



## REVIEW ARTICLE

# CURRICULUM REVAMPING IN THE AI WORLD

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## ABSTRACT

The rapid advancement of artificial intelligence (AI) is reshaping various sectors, including education. This paper explores the necessity and strategies for revamping educational curricula to integrate AI effectively. It emphasises the importance of AI literacy, critical thinking, ethical awareness, and interdisciplinary learning in preparing students for the 21st Century. Drawing on case studies and literature reviews, the article discusses the implementation of AI technologies in education and examines principles of curriculum design that align with modern technological advancements. Furthermore, it proposes strategies for curriculum revamping, such as integrating AI-related knowledge and skills, adapting pedagogical approaches, and promoting personalised learning. The article also reviews the challenges and opportunities associated with AI integration in education and suggests a holistic approach to curriculum redesign, fostering collaboration among educators, policymakers, and industry experts. Finally, it concludes with recommendations for implementing and evaluating the revamped curriculum to ensure its effectiveness in preparing students for an AI-driven future.

## KEYWORDS

AI literacy; Curriculum design; Ethical awareness; Interdisciplinary learning; Personalised learning;

## 1. INTRODUCTION

The pervasive influence of artificial intelligence (AI) necessitates a significant transformation in educational curricula at all levels. This is a result of artificial intelligence (AI), which continues to transform various sectors; its impact on education is particularly profound, challenging protocols and some established educational practices. The rapid advancement of AI technologies in reshaping education has evidently shown that traditional curricula lag behind in preparing students for the future and the changes around the world. Therefore, it is essential to revamp educational curricula to prepare students for a future dominated by AI technologies. Education systems must adapt to these changes to ensure that students are prepared for the future workforce and are capable of navigating the ethical and societal implications of AI. This paper thus explores the need for and strategies for revamping the curriculum in order to integrate AI effectively. Additionally, the discussion supports AI integration and emphasises the importance of fostering AI literacy, critical thinking, ethical awareness, and interdisciplinary learning to equip students with the skills and knowledge necessary for the 21st Century. To strengthen the aforementioned objectives, literature will also be reviewed to examine a few case studies of how to implement the necessary curricular revamping, especially in developing countries.

## 2. THE NEED FOR CURRICULUM REVAMPING

The impact of AI in education has been progressively felt over the past few decades, with greater proliferation in the early 21st Century due to the advent of online learning platforms like Khan Academy, which incorporates basic adaptive learning features using AI. AI in education has since expanded significantly to major developments that include Data Analytics, Virtual Tutors and Chatbots that enhance personalised learning experiences, classroom management of instructions, assessments and feedback, etc., (Holmes et al. 2019). All of these developments have recorded positive impacts and revolutionised traditional learning experiences. Compared with the traditional learning mode, the 21st

Century has brought significant transformations to the landscape of learning, which is largely driven by technological advancements. These learning modes have translated into online/blended learning, utilising lots of adaptive features, including AI.

This innovation comes with lots of opportunities and challenges, as well as implications for the traditional learning style. Although the traditional mode may be lagging in areas such as technological efficiency, flexibility accessibility, generic methodologies, lack of experiential learning, etc., the traditional learning mode has been proven to have its strengths (Homes, 2019). A group researcher affirmed traditional pedagogies as the key to an effective educational system in the AI era (Holmes et al., 2019). The researchers further reiterated that success in the AI era lies in combining the best aspects of both traditional and modern-day innovative approaches, integrating the human touch and structured environment of traditional learning with the personalised, adaptive, and accessible features of AI-driven education. Premised on their argument, it becomes imperative to harmonise this recommendation, which possesses lots of potential, into creating new curricular and pedagogical approaches to meet the changing needs of society.

Further, since AI has come to life and has now been integrated into education, nothing else could be more crucial than emphasising the need for AI literacies in schools for both educators and students (Walter, 2024). AI literacies involve understanding its technologies and any related impacts that could enhance its effective use. It also encompasses the knowledge, skills, and attitudes necessary to understand and interact effectively with artificial intelligence systems. These literacies are increasingly important for both educators and students due to the profound impact AI is having on various aspects of life, including education, work, and daily activities. Educators need to be well-versed in AI concepts, applications, and ethical considerations to integrate AI into the curriculum effectively.

A study also noted that educators need to master AI tools to be able to provide personalised learning experiences by adapting instructional

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content to meet the needs of individual students, making teaching more effective; also, educators need AI literacies to provide insightful analytics of data, design effective prompts to enhance personalised learning and support diverse educational requirements, including those of students with special needs; they also need to understand the ethical implications of AI to use it responsibly and teach students about digital ethics, data privacy, and bias in AI systems (Holmes, 2019; Siemens and Long, 2011). Ultimately, learning AI intricacies also serves as a form of sustainable professional development for educators.

For students at all levels, understanding AI helps to develop critical thinking and problem-solving skills (Spector and Ma, 2019). Students are able to learn to analyse and interpret data generated by AI systems, which simultaneously prepare and equip them with the skills needed for future job markets and informed digital citizens (Spector and Ma, 2019). Learning AI literacies by students also encourages students to explore innovative uses of AI, fostering creativity in developing new applications and solutions (Mitra, 2014). Also, findings from the World Economic Forum, WEF (2020) indicate that by 2025, over 85 million jobs may be displaced by AI, while 97 million new roles may emerge that are more adapted to the new division of labour between humans, machines, and algorithms (WEF, 2020).

This necessitates that curricula be revamped to closely align with industry needs and that school graduates are equipped with relevant skills that will make them remain competitive on a global scale. Revamping the curriculum to enhance industry relevance and competitiveness is critical in the AI world. Therefore, educational programs need to include technology opportunities and machine learning modules to contribute to the pathway that prepares students for the demands of the modern workforce and lifetime sustainability. AI literacies are essential needs for educators and students to navigate and thrive in an increasingly AI-driven world. As also alluded to by UNESCO, there is a need for AI to enhance various curriculum systems (UNESCO, 2019). The need should be filled with urgency to revamp the curriculum across the board to effectively teach and equip students with the tools needed to succeed in the 21st Century.

### 3. PRINCIPLES OF CURRICULUM DESIGN

Evaluation is one of the necessary demands for continuous growth and relevance. This applies to curriculum development as it is a fundamental tenet in education that serves as the foundation for teaching and learning activities in educational settings. The curriculum outlines the content, objectives, instructional strategies, assessments, and resources that guide the educational process (Thijs and Akker, 2009). It defines what students are expected to learn and how that learning will be facilitated and evaluated. Simply, it is a learning plan. Although in the history of education, the curriculum is a complex and evolving field. Curriculum design has been influenced by various educational/traditional philosophies, theories, and societal changes over time. The change has occurred from constant evaluation to meet the needs deemed essential by society. As noted in a study, various shifts or curriculum reforms were aimed at addressing changing societal needs, educational research, and technological advancements (Ornstein, 2017). Many of these reforms have led to the development of new curriculum models and approaches for students to receive a high-quality education. With the advent of AI in education, there should, therefore, be no impediment to curricular reforms across boards; rather, the established curriculum principles should be considered in reforming the curriculum's adaptability to AI innovation.

Studies show that aside from a few additions over the years, the principles of curriculum design such as alignment, relevance and authenticity, coherence, flexibility, balance (Bruner, 1960), etc., established in the early years of education still characterised the principles documented by researchers in the 21st Century, where there are technological advancements and tools such as Chat GPT, Grammarly, Tutorai, etc., available for learning enhancement. This also supports the assertion that traditional pedagogies should not be sidetracked but built on, as they serve as the foundation for effective learning (Holmes, 2019).

In addition, principles such as the integration of technology and its alignment, inclusivity, Universal Design for Learning (UDL), learner-centredness and sustainability are some recent reforms built on traditional pedagogies into the curriculum of online/blended learning (Wiggins and McTighe, 2005; Weimer, 2013; Sterling and Orr, 2001). According to research, incorporating the reform ideology into the classroom addresses changing societal needs in relation to technological advancements – AI inclusive (Kennedy and Ferdig, 2018). In their research, which centres on K -12 online learning, they also found that adhering to the rules of curriculum design also creates engaging, effective, and inclusive and motivating learning experiences for children, showing

that AI tools can be leveraged in both online/blended learning. Their findings affirm that both old and recent principles of curriculum design can be applied to the development of any curriculum that integrates AI into learning. However, ensuring balance and a responsible approach must be the goal for the effectiveness of the curriculum design.

### 4. STRATEGIES FOR REVAMPING THE CURRICULUM

Revamping the curriculum in the AI world involves integrating AI-related knowledge and skills into educational programs while also leveraging AI technologies to enhance teaching and learning processes. This process, however, requires a holistic approach which is very essential in preparing students for the future. Revamping the curriculum is required at all educational levels. A good way of understanding AI algorithms in education is by accepting their immense potential and by seeking to know their applications. This understanding will enable all educational stakeholders and policymakers to make decisions that will help the correct use of AI applications and concepts. AI generally aids in critical thinking and understanding of concepts. According to a study, introducing AI literacies in early childhood is about fostering foundational skills and understandings that support more complex learning in later years (Bers, 2020). Bers (2020) also recommended that AI literacy in early childhood should focus on developing curiosity, basic computational thinking, and an understanding of how technology works in an age-appropriate and engaging manner. This connotes that hands-on activities that integrate technologies and computational skills should be present in a class that prepares children for the future. Similarly, advanced computational thinking and coding skills that are age-appropriate should be introduced to the curriculum of students at the primary and secondary levels. Data science and machine learning programmes that explore several problem-solving applications should also be incorporated into learning. This will enhance students' understanding, enabling them to creatively design AI solutions for real-life events. Once the understanding of AI literacies is well ingrained at the fundamental level in schools, students in higher education can engage thoughtfully, critically, and ethically with AI technologies to navigate the AI-driven world.

A group researcher also identified teacher augmentation as a necessary need for revamping the curriculum (Watson et al., 2013). In the researchers' review of policy and practices in keeping up with K-12 online learning, they reiterated that teachers need to augment learning by providing access to digital resources, interactive learning platforms, educational apps, and multimedia content that enhance instruction and engage students in new ways. This implies that there be a change and a form of professional development to incorporate new pedagogies for personalised and collaborative learning experiences. Tools such as Learning Management Systems (LMS), Virtual Reality and Augmented Reality, e-learning tools, assistive and accessibility tools, etc., are essential components for the transformation and revamping of the curriculum. Augmenting teachers with AI tools is more than necessary now to equip teachers in their teaching practices as well as streamline administrative tasks and the provision of more personalised learning experiences for students, as the combination of their expertise with AI capabilities will lead to more positive educational outcomes.

Further, incorporating project-based and experiential learning strategies into the curriculum are some ways educators can leverage to revamp traditional teaching approaches and empower students to become active learners in the AI world. Project-based learning allows students to work on authentic, real-world projects that are relevant and engaging and also challenges students to identify problems, design solutions, and apply AI tools to address real-world challenges (Kolmos, 2009). Students are able to collaborate and communicate skills while working on projects that support experiential learning experiences. The review and recent literature on project-based learning emphasised the need for instructors to creatively incorporate into the curriculum hands-on projects like developing tools, analysing projects, etc., in order to develop students' passion for learning, adaptability to new technologies, and readiness to embrace the evolving landscape of AI.

Since AI in education revolves around the use of technological tools that help students personalise learning, the curriculum needs to be revamped to facilitate the learning structure. Personalised learning is described as a student-centric approach that customises the learning experience for each student. This is a shift from the traditional 'one-size-fits-all' teaching method to a more student-centered strategy, where the primary focus is on each student's distinct learning journey, needs and interests. According to a study, curricula must be designed to allow students to follow individualised learning paths supported by AI recommendations (King et al., 2017). This implies that instructions and assessments should provide students the opportunity to choose different pathways based on their interests and career aspirations. Simply, a revamped curriculum that is

student-centred needs to have adaptive learning systems, AI-driven customised learning sequences with automated assessments and instant feedback to students, and AI-powered educational games and simulations that cater to different learning styles and interests (Laak & Aru, 2024).

Consequential to personalised learning is equity and accessibility in the curriculum revamping. An equitable and accessible curriculum matters in the AI education world as it provides equal opportunities for students' success, addresses disparities and eliminates barriers to learning for students with disabilities or other special needs. These could be done effectively in teaching and learning using adaptive technologies such as AI (OECD, 2021). AI tools can address disparities across demographics. For instance, in South Korea, AI-powered textbooks level the playing field for students, personalising content and providing accessibility features (Lee, 2019). Ensuring equitable access to AI-enhanced education is critical, so in revamping the curriculum, plans must be well thought out to give a fair balance for students to thrive, regardless of their background or abilities.

Additionally, valuing human intelligence is a key factor that must be recognised in today's curriculum. Since adaptability strategies will continue to evolve in the age of artificial intelligence and the changing world, human intelligence should continually be prioritised. It is crucial to continuously recognise and value human intelligence as human intelligence encompasses a range of skills, qualities, and attributes that cannot be replicated despite AI advancements. Human intelligence is behind the invention that led to the well-rounded, creative development of the many technologies adapted to education. Valuing human intelligence, therefore, means balancing the integration of AI tools with a strong emphasis on developing critical thinking, creativity, emotional intelligence, lifelong learning, and effective use of technology (Zhao, 2012).

Researchers recommend that educators incorporate activities that focus on developing skills that complement AI capabilities, such as critical thinking, creativity, and emotional intelligence. Instructions and assessments should emphasise creativity, ethical judgment, critical thinking, emotional intelligence, design, analysis and cultural understanding (Paul and Elder, 2013). Human intelligence should also be rewarded accordingly to motivate extrinsic and intrinsic effort and to promote high-level problem-solving innovations. Above all, recognising and promoting aspects of human intelligence in classrooms and learning institutions can create a balanced and synergistic relationship between humans and AI in education, leading to more innovative, ethical, and adaptive technologies in the future.

## 5. REVIEW: CASE STUDIES

The integration of AI in education has led to some changes across various educational levels. While there is a growing body of literature on integrating artificial intelligence in education and curriculum development, limited specific studies focus on curriculum revamping. However, researchers have explored various aspects of AI integration in education, including curriculum design, pedagogical strategies and the impact of AI technologies on teaching and learning. Through their series of case studies, the literature showcases innovative AI applications and their transformation in education. Although AI integration in all educational levels differs in terms of activities and concepts, findings reveal a positive learning outcome and understanding of concepts. Finland's national AI literacy initiative with early childhood introduced simplified AI concepts through interactive and engaging activities. Adaptive AI games and storytelling used in Finland promote curiosity and a foundational understanding of AI among young children, encouraging children and their families to engage in learning.

Similarly, Singapore's Ministry of Education implemented AI curriculum modules across primary schools, aiming to equip students with basic AI knowledge and skills. AI concepts are integrated into subjects like mathematics, science, and social studies, and students are engaged in projects that involve building simple AI models and applications (Young, 2021). The outcome of the implementation of the AI framework reveals that students develop a foundational understanding of AI, critical thinking skills and ethical reasoning from a young age, which ultimately promotes interest in STEM fields (Young, 2021). Also, universities have had cause to redesign curricula as a result of AI. The Massachusetts Institute of Technology (MIT) and Stanford University developed new courses titled "Ethics of AI" and "AI for Social Good". These courses were integrated into their AI and computer science curriculum and other interdisciplinary programmes, respectively. Their findings generally show an understanding of the ethical dimensions of AI as well as the promotion of responsible AI development and deployment of students (Bryson and Winfield, 2017). Thus, through a series of case studies, innovative AI applications have transformed education, improved learning outcomes, empowered educators, and equipped students of all levels with future-

ready skills.

With the significant positive changes in schools using AI for teaching and learning, there is certainly no doubt that the AI integration framework in the curriculum came without some challenges. Challenges such as the digital divide among learners, data privacies and security issues, biases in AI Algorithm, ethical issues, scalability and standardisation etc., have all been harnessed fully by countries such as Finland, China, the United Kingdom, the United States, Korea, Singapore, etc., leading to effective and revolutionised educational environments (Pedro, et al., 2019; Su & Zhong, 2022). In a nutshell, there exists a lot of potential in the relationship between AI and education, and as stated by UNESCO publications, the need for an "orbit-shifting dialogue" should be emphasised across boards to find solutions to any existing or surging challenges, maximising the potential of AI transformative change in contemporary curriculum systems and implementing changes to different components of the curriculum system, including learners, teachers, leadership, and assessment (Abdelaziz, 2019).

## 6. IMPLEMENTING CURRICULUM REVAMP IN LEARNING INSTITUTIONS

Implementing curriculum revamping in the AI world involves a holistic, systematic approach to integrating artificial intelligence technologies and methodologies into educational programs. This begins with partnerships with educators, industry experts, students, and policymakers, working to input and ensure the curriculum aligns with the needs of all stakeholders in the AI world. Collaborations and connections need to be established, and clear objectives for what the revamped curriculum should achieve need to be carefully outlined. It is important that instructors are well-trained in AI literacies in order to make meaningful collaborations that will foster critical thinking, problem-solving skills, and proficiency in AI technologies. Instructors should also see that AI tools are integrated into teaching practices for upcoming instructors to assist with improving the learning outcomes and anticipate the needed evolution to teaching and learning.

Secondly, the curriculum must be designed to capture the new objectives that identify key AI concepts and skills of machine learning, neural networks, natural language processing, data science, ethical considerations in AI, etc. This implies that the existing curriculum be improved to adapt to AI principles, applications and ethics (Elearning Industry, 2024). This further means that the curriculum should integrate the appropriate use of AI-powered educational tools to enhance learning experiences, providing students with various assessment methods that evaluate student understanding and proficiency in learning modules, projects and workshops. Additionally, redesigning the curriculum in the face of AI may lead to a major upgrade that necessitates creating entirely new courses. In that sense, literature asserts that both old and new principles of curriculum development should be integrated into the design of skills and well aligned with the outcomes that prepare students for the future.

Further, research from the Swiss strongly recommends that there should be support and policy guiding AI use in classrooms. The research explains that students should receive support in getting access to AI tools, giving every student a fair chance. Also, AI ethics education should be mandatory for all students (Early Childhood, Primary and secondary, and Tertiary Institutions) (Su & Zhong, 2022). Modules on the ethical implications of AI, addressing issues like bias and privacy, must be carefully highlighted and instructed. Also, a pilot implementation would suffice to test the new curriculum in a controlled environment to gather data on its effectiveness. The feedback from the pilot programs can serve as information to refine and improve the curriculum before broader implementation.

Aside from teaching, implementing AI tools can help in administrative matters. AI can automate administrative tasks, allowing educators to focus more on teaching and student interaction. Tools like Knewton and Coursera use AI to streamline curriculum planning and grading, reducing the administrative burden on teachers. Schools and institutions should invest in technologies and applications that help instructors dedicate more time to direct student engagement and professional development. As the tools help in some administrative tasks, students also receive instant support and feedback from the systems that provide timely assistance and resources tailored to students' needs. AI-powered Chatbots, Virtual Assistants, Duolingo, etc., are some AI tools that could support in that regard.

Above all, constant evaluation for continuous improvement is recommended after implementing the revamped curriculum. Given the rapid advancements in AI, educational curricula must continuously be updated to reflect the latest developments. This is to evaluate practices



across disciplines and to ensure that needs are met in a relevant and profitable manner. As the OECD's report on the future of work emphasises the need for dynamic and flexible curricula that can quickly adapt to technological advancements and emerging industry trends, educators need ongoing professional development to stay abreast of AI advancements and effectively integrate AI tools into their teaching practices (OECD, 2019). Ensuring these will bring about the evolving educational changes that will thrive in an AI-driven world.

## 7. CONCLUSION

While the adoption of artificial intelligence in education is gaining momentum, any form of resistance to its integration should be abolished, and resources must be sourced for its implementation in classrooms. Revamping curricula in the AI world is a critical step towards embracing this innovative change and preparing students for relevance in the future. AI literacy, ethical considerations, interdisciplinary learning, and hands-on experiences in the curriculum should be thoughtfully considered, and solutions proffered by educators to equip students with the skills and knowledge needed to navigate an AI-driven world. Addressing the challenges of resource unavailability, lack of teacher training, dated curriculum development, etc., requires collaborative efforts and innovative strategies. As AI continues to evolve, education systems must remain adaptable and committed to fostering a holistic and inclusive approach to AI education, ensuring that all students can thrive in the 21st Century.

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