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AI-ENABLED TRANSFORMATIVE PEDAGOGY FOR SUSTAINABLE DEVELOPMENT: A PATHWAY TOWARD EQUITABLE AND RESILIENT LEARNING SYSTEMS

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***Abstract*:** As Nelson Mandela famously observed, education is the most powerful weapon one can use to change the world; today, Artificial Intelligence (AI) offers the possibility of sharpening that weapon to build a more sustainable future. It is reshaping education at a moment when the world is falling behind on Sustainable Development Goal 4 (SDG 4). Studies show that when AI is governed ethically and paired with teacher agency, it can narrow digital divides, foster sustainability competencies, and support lifelong learning. This article argues that AI has emerged not just as a tool for administrative efficiency, but as a potential catalyst for "transformative pedagogy" which is a paradigm shift from rigid, one-size-fits-all instruction to learning systems that are adaptive, resilient, personalized and deeply rooted in sustainability. This article examines how AI can shift pedagogy from transmission to transformation. The main contribution of this article is that it proposes five interconnected & actionable pathways that explicitly link transformative pedagogy with equitable and resilient outcomes. Drawing on the synthesis of recent empirical studies, policy frameworks, and teacher perspectives, the proposed pathways integrate adaptive tools, generative AI, and human-centered design. These pathways address persistent gaps in access, relevance, and crisis preparedness, especially in resource-constrained settings such as rural India. The paper concludes with a phased roadmap which is aligned with India's National Education Policy 2020 and global agendas, while acknowledging limitations such as infrastructure shortages and algorithmic bias. Ultimately, the goal is not to replace educators but to strengthen their capacity to prepare learners for uncertain futures.

IndexTerms **-** Artificial intelligence (AI), transformative pedagogy, sustainable development goals (SDG), equitable and resilient learning systems

INTRODUCTION

The global educational landscape is facing at profound crisis of relevance and resilience, where the promise of universal literacy and equity is being tested by unprecedented instability. While the United Nations' Sustainable Development Goal 4 (SDG 4) sets an ambitious target to ensure inclusive and equitable quality education for all by 2030, recent evidence suggest that the world is significantly off-track (Nyhan & Marshall, 2024; UNESCO, 2025). In many low- and middle-income countries, "learning poverty" has increased; after the recent global pandemic approximately 70% of 10-year-old children are unable to read and understand a simple text. This isn't just a matter of basic literacy or failure of infrastructure or teacher

shortages which currently affect over 85% of countries (Bhatta, 2025). Rather it's a systemic failure of traditional pedagogical models to equip learners with the competencies needed to adapt to a world defined by rapid technological shifts and socio-economic instability (Aggarwal, 2023; Trevisan et al., 2024).
In the Indian context, this challenge is mirrored by a vast, heterogeneous student population where access to quality education often depends on geography and socioeconomic status. While India's National Education Policy (NEP) 2020 provides a progressive roadmap for holistic and multidisciplinary learning, the gap between policy and practice remains wide, particularly in resource-constrained rural settings where infrastructure disparities persist (Alli, 2026;).

Traditional pedagogies, which are still largely lecture-based and focused on standardized test results, struggles to equip students with the systems-thinking and green competencies and foster the "transformative learning" required for sustainable development. Traditional pedagogy treats learners as passive recipients rather than active agents. It rarely connects classroom knowledge to real-world environmental, social, and economic challenges (Bagherimajd & Khajedad, 2025; Mariyono et al., 2025). Sustainability education requires more than awareness; it demands transformative competencies such as critical thinking, collaboration, and ethical decision-making, that conventional methods rarely promote at large. AI, when thoughtfully integrated, offers a pathway to bridge this gap. It can simulate complex systems, provide instant personalised feedback, and create immersive experiences that make abstract sustainability concepts tangible (Nyhan & Marshall, 2024).

The explosion of generative AI tools like ChatGPT and its successors hasn't just introduced a new tool; it has challenged fundamental assumptions about how we teach and learn (OECD, 2026; Pachava et al., 2025). What began as novelty writing assistants has evolved into adaptive tutors, content generators, and real-time assessment engines (Nedungadi et al., 2024). These technologies promise to personalise learning at scale, bridge shortage of teachers and deliver multilingual, offline-capable content. AI enables "Green Education," integrating sustainability principles directly into curricula to foster a deeper understanding of environmental stewardship (Aggarwal, 2023). However, the introduction of these tools brings significant ethical risks, which include data privacy and algorithmic bias that can systematically disadvantage low-income students and increase digital divides (UNESCO, 2019). To move forward, we must examine how AI can be used not as a replacement for human educators, but as a classroom assistant that redefines the teaching role toward mentorship and socio-emotional support. This article explores the pathways toward such a system, evaluating the balance between technological innovation and the ethical governance required to ensure that no learner is left behind in the digital age.

LITERATURE REVIEW

The evolution of Artificial Intelligence in education has been rapid and transitioned through distinct phases. Early waves focused on rule-based Intelligent Tutoring Systems (ITS) The second wave introduced sophisticated student modeling and adaptive platforms that adjust difficulty in real time (Bhatta, 2025; UNESCO, 2019). We're now in a third wave which is characterized by deep learning, multimodal tools, and generative AI that can understand speech, text, and even emotional signals. It has introduced content creation, natural-language dialogue, and immersive simulations (Nedungadi et al., 2024; Pachava et al., 2025; Iqbal et al., 2025).

Recent bibliometric analysis shows a sharp increase in research exploring role of AI in achieving SDG 4, particularly personalised learning and equity (AlSagri & Sohail, 2024). Research on AI literacy in higher education shows that students gain sustainability competencies when AI is used as a reflective tool (Alamäki et al., 2024). Generative AI is credited with transforming lifelong learning ecosystems, yet researchers emphasizes that such outcomes only results when technologies complement instead of replacing teachers (Nedungadi et al., 2024). Studies shows that AI interventions have resulted in improved engagement and moderate to large positive effects on learning outcomes when paired with comprehensive pedagogy (Trevisan et al., 2024; Bhatta, 2025). Yet, researchers repeatedly warn that algorithmic systems are not neutral; if poorly designed, they can reinforce existing inequalities such as cultural or gender biases (Alli, 2026; UNESCO, 2025). Moreover, substantial geographic inequalities remain; while Asia and North America lead in AIEd research, Africa contributes only about 1% (Bhatta, 2025). This geographic divide is a major concern for global sustainability (Alli, 2026; Huseynova, 2026). Frameworks such as equity-centred AI convergence models and TPACK updates for sustainable education have been proposed in the studies but at the same time they emphasize the need for governance, teacher agency, and contextual adaptation of these frameworks (Pachava et al., 2025; Riandi et al., 2026).

Education for Sustainable Development (ESD), supported by the UNESCO 2030 Agenda, recognizes that education and sustainability are "intrinsically linked" (Nyhan & Marshall, 2024; UNESCO, 2020). UNESCO's 2030 Framework for Action positions education as both a goal (SDG 4) and a means to achieve all other SDGs (UNESCO, 2019). ESD emphasises interdisciplinary learning, systems thinking, and action competence. Green education initiatives demonstrate that AI has the potential to create more sustainable "Green Education" and can make sustainability learning more accessible and efficient. For example, AI-powered remote sensing and drones can be used in curriculum projects to monitor deforestation or wildlife, making sustainability concepts tangible for students (Aggarwal, 2023). However, most implementations remain fragmented where personalised learning is rarely linked to sustainability outcomes, and resilience features such as offline functionality, crisis adaptability etc. are often afterthoughts (Bagherimajd & Khajedad, 2025).

Despite the rise in researches in the field of AI, literature reveals a limited integration of equity, resilience, and sustainability into one cohesive model. Many studies focus on test scores, but few examine how AI helps learners develop the "foresight" and "systems thinking" competencies needed for the 2030 Agenda (Alamäki et al., 2024; Bagherimajd & Khajedad, 2025). Researches in developing-countries are still emerging, and requires more participatory researches that includes teacher and learner views (Huseynova, 2026; Mariyono et al., 2025).

THEORETICAL FOUNDATIONS

To understand AI-enabled transformative pedagogy, we must move beyond the technology itself. Learning is often viewed through the lenses of **Constructivism**, where knowledge is actively built through experience. Then, **Connectivism**, which sees learning as a process of connecting nodes of information and networked interactions (Nedungadi et al., 2024). AI acts as a "cognitive tool" in these frameworks which provide immediate feedback and help students navigate vast information networks (Bhatta, 2025; Nedungadi et al., 2024).

The **TPACK model** (Technological Pedagogical Content Knowledge) reminds us that technological knowledge must intersect with pedagogical and content knowledge; simply adding AI tools is insufficient. Effective AI integration requires teachers to understand the intersection of technology, pedagogy, and subject matter (Riandi et al., 2026). Teachers must develop the digital literacy to use AI in a "pedagogically meaningful way" (Kharroubi, 2025; Riandi et al., 2026).

Sustainability education principles, such as systems thinking and **Transformative Learning theory**, emphasize a shift in "frames of reference" i.e. education that changes how people act in the world; critical reflection on assumptions and collective action for change (Alamäki et al., 2024; Bagherimajd & Khajedad, 2025). This links with the **AI Academic Convergence Framework**, which advocates for equitable and ethical AI pedagogy that fosters "global citizen" competencies like responsibility and civil participation (Bagherimajd & Khajedad, 2025; Pachava et al., 2025).

Finally, all of this must be grounded in **Human-Centered AI Ethics** which are stated in UNESCO guidelines. It provides the moral compass as it emphasizes that principles of fairness, transparency, accountability, and privacy protection are non-negotiable, especially in contexts where learners have limited owenership over their data. It also recommends that innovation should serve human development (UNESCO, 2025; Nyhan & Marshall, 2024). While AI can handle routine administrative tasks, it should never replace the "essential human touch" such as reading emotions and building trust (Alli, 2026; UNESCO, 2025).

The conceptual link between transformative pedagogy and resilient learning systems is simple yet powerful. Resilience here refers to systems that function in low-connectivity, crisis, or resource-constrained environments while continuously adapting to learner needs and sustainability requirements. Transformative pedagogy answers the "why" i.e. agency, critical consciousness; resilient AI systems answer the "how" i.e. adaptive, offline-first, ethically governed tools. Together they create learning ecosystems that are inclusive today and sustainable tomorrow (Chigbu et al., 2025). This synthesis draws on recent models that treat AI not as a replacement for teachers but as a collaborative partner in fostering global citizenship and lifelong learning (OECD, 2026).

PROPOSED PATHWAYS FOR AI-ENABLED TRANSFORMATIVE PEDAGOGY

The heart of this article lies in five interlocking and practical pathways which form the original contribution of this article. They are designed as an interconnected ecosystem rather than isolated interventions. The five pathways are presented here as a conceptual model in Fig-1; having a central "Equitable and Resilient Learning Core." This core has five radiating arms, each of them are representing a pathway that leads to "SDG 4: Quality Education. Interconnections by dotted bidirectional lines show how personalised instruction feeds into sustainability projects, how adaptive assessment informs teacher co-creation, and how lifelong ecosystems reinforce resilience across the entire system. This model is deliberately simple for adoption that avoids complexity so that policymakers, school leaders, and EdTech developers in resource-constrained settings can adopt and adapt it quickly. The pathways are grounded in recent studies yet remain purposely practical and emphasise low-bandwidth, multilingual, and offline-first solutions (Nedungadi et al., 2024; Alli, 2026).

Figure 1- model of proposed pathways for AI-enabled transformative pedagogy

Pathway 1: Personalised and Inclusive Instruction

This pathway shifts instruction from a one-size-fits-all model to truly learner-centred experiences. AI analyses real-time data on student's progress, pace, prior knowledge, language preferences, affective states and accessibility needs to generate tailored content, adjust learning materials and scaffolding. For example, generative AI chatbots can instantly translate complex science explanations into regional languages or simplify them for first-generation learners, while voice-assisted interfaces, speech-to-text tools and screen-reader integrations support students with visual or hearing impairments (Arruda & Arruda, 2024; Pachava et al., 2025; Alli, 2026).

Key technologies include adaptive learning platforms (e.g., enhanced versions of intelligent tutoring systems), multilingual large language models, and low-bandwidth mobile apps that function offline after initial syncing. These tools continuously adjust difficulty and provide scaffolded hints without requiring constant internet connectivity. Expected outcomes are directly measurable against SDG 4 indicators - increased completion rates, improved learning achievement scores, and reduced equity gaps for marginalised groups. Recent studies show that using personalised AI instruction in culturally responsive design or using AI tutors in local languages can achieve literacy gains equivalent to two years of schooling in just six months and reduce achievement inequalities by 15–25% (AlSagri & Sohail, 2024; Bhatta, 2025).

In the Indian context, this pathway could transform the DIKSHA platform by embedding offline-capable AI tutors in regional languages like Hindi, Tamil, or Bhojpuri. Rural government schools in Uttar Pradesh or Bihar could then deliver personalised mathematics or environmental science modules even during power cuts or network failures. It may directly address the learning poverty that affects millions of children (Bhatta, 2025).

Pathway 2: Sustainability-Infused Experiential Learning

AI has the power to create immersive, project-based experiences and make abstract sustainability concepts "real" (Aggarwal, 2023; Alamäki et al., 2024). Generative AI creates real-world climate projects or biodiversity monitoring dashboards, that students may explore collaboratively. VR/AR simulations allow students to manage virtual ecosystems, model deforestation or model the effects of renewable energy adoption in their own village (Aggarwal, 2023; Alamäki et al., 2024; Nedungadi et al., 2024). Learners co-create solutions rather than memorising facts.

Technologies include generative AI for project ideation and scenario generation. open-source VR/AR toolkits which are optimised for mobile devices, environmental monitoring drones, sensor-integrated simulations for local weather or pollution data etc. These are the tools which require minimal hardware yet deliver high engagement. Expected Outcomes are aligned with SDG 4 Target 4.7 (education for sustainable development) where students demonstrate systems thinking, environmental literacy, and action competence. Longitudinal studies indicate that experiential AI modules improve both cognitive understanding and pro-environmental behaviours more effectively than traditional lectures and measurable gains in systems thinking and environmental literacy (Alamäki et al., 2024; Bagherimajd & Khajedad, 2025).

An India-relevant design may include the use of generative AI to create case studies drawn from local ecosystems integrated into school projects such as Ganges River pollution or a "Smart Agriculture" project where students use AI to analyse data from sensors, learning both coding and sustainable crop management. Students could also design community mitigation projects such as low-cost rainwater harvesting models that may result in turning abstract global goals into concrete local action. This approach not only builds sustainability competencies but also strengthens community ownership of learning.

Pathway 3: Resilient & Adaptive Assessment Systems

Traditional assessments are often too slow to help struggling students as reported by Bhatta, (2025) and OECD (2026). This pathway replaces them with continuous, formative, and crisis-resilient assessment. Real-time analytics analyses interaction patterns of learners to provide instant feedback, predict learning difficulties, and recommend targeted interventions. Predictive analytics identify students at risk of dropping out weeks before a teacher might notice (Bhatta, 2025; UNESCO, 2019). Offline assessment tools ensure continuity during floods, internet blackouts, or school closures (Alli, 2026; Pachava et al., 2025).

Core technologies are real-time learning analytics dashboards, natural-language processing for automated feedback on open-ended responses, and edge-computing models that run assessments locally on low-cost tablets. Expected Outcomes are linked to SDG 4 indicators on learning outcomes and equity and supports SDG 4.1- universal primary and secondary completion; this pathway improves progression rates and reduces class repetition. Studies shows that automated essay scoring software used in 60,000 Chinese schools matching human precision in 92% of cases (Bhatta, 2025; UNESCO, 2019). Early-warning systems have already shown 20–30% gains in retention when implemented thoughtfully (AlSagri & Sohail, 2024).

In Indian government schools, Dropout prevention dashboards could be used to identify patterns of absenteeism and may allow timely community interventions. Low-bandwidth AI dashboards could track mastery of sustainability modules in real time.

Pathway 4: Teacher Empowerment and Co-Creation

AI does not replace teachers rather it should give teachers "superpowers". This pathway positions AI as a collaborative virtual assistant that handles routine tasks so educators can focus on mentorship, creativity, and relationship-building. Generative tools draft lesson plans which are aligned with sustainability themes, suggest differentiated activities for mixed-ability classrooms, and offer professional-development micro-credentials customised according to the context of each teacher (Kharroubi, 2025; Riandi et al., 2026).

Technologies include AI co-pilots integrated into existing platforms, "dual-teacher" models where AI handles drills, automated curriculum-mapping tools, and reflective analytics that show teachers how their

students are progressing. Expected outcomes strengthen SDG 4 and contributes to Target 4.c i.e. increase the supply of qualified teachers by 2030 through international cooperation for teacher training. Studies have reported that when AI acts as a virtual assistant and handle routine tasks it frees up 30% of a teacher's time for mentoring; teachers feel supported rather than threatened, adoption rates rise dramatically and pedagogical innovation flourishes (Arruda & Arruda, 2024; Nyhan & Marshall, 2024). Studies on teacher perceptions confirm that capacity-building is the decisive factor for successful AI adoption (Riandi et al., 2026).

In Indian higher-education institutions and teacher-training colleges, AI assistants could help faculty align curricula with NEP 2020's multidisciplinary requirements while generating sustainability-infused lesson plans in regional languages. This reduces preparation time and empowers teachers to become facilitators of transformative learning.

Pathway 5: Scalable Lifelong Learning Ecosystems

Formal schooling ends too early for many learners in the Global South. This pathway extends education to reach the last learners in rural or global south contexts. Offline-first AI platforms combined with community-based systems provide access without high-speed internet and extend learning beyond formal schooling. Learners can earn small, focussed micro-credentials in green skills, access peer-learning networks, and receive AI-curated open educational resources that adapt to life-stage needs. (Nyhan & Marshall, 2024; Nedungadi et al., 2024; Alli, 2026).

Technologies include AI-powered community learning hubs that operate on solar-powered devices, as used in rural India; mobile apps with intermittent connectivity, and AI-driven recommendation engines that suggest relevant vocational or civic modules. Other examples include mobile-first platforms such as M-Shule in Kenya and open-source toolkits like Kolibri (UNESCO, 2019).

Outcomes support SDG 4's lifelong learning target such as 4.4- skills for employment and 4.b – scholarships. This pathway also contributes to SDG 8- economic growth & decent work and SDG 10- reduced inequalities. Early pilot studies show adult learners gain both knowledge and agency i.e. capacity to make intentional choices and take purposeful action; when ecosystems are community-owned.

In rural India, village youth centres using AI-enabled voice assistants to access vocational training materials in local dialects that help to overcome literacy barriers (Bhatta, 2025; UNESCO, 2019). AI-powered gram-panchayat learning hubs could operate on solar devices, which may link school-leavers with farmers' cooperatives for modules on sustainable agriculture or women's self-help groups for financial and digital literacy. This creates a continuous network from school to workforce and civic participation.

To make the pathways immediately actionable, they are summarised in Table 1 below. Each row provides a concise description, key technologies, expected SDG 4 outcomes along with an illustration relevant in Indian Context.

Table 1: five pathways for AI-enabled transformative pedagogy

Pathway	Description	Key AI Technologies	Expected SDG 4 Outcomes	India Relevant Illustration

Pathway 1: Personalised and Inclusive Instruction	Shifts from one-size-fits-all to truly learner-centred experiences through analysing real-time data on pace, language, and accessibility needs.	Multilingual generative chatbots, adaptive learning platforms, voice-assisted interfaces, offline-first mobile apps	4.1- universal primary and secondary completion 4.5- eliminating disparities 4.6- universal literacy/numeracy	Offline AI tutors embedded in DIKSHA platform delivering mathematics and science in regional languages for rural schools.
Pathway 2: Sustainability-Infused Experiential Learning	Creates immersive, project-based experiences that make sustainability tangible through real-world scenario generation and simulation.	Generative AI for project ideation, lightweight VR/AR simulations, sensor-integrated climate models	4.7- knowledge for sustainable development i.e. systems thinking, environmental literacy, and action competence	AI-generated local case studies used for student-designed community mitigation projects.
Pathway 3: Resilient and Adaptive Assessment Systems	Replaces high-stakes exams with continuous, formative, crisis-resilient assessment and early-warning support.	Real-time learning analytics, natural-language feedback engines, edge-computing offline assessment modules, predictive dropout algorithms	4.1- universal primary and secondary completion 4.5- eliminating disparities	Low-bandwidth AI dashboards in government schools providing teachers with mobile alerts for students needing support on sustainability modules during floods or any interruptions
Pathway 4: Teacher Empowerment and Co-Creation	Positions AI as a collaborative assistant that frees teachers for mentorship and innovation while handling routine tasks.	AI lesson-plan generators, differentiated-activity suggesters, personalised professional-development micro-credentials	4.c- teacher supply and training i.e. Increased supply of confident, innovative teachers	AI co-pilots in teacher-training colleges and higher-education institutions helping faculty align curricula with NEP 2020's focusing on multidisciplinary and sustainability
Pathway 5: Scalable Lifelong Learning Ecosystems	Extends education beyond formal schooling through community-embedded, offline-first platforms offering stackable micro-credentials.	Solar-powered community kiosks, intermittent-connectivity mobile apps, AI-curated open-resource recommenders	4.3- Equal access to affordable technical, vocational and higher education 4.4- skills for employment 4.6- universal literacy/numeracy	AI-powered gram-panchayat learning hubs operating on solar devices, linking school-leavers with farmers' cooperatives for sustainable agriculture modules

Collectively, these pathways form a resilient ecosystem and create a self-reinforcing loop. Personalisation ensures no learner is left behind (Pathway 1), experiential projects embed sustainability values (Pathway 2), resilient assessment maintains momentum through crises (Pathway 3), empowered teachers sustain quality (Pathway 4), and lifelong ecosystems guarantee long-term impact (Pathway 5). Recent frameworks confirm that only such integrated approach can deliver both equity and resilience at scale (Bagherimajd & Khajedad, 2025; Alli, 2026).

CHALLENGES & MITIGATION STRATEGIES

This section examines the very real challenges that must be addressed if these pathways are to move from concept to classroom reality.

Technical and ethical risks are the major concern. Algorithmic bias can spread stereotypes; systems trained on biased historical data can propagate existing prejudices. For example, in career recommendation AI might suggest lower-level courses to girls in STEM (Bhatta, 2025). The digital divide remains a "new inequality in equality". It refers to a situation where access to technology exists but the quality of that access varies so wildly that it reinforces existing disparities. Students in disadvantaged areas often depend on basic smartphones, which limits the complexity of tasks they can perform compared to those with computers (Alli, 2026; Bhatta, 2025). Data privacy concerns are acute in contexts where regulations are weak (UNESCO, 2025; Alli, 2026). We must also consider the environmental cost because AI models require massive energy and water, which ironically undermines sustainability goals (Aggarwal, 2023; Chigbu et al., 2025). Implementation barriers in developing countries include unreliable electricity, teacher readiness gaps, and high initial costs (Huseynova, 2026).

Mitigation Strategies should include the following points

1. **Ethical Governance:** Mandatory regular bias audits and multi-stakeholder oversight needs to be implemented (OECD, 2026; Nyhan & Marshall, 2024).
2. **Data Privacy:** implementation of strict regulations like the GDPR to protect sensitive behavioural data (Bhatta, 2025; UNESCO, 2025).
3. **Human Oversight:** it is important to make sure that final high-stakes decisions like graduation or disciplinary actions always involve human judgment (Bhatta, 2025; UNESCO, 2025).
4. **Design Principles**: Consider offline-first; culturally responsive algorithms and use of participatory design involving affected communities. Researches suggests that participatory design dramatically reduces bias and increases acceptance (Kharroubi, 2025; Alli, 2026).

Implementation Roadmap

Recommendations for successful implementation of suggested model comprises following points-

- **National AI Literacy:** To include AI literacy alongside traditional literacy; national curricula need to be updated in alignment with India's NEP 2020. DIKSHA platform could be enhanced with the proposed pathway. (Alamäki et al., 2024; Bhatta, 2025).
- **Teacher Training:** Governments should mandate AI equity impact assessments and integrate AI literacy into teacher training. for this professional development programmes focused on "human-AI collaboration" should be launched (Kharroubi, 2025; UNESCO, 2019
- **Short-term (1-2 years):** Focus on "low-resource" AI tools such as SMS-based tutors that work on basic networks as pilot projects alongwith teacher training programmes (Bhatta, 2025; UNESCO, 2019).
- **Medium-term (3-5 years):** Establish a "National AI Education Repository" of open-source, culturally relevant tools. successful models & projects can be implemented on large scale and their longitudinal impact should be evaluated (AlSagri & Sohail, 2024).

CONCLUSION

AI isn't just about speed; it's about fairness and resilience. The five pathways demonstrate that AI-enabled transformative pedagogy can make equitable and resilient learning systems a reality. The proposed pathways offer a glimpse into achieving the targets of SDG 4 through personalization, empowerment, and reaching marginalized communities; but its success isn't guaranteed by the technology itself. It requires a human-centred approach that prioritizes ethical governance, infrastructure development, and comprehensive teacher training. However, limitations of this conceptual work include its reliance on secondary sources that currently comes from developed countries. Future research should explore the longitudinal impacts of AI on learning and participatory action research that centres marginalised voices. Studies suggests that when AI is integrated thoughtfully, it can move classrooms away from rigid routines and toward flexible, engaging environments where every learner has the opportunity to thrive. Ultimately, the goal is to harness the "weapon" of education which is sharpened by AI, to build a more sustainable and just world.

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