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Integrating Indigenous Knowledge Systems and Artificial Intelligence for Preserving and Enhancing Sustainable Development Practices

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Abstract— This study explores the integration of Indigenous Knowledge Systems (IKS) and Artificial Intelligence (AI) to promote sustainable and inclusive education. Indigenous knowledge reflects holistic and environmentally sustainable practices, while AI enables personalized learning and intelligent assessment. The paper reviews literature to examine synergy between IKS and AI in advancing sustainable development. It highlights research gaps including lack of empirical studies, insufficient pedagogical models, and ethical concerns such as data privacy and digital inequality. The study argues that ethical integration of AI with Indigenous knowledge can enhance sustainability, equitable learning, and support Sustainable Development Goals.

Keywords— Artificial Intelligence in Education, Indigenous Knowledge Systems, Inclusive Education, Sustainable Development, Sustainable Development Goals

I. INTRODUCTION

Indigenous Knowledge Systems (IKS) represent cumulative community-based knowledge developed through long interaction with natural and cultural environments. In India, IKS includes Ayurveda, Yoga, agriculture, astronomy, architecture, and Gurukul education traditions. Artificial Intelligence (AI) refers to computer systems capable of learning, reasoning, and decision-making. The convergence of IKS and AI offers transformative potential for sustainable development, combining ecological wisdom with technological innovation.

II. ROLE OF IKS IN SUSTAINABILITY

IKS promotes ecological conservation, biodiversity protection, sustainable agriculture, holistic health, cultural identity, and value-based education. India's National Education Policy 2020 emphasizes integrating Indigenous knowledge into mainstream education to support holistic and multidisciplinary learning.

III. ROLE OF AI IN EDUCATION

AI transforms education through personalized learning, intelligent tutoring systems, automated assessment, inclusive assistive technologies, and data-driven decision-making. However, ethical concerns such as algorithmic bias, privacy risks, and digital inequality must be addressed for responsible implementation.

IV. RESEARCH GAP

There is limited empirical research integrating AI and IKS in real classrooms, insufficient pedagogical frameworks, lack of Global South studies, limited teacher perspectives, and absence of scalable implementation models.

V. CONCLUSION

The integration of Indigenous Knowledge Systems and Artificial Intelligence provides a pathway toward inclusive, ethical, and sustainable education. Future research should focus on empirical validation, teacher preparedness, and culturally responsive AI governance to ensure equitable development.

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