased teaching efficiency, and broader educational access ([Kapek, Sari, and Barat 2025](#)). Furthermore, the integration of AI in education has also driven a paradigm shift from teacher-centered learning to student-centered learning, which is more adaptive and responsive to individual student needs ([I. Journal and August 2023](#)). However, behind this great potential, various critical issues have emerged related to ethical aspects, algorithmic bias, and the inequality of cultural representation in educational AI systems.

One of the main issues in AI implementation is the tendency of these systems to reproduce biases inherent in training data. This results in the dominance of certain cultural perspectives, particularly Western ones, in digital learning content ([Mujahidin, Abdullah, and Rofiq 2025](#)). This condition has the potential to ignore local cultural diversity and reduce the relevance of learning for students who come from different social and cultural backgrounds. In fact, some studies suggest that a lack of cultural sensitivity in AI may exacerbate educational inequality and the marginalization of certain groups ([Media, Populism, and Authority 2020](#)). Thus, it is important to develop approaches that are able to contextualize AI to be more inclusive and culturally relevant.

In this context, ethnopedagogy emerged as an alternative approach that offers the integration of local cultural values into the learning process. Ethnopedagogy emphasizes that education must be rooted in the social and cultural experiences of students, thereby enhancing meaning and engagement in learning ([Sosial et al. 2025](#)). This approach serves not only as a means of cultural preservation but also as a pedagogical strategy for building students' identity, character, and critical awareness. Recent research shows that ethnopedagogy-based learning can improve conceptual understanding, social competence, and the internalization of moral values through contextual learning experiences.

Furthermore, the integration of AI and ethnopedagogy opens up new opportunities in creating an inclusive and transformative education system. AI can be utilized to support the development of local culture-based content, such as the digitization of folklore, the use of regional languages in learning platforms, and the development of adaptive learning systems that consider the social context of learners ([Singarimbun 2008](#)). On the other hand, ethnopedagogy provides a framework of values and context that ensures that technology does not eliminate cultural identity, but rather strengthens it. This approach aligns with the concept of culturally responsive AI, which emphasizes the importance of cultural sensitivity in educational technology design.

Beyond inclusivity, the integration of AI and ethnopedagogy also contributes to transformational learning. Learning focuses not only on knowledge transfer but also on developing critical, reflective, and contextual thinking skills. In this regard, AI serves as a tool that enriches the learning experience, while ethnopedagogy ensures that the process remains rooted in the social and cultural realities of learners. This approach enables learners to not only understand concepts theoretically but also apply them in their daily lives.

On the other hand, sustainability issues are also a crucial dimension of modern education. Integrating ethnopedagogy into AI-based systems can contribute to the preservation of local wisdom, which is being eroded by globalization and digitalization. AI technology enables the documentation, storage, and dissemination of traditional knowledge more widely and systematically ([Daulay 2024](#)). This is in line with global efforts to support sustainable education that is not only oriented towards technological progress, but also towards preserving cultural values and local identity.

However, the implementation of this approach is not without various challenges. Limited local data available for training AI systems, low digital literacy among educators, and gaps in technological infrastructure are key barriers to effectively integrating AI and ethnopedagogy. In addition, a policy framework and collaboration between the government, academics, and the community are needed to ensure that the development of AI in education is inclusive and equitable.

Based on this description, it can be concluded that contextualizing AI in education through an ethnopedagogical approach is a strategic step towards creating an inclusive, transformational, and sustainable learning system. This integration not only addresses the challenges of educational globalization but also ensures that technology serves as a tool to strengthen, not replace, local cultural values in the learning process.

In addition, the issues of inclusivity and sustainability are also major concerns in modern education. Education that does not take cultural diversity into account can reinforce social inequality and the marginalization of certain groups ([Munawaroh and Marlina n.d., 2020](#)). Therefore, it is important to develop an approach that is able to integrate technology with local values to create a fair and sustainable education system.

LITERATURE REVIEW

The implementation of Artificial Intelligence (AI) integration in education combined with an ethnopedagogy approach presents various complex challenges that include technical, pedagogical, social, and cultural aspects. Although conceptually this integration offers an inclusive, transformational, and sustainable education model, in practice there are still various obstacles that need to be addressed systematically and collaboratively. This challenge becomes increasingly relevant in the context of accelerating the digitalization of global education post-COVID-19 pandemic, where the adoption of educational technology has increased significantly but has not always been accompanied by adequate readiness of the education ecosystem ([Villiers 2024](#)).

One of the main challenges is the limited technological infrastructure, especially in developing countries. Many educational institutions do not yet have adequate access to digital devices, stable internet networks, and AI-based learning support systems. This inequality leads to uneven implementation of AI in education, potentially widening the educational gap between regions ([Q. I. Journal and Volume](#)

2019). In the context of ethnopedagogy, limited infrastructure also hinders the digitization of local wisdom, which could be integrated into technology-based learning systems.

Furthermore, another significant challenge is the low level of digital literacy among educators and students. Many teachers lack the competency to optimally utilize AI technology in the learning process. This is reinforced by the findings of Holmes ([Legi, Damanik, and Giban 2023](#)), who stated that the successful implementation of AI in education depends heavily on teachers' pedagogical readiness to understand how the technology works and its implications. Without adequate training, AI risks becoming merely an additional tool that does not significantly impact the quality of learning.

The next challenge relates to the availability and quality of local data. AI systems require large amounts of data to function optimally, yet many local cultures remain digitally undocumented. Traditional knowledge, regional languages, and social practices are often oral and undigitized ([Villiers 2024](#)). This poses a serious obstacle to integrating ethnopedagogy into AI systems, as the lack of representative datasets can lead to bias or even a loss of cultural context in technology-based learning processes.

Beyond technical issues, there are also ethical challenges and algorithmic bias. AI developed based on global data tends to represent the perspectives of dominant cultures, thus ignoring or even distorting local cultural values. ([Torres-rivera et al. 2025](#)) emphasize that bias in AI is not only technical but also social and cultural, which can impact inequities in the education system. In the context of ethnopedagogy, this poses a serious challenge because the primary goal of this approach is to maintain cultural diversity and authenticity in education.

In addition, implementation challenges also arise from the educational curriculum, which is still rigid and less flexible. Many education systems still use a national standard curriculum that does not provide enough space for the in-depth integration of local values. ([W. Journal and Systems 2024](#)) stated that the lack of curriculum flexibility is one of the main obstacles in implementing a culture-based approach in schools. As a result, the integration of ethnopedagogy in AI-based systems becomes difficult to do systematically.

Another challenge is resistance to change from various parties, including educators, institutions, and society. The shift towards AI-based learning and culture is often perceived as complex and requires major adjustments in everyday educational practices. Some educators still feel more comfortable with conventional methods, so the adoption of new technologies is slow. In addition, a lack of understanding of the long-term benefits of integrating AI and ethnopedagogy also reinforces this resistance ([Marjuni 2022](#)).

Furthermore, challenges also arise in the aspect of education policy. Not all countries have clear regulations regarding the use of AI in education, especially those that consider ethical aspects, data privacy, and cultural diversity. Emphasizes the importance of a global policy framework that can regulate the fair and responsible use of AI in the education sector. Without strong regulations, the implementation of AI has the potential to create inequality and misuse of technology.

Based on this description, it can be concluded that the challenges of implementing the integration of AI and ethnopedagogy are multidimensional, covering aspects of technology, human resources, culture, curriculum, and policy. Therefore, a holistic and collaborative approach is needed between the government,

educational institutions, technology developers, and the community to overcome these various obstacles. With the right strategy, these challenges can be transformed into opportunities to build a more inclusive, adaptive, and sustainable education system for the future.

Some of the main challenges include limited local data, low digital literacy, and lack of infrastructure support. Therefore, collaboration between the government, academics, and the community is needed to overcome these obstacles.

METHOD

This research uses a qualitative approach with a descriptive-analytical method ([Anwar 2022](#); [Sholihul Anwar et al. 2025](#)). Data were collected through literature studies from various academic sources such as scientific journals, books, and research reports relevant to the topic of AI in education and ethnopedagogy. This approach was chosen because it allows researchers to understand phenomena in depth and contextually ([Tavares and Azevedo 2022](#)).

Data analysis was carried out using content analysis techniques, namely identifying the main themes related to the integration of AI and ethnopedagogy. The literature used includes critical educational theory, educational technology, and cultural studies. Data validity is maintained through triangulation of sources and selection of credible references.

RESULT AND DISCUSSION

AI in Education: Opportunities and Challenges

AI has opened up significant opportunities for improving the quality of education, particularly through personalized learning and efficient data management ([Hamedani et al. 2024](#)). However, AI also has limitations, particularly in terms of algorithmic bias that can reinforce social inequities ([W. Journal and Systems 2024](#)).

The development of Artificial Intelligence (AI) in education has opened up various strategic opportunities to improve the quality of learning in the digital era. In the past five years, AI has become a key innovation driving the transformation of the global education system, particularly through its ability to rapidly process data and provide more personalized learning experiences ([Legi, Damanik, and Giban 2023](#)). This technology enables adaptive learning systems that can adjust the material, pace, and learning methods to suit individual learners' needs. Thus, AI has the potential to overcome the limitations of conventional learning approaches which tend to be uniform and less responsive to differences in student abilities.

One of the main opportunities for applying AI in education is its ability to support personalized learning. Through the analysis of student learning data, AI can identify individual strengths, weaknesses, and learning preferences, enabling the development of more effective and efficient learning strategies ([Budiharjo et al. 2025](#)). Furthermore, the use of AI-based chatbots and intelligent tutoring systems can also help students understand material independently outside of formal classroom hours. This not only increases educational accessibility but also expands learning opportunities for diverse groups, including those in remote areas ([Tavares and Azevedo 2022](#)).

On the other hand, AI also plays a role in improving educators' work efficiency. This technology can be used to automate administrative tasks such as assessment, learning outcome analysis, and student data management, allowing teachers to focus more on pedagogical aspects and interactions with students

([Torres-rivera et al. 2025](#)). Furthermore, AI can support data-driven decision-making in education, for example in curriculum design or early identification of learning intervention needs. Thus, AI serves not only as a technical tool but also as a strategic partner in improving the quality of education.

However, despite these opportunities, there are a number of challenges that require critical consideration. One key issue is algorithmic bias, which can arise from imbalanced training data. AI systems developed based on unrepresentative data have the potential to produce unfair recommendations or decisions, particularly for minority groups or people with diverse cultural backgrounds ([In and Religious 2025](#)). This shows that AI is not a neutral technology, but is heavily influenced by the social and cultural context in which the data originates.

In addition, ethical issues and data privacy are also important concerns in the implementation of AI in education. The use of AI often involves the collection and analysis of large amounts of students' personal data, which potentially poses a risk of data misuse if not managed properly ([I. Journal and August 2023](#)). Therefore, clear regulations and ethical awareness are needed from technology developers and users to ensure that student data is used responsibly and safely.

Another challenge is the digital divide, which is still a problem in many countries, including developing countries. Not all educational institutions have adequate access to technological infrastructure, such as digital devices and stable internet connections. In addition, low digital literacy among educators is also an obstacle to optimal use of AI ([S Nur'aini 2023](#)). Without efforts to increase capacity and equalize access to technology, the implementation of AI has the potential to widen existing educational gaps.

Furthermore, the lack of cultural sensitivity in AI design also poses a significant challenge. Many AI systems are unable to accommodate cultural diversity and local contexts in the learning process. This can lead to a mismatch between the material presented and the social realities of learners, thus reducing learning effectiveness ([S Nur'aini 2023](#)). In this context, it is important to integrate culturally based approaches, such as ethnopedagogy, to ensure that the technology used remains relevant and inclusive.

Based on this description, it can be concluded that AI has great potential in improving the quality and accessibility of education, especially through personalization of learning and efficiency of the education system. However, the use of AI also faces various challenges, such as algorithmic bias, ethical issues, the digital divide, and a lack of cultural sensitivity. Therefore, a comprehensive and contextual approach is needed in integrating AI in education, so that this technology can provide optimal benefits without ignoring the values of justice, inclusivity, and cultural diversity.

Ethnopedagogy as a Contextual Approach

Ethnopedagogy emphasizes the importance of learning based on local culture. This approach allows students to understand the material more deeply because it is related to their life experiences ([Feri et al. 2025](#)). In addition, ethnopedagogy also plays a role in maintaining cultural identity amidst the flow of globalization.

Ethnopedagogy is an educational approach that places local culture as the primary foundation of the learning process. In recent years, attention to the importance of integrating cultural values into education has increased, particularly in response to the impacts of globalization and digitalization, which tend to erode local identities ([Rahardjanto, Husamah, and Hadi 2024](#)). This approach emphasizes

that effective learning depends not only on the transfer of knowledge but also on the relevance of students' social and cultural contexts. Thus, ethnopedagogy is an important strategy in creating meaningful, contextual learning that is rooted in students' lived experiences.

Conceptually, ethnopedagogy is rooted in the view that knowledge is not universal, but rather shaped by specific cultural contexts. Therefore, the educational process needs to consider local values, traditions, language, and social practices that develop in society ([Nasir and Makassar 2026](#)). In practice, this approach can be realized through the use of folk tales, local wisdom, and everyday life contexts as part of the learning materials. This not only helps students understand concepts more concretely, but also strengthens their cultural identity amidst the increasingly strong currents of globalization.

In the context of modern education which is increasingly influenced by technology, ethnopedagogy has a strategic role in maintaining the balance between innovation and cultural preservation. Recent research shows that local culture-based learning can significantly increase student engagement, learning motivation, and learning outcomes ([Hikmayana et al. 2026](#)). This is because students feel closer to the material being presented, so they are able to build a deeper and more reflective understanding. In addition, this approach also encourages the formation of character values, such as mutual cooperation, tolerance, and social responsibility, which are very important in community life.

Furthermore, ethnopedagogy also contributes to creating inclusive education. By accommodating cultural diversity, this approach provides space for all learners to feel recognized and valued. This is particularly important in the context of a multicultural society, where cultural differences are often a source of inequality and discrimination ([Nurhayati and Tri n.d.](#)). Through ethnopedagogy, education can be a means of building equality and social justice by integrating diverse cultural perspectives into the learning process.

On the other hand, in the digital era marked by the use of technologies such as Artificial Intelligence (AI), ethnopedagogy also serves as a framework to ensure that technological innovations remain culturally relevant. Many technology-based learning systems tend to be universalistic and pay little attention to local contexts. This can cause a “cultural mismatch” between learning materials and student experiences ([Bermakna and Menyenangkan n.d.](#)). Therefore, the integration of ethnopedagogy in the development of educational technology is very important, so that the resulting system is not only technically sophisticated, but also sensitive to cultural values.

In addition, ethnopedagogy also has an important role in supporting the sustainability of education. Local wisdom that is passed down from generation to generation often contains values that are relevant to the principles of sustainability, such as environmental management, social balance, and life ethics ([Siti Nur'aini 2023](#)). By integrating these values into learning, education serves not only as a means of transferring knowledge but also as a tool for developing students' ecological and social awareness. In this sense, ethnopedagogy serves as a bridge between the past, present, and future.

However, the implementation of ethnopedagogy in education still faces various challenges. One of them is limited resources, both in the form of culture-based learning materials and teacher competence in integrating local values into the curriculum. In addition, education systems that tend to be oriented towards national or global standards often ignore the local context ([Jombang 2026](#)). Therefore,

systematic efforts are needed to develop flexible and contextual curricula, as well as training for educators to be able to implement ethnopedagogy effectively.

Based on this description, it can be concluded that ethnopedagogy is a very relevant approach in facing educational challenges in the modern era. By placing local culture at the heart of learning, this approach not only improves the quality and relevance of education, but also supports inclusivity, transformation, and sustainability. Therefore, the integration of ethnopedagogy in the education system, including in the development of technologies such as AI, is a strategic step to create education that is more equitable, meaningful, and rooted in cultural identity.

Integration of AI and Ethnopedagogy

The integration of AI and ethnopedagogy can be done through the development of locally based content, the use of regional languages in AI systems, and community involvement in learning design. This is in line with the concept of culturally responsive teaching ([Sukisno et al. 2024](#)).

The integration of Artificial Intelligence (AI) and ethnopedagogy is a strategic approach to addressing the increasingly complex challenges of education in the digital era. AI as an advanced technology has the ability to process data on a large scale, provide adaptive learning, and increase the efficiency of the education system. However, without a strong foundation of values, the use of AI has the potential to ignore the social and cultural context of students. Therefore, ethnopedagogy is present as a conceptual framework that is able to provide direction and meaning in the use of this technology, so that learning is not only technological, but also contextual and humanistic ([Sofanudin, Fanani, and Prihastuty 2021](#)).

In practice, the integration of AI and ethnopedagogy can be done through the development of learning systems based on local data and content. AI can be used to collect, analyze, and process information related to local culture, such as regional languages, folklore, and social practices. The data is then used to produce learning materials that are relevant to students' lives ([Darwis Hude, Muid N, and Faizin 2020](#)). Thus, technology not only functions as a tool for conveying information, but also as a medium for preserving and developing local culture in the context of modern education.

Furthermore, AI can also support the development of adaptive learning that takes students' cultural backgrounds into account. AI-based learning systems can be designed to adapt teaching approaches to students' social and cultural characteristics, making the learning process more personalized and meaningful ([Bajuri et al. 2021](#)). For example, in the Indonesian context, AI can be used to present learning examples relevant to local communities, such as traditional agricultural practices, the value of mutual cooperation, or local wisdom in environmental management. This approach not only enhances students' understanding but also strengthens their cultural identity.

Furthermore, the integration of AI and ethnopedagogy also opens up opportunities to create inclusive learning. By leveraging technology, education can reach various community groups that previously had difficulty accessing educational services, including indigenous communities and remote areas. However, what distinguishes this approach is the effort to ensure that the content delivered remains relevant to local cultures, preventing the dominance of one culture in the learning process ([Singarimbun 2008](#)). This aligns with the principle of social justice in education, which emphasizes the importance of recognizing cultural diversity.

On the other hand, this integration also contributes to creating transformational learning. AI enables interactive and dynamic information presentation, while ethnopedagogy provides in-depth and reflective context. The combination of the two encourages students to not only receive information passively, but also to criticize, reflect, and relate it to their life experiences ([Habibi 2017](#)). Thus, learning becomes a means to form critical awareness and high-level thinking skills.

However, the implementation of the integration of AI and ethnopedagogy is not without various challenges. One of the main challenges is the limited local data that can be used to train AI systems. Many local cultures have not been digitally documented, making them difficult to integrate into technology-based systems ([Jafar 2025](#)). In addition, there are also challenges in terms of digital literacy, both among educators and students, which can hinder the optimal use of technology.

Another challenge is the lack of collaboration between technology developers and local communities. In many cases, AI development is conducted without involving the community as the cultural owners, potentially resulting in inaccurate or even harmful representations ([Supriyanto 2021](#)). Therefore, it is crucial to adopt a participatory approach to educational technology development, in which local communities are actively involved in the design and implementation process.

To address these challenges, a comprehensive and collaborative strategy is needed. The government, educational institutions, and the community need to work together to develop policies that support the integration of AI and ethnopedagogy. Furthermore, investments are needed in developing technological infrastructure and enhancing human resource capacity, particularly in digital literacy and culturally based pedagogical competencies. Developing representative local datasets is also an important step in ensuring that AI systems can function fairly and inclusively.

Based on this description, it can be concluded that the integration of AI and ethnopedagogy is an approach with great potential in creating an inclusive, transformational, and sustainable education system. AI provides advanced technological support, while ethnopedagogy ensures that the learning process remains rooted in local cultural values. Therefore, the synergy between the two needs to be continuously developed as part of efforts to build a future education system that is not only technologically advanced but also culturally rich and socially just.

Inclusive and Transformational Learning

Inclusive and transformational learning are two key concepts in the development of education in the digital era which is increasingly influenced by Artificial Intelligence (AI). In this context, inclusivity refers to efforts to ensure that all students, regardless of social, cultural, economic, or geographic background, have equal access to quality education. Meanwhile, transformational learning emphasizes fundamental changes in students' thinking, attitudes, and actions through a process of critical reflection on their learning experiences ([FTIK UIN Maulana Malik Ibrahim Malang 2020](#)). When these two concepts are integrated with AI and ethnopedagogy, an educational model is created that is not only technologically adaptive but also equitable and culturally meaningful.

Over the past five years, developments in AI in education have presented significant opportunities to expand access and increase the inclusiveness of learning. Technologies such as learning analytics, intelligent tutoring systems, and adaptive learning platforms enable students with varying abilities to learn at their

own pace and style ([Septianingsih et al. 2024](#)). This significantly helps reduce the learning gap that often exists in traditional education systems. In addition, AI also enables distance learning that can reach remote areas, thus supporting equal access to education across various regions ([Tarbiyah et al. 2025](#)).

However, inclusivity in education is not only about access to technology, but also about cultural relevance in the learning process. This is where ethnopedagogy plays a crucial role as an approach that ensures that learning materials align with the social and cultural contexts of learners. By integrating local values, regional languages, and cultural practices into AI-based learning, students can feel more connected to the material they are learning ([Daulay 2024](#)). This not only increases learning motivation but also strengthens cultural identity and a sense of ownership in the educational process.

Furthermore, transformational learning in the context of AI and ethnopedagogy emphasizes shifting students' thinking from simply receiving information to becoming critical and reflective individuals. AI provides access to broad and diverse information, while ethnopedagogy provides a value framework for understanding that information contextually. This combination encourages students to not only memorize knowledge, but also to be able to relate it to the realities of their lives and evaluate its social and cultural meaning ([Sosial et al. 2025](#)).

In Mezirow's (2023) perspective, transformational learning occurs when individuals experience a “disorienting dilemma” that encourages them to reflect on old assumptions and build new perspectives. In the context of AI and ethnopedagogy, this disorientation can arise when learners are confronted with the difference between the global knowledge presented by AI and the local values they hold. This reflection process is important for forming critical awareness that enables students to understand the complexity of the world more deeply. In addition, inclusive and transformational learning also contributes to strengthening social justice in education. By utilizing AI wisely and culturally based, education systems can reduce discrimination and inequality caused by differences in access and cultural background ([Algoritma and Sosial 2026](#)). Ethnopedagogy ensures that every learner's cultural identity is recognized, while AI provides the means to expand access and improve the quality of learning. This combination creates a more equitable and sustainable education ecosystem.

However, the implementation of inclusive and transformational learning is not without challenges. One of the main challenges is the digital divide, which persists in many regions, particularly in developing countries. Not all students have equal access to technological devices and adequate internet connections ([Setyawan et al. n.d., 2023](#)). Furthermore, the lack of digital literacy among educators is also a barrier to optimizing the use of AI in culture-based learning.

Another challenge is the need for a curriculum that is flexible and responsive to cultural diversity. Many education systems still use standardized approaches that pay little attention to local contexts, making it difficult to integrate ethnopedagogy effectively ([Inclusive Technology n.d., 2025](#)). Therefore, curriculum reform is needed to allow for balanced integration between modern technology and local cultural values.

Based on this description, it can be concluded that inclusive and transformational learning in the context of AI and ethnopedagogy is a very relevant approach to facing today's educational challenges. This integration not only improves access to and quality of education but also fosters the development of

critical, reflective learners rooted in cultural values. Therefore, the future of education must be geared toward developing systems that are not only technologically advanced but also equitable, inclusive, and socially and culturally transformative.

This approach allows for the creation of inclusive learning by accommodating various cultural backgrounds. In addition, learning becomes more transformational because it encourages students to think critically and reflectively ([Arina and Herlambang 2025](#)).

Sustainability in Education

Educational sustainability is a concept that emphasizes the importance of an education system that is oriented not only toward short-term results but also toward long-term impacts on individuals, society, and the environment. In the context of digital transformation and the development of Artificial Intelligence (AI), educational sustainability becomes increasingly relevant because technology has significant potential to shape the future of learning globally ([Putri 2024](#)). However, sustainability is not only related to technological aspects, but also encompasses the preservation of cultural values, social justice, and strengthening human capacity to face changing times.

Over the past five years, the integration of digital technology in education has shown significant growth, particularly following the COVID-19 pandemic, which accelerated the digitalization of learning systems worldwide. AI has emerged as a key technology supporting continuous learning through adaptive systems, learning automation, and educational data analytics ([Bajuri et al. 2021](#)). This technology allows learning to take place flexibly, without being limited by space and time, and can be adapted to the individual needs of students. Thus, AI contributes to creating an education system that is more resilient to disruption.

However, sustainability in education cannot be measured solely from the aspect of technological efficiency. An approach that maintains a balance between digital innovation and the preservation of local values is needed. In this regard, ethnopedagogy plays a crucial role as an approach that ensures the educational process remains rooted in the community's culture. Ethnopedagogy enables the integration of local wisdom into the curriculum and learning, ensuring that traditional knowledge is not lost amidst the currents of globalization ([Jafar 2025](#)). Thus, education not only functions as a tool of modernization, but also as a means of preserving cultural identity.

Furthermore, educational sustainability is also closely related to the concept of Sustainable Development Goals (SDGs), especially the fourth goal which emphasizes inclusive and equitable quality education. ([Arina and Isyanto 2025](#)) emphasizes that sustainable education must be able to build inclusive, equitable societies that are adaptable to global change. In this context, the integration of AI and ethnopedagogy is highly relevant because they can complement each other: AI provides technology and efficiency, while ethnopedagogy provides values and cultural context.

In addition, educational sustainability also includes aspects of preserving local knowledge. Many traditional wisdoms contain principles of sustainability, such as wise management of natural resources, social life based on mutual cooperation, and balance between humans and the environment. Research shows that integrating local knowledge into education can increase students' ecological awareness and social responsibility ([Munfiatik 2023](#)). In this case, AI can be used

to document, archive, and disseminate local knowledge so that it is not lost over time.

However, there are a number of challenges in realizing the sustainability of AI-based education and ethnopedagogy. One of the main challenges is the digital divide that still exists in various regions, especially in developing countries. Not all educational institutions have access to adequate technological infrastructure, so the use of AI cannot be carried out evenly (Hamedani et al. 2024). In addition, low digital literacy among educators is also an obstacle in integrating technology with cultural approaches effectively.

Another challenge is the lack of systematic documentation of local cultures that can be used as a database in developing AI systems. Much traditional knowledge is still oral and has not been digitized, making it difficult to integrate into technology-based learning systems ([Torres-rivera et al. 2025](#)). Therefore, collaborative efforts between the government, academics, and the community are needed to develop a cultural database that can support the sustainability of AI-based education.

Besides the technical challenges, there are also philosophical challenges in ensuring that education remains oriented towards human values. AI as a data-based technology has the potential to shift the role of humans if it is not balanced with a humanistic pedagogical approach. Therefore, ethnopedagogy is important as a balance that ensures that education remains centered on people, values, and culture ([I. Journal and August 2023](#)).

Based on this description, it can be concluded that sustainability in education does not only depend on technological advances such as AI, but also on the ability of the education system to maintain cultural values, improve social justice, and strengthen human capacity. The integration of AI and ethnopedagogy offers a holistic approach to building sustainable education that is not only efficient and modern, but also inclusive, contextual, and rooted in local values. Therefore, the future of education must be directed at balancing technological innovation and cultural preservation to create a sustainable and equitable education system.

Integrating local culture into AI also supports sustainability by preserving traditional knowledge. AI can be used to document and disseminate local wisdom to future generations ([Budiharjo et al. 2025](#)).

CONCLUSION

The conclusion of this article indicates that the integration of Artificial Intelligence (AI) in education has significant potential to enhance learning quality through personalization, efficiency, and expanded access to education. However, its implementation still faces challenges, including algorithmic bias, limited cultural sensitivity, inadequate infrastructure, and gaps in digital literacy. In this context, ethnopedagogy emerges as a strategic approach that integrates local cultural values and community wisdom into technology-based learning systems, making education more inclusive, contextual, transformative, and sustainable. The synergy between AI and ethnopedagogy enables the creation of learning environments that are not only adaptive to technological advancements but also capable of strengthening cultural identity, enhancing students' critical thinking skills, and preserving local knowledge amidst globalization and digitalization. Therefore, the future development of education should be directed toward achieving a balance between technological innovation and the preservation of cultural values.

ACKNOWLEDGMENTS

Thank you for the cooperation of all teams who are always compact so that this research is completed and published as planned.

AUTHOR'S CONTRIBUTION

All authors contributed equally to the publication of this paper, and all authors read and approved this paper, and all authors declare no conflict of interest.

CONFLICT OF INTEREST

All authors state that there is no conflict of interest.

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