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AI-BASED PERSONALIZED LEARNING IN ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS: A POLICY ANALYSIS

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ABSTRACT
Achieving the Sustainable Development Goals (SDGs) has become a global priority, and education plays a crucial role. The current study aims to analyse how artificial intelligence (AI)-based personalized learning can contribute to the achievement of the Sustainable Development Goals at the policy level. This study is based entirely on secondary data, analysing various national and international policies, research papers, and reports. The study used thematic analysis to identify key themes. The results demonstrate that AI-based personalized learning not only enhances the quality of teaching but also strengthens the objectives of equity, inclusion, and sustainable development.

KEYWORDS- *AI, Personalized Learning, Sustainable Development Goals, Policy Analysis, Education*

INTRODUCTION
Education is considered a cornerstone of sustainable development, with SDG 4 specifically emphasizing ensuring quality education (United Nations, 2015). In the current digital age, artificial intelligence (AI) is rapidly transforming the education system (Selwyn, 2019).

AI-based personalized learning delivers content tailored to students' needs, abilities, and learning pace, making learning more effective (Holmes et al., 2019).

The National Education Policy (NEP-2020) in India also emphasizes the promotion of AI and digital education (Government of India, 2020). This policy is an important step towards making the teaching-learning process more flexible, inclusive, and student-centred. It places special emphasis on the development of digital infrastructure, the use of e-learning platforms, and the integration of artificial intelligence-based tools (UNESCO, 2021).

Additionally, the policy recommends promoting technology training for teachers, virtual labs, and adaptive learning systems to tailor learning to the individual needs of each student (Government of India, 2020; UNESCO, 2021). Thus, NEP-2020 can help ensure quality, equitable, and accessible education to achieve the Sustainable Development Goals (United Nations, 2015).

- Blogs, non-academic content
- Research with incomplete information.

Review Guiding Research Questions
How does AI-based personalized learning contribute to achieving the SDGs?
What is the role of AI in education policies?
What are its key opportunities and challenges?

Methodology
This study is a review-based, policy analysis based entirely on secondary sources. Data collection for this research involved the use of various reliable academic and policy sources, including Google Scholar, Scopus, UNESCO, and the World Bank. The study included research papers and policy documents published between 2015 and 2025 to capture the latest trends and perspectives on the topic. Thematic analysis was used to analyse the selected literature, identifying key themes and patterns. Additionally, policy documents were analysed to understand how AI-based personalized learning contributes to the achievement of the Sustainable Development Goals.

Inclusion Criteria
- Research published between 2015–2025
- Studies related to AI and education
- Articles related to the SDGs or sustainable development

Exclusion Criteria
- Irrelevant studies

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RESULT AND DISCUSSION

Author & Year	Country	Title
Holmes, W., Bialik, M., & Fadel, C. (2019)	Outside India	*Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*
Khosravi, H., Shum, S. B., Chen, G., et al. (2022)	Outside India	*Explainable Artificial Intelligence in Education*
Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016)	Outside India	*Intelligence Unleashed: An Argument for AI in Education*
UNESCO (2021)	Outside India	*AI and Education: Guidance for Policy-Makers*
Vinuesa, R., Azizpour, H., Leite, I., et al. (2020)	Outside India	*The Role of Artificial Intelligence in Achieving the Sustainable Development Goals*
Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019)	Outside India	*Systematic Review of Research on AI Applications in Higher Education*
United Nations (2015)	Outside India	*Transforming Our World: The 2030 Agenda for Sustainable Development*
UNESCO (2021)	Outside India	*Recommendation on the Ethics of Artificial Intelligence*
Government of India (2020)	India	*National Education Policy 2020*
UNESCO. (2021)	Outside India	*Recommendation on the ethics of artificial intelligence*

The Role of AI and Personalized Learning

AI-based learning systems provide personalized content by deeply analysing students' learning patterns, interests, and learning pace, making learning more effective, flexible, and adaptive (Holmes et al., 2019). Such systems use learner analytics and adaptive algorithms to identify each student's strengths and weaknesses and customize study materials, practice questions, and feedback accordingly (Zawacki-Richter et al., 2019).

Additionally, AI-based personalized learning systems offer students the opportunity for self-paced learning, allowing them to learn at their own pace and ability. This is particularly useful for learners from diverse backgrounds, as it promotes inclusive education by taking individual differences into account (UNESCO, 2021).

AI technologies such as intelligent tutoring systems, recommendation systems, and predictive analytics can make the teaching process more student-centred, thereby improving learning outcomes (Luckin et al., 2016). Additionally, these systems provide real-time feedback, helping students quickly correct errors and strengthen their conceptual understanding (Khosravi et al., 2022).

Ultimately, the combination of AI and personalized learning not only enhances the quality of learning, but it also plays a key role in achieving the Sustainable Development Goals (SDGs), especially quality education (SDG 4), as it makes education more accessible, inclusive, and effective (Vinuesa et al., 2020).

Relationship with the SDGs

Ultimately, the combination of AI and personalized learning not only enhances the quality of learning, but it also plays a key role in achieving the Sustainable Development Goals (SDGs), especially quality education (SDG 4), as it makes education more accessible, inclusive, and effective (Vinuesa et al., 2020). AI-based education is emerging as a key tool in achieving the Sustainable Development Goals (SDGs). Its contribution to SDG 4 (Quality Education), SDG 10 (Reduced Inequality), and SDG 13 (Climate Action) set by the United Nations is crucial (United Nations, 2015).

The context of SDG-4, AI-based personalized learning delivers learning content tailored to learners' individual needs, abilities, and learning pace, making education more inclusive, accessible, and quality. This is particularly beneficial for students who lag behind in traditional teaching methods, as AI provides them with tailored support and real-time feedback (Holmes et al., 2019; UNESCO, 2021).

In the context of SDG-4, AI-based personalized learning delivers learning content tailored to learners' individual needs, abilities, and learning pace, making education more inclusive, accessible, and quality. This is particularly beneficial for students who lag behind in traditional teaching methods, as AI provides them with tailored support and real-time feedback (Holmes et al., 2019; UNESCO, 2021).

In the context of SDG-13 (Climate Action), AI education can develop environmental awareness and responsibility for sustainable development among students. AI-supported learning systems can provide personalized content related to climate change, sustainability practices, and environmental protection, encouraging behavioural change in learners (Vinuesa et al., 2020).

Thus, AI-based personalized learning not only enhances the quality of education but also plays a vital role in the overall achievement of Sustainable Development Goals by promoting social equality and environmental awareness.

Policy Initiatives

Several important policy initiatives have been taken at the global and national levels to promote the integration of Artificial Intelligence (AI) in education, with the aim of making the education system more effective, inclusive and future-oriented.

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In India, the National Education Policy 2020 (NEP-2020) places special emphasis on the integration of AI and digital education. The policy recommends making the teaching-learning process student-centred, strengthening digital infrastructure, and promoting the use of e-learning platforms and virtual labs (Government of India, 2020). Additionally, NEP-2020 encourages capacity building for teachers and the use of AI-based adaptive learning systems to enable teaching to be tailored to the individual needs of each student.

Internationally, the AI policy framework (2021) developed by UNESCO emphasizes the ethical, inclusive, and human-centered use of AI in education. This framework provides guidelines for the responsible use of AI, covering important aspects such as data privacy, transparency, and equity (UNESCO, 2021). The aim is to ensure that the use of AI in education provides equal opportunities and does not exacerbate any inequalities.

Similarly, the World Bank's Digital Education Initiative (2022) encourages the use of AI and digital technologies to enhance the quality and accessibility of education in developing countries. This initiative promotes digital learning platforms, online resources, and data-driven decision-making, particularly in low-resource settings, to make education more accessible and effective (World Bank, 2022).

Thus, these policy initiatives clearly show that AI-based education is being viewed globally as an important strategic tool that not only enhances the teaching-learning process but also helps in achieving the Sustainable Development Goals (SDGs).

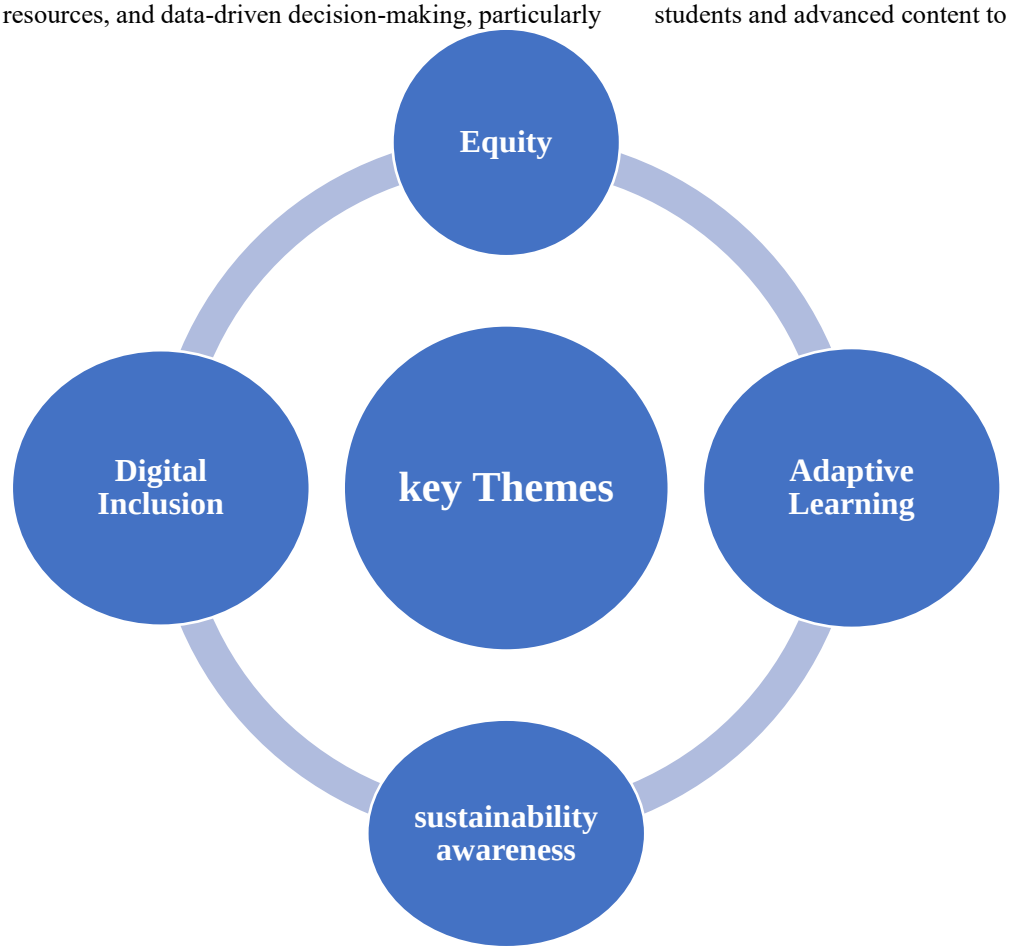
Key Themes

Digital Inclusion

AI-based learning ensures equal opportunities by providing education to remote and disadvantaged students through digital means, thereby promoting SDG-4 (quality education) and SDG-10 (reducing inequality).
Example: Providing quality content to students in rural areas through AI-based mobile apps.

Adaptive Learning

AI makes learning more effective by tailoring content to students' abilities, interests, and pace, thereby enhancing the quality of education and strengthening SDG-4.
Example: AI platforms provide additional practice to weaker students and advanced content to faster students.



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Equity
AI bridges the learning gap and provides equal educational opportunities to every student, thereby reducing social and educational inequalities and supporting SDG-10.
Example: AI-based translation tools help students from different languages understand the same content.

Sustainability Awareness
AI learning develops awareness and responsibility in students by imparting knowledge related to the environment and sustainable development, thereby promoting SDG-13 (Climate Action). Example: Explaining the impacts of climate change to students through AI-based simulations.

CONCLUSION

AI-based personalized learning can play a key role in achieving the Sustainable Development Goals (SDGs) by making the teaching-learning process more student-centered, flexible, and adaptive. In particular, it supports SDG 4 (quality education), as AI technologies tailor content to students' individual needs, abilities, and learning pace (Holmes et al., 2019; UNESCO, 2021).

AI-based learning systems make education more inclusive by providing equal opportunities to students from diverse socioeconomic backgrounds. Digital platforms and online resources can also provide quality education to students in remote and disadvantaged areas, reducing inequalities (Zawacki-Richter et al., 2019). Additionally, AI makes learning more effective through real-time feedback and adaptive learning, improving student achievement and understanding (Khosravi et al., 2022).

However, there are some significant challenges to the successful implementation of AI-based learning. First, strong policy support is needed to ensure AI is used ethically, safely, and equitably (UNESCO, 2021). Second, adequate technological infrastructure, such as the internet, digital devices, and software, is essential, especially in developing countries (World Bank, 2022). Third, teacher training is crucial, as effective use of AI-based tools is only possible if teachers understand and implement them correctly (Selwyn, 2019).

Thus, AI-based personalized learning can help achieve the Sustainable Development Goals by making education more inclusive, effective, and accessible, provided its implementation ensures a balanced development of policy, technological, and educational aspects.

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