

## A Book Review: *AI and Education: Guidance for Policy-Makers*

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### ABSTRACT

*The AI and Education: Guidance for Policy-Makers, published by UNESCO in 2021, explores AI's potential to transform teaching, learning, and assessment while addressing ethical concerns and policy implications. The review commends the book's emphasis on equity, inclusion, and ethical considerations in AI adoption. It highlights the importance of interdisciplinary collaboration and robust governance frameworks to ensure AI's responsible and equitable implementation. Additionally, the review underscores the book's practical recommendations for leveraging AI to enhance educational management, empower educators, and foster lifelong learning.*

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## 1. INTRODUCTION

This book by Miao et al. (2021) offers policy-makers guidance on leveraging Artificial Intelligence (henceforth called AI) to enhance education while addressing associated risks. It establishes clear connections between AI and education, a highly relevant topic in the field. As a comprehensive resource, it provides policy-makers with essential insights and guidelines for integrating AI into educational frameworks. Each chapter thoroughly explores concepts from definition to practical solutions, equipping policy-makers with the necessary knowledge to effectively utilize AI in education.

In general, the book has six main chapters. Chapter one serves as the introduction, highlighting how AI is integrated into the education system, from school management to pedagogy, without compromising equity and equality in education. Chapter two lays the groundwork by defining AI and detailing techniques and technologies, thus facilitating an understanding of its role in education. Chapter three delves into the impact of AI on teaching and learning, emphasizing the importance of ethical, inclusive, and equitable implementation. It also discusses how education can prepare students for a future where AI plays a significant role and how AI itself can augment educational practices. Chapter four focuses on the challenges of using AI to achieve Sustainable Development Goal 4, which aims to ensure universal access to quality education. Chapter five showcases specific national and regional policies, inspiring policy-makers worldwide. Meanwhile, the final chapter offers concrete recommendations tailored to local contexts, emphasizing AI's practical deployment and utilization in education. With its accessible language and practical insights, this book benefits readers seeking to understand and implement AI in education. The author's explicit evaluations of various AI tools and their suitability for specific tasks enhance the book's utility. Additionally, including explanations for AI-related acronyms and abbreviations makes it particularly accessible to those new to the field.

In the following sections, we will reflect on key takeaways from this book and provide suggestions for readers interested in utilizing it as a foundation for implementing AI in education.

## 2. SUMMARY

Artificial Intelligence (AI) is rapidly transforming education, presenting both opportunities and challenges. This UNESCO guidance for policy-makers explores AI's potential to address educational challenges, emphasizing the need for ethical, inclusive, and equitable AI use. It defines AI, discusses its techniques and technologies, and analyzes its implications for teaching, learning, and education management. The guidance also addresses the risks and challenges of AI in education, such as data privacy, algorithmic biases, and the need to prepare individuals for an AI-driven world. It concludes by offering recommendations for policy-makers to harness

AI's benefits while mitigating its risks, ensuring that AI serves as a tool to enhance human-centered learning and achieve equitable and inclusive quality education for all.

### **3. ANALYSIS**

#### **3.1. Navigating the Intersection of AI and Education**

AI, or artificial intelligence, has become an integral aspect of modern society, extending far beyond the realms of science fiction. Its applications span diverse sectors, from healthcare to education, promising transformation through enhanced efficiency, accuracy, and decision-making processes. As AI evolves, policy-makers must grasp its complexities and implications, particularly in education.

The definition of AI has evolved, often intertwined with debates on machine intelligence. For this publication, AI refers to computer systems engineered to interact with the world using human-like capabilities (Miao et al., 2021). This book explores various AI techniques, including classical AI, characterized by rule-based systems, and machine learning, which involves analyzing vast datasets to identify patterns and construct models (refer to Figure 1 on p. 8). An array of AI technologies is now available as services, widely utilized across diverse applications, ranging from Natural Language Processing (NLP), facilitating text interpretation and generation, to Artificial Creativity, generating new content such as photographs, music, artwork, or narratives (refer to Table 2 on p. 10).

Despite remarkable achievements, deep neural networks primarily derive patterns through statistical analysis and lack intrinsic intelligence (Marcus & Davis, 2019). While machine learning techniques can accomplish impressive feats, they may only sometimes surpass more straightforward approaches like linear regression. However, AI's rapid development pace and ubiquity in modern life set it apart from previous technological revolutions. This part of the book underscores the significance of human involvement in AI successes, emphasizing humans' need to frame problems, select data, design algorithms, draw conclusions, and make judgments, among other pivotal roles. Initially aimed at simulating human thought processes, AI faces clear limitations compared to human abilities, known as Moravec's paradox (Moravec, 1988). While excelling at tasks like pattern discovery, AI needs help with self-directed learning, common sense, and value judgments. Despite AI's advancements, human involvement remains critical, from framing problems to making value-based judgments. This nuanced relationship has led to "augmented intelligence," emphasizing collaboration between humans and AI to enhance human capabilities (Zheng et al., 2017). This approach explores how AI can complement human cognition and suggests a blended approach to problem-solving using artificial and collective intelligence (Mulgan, 2018).

AI is considered a fundamental component of the Fourth Industrial Revolution (Industry 4.0), alongside technologies like 3D printing, autonomous vehicles, and robotics. Its widespread integration across various industries necessitates a comprehensive response to its implications, including potential job displacement and the emergence of new occupations. Estimates suggest that up to 30% of work activities could be automated by 2030, affecting millions of workers globally. While AI may replace middle-income jobs reliant on logic and algebra, it also creates opportunities for high-skill jobs requiring creativity, analytical abilities, and human interactions (Elliot, 2017). To adapt to this changing landscape, workers must undergo upskilling or reskilling. Many countries (e.g., Australia, Finland, and Japan) have begun developing strategic plans to address the future of AI, focusing on theoretical and practical approaches to maximize its social and economic benefits while mitigating negative impacts.

#### **3.2. Leveraging the Use of AI in Education**

Miao et al. (2021) have articulated clear insights into how AI can be harnessed in education, categorizing its applications into four distinct, needs-based categories: AI for management and delivery, AI-driven learning and assessment, AI for empowering educators and enhancing teaching, and AI for lifelong learning. While traditionally viewed as a tool primarily for student-facing learning systems, AI's evolution since its inception in the 1970s has extended its reach far beyond the confines of the classroom (see p. 13). Presently, education not only involves learning with AI but also learning about AI, reflecting a shifting paradigm where humans are expected to coexist and collaborate with AI. However, the critical question persists: How can AI effectively collaborate with education policy-makers to manage processes, assess classrooms, empower educators, enhance learning, and foster lifelong learners?

AI for education management, termed system-facing applications, focuses on optimizing the school system's operational aspects. By automating administrative processes, these applications aim to alleviate the burden on school staff tasked with managing student admissions, maintaining data records, and evaluating the school's overall performance (cited in Miao et al., 2021). Galadima and Adbullah (2024) highlight that integrating AI into school administration facilitates decision-making, task automation, resource optimization, communication enhancement, and bolstering security measures. Leveraging big data generated by learning management systems, AI empowers administrators, educators, and students by providing timely insights and guidance (Miao et al., 2021).

In the realm of AI for management and delivery, our search-engine-based research has uncovered several emerging applications that aim to automate various school management processes. Notable examples we identified include *OU Analyze* (<https://analyse.kmi.open.ac.uk>), developed by the UK's Open University for predictive student analysis; *Swift* (<https://www.swiftlearningservices.com>), created by Swift eLearning Services in India to identify student struggles; and *ALP* (<https://alplearn.com/ai-for-learners/>) in the US, which is capable of creating comprehensive psychometric profiles based on student interactions and achievements. These applications predominantly focus on providing insights into students' preferences, accomplishments, and learning styles, with limited offerings specifically designed for automating broader school management processes. A key part of our research involved conducting a *Google* search for AI solutions specifically tailored to automate school management, using terms like "AI for school administrators." Our findings showed sparse results, and most of the available solutions are still in developmental stages. *Academia* by Serosoft (<https://www.academiaerp.com>) emerged as a potential match for our criteria, though it requires schools to fully subscribe to access its services.

On the other hand, AI for assessment engages students directly, functioning as student-facing applications. Embedded within various learning platforms, these AI-driven systems aim to revolutionize the timing, content, and delivery of learning methods (Richardson & Clesham, 2021). Based on our analysis, noteworthy platforms in this category include Intelligent Tutoring Systems (ITS), Automated Writing Evaluation (AWE), and Teachable Agents. ITS provides adaptive tutoring tailored to students' individual strengths and weaknesses, offering real-time feedback and hints for self-correction (Miao et al., 2021). AWE tools such as *Turnitin* (<https://www.turnitin.com>) and *Grammarly* (<https://www.grammarly.com>) offer automated feedback on writing, categorized into formative and summative feedback. Summative AWE helps students refine their writing before submission, while formative AWE focuses on surface-level elements like wording, grammar, and sentence length. However, our findings show that there are concerns about formative AWE, as it often prioritizes superficial features, potentially stifling creativity and the deeper comprehension of writing (Miao et al., 2021).

For educators, teacher-facing AI applications aim to streamline tasks such as administration, plagiarism detection, and assessment (Miao et al., 2021). While the extent to which these apps may replace teacher tasks remains uncertain, policy-makers must prioritize equipping teachers with pedagogical skills that complement AI assistance, emphasizing interactive teaching methodologies that promote critical thinking and engagement between teachers and students.

### 3.3. The Benefit of AI: Between Promises and Perils

In its inception, AI in education aimed to bridge the gap between humans and personalized lifelong tutoring (Miao et al., 2021). By leveraging data on students' learning styles, these platforms were anticipated to revolutionize traditional classroom paradigms, granting learners control over their educational experience—pace, instructional method, or subject matter (Dishon, 2017). Through such platforms, learners could adapt their learning to suit their styles, free from the constraints of time and place. For instance, a student with special needs could receive personalized, one-on-one instruction. In contrast, a university student in a remote area could access courses from top institutions worldwide, transcending geographical barriers—AI aimed to empower students to choose when, where, and how they learn.

However, concerns have emerged. As these platforms gather data on learners' preferences and styles, questions regarding the safety and ethics of data mining arise. Miao highlights the accumulation of AI data by a handful of powerful international technology and military entities, indicating that the development of AI in education is primarily driven by profit-seeking actors catering to the burgeoning educational technology market's demand for personalized tutoring (Dishon, 2017). Unfortunately, many people view this data collection as being invasive, dehumanizing, and a violation of their right to privacy. It is intrusive because these platforms necessitate continuous monitoring of student gestures and actions. It is dehumanizing because it compels students to conform to a singular learning model, diminishing human interaction and curtailing learners' autonomy (Miao et al., 2021). Furthermore, data collection often occurs without individuals' awareness (Regan & Jesse, 2019). For instance, Miao et al. (2021) cites the example of camera-based AI used in Chinese classrooms, which analyzes students' facial expressions to gauge their concentration level. Such technologies extend beyond education, raising questions about societal awareness of their proliferation.

While AI in education offers exciting possibilities, it presents significant ethical and privacy challenges. Striking a balance between innovation and safeguarding individuals' rights and autonomy remains imperative in navigating the evolving landscape of AI in education and beyond.

### 3.4. A Global Policy Perspective

In this chapter, the authors thoroughly examine global policy responses to the integration of Artificial Intelligence (AI) in education systems. Hwang et al. (2020) stated that AI materials and information can inform policies in education systems. Drawing from various national and regional initiatives, the authors shed light on the diverse approaches adopted by different countries and regions, providing invaluable insights for policy-makers navigating this complex terrain.

The authors begin by surveying policy initiatives in over 60 countries, as documented by the Organisation for Economic Co-operation and Development (OECD). They astutely observe a notable gap in the attention given to K12 education within these initiatives, underscoring the need for tailored strategies to address AI's implications for younger learners (Miao et al., 2021). Through synthesizing national policies, the authors advocate for a nuanced approach that accounts for the diversity of educational contexts.

Divided into three overarching approaches—Independent, Integrated, and Thematic—the book meticulously dissects the strategies employed by various nations. Under the independent approach, exemplified by initiatives such as the European Union's (EU) 'The Impact of Artificial Intelligence on Learning, Teaching, and Education,' countries forge dedicated AI policies to revolutionize teaching methodologies and foster personalized learning environments (Miao et al., 2021). In contrast, the integrated approach emphasizes seamless integration within existing educational frameworks, as demonstrated by Malaysia's #mydigitalmaker movement and Argentina's 'Aprender Conectados' initiative (Miao et al., 2021). Lastly, the thematic approach emphasizes specific facets of AI and education, prioritizing data privacy and digital competence, as seen in policies like China's 'New ICT Curriculum Standards for Senior High School' (Miao et al., 2021).

Amidst diverse policy initiatives, common concerns emerge that demand attention and strategic focus. Governance for data and privacy stands out as a paramount concern, exemplified by policies such as the EU's General Data Protection Regulation (GDPR) (Miao et al., 2021). The principle of openness is equally crucial and essential for fostering equitable access and opportunities in AI education. Curriculum innovation is also highlighted as a pressing concern, emphasizing the need for educational systems to evolve alongside the Fourth Industrial Revolution.

Financial support emerges as a critical enabler for effective AI implementation in education, with nations like the Republic of Korea demonstrating commitment through substantial investments in scholarships and research institutions (Miao et al., 2021). Moreover, comprehensive system-wide planning, sustained funding, and international cooperation are imperative to effectively navigate the complexities of AI integration in education (Miao et al., 2021).

The authors provide a comprehensive framework for policy-makers to navigate the integration of AI into education, emphasizing the importance of tailored strategies, common concerns, financial support, and international cooperation in shaping inclusive and equitable AI-driven education systems globally.

### **3.5. A Guide to Policy and Practice**

Miao et al. (2021) provide a structured guide for policy-makers, educators, and stakeholders, delving into the evolving relationship between artificial intelligence (AI) and education policy. Focusing on enhancing education, AI's potential has often been overlooked by both the public and policy-makers (Saputra et al., 2023). Miao et al. (2021) set a clear foundation on how AI can be integrated into education while prioritizing ethicality, equity, and inclusion. The authors emphasize the importance of thoughtful planning and diverse stakeholder engagement to maximize AI's benefits, which is rapidly transforming the educational landscape.

A core message of the text is the necessity of interdisciplinary planning and inter-sectoral governance. AI in education cannot be implemented in isolation; it demands collaboration across sectors, pooling knowledge from educators, policy-makers, and AI experts. As Luan et al. (2020) argue, this collaborative effort is pivotal in realizing AI's transformative potential in education. By fostering these partnerships, AI can be harnessed to address entrenched educational challenges, enhance learner-centered approaches, and promote inclusive practices. The authors argue that equity in the use of AI relies on policies that support its development while addressing societal concerns such as data privacy, algorithmic bias, and access disparities (Miao et al., 2021).

The chapter also focuses on the practical aspects of AI implementation in educational management, teaching, and learning processes. AI-powered educational management information systems (EMIS) are positioned as dynamic tools that can create responsive learning environments. The text highlights the critical role of educators, noting the importance of equipping them with the necessary skills and resources to maintain human agency in a rapidly evolving AI-driven educational landscape (Miao et al., 2021).

A notable strength is its attention to lifelong learning and AI's role in fostering human-centric development. The authors stress the need for AI literacy as a societal priority, ensuring that individuals across all demographics are prepared to engage responsibly. By promoting AI as a tool for continuous learning and adaptability, policy-makers can create pathways that support diverse learners and address future labor market demands (Miao et al., 2021).

In summary, this chapter serves as a crucial resource in the discussion of AI governance and education policy. By blending case studies, best practices, and theoretical insights, the authors provide a source of guidance as we approach a new era in education. It enables stakeholders to embrace the revolutionary potential of AI while maintaining the values of justice, inclusivity, and ethics.

#### 4. CONCLUSION

*AI and Education: Guidance for Policy-makers* is a valuable resource for navigating the complexities of AI in education. By advocating for a balanced approach that prioritizes ethics, collaboration, and human-centered design, the book equips policy-makers with the tools necessary to harness the power of AI for the benefit of all learners. However, it also serves as a cautionary tale, reminding policy-makers that AI is a powerful tool that requires careful consideration and responsible implementation to avoid exacerbating existing inequalities. As we move forward, policy-makers must ensure that AI becomes a force for positive change in education, not a source of further disparities. Finally, this book can be a starting point not only for policy-makers but also educators, and students who are researching AI. In the Indonesian setting, this book can be a guideline for policy-makers to create a baseline policy in implementing AI.

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