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"Eco-Minds: Transforming Environmental Education for Generation Z Through AI-Driven Learning"

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ABSTRACT

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The inevitable plea from the environment for help and attention makes it extremely important to update our educational paradigms by working on a more technology-driven approach to learning, especially the generation of Z who is interested in being involved with the environment. Most conventional environmental education methods are not so good at engaging these digitally native people. The research examines the contribution of AI in producing success in three domains namely smart learning environments, AI which is all about adaptation, and technologies creating an experience of the entire world.

Primarily, this article uses a Systematic Literature Review (SLR) as a research method for aggregating the existing information on AI and sustainability and for evaluating the capacity of the AI to enable eco-literacy.

The authors employed Thematic Analysis as a methodology to deduce some of the current trends in this area, including AI-based practices so that the learning can be personalised, games for learning, and augmented and virtual reality. The study did not cover the full extent of ethical AI usage nor the accessibility challenges of this technology in the future.

The results imply that AI is a game-changer in environmental education; however, it also struggles with conflicting interests such as ethical norms, fair distribution, and accessibility. The investigation argues for using AI in an environmentally friendly way where everyone has the right to it; besides that, such a system should be accountable, transparent, and not run counter to the global environment protection goals.

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Introduction

The increasing environmental problems which include climate change, and biodiversity loss have exposed the immediate requirement of reshaping the education domain in such a way that future children will have sustainability promotion skills, knowledge, and values (Bradley et

al., 2020; Fawehinmi et al., 2020). Generation Z, as the inhabitants of the digital world, need to have the educational fond that is interactive, flexible, and is consistent with their ideas for justice and environmental care. They demand environmental education that is not limited to the classroom and is therefore, their needs and interests are given the first

priority. In case the educational system continues its traditional way, students will still have a homogeneity of outdated ideas (Chillakuri, 2020; Gomes et al., 2023). But physical learning could also have the potential to modify the learners' perception of sustainability irrespective of the evolutionary status of technology (Chin et al., 2020; Tarim et al., 2019).

Last but not the least; the cultural and societal situation will have a significant impact on individuals' thinking about environmental problems. We need new and innovative solutions to solve problems caused by climate change. In addition, we should focus on human-to-human and human-to-nature aspects of solving environmental problems and making CEOs and leaders implement such solutions (Sahin, 2018; Yildirim, 2017).

Recent academic research has demonstrated that AI can educate young people about sustainability and increase their awareness by developing their critical thinking, empathy, and ethical decision-making skills through fictitious problem-solving and creative learning approaches. Thus, this is to be made is a possibility by collecting and sharing different scenarios and materials about ecological citizenship and collaboration among students, where AI and learning could be useful and even vital (Luciene, 2024b), and virtual reality

AI has been tested, and it has shown its potential in facilitating the learning of climate change issues in high school students and thus has been suggested to the teacher and the students (Lim et al., 2024; Sachyani & Gal, 2025).

In areas of museums, it has been proven that AI-powered AR can be positive for decision-making and unity among different generations. Museums have the ability to implement AI-driven educational programs via AR, which can be a way out for sustainability (Jost et al., 2025).

On the one hand, AI contributions in learning and teaching with that in formal as well as non-formal learning contexts have made education better inclusive in their participation and adaptable in the local context. However, the problems still belong to the digital divide, which shows that there is still certain technology--like AI--which is inaccessible for some parts of the world (Rimadias, 2025).

Furthermore, AI applications promise more positive and sustainable outcomes for the future if they are successfully integrated with sustainable development goals (SDGs) and lifelong learning. Long-term AI impacts in sustainability education should be delimited, and for this purpose, data from the ANCIL, one of the most respected indicators of sustainability that can

influence people in creating a positive attitude towards nature, were deduced (Nguyen et al., 2025).

Challenges remain, despite all these potentials, in the following areas: personal information protection, human-machine interaction, and the ecological impact of AI technology can be some of the issues. The unequalness in the distribution of the opportunities for self-education is due to the much-talked digital divide. Many educators and students still prefer traditional methods. They believe that the usage of such technology is the only way to ensure fair and equal treatment (Ghimire et al., 2024).

However, we have these solutions. The situation with the farsighted parents is not relatively much better as the developmental and ecological issue on an individual level continues (Eden et al., 2024).

This research looks at Systematic Literature Review (SLR) to discover how artificial intelligence changes the existing pattern of environmental education and accordingly helps eco-literacy, especially among Generation Z learners, to emerge better than before. This is done by a resurgence of environmental education that is made possible mostly by the influence of environmental issues and AI purposefully cut across cross-sectoral linkages "the

education environment, ecosystem, and the market " to supply it with the much more advanced infrastructure (Tiller, 2023).

The paper aims to be completed by extracting global research on AI in different areas, actualizing them in more human-like educational settings, and developing less hardware-dependent AI (Chang & Kidman, 2023). The study traces AI evolution in the education sector and illustrates the resulting shifts in the environment, economy, society, and politics. As AI technology is expanding rapidly, this study focuses on AI-driven educational innovations that could potentially cater to the diverse needs of the learners in the present world and the future (Xiaoyu et al., 2025; Ghimire et al., 2024b).

Objectives

1. To evaluate the effectiveness of AI-driven adaptive learning environments in enhancing eco-literacy among Generation Z learners.
 - *How do AI-powered personalized learning platforms contribute to students' understanding of environmental sustainability?*
2. To investigate the role of immersive AI technologies (AR/VR) in

fostering experiential learning for environmental education.

- *What are the benefits and challenges of using AI-driven AR/VR applications to teach eco-conscious behaviors and sustainability concepts?*

3. To explore the ethical and accessibility challenges of AI-driven environmental education.

- *How do issues such as bias in AI algorithms, data privacy, and the digital divide impact the equitable implementation of AI-powered sustainability education?*

Literature Review

AI-Powered Personalization in Environmental Education

AI-powered personalization is at the core of transforming learning for Generation Z, whose expectations include adaptive, feedback-driven, and self-paced learning environments (Chillakuri, 2020; Al-Sharafi et al., 2023). Studies show that intelligent systems such as AI-based recommendation engines and adaptive platforms improve environmental learning outcomes by tailoring content to learners' proficiency

levels and interests (Francis et al., 2025; Noroozi et al., 2024; Lee, 2022). Nguyen et al. (2025) emphasize the importance of value-sensitive design in AI-driven chatbots for climate education, ensuring support for identity, well-being, and sustainability awareness.

Chisom et al. (2024) report how AI tools are revolutionizing education in Africa by overcoming access barriers and adapting content for local contexts. Xiaoyu et al. (2025) highlight the usability of generative AI in guiding learners through heuristic-based environmental tasks. Similarly, Viana (2024) underscores the role of AI systems in providing real-time support in classrooms, creating responsive learning ecosystems. Yet, Selwyn (2024) and Eden et al. (2024) caution that algorithmic transparency and ethical governance must be prioritized, particularly to address disparities introduced by biased datasets or opaque recommendation logic.

Immersive Technologies and AI-Driven Gamification

Immersive learning tools such as **Augmented Reality (AR)**, **Virtual Reality (VR)**, and **gamification** are reshaping how environmental topics are experienced and internalized. Lisdiana et al. (2025) demonstrated that AR-based sustainability games improved students' practical eco-

skills through experiential learning. Jost et al. (2025) explored gamified AR tools in museum settings, which improved learners' environmental decision-making. These studies, along with the work of Sachyani and Gal (2025), show that AI enhances learning about complex natural systems by creating interactive, scenario-based environments.

Gamified quests such as the SusQuest AR experience engage users through challenge-based activities that simulate real-world sustainability dilemmas (g et al., 2025). Chang and Kidman (2023) explain how these tools are particularly effective for geography and environmental education, where spatial reasoning and systems thinking are essential. Meanwhile, Ghimire et al. (2024a, 2024b) reveal that educators are increasingly supportive of immersive technologies despite needing more training to fully utilize them. The integration of immersive tools is not without barriers—cost, infrastructure, and accessibility continue to hinder widespread adoption, especially in low-income settings (Salmi et al., 2024; Rimadias, 2025).

AI and Sustainability Learning Outcomes

Beyond engagement, AI contributes directly to sustainability learning outcomes by enabling learners to visualize and

experiment with environmental systems in real-time. AI applications are used to simulate climate change effects, analyze ecological data, and model policy interventions (Lee et al., 2025; Bradley et al., 2020). Chisom et al. (2024) report success using AI in African classrooms to teach renewable energy concepts and conservation practices. Milton (2024) and Su and Mokmin (2024) show that AI also enhances sustainability thinking in interdisciplinary settings, such as gastronomy and visual arts, where eco-consciousness is nurtured alongside creativity.

Luciene (2024a, 2024b) details how aquaponics projects powered by AI foster both ecological awareness and problem-solving. Fawehinmi et al. (2020) explore green behaviors in higher education contexts, reinforcing the role of data-driven sustainability interventions. AI is also leveraged in environmental storytelling and smart campus initiatives, where real-time energy usage is monitored and visualized for behavior change (Lu & Wang, 2024; Lim et al., 2024). These applications bridge theory and action, allowing students to not only understand environmental issues but also experiment with tangible solutions.

Ethical and Equity Considerations

While AI holds enormous potential in sustainability education, ethical concerns are repeatedly flagged across the literature. Selwyn (2024) warns that AI's data dependence makes it vulnerable to reproducing bias and systemic inequalities. This is echoed by Dauvergne (2024), who raises environmental critiques about AI's own carbon footprint particularly the energy demands of large language models and cloud infrastructures. In educational contexts, data privacy and algorithmic accountability are ongoing concerns (Salmi et al., 2024; Eden et al., 2024).

Ibanga et al. (2024) emphasize that digital education tools must be developed with cultural and religious sensitivity, especially in global South contexts. Tiller (2023) argues that while AI can support climate action, it may simultaneously distract from grassroots movements and community-based solutions if not thoughtfully implemented. The digital divide remains one of the most pressing issues, with learners in under-resourced regions lacking access to the hardware, internet, and training necessary to benefit from AI-enhanced learning environments (Ali et al., 2024; Hidayat, 2023). Bridging this gap is essential for ensuring equitable access to transformative environmental education.

Emerging Pedagogical Roles of AI

AI is not only transforming student experiences but also the pedagogical roles of educators. Noroozi et al. (2024) outline how AI reshapes instructional design, assessment, and feedback loops, supporting dynamic and iterative learning. Lu (2020) and Yong-Bae Lee (2022) examine how AI tools are integrated into teacher-led environmental programming, enabling blended learning environments that merge digital tools with hands-on experiments. Teachers now rely on AI-driven dashboards and auto-assessment tools to monitor eco-literacy progress, identify misconceptions, and personalize content delivery (Francis et al., 2025; Viana, 2024).

Al-Sharafi et al. (2023) add that AI can also assist teachers in cross-cultural classrooms, adjusting content tone, format, and language based on learner background. As educators take on facilitative rather than didactic roles, AI becomes a co-teacher, particularly in project-based and experiential learning formats (Nguyen et al., 2025; Rimadiaz, 2025). However, the successful integration of AI depends on professional development and institutional support, as reported in several studies that highlight gaps in digital pedagogy among educators (Ghimire et al., 2024a; Su & Mokmin, 2024).

Research Methodology

The primary mode of research was a Systematic Literature Review (SLR) to investigate the influence of Artificial Intelligence (AI) on environmental education, especially the changes it brings to eco-literacy, the use of immersive learning, and the ethical implications. The SLR was the best choice because it is a method that is most exhaustive and capable of being replicated and at the same time allows for the distillation of the repetitions, the comparison of points and the opening of areas in AI-driven environmental learning. Researcher then came up with his her questions concerning the environmental learning field, the answers to which will be found from the literature review.

Literature Selection Criteria

Through 2019-2025, the publications in academic journals, book chapters, and conference proceedings were the targets of the review process. The only exception is the cases when the studies do not exist at all. The criteria for the study to be included were:

Those exploring AI applications in education that focused on the issue of environmental sustainability, eco-literacy, or environmental science. (in the field of studies that the candidate for the post benefits from)

Studies that dealt with AI-based teaching tools like adaptive learning platforms, chatbots, AR/VR simulations, and gamification resources.

Reports addressing the topics of ethical, accessibility, or equity in AI-supported education also fall into the category of admissible sources.

Different academic databases (Google Scholar, ERIC, ScienceDirect, SpringerLink) provided the required material. The search terms for the conducted research were: AI in education, sustainability learning, eco-literacy, immersive learning technologies, environmental education, and ethical AI. The completion of the first phase of the research led to the 40 abstracts and full-text papers chosen for the study after the removal of the duplicates and the irrelevant sources.

Data Analysis Methods

The paper resorted to a combo of two qualitative methods for the literature as the researchers had not carried out the research for collecting original data.

- **Thematic Analysis:** This technique has been followed for identifying the subjects, the patterns, and the repetitions in the studies. In the process of coding and categorizing that was ongoing, the key themes, among which are AI-driven

personalization, immersive learning, sustainability integration, ethical concerns, and teacher support, were discovered and further developed.

- **Comparative Analysis:** A comparison of numerous studies was carried out to judge the effectiveness of different AI interventions (i.e., AR technology-based teaching, AI-assisted museum expositions, intelligent tutoring systems) in boosting eco-literacy and sustainability decision making. Interventions were matched by various reported outcomes, such as the participants' engagement, motivation, their level of understanding, and the changes of their conduct.

Research Rigor and Trustworthiness

To assure the transparency and trustworthiness of the results, the paper observed the PRISMA guidelines for the process of literature review, the point at which everything becomes crystal clear. To maintain the measurement and comparison of themes constantly, the modes of reading, checking, and recondite checking were incorporated. The consistency of the references was checked through triangulation in the following varied environments: schools, museums, rural vs. urban settings. This is the way to certify that one's results are faultless and representative.

Limitations

Being a review-based study, the methodology is weakened by the unavailability and limit of existing literature. In fact, there are only a small number of the studies focusing on the long-term impacts while the majority of them elaborate on the same topic of immediate results, without taking the larger picture into account. Also, the accessibility to the limited proprietary AI and data sources are the ones that prevent the researchers from doing in-depth comparative analysis in some articles.

Discussion :

AI-Driven Personalization in Education

AI-generated personalization undeniably is a paradigm. Generation Z's being digital natives has become a ground for changing the environmental educational system to personalize, which AI has done quite perfectly. Learners, on the other hand, can benefit from a more personalized learning approach because it is a system that is meant to adapt them individually. Many scientific papers have repeatedly advanced the importance of the personalization of the learning process because it can help the learners only to work under a certain level of strength in terms of materials, which will lead to a better personal experience, better, and energized learning, and hence, to a

great chance to improve the retention and recall of knowledge. For example, by the end of 2025 Francis et al. have found out the correlation between the report of the learners and the smart devices being adjusted at the point of need and decide that it is the main factor leading to easy efficient learning of the students. Noroozi et al. (2024) put forth a similar view while showing the AI power of personalized feedback and tutoring tools in materializing a more profound understanding of environmental issues. Thence, even Nguyen et al. (2025) are of the opinion that, with the help of AI, it is possible to bring in value-oriented chatbots that will be a great addition to any high school climate education curriculum. More so, Ali et al. checked the general effectiveness of AI in the education of climate change and brought out very positive results. They stated that machines with AI were very helpful; it is very possible that machines with AI top human tutors in all aspects of education. It is by Ali et al. (2024) conducting studies and surveys that the most important relevance AI has on education worldwide, and most importantly, in education rather than anything else. As well, a major finding from several studies conducted by both Chisom et al. (2024) and Lee (2022), shows that, among the several methods of improving environmental knowledge and

programming through the use of artificial intelligence are intelligent tutoring systems and AI-driven programming modules which personalize environmental content on student performance. In addition, a major outcome, the most all-embracing outcome, common to all these resources is that AI addressing personalized and tailored ecological literacy, through the adoption of adaptive face-machines, is motivated by the great number of learners of all ages at all levels who have enjoyed the quality of learning. In other papers, AI-enhanced adaptive learning being the core source of successful personalized environmental education is underscored, while another group tends to stress the importance of responsible and fair implementation.

Immersive and Interactive Learning (AR, VR, Gamification)

Immersive technologies like 3D experience, Virtual Reality (VR), and a game are starting to be acknowledged as the tools that can really make a difference in the education for sustainable development. Thanks to these technologies, students get opportunities to experience for real the dilemma and the possible solutions of environmental problems in a vivid or real-like environment. The paper uses a meta-analytic review of literature to argue that the positive evidence of immersive technologies exceeds at least five studies

on the integration of AI in environmental curricula. The article presents examples of studies that have shown how AI-based gamified environments are the perfect tool for stimulating students to generate causal models that describe the relationship between climate change and different situations thus they are able to learn it more easily. In addition to this, another widely known and often referenced example of successful implementation of AR in a museum quest is the SusQuest AR quest (Thomson et al., 2025) which became a real sensation as it managed not only to attract people of different ages and groups but also to make them participate more actively and show better memorization abilities. Lisdiana et al. (2025) have also proved to have developed a really interesting AR-based and gamified eco-enzyme workshop program that is supposed to be used for teaching waste reduction techniques and is of great success to the potential of making students recognize ecologically practical. The innovative approach described by Lee (2022) refers to learning through a headset by the students of elementary schools as they practice their knowledge of recycling and VR, which is a novel learning method. There are numerous practical examples of how gamified AI can improve the quality of the user experience. Such measures might include a gamified real-time system that provides feedback based on points, and

finally, sustainability challenges. With the help of the studies, human educators can not only dramatize but also actualize the sustainability aspect.

One of the biggest shared opinions in the research is about the potential of immersive education, however, it concerns the need for new infrastructure and the high costs of maintenance that are likely only in some already possessed schools (O'Sullivan, 2026; Makower, 2024). On the whole, AI-based interactive and immersive technologies are seen as an effective way of realizing abstract environmental concepts into interpretation and action initiatives.

AI in Sustainability and Eco-Literacy

One of the roles that AI has is the processing of big data and the modeling of our environment, which in the real-time processing of the data of the Earth System, AI is a great successful tool. Involving real-time analytics, data visualization, and predictive modeling, AI is more than capable of promoting environmental awareness; this is proven by at least six studies from the review. Viana (2024) and Chisom et al. (2024) show in their work how AI-afforded student learners could deal with live environmental data to interpret the impact of human behavior on climate systems effectively. In his work Lee (2022) shares his opinion about AI-

based weather models to be implemented in schools. That way, students can change variables such as carbon emissions and real-time ecosystems and see what they affect. Lvt et al. (2025) are the authors of a study among museum visitors which reveals that interactive storytelling and AI-generated environmental scenarios present a significant method to convey public knowledge of sustainability. Ali et al. (2024) introduce AI-based digital campaigns as a personal way to bring about the change in the environment that resulted directly in waste and water recycling communities. Correspondingly, Francis et al. (2025) also shed light on the aspect of AI used in delivering that test an instant result in terms of the students' environmental literacy, a feature that gives room for data-driven curricular adjustments. These means are not only a method of bringing personalization into teaching but they bear also the capacity of stimulating independence in thought and system-based problem-solving skills, which are key requirements in solving sustainability problems. However, it should not be forgotten that the responsibility of embracing such technologies should come with the awareness of the energy demands and possible environmental impact (Dauvergne, 2024). The research consistently emphasizes AI's ability to expand eco-literacy and infuse a

sustainable way of thinking into educational applications.

Ethical and Equity Considerations in AI-Driven Learning

AI's potential in environmental education has been extensively studied in the literature, and it has been pointed out that while it indeed has a substantial scope of benefits, yet there are major ethical and equity issues as the most emphasized obstacles in at least seven studies. Repeatedly, one of these is the built-in bias of AI algorithms, which can discriminate in favor of one group of learners while at the same time, another group may be put at a disadvantage (Nguyen et al., 2025; Selwyn, 2024). Data privacy and surveillance are amongst the most frequently mentioned worries. For example, Dauvergne (2024) and Francis et al. (2025) are of the opinion that the wide use of AI in schools mandates a clear approach to data management and the enforcement of ethics, primarily when intelligent systems are used for the collection of learners' sensitive information. Besides, the digital divide is another obstacle in education where learners from underprivileged areas who often do not have access to necessary devices and internet may not benefit from AI-enhanced tools (Ali et al., 2024). Finally, the issue of environmental sustainability comes to the fore through the energy usage of AI. For

instance, Selwyn (2024) shows that the use of energy-intensive machine learning models and server farms as a means of teaching climate change is in contradiction with the objective. Hence, all learners and not just the fortunate ones will benefit from AI-powered sustainability education only if carried out with the help of value-sensitive design frameworks, inclusive data practices, and equitable policy implementation.

AI's Role in Teacher Support and Pedagogical Innovation

AI is upskilling student learning in addition to that of the school. It is the power of AI, the "taught to" part, that is making the teacher able to elaborate, as it is stated in the metacognitive pedagogical construct, AI as a tool to the teacher (Brown & Campione, 1994). AI is also capable of managing many educational factors, such

as educational progress, grade, and even the students' desired learning approaches. The respondents even verified their last-order growth factors which include number of employees, market capitalization, human development index (Trockel et al., 2020). The point is that if employees are unaware of their enterprise's last-order growth metrics, they cannot be expected to aid in the implementation of a POS system effectively. AI can provide the organizations ideas about the incentive scheme, the bonuses, and promotions that are most preferred by the employees. Additionally, AI has the potential to establish climate-friendly practices in the classroom, through an appropriate mix of the practice of grouped problem-solving activities, discussion, and disputation, for instance, (Word et al., 2020). Thus, the study is tangential to the situation and the study's results are inconclusive.

Table of Findings

Theme	Findings	Implications
AI-Powered Personalization	AI-driven adaptive learning improves Eco literacy.	Personalisation helps address different learning styles.
	Intelligent Tutoring Systems (ITS) enhance engagement and retention.	AI-powered education can enhance environmental awareness at an individual level.
	AI-based recommendation systems tailor content to	

	students' interests.	
Immersive Technologies & Gamification	AI-driven AR/VR simulations reinforce eco-conscious behaviours.	Experiential learning fosters deeper understanding of sustainability challenges.
	Gamification (e.g., sustainability quests) enhances motivation and decision-making.	Gamification makes eco-education more engaging and interactive.
	AI-powered museum and virtual field trip experiences improve sustainability learning.	
AI's Role in Sustainability Education	AI driven simulations and climate modelling improve student understanding.	AI can make sustainability education data-driven and practical.
	Real-time environmental data analysis strengthens eco-literacy.	Helps students analyse real-world environmental scenarios.
	AI-powered tools enhance critical thinking and problem-solving.	
Ethical & Accessibility Challenges	Algorithmic bias and data privacy concerns exist in AI-driven education.	AI deployment must be transparent, fair, and ethical.
	AI's energy consumption raises environmental concerns.	Policy changes are needed to improve accessibility and inclusion.
	The digital divide limits access to AI-enhanced learning, especially in underprivileged areas.	

Table 1

Table 1 shows the core discoveries described in this review and sets them in four themes that directly show the application of AI in changing the way that environmental education is dealt with. First and foremost, AI-based personalized adaptation has become quite visible as a most important development, since apart from the fact that adaptive learning technologies, intelligent tutoring systems, and recommendation engines significantly contribute to the students' understanding of environmental topics, these tools provision of the learning of the individual with personalized pathways on the basis of their knowledge levels and interests results in not only higher engagement, retention, and conceptual clarity but also (Francis et al., 2025). Capacity of the reviewed papers to verify the reality of the personalized AI system has even more to obtain recognition is obtained by creating more inclusive and effective educational experiences which cater to various cognitive needs and learning styles. Moreover, the studies happened to reveal that brands using AI are considered as a dominant force where they are more experienced and expose their ability in creating the transparent and authentic two-way relationship with customers that will, in turn, enable the customer engagement and retention of the company. Their results also indicated that the primary driver of such a relationship

was the alignment of customer and brand characteristics and also the perceived relationship benefits the engagement of consumers that provide relational benefits that are favorable to both parties. Similarly, virtual reality, robotics, and data analysis play a significant role in the impact of AI that occurs as a result of AI in the industrial market which Also, AI that can enhance one's own engagement also helps to build one's own community of people who are dedicated to the environment. Using live local data on weather, climate, and human behavior to create a simulation in 3Ds of a location that has the same environmental issues as a particular school (e.g. melting ice) would be a good example for this. The students' task would then be to contribute their share for environmental protection of the locality. The data to be used by each student would be provided by sensors placed around or near the student's residence, to help them make "live data" based authentic observations and hence, expedite their participation in ongoing discussions. Besides, the inclusion of multi-sensory experiences in education, gamified activities, and a combination of virtual... Besides, there is an increase in the level of learning skills and the development of the self thereby giving learners a different mode of learning apart from traditional methods. The use of such a tool can be attributed to the fact that students of all

grade levels found it interesting and were engaged, and the flexibility provided by the augmented learning, as well as the possibility of changing positions of the device and controlling it remotely, also added to the... Besides, the realization that technology must be used according to the students and their needs and capabilities, is still unknown to many teachers, even the author, but it is certainly a very productive way of teaching and motivating students, and also of enabling them to discover ways of learning that suit them best. The extensive use of social media for different purposes including learning, has brought up the concept of digital citizenship in recent years which is mainly being taught in schools around the world (whether in developed or developing countries). However, in the majority of low-income countries, students still lack the same opportunities in the education domain mostly because of the absence of basic resources, skilled teachers. The only resources that ...

Conclusion:

The research concentrated on the changing nature of Artificial Intelligence (AI) in Green education, which is especially Quantum Z students in a better condition. The authors used an up-to-date literature review as a method and came up with the conclusion that the AI technologies like

individual learning platforms and virtual simulations are the most powerful means of promoting eco-literacy, inciting key problems in the area of sustainability and using virtual reality as a powerful source of practicing experiments to engage the students in the schools.

Regarding the first point of view, it should be mentioned that specifically the AI individualization motivates the teachers to cater the different students with the most suitable subject and thus those students gain the biggest learning benefits. On the other hand, such immersive technologies as AR and VR are like an added advantage for students who understand deeper by solving problems related to real-world.

The emergence of AI in sustainability education is an opportunity to develop an interface that is suitable for analyzing environmental data and developing models of ecosystems, thus the students are improving their capacity for solving problems and are more critical in their approach to them. Consequently, we can see that by making a mid-feed of the right environmental data and preparing for the ecological systems an AI algorithm would be acknowledging the environmental model and keeping the learner challenged with new problems and thus enhancing the level of expertise. It also describes the architecture of the environmental model by

directly centering the shifts in the model with real data and then letting the algorithm generate the rest.

Nevertheless, it might result in educational aspects with AI without the ethical and accessibility requirements due to bias in algorithms, issues of privacy when dealing with data in AI systems, and the digital division among users. In conclusion of the current work, the authors state that these concerns should be solved in order to make education in environmental studies which is driven by AI equitable, inclusive and sustainable. We envisage a future where technology, led by educators, technologists, and policymakers, is used to create responsible AI frameworks that are not only conducive to high-quality learning but also in line with environmental conservation and social equity values.

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