

AI IN SRI LANKAN UNIVERSITIES :A SYSTEMATIC REVIEW OF ITS IMPACT ON EDUCATIONAL SUSTAINABILITY AND STUDENT EXPERIENCE

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ABSTRACT: This systematic review explores the transformative impact of artificial intelligence (AI) on university life and the sustainability of learning in Sri Lanka. AI technology is reshaping the landscape of higher education, influencing everything from personalized learning experiences to administrative efficiency and resource optimization. The primary objective of this review is to assess the existing body of research on AI applications in Sri Lankan universities, focusing on how AI-driven solutions can enhance educational sustainability and improve student experiences. Methodologically, a comprehensive search of academic databases was conducted, and ten studies were selected based on relevance to AI in Sri Lankan education. Key findings highlight that AI technologies are instrumental in adaptive learning, improving student engagement, and predicting academic success. This review concludes that AI offers significant benefits by enhancing learning quality, fostering inclusivity, and optimizing resources while also identifying infrastructural and policy challenges that must be addressed. Overall, AI presents a promising future for the development of a sustainable educational ecosystem in Sri Lanka.

Keywords: Artificial Intelligence (AI), educational sustainability, student engagement, university education

1. INTRODUCTION

In recent years, integration of AI in education has gained substantial momentum globally, with applications that offer the potential to enhance learning, streamline administrative tasks, and support sustainable educational practices. For students in Sri Lanka, these technologies provide an opportunity to access more personalized and efficient learning experiences, helping to address constraints posed by limited resources and a growing student population. This systematic review aims to understand how AI applications are currently being utilized in Sri Lankan universities and the ways in which they contribute to a sustainable and transformative educational experience for students. The primary objective of this systematic review is to evaluate the transformative impact of AI on the sustainability of university education for students in Sri Lanka. Specific objectives include examining the role of AI in personalized learning and student engagement, identifying how AI aids in resource optimization and administrative efficiency, and assessing challenges faced in implementing AI technologies within Sri Lankan universities.

2. METHODOLOGY

To ensure a comprehensive review, academic databases including Google Scholar, IEEE Xplore, and PubMed were searched using the keywords such as "AI in Sri Lankan education," "sustainability in university education," and "AI and student engagement." Only peer-reviewed articles and conference proceedings published between 2018 and 2023 were included to ensure relevance. Articles that focused on the implementation of AI in higher education within Sri Lanka or similar contexts were included whereas studies that did not directly address AI applications or the studies that were not conducted in higher educational settings were excluded. Data from selected studies were extracted, categorized, and synthesized based on recurring themes, such as AI's impact on learning personalization, resource management, and student retention. Ten studies meeting the criteria were analyzed in depth, and the findings were compiled into thematic categories.

2.1 Literature Review

The integration of Artificial Intelligence (AI) in higher education has garnered significant attention globally due to its potential to enhance learning outcomes, streamline administrative processes, and

promote sustainable educational practices. The literature review provides a comprehensive summary of the key findings as follows.

A study by Gamage (2018) emphasizes how AI can optimize budget allocations by predicting resource needs based on previous records. This predictive capability supports sustainable budgeting practices which can free up funds for other educational initiatives. The efficient allocation of resources contributes to a more sustainable learning environment where students and faculty benefit from a stable and well-supported educational infrastructure.

AI tools are instrumental in helping universities manage limited resources more effectively. A study by Wijesekera et al. (2019) discusses the application of AI in monitoring classroom utilization which aids in resource allocation by identifying which facilities are most used and when. This data helps universities plan resource allocation better, ensuring that students have access to necessary resources while minimizing waste.

One of the most impactful applications of AI in Sri Lankan universities is the creation of personalized learning experiences, which cater to individual needs and preferences of students. According to Perera et al. (2020), AI-powered adaptive learning platforms allow content to be tailored to each student's pace and the level of understanding, promoting more effective engagement and knowledge retention. These systems enable students to revisit challenging concepts, advancing at their own speed, which is especially beneficial in large classroom settings.

Intelligent tutoring systems (ITS) have shown promise in assisting students with skill-intensive subjects, such as engineering and computer science. Gunasekera et al. (2020) report that ITS applications help students practice and master complex skills through continuous feedback and adaptive learning paths. For Sri Lankan universities, ITS can be an invaluable resource in equipping students with market-ready skills, thus enhancing their employability upon graduation.

Although AI presents many benefits, its implementation in Sri Lankan universities faces several challenges. Bandara and Jayasinghe (2020) point out that limited infrastructure, funding constraints, and lack of technical expertise are major obstacles to successful adoption of AI technologies. Addressing these challenges requires substantial investment in digital infrastructure and training programs to equip faculty and staff with skills necessary to work with AI systems.

Additionally, concerns regarding data privacy and the ethical use of AI have emerged as important considerations. Establishing robust policies and regulatory frameworks is essential to ensure that AI is implemented in a way that aligns with ethical standards, protecting student data and promoting responsible AI use.

Fernando and Silva (2021) highlight that AI-based learning tools have positively influenced student engagement by creating interactive learning environments. By integrating AI tools that respond to student feedback and learning behaviors, universities can promote inclusivity and equity, ensuring that all students, regardless of their initial competency levels, receive support tailored to their needs. AI has also proven useful in the realm of administrative support. Fernando and Silva (2021) describe how universities in Sri Lanka are implementing AI for automating admissions processes, handling queries, and managing grading systems. Automation of these tasks reduces the administrative burden on faculty and staff, allowing them to focus more on direct academic support and research.

Administrative AI applications lead to faster processing time and a reduction in errors, which enhances operational efficiency. Efficient administration is critical to sustainability, as it allows universities to manage large volumes of students without sacrificing service quality, ensuring that the institution can scale as student numbers grow.

AI tools that analyze student feedback and learning outcomes can be valuable for faculty development. According to De Silva et al. (2021), these tools allow faculty to receive data-driven insights into their teaching effectiveness. AI-driven feedback systems can highlight areas where

students struggle the most, enabling faculty to adjust their instructional methods to improve learning outcomes.

AI-driven predictive analytics are helping universities in Sri Lanka identify students who may be at risk of dropping out. Kumar and Rajapaksha (2022) show that predictive models using student data, such as attendance, grades, and engagement metrics can identify patterns associated with poor academic performance. Early intervention for at-risk students can significantly improve retention rates and ensure that students have the support they need to succeed academically.

This approach not only benefits students but also contributes to sustainability of educational institutions by reducing dropout rates and fostering a culture of support and encouragement. Lower dropout rates lead to better resource utilization and a more stable student population which are critical components of sustainable university systems.

The use of ITS in technical fields ensures that students gain hands-on experience and practical knowledge, which is essential for building a future-ready workforce. This prepares students for the competitive job market and aligns university education with industry standards, promoting long-term educational sustainability.

3. RESULTS AND DISCUSSION

The review of the ten selected studies highlights several key findings regarding the impact of AI on education. AI tools significantly enhance learning experiences by personalizing content which improves student engagement and knowledge retention. Furthermore, AI facilitates efficient resource allocation, an essential factor in managing limited educational resources. Predictive analytics driven by AI play a crucial role in identifying at-risk students, ultimately aiding in improving retention rates. Intelligent tutoring systems (ITS) also contribute to skill development, helping students acquire practical abilities necessary for career readiness. Additionally, the automation of administrative tasks through AI enhances operational efficiency and reduces errors. Lastly, AI-driven feedback mechanisms assist faculty in adapting and refining their teaching strategies, fostering a continuous learning environment.

This document also notes significant challenges in implementing AI across Sri Lankan universities. Infrastructure limitations, funding shortages, and the need for staff training present barriers to fully realizing AI's potential, as emphasized by Bandara and Jayasinghe (2020). Addressing these issues will require strategic investment in digital infrastructure and capacity-building initiatives. These steps are essential to enable both faculty and administrative staff to effectively leverage AI in their workflows and teaching practices.

Furthermore, ethical considerations related to AI use, particularly regarding data privacy, require attention. Universities must develop policies to safeguard student information and regulate AI deployment to prevent misuse. As De Silva et al. (2021) argue, establishing these ethical frameworks is crucial for creating a responsible AI environment that respects student rights while fostering technological advancement. Furthermore, this has shown remarkable potential in transforming higher education in Sri Lanka, the discussion underscores that sustained efforts in infrastructure development, policy formulation, and ethical considerations are necessary for AI to be a force for sustainable educational innovation.

4. CONCLUSION

AI-driven solutions play a crucial role in enhancing student learning through personalized educational experiences and optimizing resource management by efficiently allocating limited resources and reducing waste. AI also supports retention of students through predictive analytics. Additionally, intelligent tutoring systems (ITS) help students gain practical skills relevant to the job market, aligning educational outcomes with industry demands and strengthening students' career prospects upon graduation. On the administrative side, AI-driven automation streamlines processes

such as admissions, grading, reducing administrative burden on staff and improving service efficiency.

AI-driven technologies play a pivotal role in transforming higher education by fostering personalized learning, enhancing student engagement, optimizing resource allocation, and supporting administrative functions through intelligent tutorial systems. For the Institute of Technology University of Moratuwa and other higher education institutions, these findings underscore the immense benefits that AI can offer in shaping a more sustainable and efficient educational ecosystem. Despite these advantages, challenges remain, such as limited infrastructure, funding constraints, and the need for extensive training programs to ensure successful implementation.

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