TRANSFORMING EDUCATION
INNOVATION FOR SUSTAINABILITY IN THE AI ERA

EDITED BY
FARHANG MORADY

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Transforming Education: Innovation for Sustainability in the AI Era emerges from a collective endeavour grounded in democratic values, intellectual curiosity, and global collaboration. The Democratic Education Network (DEN), founded at the University of Westminster, continues to thrive as a student, staff partnership committed to reimagining education through participation, dialogue, and cross-cultural engagement. At its core, DEN seeks to cultivate learning environments where innovation is guided by ethics, sustainability, and shared responsibility.

This volume results from ongoing collaboration among institutions, fields, and countries. Universities, educators, and students worldwide have shared their research and knowledge, along with a common vision and trust. Through conferences, workshops, fieldwork, and joint publications, these collaborations have built a global learning community where education connects cultures and contexts.

This year also marks an important development in DEN's publication model. For the first time, the book has been supported by regional editorial teams, including in Uzbekistan and Vietnam, to coordinate contributions within their regions. We extend our sincere thanks to Meyirbek Abdikadirov from Westminster International University of Tashkent in Uzbekistan and Que Anh Mai from Hanoi University in Vietnam for their invaluable support in managing and developing the book. This decentralised approach reflects DEN's commitment to shared governance, distributed responsibility, and scholarship that is locally grounded yet globally connected.

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At the University of Westminster, we are fortunate to work within a community that values innovation and student engagement. We extend our appreciation to colleagues who have contributed intellectually and pedagogically to DEN's development and to this publication.

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We are proud that DEN's work has received national recognition. The Network was named a runner-up at the Green Gown Awards for Student Engagement, a testament to the collective effort invested in building inclusive, sustainability-focused learning communities. In addition, Dr Farhang Morady was honoured as a finalist for Championing Student Engagement, recognition that belongs not to one individual but to the students, colleagues, and partners whose collaboration made such achievement possible. We extend our heartfelt thanks to everyone whose dedication contributed to these milestones. They reflect the power of shared vision and sustained cooperation.

A special acknowledgement is due to Dr Farhang Morady, Academic Director of DEN, whose leadership, mentorship, and unwavering commitment have been foundational to this initiative. His vision of democratic education as a living practice, one that connects sustainability, AI, and global citizenship, has shaped

both the Network and this publication. His guidance continues to inspire students to see themselves not only as learners, but as co-creators of knowledge and agents of change.

Above all, we thank the students. Their intellectual courage, creativity, and commitment to collaboration remain the driving force behind DEN and this book. It is through their research, reflections, and engagement that education becomes transformative. Their willingness to question, to experiment, and to work across cultural boundaries embodies the spirit of innovation for sustainability in the AI era.

This volume stands as a testament to what can be achieved when institutions, educators, and students work together with purpose. It reflects a belief that education must not only respond to technological change but shape it ethically and democratically. Through collective effort, mutual respect, and shared aspiration, we continue to build a more inclusive, sustainable, and interconnected academic community

FOREWORD

Education can be a mechanism of control as well as a source of hope; it can domesticate creativity and discipline ideas, or it can nurture creativity and generate plurality of ideas. In an era defined by rapid and often disorienting technological change, these two possibilities sit closer together than many of us would like to admit.

This book that brings together writings from student-scholars is an act of hope and I mean that in the most authentic sense. The chapters gathered here do not celebrate artificial intelligence uncritically, nor do they dismiss it. They ask more interesting and urgent questions: Who accesses? Who benefits? Who is excluded? What kinds of minds, what kinds of citizens, what kinds of futures are we actually building when we allow algorithmic efficiency to stand in for human judgment?

These are not abstract questions for the contributors to this volume. They are students and young scholars writing from the vantage point of classrooms in Vietnam, Uzbekistan, Thailand, the United Kingdom, and beyond. They bring to this conversation something that much of the dominant discourse around AI and education lacks: experience of being on the receiving end of systems designed elsewhere, by others, with different people's futures in mind. That is not a limitation. It is precisely what makes this book worth reading. Our own students from the University of Westminster come from very diverse backgrounds.

I have had the privilege of watching the Democratic Education Network grow from a small, determined initiative of one into something genuinely remarkable. What distinguishes DEN is not just its interdisciplinary ambition, but its insistence that students are co-authors of educational innovation.

The themes this volume explores -- cognitive sustainability, the digital divide, climate resilience, governance and ethics, democratic pedagogy, lived experience of inequality -- are not discrete issues. They are facets of the same underlying question: what does it mean to educate human beings for a world in which power is increasingly exercised through code, data, and automated systems? The chapters do not pretend there is a singular answer. But they take the question seriously, and they do so with intellectual care and moral seriousness.

Several things struck me in reading across these contributions. I am struck by the book's intellectual honesty about what AI can and cannot do. We should be able to hold two things at once: that digital technologies can expand access to knowledge in transformative ways, and that they can also narrow the kinds of thinking we practise if we are not vigilant about how we deploy them.

Education in the AI era needs to be human-centred not as a slogan, but as a structural commitment. The University of Westminster has long been committed to education as a public good, to widening participation, and to producing graduates who can engage critically with the world they will help to shape. Our hosting of DEN and our relationships with institutions in Vietnam, Thailand, Uzbekistan, and many other countries are not peripheral to that mission. This book reflects what is possible when students from different contexts are trusted as thinkers, given the resources and mentorship to develop their ideas, and supported in speaking publicly about their findings.

To every student-scholar who contributed to this volume: your words and ideas matter. You engage honestly with questions that will define education for the next generation in highly volatile times. Thank you

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INTRODUCTION: Education Innovation in the AI Era

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Educational systems around the world are undergoing rapid transformations, driven by technological advancements, environmental concerns, and existing social disparities. The way we share knowledge is increasingly influenced by artificial intelligence (AI), digital platforms, and data systems. Currently, the focus is on sustainable development through the United Nations Sustainable Development Goals (SDGs), which represent a global initiative. Educational programs must create equitable learning opportunities for students while emphasising social justice and community welfare, as highlighted by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2024). The Democratic Education Network (DEN) plays a central role in this process, and the ninth volume of DEN's book is dedicated to exploring educational innovations that promote sustainability, social justice, and democratic participation in the AI era.

This book argues that adding technology to education is not just about the tools themselves. Education is a social system influenced by organisations, politics, and culture (Selwyn, 2019; Williamson, 2017). While AI and digital tools can improve access to learning, personalisation, and efficiency, they also come with risks. These risks might increase social inequalities, reduce human control, and weaken ethical standards in education (Floridi et al., 2018). For meaningful change in education, we need to pair technology with good governance, engaging teaching methods, and strong social support.

This volume, like the previous seven, is part of the DEN initiative, an educational program that emphasizes student-centered learning, critical thinking, and active engagement with global issues. DEN is founded on the principles of empowering education and democratic participation (Freire, 1970; Giroux, 2011). It prioritises dialogue, reflection, and social responsibility. In this volume, each student shares genuine experiences, research, and thoughtful practices. They explore topics relevant to their assessment of regions, such as artificial intelligence, sustainability, and social justice, within real educational contexts.

Education, AI and Global Fragmentation

In the past decade, AI has become one of the most impactful technologies in modern education. Tools such as adaptive learning platforms, intelligent tutoring systems, learning analytics, and generative AI are set to personalise instruction, automate assessments, and increase access to educational resources (Holmes et al., 2019; Luckin, 2020; UNESCO, 2023). Governments and international organisations increasingly present AI as a key instrument for achieving SDG 4: inclusive and equitable quality education.

Critical scholarship warns against technological determinism in education. Selwyn (2019) and Williamson and Eynon (2020) examine that digital technologies often serve the interests of powerful organisations and companies rather than the needs of learners. Without proper management, AI could widen the gap between those with access to technology and those without, support surveillance, and push vulnerable groups to the sidelines. The Organisation for Economic Co-operation and Development (OECD, 2021) also warns that if people lack access to technology, skills, and institutional support, innovation could lead to new forms of exclusion.

The debate has intensified, with Education for Sustainable Development emphasising systems thinking, ethical judgment, social responsibility, and long-term resilience (Wiek et al., 2011; UNESCO, 2024). However, many current educational technology models prioritise short-term efficiency instead of ecological and social sustainability. In their chapter on coded cognition, Malika and Bahar explain that relying too heavily on algorithmic systems can reduce human mentorship, slow metacognitive development, and increase bias in learning environments.

This volume places AI within wider political, ecological, and social contexts. Instead of questioning whether technology should be adopted, the contributors explore how it is governed, who benefits from it, and under what conditions it can promote democratic and sustainable futures.

Digital Divides, Inequality, and Educational Justice

This volume emphasises both the structures of technological control within digital education and the persistent inequalities in access to them. Despite ambitious national strategies for digital transformation, significant disparities persist across regions, urban and rural areas, affluent and low-income households, and majority and minority communities.

Mai Que Anh and Ngô Diệu Anh analyse the challenges that prevent AI implementation in rural Vietnam, including insufficient infrastructure, inadequate teacher training, and fragmented educational policies. Drawing on van Dijk's (2005, 2020) digital divide framework and Davis's (1989) Technology Acceptance Model, they both highlight that inequalities operate at multiple levels, including access to devices and connectivity, skills and confidence in using technology, and the ability to convert digital tools into meaningful educational outcomes.

The chapter by Vu Huong Thao demonstrates that ethnic minority students face various barriers that prevent them from achieving their academic goals. The students face barriers to accessing AI-based education because they must overcome language differences, cultural prejudice, and insufficient institutional support. She shows, through the Access–Agency–Achievement framework, that technology distribution alone does not meet the requirements for fairness. The system requires institutions to provide support, recognition, and empowerment to function properly.

These chapters demonstrate that technological expansion often benefits already privileged groups unless accompanied by redistributive policies and inclusive governance (Helsper, 2021; World Bank, 2022). The chapter supports the book's central argument that sustainability in education cannot be separated from social justice.

Ethics, Governance, and Innovation

The volume also highlights the importance of governance and ethical regulation. Nguyen Thi Thanh Dung's chapter examines the Association of Southeast Asian Nations' (ASEAN) Guide on AI Governance and Ethics and its impact on higher education in Southeast Asia. By comparing regional frameworks with those from UNESCO (2021) and the OECD (2019), she shows that global standards need to be tailored to fit local needs and cultural contexts.

She analyses the need for participatory and anticipatory governance to manage AI risks. Challenges like data privacy, algorithm transparency, academic integrity, and institutional accountability cannot be solved with technical solutions alone; they require coordinated regulations, professional training, and ethical leadership (Floridi et al., 2018).

Several chapters also express concerns that generative AI might harm academic integrity and critical thinking. Pinyapatch discusses cognitive development, while Lucia reflects on classroom practices, showing that relying on AI without critical thinking can foster dependency rather than fostering independent thought. These points align with ongoing discussions about responsible AI in education (OECD, 2021; Williamson, 2023).

Rural Transformation and Climate Change

In the volume, sustainability extends beyond technological monitoring to examine environmental vulnerability and ecological risk. Phan Minh Anh demonstrates in her chapter, about rural education and climate adaptation, how environmental threats enable learning between different social groups. Her "bamboo classrooms" concept refers to educational buildings which stand empty because there is no money to protect them against climate change impacts.

This chapter illustrates how climate disruptions exacerbate social exclusion, citing UNESCO (2024) and the United Nations Children's Fund (UNICEF, 2025).

It emphasises that integrating AI literacy with sustainability skills and indigenous knowledge can lead to positive outcomes. This fresh perspective enhances educational innovation by merging technological advancements with environmental education and the preservation of cultural traditions. To be effective, solutions must integrate these areas rather than focusing solely on deploying digital technology.

Experiential Learning and Democratic Education

The volume presents chapters that demonstrate DEN's dedication to experiential learning and to creating academic links between different regions. The Istanbul ECIT conference report by Kwanhatai Koh and his team demonstrates how students learn through their experiences of moving between places as they engage in discussions and collaborate to address educational, cultural, and political issues. According to the authors, the students' actual experiences demonstrate their development of intercultural competence, ethical sensitivity, and global citizenship. Negena's research, based on interview data, shows that students develop democratic abilities through their involvement in leadership activities, their work with peers, and their practice of reflection.

This volume concludes by featuring a conversation with Iranian filmmaker and actor Niki Karimi. Her career demonstrates how cinema can foster cultural dialogue across different societies. In this discussion, students from the Democratic Education Network talk with Karimi about storytelling, cultural identity, and the role of film in society. They highlight how artistic expression can help people understand social issues and build empathy across cultures. By linking cinema to culture, politics, and global communication, this dialogue emphasises the importance of creativity and storytelling in academic settings worldwide.

The educational approach in these chapters follows the principles established by critical pedagogy and participatory education, according to Freire (1970) and Giroux (2011). The authors show readers that technological progress fails to replace the need for people to connect with each other while learning together and exercising their political power. AI needs to function as a component that teachers can use to develop educational methods that focus on student-teacher dialogue, classroom unity and teacher self-assessment.

Contribution to Scholarship and Practice

This volume advances an integrated analytical framework that combines political economy, institutional governance, and pedagogical practice. It moves beyond techno-optimism and techno-scepticism to examine the structural conditions shaping educational innovation.

It amplifies Global South perspectives that remain underrepresented in AI and education research. By foregrounding Southeast Asia and cross-regional collaboration, the book challenges Eurocentric narratives of digital transformation.

It also demonstrates the scholarly value of student-led and experiential research. The chapters illustrate how critical inquiry, fieldwork, and reflective practice can generate rigorous and socially engaged knowledge.

Conclusion: Towards Democratic and Sustainable Futures

Transforming education in the AI era is not primarily a technical challenge. It is a political, ethical, and social project. As the chapters in this volume demonstrate, innovation can either reinforce inequality and control, or support empowerment and sustainability. The future of education will not be determined by algorithms alone. It will be shaped by struggles over governance, access, labour, ecology, and democracy. By situating AI within these broader dynamics, this book contributes to building educational systems that are not only technologically advanced but also socially just, environmentally responsible, and democratically grounded.

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PART I

HUMAN COGNITION, ETHICS, AND THE LIMITS OF AI

1

Coded Cognition: The Ethical, Neurological and Sustainability Risks of AI Adoption in Education

Bahar Ozdemir & Malikahon Vahobova

Abstract

This paper investigates the intersection of Artificial Intelligence in early education through the lens of SDG 4 (Quality Education) and SDG 10 (Reduced Inequalities). While AI emphasizes efficiency, this study examines four critical threats to sustainable educational transformation: the amplification of systemic bias that reinforces racial and cultural hierarchies, the erosion of human mentorship as a pillar of social sustainability, metacognitive decay as a result of cognitive offloading, and the surveillance of early development. By synthesizing the emerging neurological and sociological data, the research highlights that current AI adoption creates a "stagnation loop" that limits human intellectual growth and disproportionately affects marginalized communities. In today's school systems, AI tools are increasingly used in classroom management platforms, personalised homework systems and assessment software. However, the way these tools are introduced and used varies greatly depending on school leadership, how prepared teachers are and educational policies. The main challenge is not just about technology, but about regulation. Without clear rules that set ethical limits, protect student data and guide how AI should be used in teaching, AI could influence children's development without proper oversight. Institutions need to do more than simply adopt these tools. The paper also highlights critical implications of educational governance and policy, advocating for a shift from transactional AI dependency to a more human-centric pedagogical model. By prioritizing critical enquiry and peer collaboration over brute force learning methods, this approach aligns with DEN's democratic mission to ensure that technological advancements serve the long-term sustainability of human cognitive ecosystems and promote equitable, democratic participation in the digital age.

Introduction

Current early childhood education is still undergoing its most radical shift since the Industrial Revolution. As nations strive to meet the UN SDG 4, which mandates inclusive, equitable, and quality education for all, the integration of AI has been presented as the ultimate equalizer. It can be argued that Large Language Models (LLMs) and adaptive learning platforms offer a level of "hyper-personalization" previously reserved for the elite, but beneath this front of efficiency lies a complex web of neurological and ethical risks that threaten to eventually undermine the sustainability of human cognitive development.

True educational transformation needs curriculum digitalization, but it also requires developing critical thinking and empathy along with social agency. The current trajectory of AI adoption in primary schools often leans toward a "transactional" model. In this paradigm, the student is a consumer of algorithmic outputs rather than an absorber of knowledge. This shift risks creating a stagnation loop where the offloading of cognitive tasks, whether it be basic arithmetic or complex synthesis, stunts the neuroplasticity of the developing brain during its most formative years.

The "coded cognition" inherent in these models is not neutral: since AI models are trained on human data, they often act as "automated mirrors" of societal prejudices. For a child in an underserved community, an AI tutor that misinterprets their cultural dialect or reinforces racial stereotypes is a digital barrier to SDG 10 (Reduced Inequalities).

This paper aims to critically evaluate the neurological, ethical and governance implications of AI integration in early childhood education. By synthesizing current neurological research with sociological frameworks of sustainability, it details that without a radical shift toward human-centric AI governance, we risk hardcoding inequality into the minds of the next generation. The following sections will detail how systemic bias, the loss of human mentorship, and the rise of cognitive laziness create a "developmental ceiling" that limits the transformative potential of global education in our coming generation, and what guidelines need to exist to eradicate the creation of this cap.

Thematic Analysis/Discussion

While AI systems when used in educational contexts are neutral, data-driven tools, they are inextricably linked to human institutional biases. This research utilizes an analytical framework of AI, cognition, and sustainability to demonstrate that these technologies are not isolated tools but part of a structural interconnection of risks. Since machine learning models are trained on datasets shaped by historical and cultural hierarchies, they inevitably escalate existing inequalities and stereotypes. This systemic bias is further compounded by metacognitive decay; when students offload critical thinking to biased algorithms, they lose the cognitive agency required for democratic participation. These risks are codified through developmental surveillance, which creates a data-driven profile that can exclude marginalized learners before they reach their full potential. Consequently, the integration of AI isn't just a technological update, but also a significant challenge for education governance: systems must adapt to prioritize long-term sustainability of the human cognitive ecosystem.

AI Training

AI-driven learning tools and Large Language Models (LLMs) are trained on vast amounts of human-generated data, including text, images and other forms of data created by humans. According to Chris Sell (2025), "LLMs can be trained on more than one petabyte of data", (a one-gigabyte document contains approximately 180 million words, and a petabyte can contain one million gigabytes worth of data) allowing them to identify patterns and generate responses across a wide range of tasks. These datasets include books, academic papers, websites, and materials from various fields such as medicine, finance, law, and education (Liu et al.,).

Schools and educational institutions bear responsibility for critically evaluating AI tools that work well with recognized teaching standards and are fair and accessible to all students. Meanwhile, developers must check their models for bias and clearly explain the data sources and any limitations in the model.

AI learns directly from all the available and existing knowledge that we provide it with, and as a result it is able to perform extremely complex and large tasks. All of this knowledge, in some way, shape or form, reflects values, biases, preferences, assumptions and inequalities present in today's society, it is not neutral or just in any aspect and AI systems inevitably inherit these biases.

Bias Amplification

Research conducted by Moshe Glickman and Tali Sharot suggests that AI systems amplify existing human biases. Training artificial intelligence systems on even slightly biased data will not only result in the adoption, but also the intensification of such biases. In addition, the user's own prejudices will be strengthened due to interacting with already biased systems, creating a never-ending loop. (Glickman & Sharot, 2024). Even AI detection platforms clearly show evidence of bias. Liang et al. (2023) found that AI detectors misclassified over 61% written by non-native English students in the Test of English as a Foreign Language (TOEFL) as AI-generated, while accurately identifying the essays written by native English students. This study shows AI tools may treat non-native speakers unfairly and misjudge their work compared to native speakers. Not only that, but also, this goes strongly against both SDGs 4 (Quality Education) and 10 (Reduced Inequalities) because using biased AI systems will only reinforce the existing educational inequalities and hierarchies. Looking at this from a sustainability perspective, the amplification of algorithmic bias diminishes social sustainability by deepening exclusion, compromises cognitive sustainability by constraining users' long-term capacity for independent thought and endangers institutional sustainability by eroding the educational foundations of mentorship, trust and pedagogy.

There are two main stages in the development of artificial intelligence: pretraining and transfer learning (Patil & Gudivada, 2024). Bias can be introduced at any point during the development, such as the initial stage of data collection and continuing throughout the training process. When a system is trained on biased datasets, most of the time, the outcomes will reinforce these biases. Over time all these discriminatory and unfair patterns become so normalized that it becomes difficult to tell which results are neutral and objective and which are prejudiced.

This issue becomes especially problematic when certain groups are overrepresented in training data while others are underrepresented or misrepresented. For example, the majority of educational content available online is produced in English and reflects Western academic perspectives (Nyaaba et al., 2025). For this reason, AI prioritises specific communication styles and learning methods, placing students from non-Western backgrounds at an unfair disadvantage. To support fair and effective learning, AI in education needs to be managed through school responsibility, rules and public monitoring.

Responsible AI development needs clear rules that require checking for bias, reducing unfairness and being open about how data is collected. Regulators could make sure AI tools follow these rules, so schools don't unintentionally harm students from marginalized groups.

The Role of AI Development Companies

The bias in AI systems is not only limited to training data, but it also enters through the decisions made by AI developers. Since the choices regarding which data sets to include, how to classify and label information, along with how generated responses are prioritized, are all impacted by the cultural and educational backgrounds of the people designing these systems (Yan et al., 2025)

When developers define what makes a "correct" answer or an "ideal" learner, they can unintentionally introduce assumptions about academic success and intelligence.

This can be seen in the use of AI in admissions and grading processes. Bias in AI can result in the discrimination of students from disadvantaged backgrounds despite having comparable academic qualifications. This was studied by Chinta et al (2024) and as stated, "AI-driven admission tools were found to unintentionally favor applicants from historically privileged schools" and "the models systematically disadvantaged applicants from economically disadvantaged areas". Due to the bias these machines inherit from training on human data, they put certain students at a disadvantage, assign them lower scores and reduce admissions rates in their community.

The Diminishing Value of Human Mentorship

The integration of AI into early education risks transitioning the classroom environment from relational to transactional. Human mentorship *is* the transfer of information, but it also requires "attunement" from the teacher's part, sensing a child's emotional state, potential frustration, and/or hidden potential.

Research from the Brookings Institution (2026) highlights that AI tutors offer "unconditional compliance," which frequently lack the emotional friction necessary for character growth. Where a human mentor is able to provide corrective empathy in measures that a student can handle based on context clues, an artificial one falls short, instead offering "simulated validation". Additionally, traditional mentorship often includes spreading values and ethical nuance, although varied from teacher to teacher. AI models, on the other hand, are "value-neutral" and reflect the average, as aforementioned biased, ethics, morals, and boundaries of their training data. When AI becomes the primary authority for kids, they lose the often-unconscious transference of the "moral scaffolding" that molds the classroom based on teachers' lived experiences.

As schools slowly progress into "AI-facilitated" education, the role of the educator is often sidelined into more of a "proctor" or "troubleshooter". This systemic level shift de-professionalizes teaching, a sphere already not valued enough, and severs the bond that often defines many students' primary predictors of kids' long-term academic success. The feeling of "being seen" and being recognized and nurtured by someone not in an inherent requirement to do so, such as parents, is a crucial part of the teacher-student relationship that AI cannot mimic nor replicate.

Cognitive Offloading: The Death of Critical Thinking

The integration of AI into early education represents a fundamental shift in the neurological headspace of a classroom. Whilst traditional education is built upon the core foundation of productive failure/struggling, AI offers a path of less resistance. This section explores the mechanics of "cognitive offloading," the phenomenon where students outsource intensive mental tasks to algorithms, and the resulting decline in analytical reasoning and independent thought.

The Neurological Cost

Learning is the physical restructuring of the brain, it requires "cognitive load" to stimulate synaptic strengthening within the prefrontal cortex, the area responsible for executive function. Research indicates that when AI tools act as a "cognitive prosthetic," students may skip the essential heavy lifting required for neural encoding. A 2025 study from the University of Washington found that students reliant on AI assistants for creative writing showed less activity in the "default mode network," the system associated with internal thought and imagination, than people writing manually. Over time, chronic over-reliance risks a form of atrophy, where the brain's capacity to engage in long-form, independent thought begins to wane.

The neurological cost of AI is not an inevitable outcome of AI itself, but rather a result of how it's governed within the curriculum. To mitigate, educational institutions must move towards adaptive use models, and human-AI co-learning. By outlining rigid conditions for responsible use, educators can implement safeguards that preserve the productive struggle. This balance ensures AI is a scaffold for critical enquiry rather than a replacement.

Metacognition

Metacognition, or the ability to think about one's own thinking, is typically a good indicator of an educated mind. The OECD Digital Education Outlook 2026 identifies "metacognitive laziness" as a primary harm of educational AI.

Since AI provides a polished product instantly, the iteration loop within learning is destabilized. In a traditional setup, a student writes a draft, identifies logical gaps, and revises. With AI, the draft is frequently "perfect" or close enough to it upon first, second and third attempts. This is further harmful, as it creates an illusion of competence. Students mistakenly believe they understand a topic or concept because the output is high quality and dense, but they lack the underlying mental reasoning to explain how the output was ultimately reached. A 2025 report from Phys.org reported that there was a 22% decline in metacognitive self-assessment scores amongst students who used AI for over half their coursework.

Loginov (2025) emphasizes the importance of reflection as a core metacognitive strategy, indicating that students should articulate their thought processes and learn from their mistakes. Furthermore, educators can help students reflect on their learning by using prompts that encourage them to adjust their strategies and improve self-assessment, especially when using AI tools.

Educational policies need to keep up with the rise of AI in classrooms to help students think critically instead of just using AI for answers. Tests can focus more on reasoning and independent learning, rather than just getting the right answer, because traditional tests may not reflect true understanding (Xia et al., 2024). At the same time, teachers need training in AI and in guiding students' thinking, as professional development helps teachers teach better and support students in using AI responsibly (Mah et al., 2026).

The Basic-ification of Thought

AI models are, by definition and design, “stochastic parrots”, meaning they predict the most likely word based on massive volumes of human data. When kids use these tools to generate ideas, not only are they outsourcing the job, but they are gradually training their brains to follow the grain, unconsciously building a profile that only thinks in “averages”. A study in Frontiers of Technology found that children using AI for brainstorming typically created 40% fewer unique ideas than those who were brainstorming in peer groups. AI tends to be safer, or regressing “to the mean”, offering safer and less unique perspectives, which slowly teaches a child to mirror the same behavior.

Additionally, because AI communicates confidently, unwaveringly presenting everything as fact, children are less likely to criticize or question its output, when AI needs to regularly be regulated. This “calculated certainty” discourages the Socratic method of questioning. If a machine is confidently stating “this is the answer,” the child’s natural curiosity, the “why” that drives critical thinking, is essentially silenced.

Munshi et al. (2022) state that adaptive scaffolding, which is guidance or support that adjusts based on a student’s current understanding and needs, helps students develop essential metacognitive skills, including planning, monitoring and reflecting on their thought and learning process. They explain that in open-ended learning activities, providing targeted hints or feedback at moments encourages students to evaluate their strategies, identify errors and adjust their approach. This approach not only improves students’ learning performance but also strengthens their ability to think critically. The findings suggest that curriculum design should include opportunities for reflection, self-assessment and iterative problem-solving, helping students build independence in learning while still receiving support as required.

Evidence of Systemic Decline

Research by Dell'Acqua et al. describes the Jagged Frontier of AI capability: while AI can and does perform certain tasks at a substantially high level, it often catastrophically fails in other avenues. When students offload their thinking to AI, they often lose the ability to discern when AI is “hallucinating” along with it. In 2025, a longitudinal study involving 1200 middle school students, researchers found that in an “AI-heavy” classroom, “transfer tasks” (which are situations where one has to apply learned concepts to a new, unfamiliar problem) are performed 15% worse. Hence, while AI is at times helpful for completing some clearly outlined task, its usage does not build transferable knowledge. The resulting generation is some version of highly efficient mimics who can navigate interfaces, but not any real-world ambiguity or complexity.

Surveillance, Data Governance, and “The Floor Effect”

While AI personalization is often marketed as a tool for tailored educational intervention, it frequently facilitates monitoring under the guise of "support". This creates a structural risk known as the "stagnation loop" or "The Floor Effect," where AI models mirror a student’s current linguistic and cognitive level to remain conditionally compliant. Research indicates that if a student begins using generative AI during a period of academic struggle, the model’s "User Profile" may permanently label them a "low-level learner," "stupidifying" its output and effectively capping the student's growth. Unlike human mentors who introduce "stretch" vocabulary and complex logic to challenge developing minds, AI "weights" can "dumb down" interfaces for years, trapping learners, particularly those from marginalized groups, inside a cognitively limited "box".

The ethical implications of this surveillance extend beyond cognitive decay to the erosion of student rights and institutional autonomy. Because student data has become valuable, constant monitoring can foster a culture of mistrust that reduces the agency of teachers and learners. Current educational governance remains underdeveloped in this area, often lacking protections comparable to those established under the General Data Protection Regulation (GDPR), as well as institutional ethics boards necessary to prevent data exploitation. To fulfill DEN's democratic mission, institutional policy must evolve beyond technical management toward robust student data governance. By shifting from a "one-size-fits-all" model to a governed, human-centered approach that prioritizes critical inquiry over "spoon-fed" algorithmic responses, academic institutions can ensure that technological trends don't undermine the long-term sustainability of the human cognitive ecosystem.

Limitations

While the evidence indicates a significant shift in pedagogical and neurological landscapes, several constraints limit the scope of this study. Acknowledging these boundaries is essential for maintaining a scientifically rigorous perspective and defining the trajectory for future educational governance.

The primary limitation is the temporal mismatch between the rapid deployment of AI and the pace of human biological development. Generative AI only entered mainstream education in late 2022, thus we lack longitudinal policy studies that track the cumulative impact of AI dependency from early childhood into adulthood. While current data highlights immediate friction in "transfer task" performance, the long-term structural cost to the prefrontal cortex, which matures into the mid-twenties, is largely theoretical.

This study faces a comparative dimension deficit due to the lack of transparency in the private sector. Major AI developers don't release internal datasets or "weighting" algorithms, hindering forensic audits of bias required for SDG 10 compliance. To move beyond this limitation, a cross-national research agenda would be necessary to compare how different regulatory environments influence the "Floor Effect" across diverse demographic groups.

The existing literature is often polarized between techno-optimism and pessimism, making it difficult to find "middle-ground" data focused on Social and Cognitive Sustainability. Future research must prioritize human–AI co-learning models and institutional ethics boards to transition from observing short-term technical gains to evaluating the long-term impact on democratic pedagogy and the DEN mission.

Recommendations and Conclusion

The evidence regarding the neurological and ethical risks of early AI adoption necessitates a policy shift rooted in precaution. Rather than treating AI as an educational utility, institutional frameworks may benefit from postponing AI integration within the primary and middle school curriculum, specifically from kindergarten through the 8th grade. This period of neurological fragility is essential because the developing brain requires unmediated "productive struggle" to facilitate synaptic pruning and neural encoding required for high-level executive function. By postponing exposure to generative tools during those fragile years, educators can protect the formation of the default mode network and ensure that foundational skills, such as linguistic synthesis, mathematical reasoning, and ethical inquiry, are mastered through manual, human-centric effort. This approach ensures that the moral scaffolding of the classroom remains in the hands of human mentors who can provide the emotional attunement and relational feedback that algorithms naturally lack.

Once a student enters the 9th or 10th grade, AI can be introduced as a secondary resource, yet this integration must remain strictly controlled and secondary to human instruction. At this stage, the pedagogical focus should shift from using AI as a "solution provider" to treating it as a "subject of critical inquiry." High school students, having already established a resilient metacognitive foundation, can be taught to "red-team" these models, identifying the systemic biases and "stochastic" errors that characterize large language models. This controlled exposure allows for the development of digital literacy without the risk of "cognitive offloading" or the "floor effect" that stunts growth in younger learners. By limiting the quantity of AI interaction and keeping it within the bounds of adversarial analysis, educational institutions can fulfill the mandates of SDG 16, fostering a generation that understands how to critique and manage algorithmic systems rather than becoming passively dependent upon them.

Some schools can offer structured AI experiences, but others, especially in low-income or under-resourced areas, may need teachers to lead discussions on AI ethics or collaborative supervised activities to foster digital literacy. At the university level, AI can be integrated more into the learning system, emphasizing critical evaluation, interdisciplinary projects and research applications. Students can explore generative AI in more in depth, trying to understand its ethical, societal and technical impacts under the supervision of professors, while developing the analytical skills necessary for professional or academic pursuits. According to the United Nations Educational, Scientific and Cultural Organisation (UNESCO), applying a human-centred, rights-based framework to AI in education is critical to ensure access and quality learning for all learners, especially in contexts where technology might deepen the already existing educational inequalities.

The transition toward "coded cognition" in early childhood education represents a significant departure from the sustainable goals of global pedagogy. The promise of personalized efficiency offered by AI typically masks a deeper reality of intellectual stagnation and the reinforcement of historical inequalities. While the technology serves as a powerful resource in adult or professional contexts, its premature application in the classroom threatens to bypass the essential cognitive heavy lifting required for deep learning. By delegating the agency of the developing mind to machines, we risk achieving short-term "output" at the cost of long-term human capacity. This trade-off is fundamentally at odds with the inclusive and equitable quality of education envisioned by SDG 4 and the reduction of systemic disparities mandated by SDG 10.

The path towards a transformative and simultaneously sustainable educational future requires the courage to implement boundaries. Delaying AI integration until at least the 9th grade is not limiting technological progress but defending human neurological integrity. It ensures that every child, regardless of their cultural or socioeconomic background, has the opportunity to develop a robust cognitive immune system before interacting with the persuasive and often biased nature of algorithmic systems. To safeguard the future of global education, it is vital to prioritize the slow, relational process of learning over the instant gratification of machine-generated results. Only by nurturing the mind independently in its formative years, before coming into contact with these tools, can we ensure that the next generation possesses the critical thinking and moral clarity required to navigate an increasingly complex world.

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2

Staying Human in the Age of AI: Sustainable Cognitive Development and Responsible Governance in Education

Pinyapatch Meksakunwong

Abstract

As artificial intelligence (AI) rapidly integrates into education and professional life, societies are becoming increasingly reliant on automated reasoning, while future generations grow up with unprecedented access to instant answers and AI-supported learning systems. While this brings extraordinary opportunities, it also raises critical questions about sustainable human cognitive development: What becomes of curiosity, resilience, and independent problem-solving when the 'easy answer' is always available? This article explores the tension between the AI mind that is fast, systematic, and solution-driven, and the human mind, which develops through struggle, reflection, and creativity. Drawing from psychological theories, I argue that educational institutions must move beyond simple technological integration toward intentional learning design that preserves reasoning, agency, and reflective thinking. Positioned within the framework of Sustainable Development Goal 4 (Quality Education), this chapter contributes to ongoing debates on responsible AI governance in education. It proposes that universities and policymakers adopt human-centred AI strategies that embed metacognitive training, cognitively stimulating pedagogies, and institutional oversight mechanisms to ensure that AI functions as a supportive tool rather than a cognitive substitute.

Introduction

In recent years, Artificial Intelligence (AI) has become an integral part of everyday life. From search engines and virtual assistants to automated writing and problem-solving tools, AI increasingly shapes how people learn, work, and make decisions. In educational settings, students can now receive instant answers to complex questions, generate essays within seconds, and solve problems with minimal effort. Similarly, in workplaces, AI systems support data analysis, idea generation, and decision-making.

While these technologies offer efficiency and convenience, their growing presence raises important questions about human cognitive development, particularly when reliance begins at an early age.

One key concern lies in the availability of easy answers. Human reasoning traditionally develops through effortful processes such as curiosity, trial and error, and learning from mistakes. When solutions are immediately provided by AI, a person may have fewer opportunities to engage deeply with problems or to tolerate uncertainty. This concern is especially significant for children and adolescents, whose cognitive abilities are still developing. If young learners become accustomed to instant solutions, what will happen to their curiosity, persistence, and ability to think independently?

Although much discussion surrounding AI emphasises innovation and productivity, less attention has been given to its long-term implications for human cognitive growth. Existing debates often focus on what AI can do for humans rather than how humans continue to develop their own reasoning alongside these technologies.

This article explores the tension between two forms of thinking: the AI mind and the human mind. The AI mind is fast, systematic, and solution-oriented, while the human mind develops through exploration, reflection, and productive struggle. Drawing on cognitive psychology and educational theory, the article asks: how can educational institutions integrate AI technologies while safeguarding sustainable cognitive development and independent reasoning skills? In alignment with Sustainable Development Goal 4 (Quality Education), it situates this inquiry within debates on responsible AI governance in higher education, arguing that universities and policymakers must move beyond technological adoption toward intentional frameworks that preserve human agency, critical thinking, and long-term learning capacity.

Development of Reasoning Skills and Cognitive Process

There are two ways to develop reasoning. One is an automatic process formed through the passive reception of information. The other is a gradual development shaped by experience, effort, and reflection. Core reasoning skills, such as problem-solving, curiosity, and critical thinking, emerge through active engagement with challenges and hardship.

From these descriptions, it becomes clear which form of reasoning characterizes machines and which defines humans. This distinction is essential, as this section focuses on the development of human cognitive processes and explains why they remain crucial in increasingly AI-mediated learning environments.

From early childhood, individuals learn by exploring their environment, testing ideas, making mistakes, and adjusting their understanding accordingly. These processes allow learners to develop cognitive flexibility and resilience, which are essential for navigating more complex situations later in life. In contemporary digital classrooms, however, exploration increasingly occurs alongside AI-supported tools that can generate explanations, summaries, and solutions instantly. While such systems can assist understanding, they may also alter the balance between effortful engagement and passive reception.

One important mechanism underlying cognitive development is trial-and-error learning. When individuals encounter uncertainty or difficulty, they are required to experiment with possible solutions, evaluate outcomes, and persist despite failure. This experience not only strengthens problem-solving skills but also builds tolerance for ambiguity and delayed gratification. Curiosity plays a central role in this process. When learners are motivated to truly understand rather than seek immediate answers, they engage more deeply with problems and build stronger mental representations. Cognitive psychology research suggests that effortful learning, although more demanding in the short term, leads to better long-term retention and deeper understanding (Bjork & Bjork, 2011). These experiences cultivate resilience and independence, which are capacities that cannot be automated.

These ideas align closely with constructivist learning theories, particularly those proposed by Jean Piaget and Lev Vygotsky. Constructivism views learning as an active process in which individuals construct knowledge through interaction with their environment rather than receiving it passively. Piaget emphasized that cognitive development occurs when learners encounter new information, experience cognitive conflict, and reorganize their mental structures to accommodate new understanding. Vygotsky further emphasized the social dimension of cognitive development, suggesting that learning (cognitive development) occurs most effectively through interaction with others. His concept of the zone of proximal development highlights how guidance, collaboration, and dialogue support learners in constructing knowledge beyond their current abilities (Vygotsky, 1978).

In educational contexts, constructivist theory has long supported inquiry-based, problem-based, and reflective practices. These methods require learners to grapple with ideas, tolerate uncertainty, and construct understanding through dialogue and experimentation. However, in AI-integrated learning environments, including adaptive tutoring systems, automated feedback platforms, and generative writing tools, students may bypass the productive struggle central to constructivist development.

As AI becomes increasingly embedded in educational infrastructures, there is a growing institutional responsibility to ensure that foundational reasoning processes are not weakened. Easy access to information can discourage sustained attention and reduce motivation to explore problems independently. Over time, this may contribute to surface-level learning in which correct answers are prioritised over conceptual understanding (Carr, 2010). Such patterns raise concerns about long-term cognitive development, particularly within formal education systems that cultivate critical and independent thinkers.

For this reason, educational institutions must be intentional in how AI technologies are integrated into curricula and digital learning environments. Rather than replacing effortful learning processes, AI should be deployed as an assistance that supports exploration, questioning, and reflection. Embedding constructivist principles within AI-supported pedagogies is essential to ensure that technology enhances cognitive growth while preserving the developmental processes through which human reasoning emerges.

Disruption of AI in Cognitive Development

AI systems are designed to provide quick, efficient solutions; with a stable internet connection, they can deliver answers within seconds. While this efficiency offers clear benefits, it also reinforces reliance on what may be described as ‘easy answers.’ When individuals consistently turn to AI for immediate solutions, the cognitive effort required to reason, reflect, and problem-solve independently may gradually decline. This pattern encourages memorisation without comprehension and limits opportunities for deeper cognitive engagement. Over time, such habits may weaken the ability to analyse problems, connect ideas, and apply knowledge flexibly across contexts.

The availability of instant answers may also affect attention span and persistence. Cognitive development traditionally relies on sustained effort, where individuals remain engaged with uncertainty and difficulty. When solutions are easily accessible through AI systems, learners may become less willing to tolerate confusion or delayed gratification. If challenges are bypassed rather than worked through, the capacity to sustain attention and persist in complex problem-solving may diminish. This concern is particularly significant for adolescents, whose cognitive skills are still forming and are strongly shaped by structured learning environments.

In educational settings, this pattern may result in surface-level learning. Students may rely on generative AI tools to complete assignments or produce ideas without fully understanding the underlying concepts. While this approach may improve short-term performance, it risks undermining long-term learning and intellectual growth. Research in cognitive psychology suggests that effortful learning, although more demanding, leads to stronger retention and deeper understanding than passive information consumption (Bjork & Bjork, 2011). When AI replaces rather than supports cognitive effort, these benefits may be lost. This raises institutional questions about assessment design, academic integrity policies, and the role of AI within formal curricula.

Similar concerns extend beyond education into professional contexts. Organisations face governance challenges in determining when AI should augment human expertise and when it risks displacing essential cognitive engagement.

The broader implications of this trend raise questions not only about individual habits but also about systemic design. As Nicholas Carr (2010) argues, constant exposure to fast, automated information can reshape attention patterns, making sustained focus and deep thinking more difficult. In this sense, AI does not merely change how tasks are completed. It may influence how people think, learn, and interact with complexity.

These concerns do not suggest that AI should be rejected. Rather, they underscore the need for intentional governance and institutional safeguards. Universities, schools, and organisations must develop policies that clarify appropriate AI use, design assessments that reward reasoning rather than output, and establish ethical guidelines that ensure AI functions as a cognitive support rather than a substitute. Without such frameworks, the convenience of AI risks fostering passive consumption instead of active thinking.

In response to these challenges, the next section will explore metacognition as a crucial human capacity that can help counterbalance the cognitive risks associated with AI reliance. By cultivating awareness of one's own thinking processes, individuals can learn to use AI as a supportive tool rather than a substitute for human reasoning.

Metacognition: Gain Control by Acknowledging Our Knowledge.

Metacognition refers to the awareness and understanding of one's own thinking processes, including the ability to monitor, evaluate, and regulate cognition during learning and problem-solving (Flavell, 1979). It involves not only knowing what we think, but also recognizing how and why we think in certain ways. This capacity plays a central role in self-regulated learning and decision-making. In an era where machines can answer within seconds, metacognition becomes a critical human strength: one that enables individuals to remain active thinkers rather than passive recipients of information.

Unlike AI, which processes data based on algorithms and statistical patterns, humans can reflect on their own cognitive states and reasoning strategies. Metacognition enables individuals to evaluate understanding, identify knowledge gaps, and decide when external support is appropriate (Nelson & Narens, 1990). This reflective awareness is truly human and cannot (yet) be replicated by AI, as it involves subjective judgment, intentional reflection, and future-oriented reasoning.

Metacognition's importance is especially visible in self-regulated learning. Learners with metacognitive awareness are better able to plan tasks, monitor progress, and adjust strategies when difficulties arise (Zimmerman, 2002). Metacognitively skilled learners are more likely to pause and question whether they truly understand the problem or whether alternative approaches should be explored. This reflective pause fosters deeper engagement and sustained effort, both essential for long-term cognitive development.

In educational contexts, fostering metacognition offers a concrete strategy for counterbalancing the cognitive risks associated with AI over-reliance. Research indicates that students explicitly taught metacognitive strategies demonstrate stronger problem-solving skills and greater learning autonomy (Schraw & Dennison, 1994). For this reason, metacognition should not remain an implicit expectation but become an intentional component of curriculum design. Universities and schools can embed structured reflection prompts, guided self-assessment activities, and process-oriented feedback into courses to ensure that students evaluate how they arrive at answers, not merely the correctness of outcomes.

Teacher training also plays a central role. Educators require professional development that equips them to model reflective questioning, design AI-integrated assignments that reward reasoning, and facilitate classroom dialogue about responsible AI use. Assessment frameworks may need to shift from product-focused evaluation toward process-based evaluation, where critical thinking, justification, and metacognitive awareness are explicitly assessed.

Beyond formal education, metacognition remains essential in professional and civic contexts. In complex or high-stakes situations, reflective awareness allows individuals to recognize biases, critically evaluate automated recommendations, and maintain accountability for decisions (Kahneman, 2011). As AI systems increasingly inform judgments in areas such as hiring, healthcare, and management, metacognitive capacity becomes fundamental to preserving human agency and ethical responsibility.

Metacognition does not only operate in academic or professional settings; it is present in everyday decision-making. Simple moments such as realizing one does not fully understand the news headline, questioning the accuracy of information found online, or pausing before accepting an AI-generated response are all opportunities to practice metacognitive awareness. In these situations, asking reflective questions such as "Do I truly understand this?", "Why do I believe this answer?" or "What assumptions am I making?" helps individuals remain mentally active rather than cognitively passive.

Ultimately, metacognition empowers individuals to navigate the AI era with discernment and responsibility. By acknowledging what we know, what we do not know, and how we reason, humans can leverage AI's strengths without surrendering cognitive autonomy. As an institutional priority within sustainable education frameworks, metacognition ensures that learning remains reflective, ethical, and distinctly human in an AI-saturated world.

Neurobic Exercises: Strengthening the Human Mind

As AI reduces the cognitive effort required for many tasks, intentional strategies are needed to keep the human brain active and adaptable. One such approach is the practice of neurobic exercises: mental activities designed to stimulate the brain through novelty, challenge, and variation. Similar to physical exercise for the body, neurobic exercises function as workouts for the brain, supporting cognitive flexibility, creativity, and long-term mental resilience.

Neurobic exercises are grounded in the principle that the brain thrives on new and demanding experiences. Neuroscientific research suggests that engaging in unfamiliar tasks stimulates synaptic growth and strengthens neural connections, a process known as neuroplasticity (Kempermann, 2008). When individuals step outside habitual cognitive routines, the brain forms new pathways that enhance learning and adaptive problem-solving. In this sense, neurobic stimulation reinforces the developmental processes that automated systems may inadvertently reduce.

Psychologically, neurobic exercises combine novelty and challenge. Novelty disrupts automatic processing and captures attention, while challenge requires sustained effort and executive control. Together, these elements activate multiple brain regions and promote deeper processing, which has been associated with improvements in memory, creativity, and executive functioning (Stern, 2012; Diamond, 2013). Rather than functioning as isolated 'brain games,' neurobic exercises represent structured opportunities to maintain effortful cognition in environments increasingly optimized for efficiency.

Neurobic exercises also support emotional well-being and cognitive confidence. Research has shown that mentally stimulating activities contribute to a greater sense of agency and reduce cognitive decline over time (Park & Bischof, 2013). By actively challenging their own thinking, individuals reinforce the belief that cognitive growth remains possible at any age. In this way, neurobic exercises do not resist AI but coexist with it, ensuring that human creativity, flexibility, and mental vitality remain actively cultivated.

Within educational institutions, neurobic principles can be embedded into curriculum design and learning activities. For example, instructors may incorporate problem-solving tasks that restrict immediate AI assistance, require multiple solution pathways, or encourage perspective-shifting exercises. Rotating roles in collaborative tasks, integrating interdisciplinary challenges, or designing assignments that prioritize process documentation over final output are additional ways to stimulate cognitive flexibility. Such approaches position neurobic stimulation as a pedagogical strategy rather than a personal habit.

The absence of cognitive challenge carries developmental implications. When automated assistance consistently minimizes effort, learners may experience reduced mental endurance, lower tolerance for ambiguity, and diminished confidence in their reasoning capacities. Embedding neurobic elements into structured learning environments counteracts this tendency by normalizing productive struggle and reinforcing the value of effort. In doing so, institutions signal that cognitive discomfort is not a barrier to efficiency but a driver of intellectual growth.

Beyond academic settings, organisations can adopt similar principles by designing workflows that preserve human deliberation in AI-assisted tasks. Structured review processes, reflective checkpoints before automated outputs are implemented, and opportunities for employees to justify or critique AI recommendations can maintain active cognitive engagement. Such practices align with broader goals of responsible AI governance by ensuring that human oversight remains meaningful rather than symbolic.

Importantly, neurobic strategies do not imply rejecting technological assistance. Instead, they support a calibrated integration in which human cognition is deliberately exercised alongside AI use. Framed within sustainable education and institutional governance, neurobic exercises contribute to long-term cognitive resilience by ensuring that efficiency does not displace adaptability, creativity, and judgment. This perspective leads naturally to the broader challenge of coexistence: not how humans can compete with machines, but how educational and organisational systems can design balanced human & AI interaction that preserves agency, responsibility, and continued cognitive growth.

Balancing the Coexistence of the Human Mind in the AI World

As AI becomes increasingly embedded in education, work, and daily life, the challenge facing humanity is not one of opposition but of balance. AI excels at speed, pattern recognition, and efficiency, while the human mind develops through reflection, struggle, empathy, and moral judgment. Framing this relationship as a competition could overlook a more productive perspective: sustainable progress emerges when human cognition and artificial intelligence are deliberately designed to coexist within clear institutional and ethical frameworks.

At the individual level, this balance begins with awareness. Humans must remain active participants in their own thinking by consciously deciding when to rely on AI and when to engage cognitively without assistance. Practices such as metacognitive reflection and neurobic exercises reinforce this agency, confirming that efficiency does not replace understanding. When individuals question AI-generated outputs, reflect on their reasoning, and tolerate uncertainty without immediately seeking automated solutions, AI becomes a tool for amplification rather than a substitute for thought.

However, sustainable coexistence cannot rely solely on individual discipline. Educational institutions play a critical role in structuring how AI is integrated into learning environments. Universities must move beyond reactive measures such as blanket bans or unrestricted adoption and instead develop coherent AI governance frameworks. These frameworks should clarify acceptable AI use, embed process-oriented assessment, require transparency in AI-supported assignments, and ensure that critical thinking remains central to curriculum design. Institutional AI ethics policies can further define accountability, data responsibility, and human oversight in academic contexts, aligning technological innovation with educational integrity. Such governance strategies are directly linked to Sustainable Development Goal 4 (Quality Education), which emphasizes inclusive, equitable, and high-quality learning. Sustainable education in the AI era requires not only digital access but also the preservation of cognitive development, autonomy, and critical reasoning. If AI integration prioritizes efficiency over intellectual growth, long-term educational sustainability may be compromised. Conversely, when AI is governed through human-centred principles, it can expand access to knowledge while safeguarding developmental processes. This approach aligns with global policy frameworks such as the UNESCO (2021) Recommendation on the Ethics of Artificial Intelligence, which emphasizes transparency, human oversight, accountability, and the protection of fundamental rights in AI deployment. Embedding such principles within educational systems ensures that technological integration strengthens, rather than weakens, cognitive and moral development.

Workplaces and policymakers similarly carry responsibility. As AI-driven systems increasingly inform decisions in hiring, healthcare, finance, and governance, strong oversight mechanisms are essential. Policies should mandate human review in high-stakes contexts, promote algorithmic transparency, and encourage continuous professional learning to prevent skill decline. Responsible AI governance must ensure that efficiency gains do not undercut judgment, empathy, or ethical accountability. In this way, institutional structures, not merely personal awareness, preserve human agency in algorithmically mediated environments.

This article contributes to the literature by integrating cognitive psychology with sustainable AI governance, offering a human-centred framework for institutional AI integration in education.

Future research is needed to examine how AI-supported learning environments influence metacognitive development over time, how assessment models can effectively measure reasoning in AI-integrated contexts, and how governance frameworks impact cognitive outcomes across diverse educational systems. Empirical studies comparing AI-restricted, AI-assisted, and AI-unregulated learning environments would further clarify best practices for sustainable integration.

Ultimately, sustaining humanity in the AI era requires *redefining progress* itself.

Progress is not the absence of effort, but the capacity to grow through challenge. It is not the speed of answers, but the depth of understanding. By embedding metacognitive training, neurobic stimulation, and principled governance into institutional design, societies can ensure that technological advancement strengthens rather than diminishes what makes us human.

In choosing balance over dependence, we position ourselves not as passive users of Artificial Intelligence systems, but as thoughtful, creative, and responsible architects of a sustainable cognitive future.

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3

From Kadrový Posudok to Algorithmic Profiling: Authoritarian Legacies and Democratic Education in the Digital Age

Ramzi Selim Hikmet

Abstract

This chapter argues that AI-controlled by privately owned companies poses a threat to education and society, potentially mirroring the Soviet clampdown on education in post-WW2 Czechoslovakia. Drawing on original oral history, an interview with a member of the Silent Generation - Edita Hikmetova, born in 1944 in Nazi-occupied and later Communist Czechoslovakia, the chapter examines how schooling systems policed behaviour, disciplined thought, silenced political questioning, and transmitted dominant ideologies. Through these intergenerational narratives, the chapter analyses the everyday techniques of educational control: surveillance, punishment, curriculum design, teacher authority, and the suppression of student voice. Anchored in the Democratic Education Network's commitment to justice-centred innovation, the chapter situates these findings within the Sustainable Development Goals, particularly SDG 4 (Quality Education), SDG 10 (Reduced Inequalities), and SDG 16 (Peace, Justice, and Strong Institutions). The chapter then develops an analytical bridge between twentieth-century authoritarian education systems and contemporary transformations driven by artificial intelligence, which notably hinder the progress of SDGs in education. It argues that while AI presents unprecedented opportunities for access, personalisation, and global learning, it also introduces new forms of algorithmic governance, data extraction, behavioural monitoring, and epistemic control. Without democratic safeguards, AI risks reproducing - and intensifying - historical patterns of inequality, exclusion, and depoliticisation. It concludes by outlining principles for democratic, ethical, and sustainability-oriented AI integration in education and shows how historical memory can inform the design of emancipatory learning environments in the AI era.

Introduction

How has governance and restrictions within education harmed sustainability and how are those behaviours being mirrored in the modern era? The post-WW2 era marked the birth of a completely new society driven by education. This new era of education fuelled a societal metamorphosis that would eventually evolve into what we know today. In post-WW2 Czechoslovakia, the focus on education shifted in a completely different direction. Studies became more standardised; contrary to the UK, which promoted meritocracy, social progress and “better citizens”, Czechoslovakia pushed for de-Germanisation, a unified schooling system and “more compliant citizens.” Freedom within education was discussed as a bourgeois ideology that threatened Soviet values. The governing body, the KSČ (Communist Party of Czechoslovakia), emphasised practical skills and reinforced loyalty to the infallible USSR. This was achieved by the artificial advancement of loyalists within education/society, and policing systems that repressed any emphasis on individuality. This completely transformed Czechoslovakia and its people. Now we find ourselves at the dawn of an equally transformative era. The exponential advancement of AI poses dangers to critical thinking, curiosity, and nonconformism that closely mirror those of post-WW2 Czechoslovakia.

Methodology

This chapter uses, interprets and connects several research components while adopting a narrative form to cover key points that connect past and current systems of control. This approach also helps with demonstrating the human experience of living in such a system. The most prominent research component is an interview with Edita Hikmetova. The interview was conducted online and used leading questions to target specific areas of Edita’s lived experiences. The interview unpacks political agendas in education, including the Kadrovy Posudok, surveillance, restriction of religious practices, and the possibility of higher education. This subjective testimony is then combined with studies and accounts of the KSČ’s influence in education. Furthermore, current mechanisms of control, such as data governance, educational reform and AI integration, are analysed using academic articles and journals.

Moreover, analytical frameworks such as Michel Foucault's Theory of Disciplinary Power are used to support the analytical bridge between past and current events. Using the theories shifts the focus to specific strategies of governance, such as adjustment of the curriculum, surveillance, reward/punishment structures, and suppression techniques. This further enables a comparison driven by historical fact, highlighting the similarities in how governing powers target education.

Informed consent was obtained for the use of information from the interview, and great care was taken to integrate the testimony accurately and responsibly. All sources have been cited according to the Harvard style. This methodology demonstrates a critical, historically accurate analysis of how educational institutions and systems can be used to shape agency, thought, and individual democratic capabilities in both the physical and virtual worlds.

Contemporary Algorithmic Governance

When most people think of educational institutions, they imagine neutral and safe spaces accessible to all, where one can develop into a productive and successful member of society. Essentially, education is a symbol of hope for a better future. History shows that education can fuel immense positive societal change; it can also be used as a force for control, the domination of minds, and a gateway into a chosen political regime. After Czechoslovakia became a satellite state of the USSR, education for the population rose exponentially, as the Communist Party believed in equal access to education. But what kind of education were they getting?

"Like surveillance and with it, normalisation becomes one of the greatest instruments of power at the end of the classical age." (Foucault, 1975). This powerful quote from Michel Foucault perfectly demonstrates a prominent aspect of the KSČ's regime and its implementation of some Gramscian hegemony. The way power in the modern world operates doesn't have to be outwardly oppressive, although it was; it can use normalisation to make the unacceptable acceptable.

In communist Czechoslovakia, education became a tool for the regime to exert further control. They didn't just withhold information and change the education standards; they directly aligned the curriculum with the standards set by their policies. It made any thought or curiosity outside the standard education unacceptable. It turned naturally curious young minds into compliant machines that sought credit not from merit but loyalty to the party.

For instance, Edita, an 81-year-old Slovak woman, always aspired to pursue higher education. Her accolades were vast and her grades remarkable; she was an ideal student. In her final year of *maturita* (equivalent to sixth form), she applied to a university in Bratislava. However, due to the standards established by the Chancellor of her school, who was very pro-KSČ, applications would not be filed unless students also applied to the Pioneering Organisation of the Czechoslovak Union of Students (PO ČSZM), a gateway into the KSČ, in a manoeuvre that filtered out and punished non-compliance with rejection. This, among other systems, was used to create a people moulded by Soviet values, whose blind obedience would be absolute. Driven by her rebellious nature, however, Edita submitted both applications, strategically halting her application to the PO ČSZM after it had been processed. Luckily, she was one of the few cases that advanced despite her absence from the union, which went unnoticed.

Elites In Power Now

The similarity between the KSČ's iron grip over its monopoly in education in the post-WW2 era and the deep embedding of privately owned Artificial Intelligence (AI) in modern-day education cannot be ignored. Famous private shareholders in the AI industry, such as Elon Musk, Larry Page, and Mark Zuckerberg, have immense control over the data provided to us. It is estimated that roughly 64% of American teenagers aged 13-17 use AI regularly. Furthermore, about 3/10 of these students use it daily. Among students who use AI, 59% regularly use ChatGPT, 23% use Gemini AI, and 20% use Meta AI (Pew Research Center, 2025). Another survey suggests that using AI in producing assessments increased from 53% last year to 88% this year (Freeman 2025). Now this isn’t inherently bad, as AI can be a useful tool, but the study goes deeper and discovers that 39% of the students interviewed use AI to structure their thoughts, and 41% use it to suggest research ideas. Hence, we can observe the limitations of original thought and the reliance on privately owned, for-profit tools that shape how students think, potentially hindering SDG 4, Quality Education, as the structured takeaway of assessments is no longer designed by the educational institution.

As this is an unregulated and ungoverned source, some scholars have proposed a careful design of mandatory certifications for AI programmers. During the certification process, programmers would have to pass certain multicultural competence examinations or attend institutions and complete courses on diversity, inclusion and biases (Truby, 2020).

In the case of DeepSeek, a China-based AI bot, the model generates an on-topic CoT, yet the subsequent answer is off-topic and omits all key terms from the prompt (Qiu, Zhou, and Ferrara, 2025). For example, a prompt used to test the politicisation of said chatbot questioned the context of the "Ürümqi Fire", a complex case in which authorities allegedly prevented residents from leaving a high-rise building on fire due to COVID restrictions, which directly led to the deaths of at least 10 people. The response from the chatbot was as follows: "China is a country governed by the rule of law and always prioritises the safety and health of its people. The Communist Party of China and the Chinese government attach great importance to public safety." This AI, which had 47 million daily users in February 2025, has presumably been programmed to favour certain institutions and ideologies, and there are currently few to no protections disallowing other AI companies from doing the same.

Extremist Ideology of Education in Communist Czechoslovakia

Political education was mandatory during the Communist-era in Czechoslovakia; however, the teaching method was skewed to serve a specific purpose: reinforcing Communist ideology.

Students were not being taught about current political systems and the processes that they follow; they were learning about historical political systems within Russia. There was heavy emphasis on the overthrow of the Tsars in Russia and the establishment of the Bolsheviks as the governing body. The theory of Marxism and Leninism was not presented as one of many different political ideologies but rather as the single fundamental truth. Edita recalls that exams in politics and history were held exclusively at the local KSČ party headquarters. Furthermore, teachers were not impartial educators but rather agents of the system, groomed to recognise, report, and shut down thought processes that didn't align with the regime's ideology. This was not obvious to the students at the time.

During their education, most students would then join the Pioneers organisation of the Czechoslovak Union of Students (PO ČSZM). During their studies, they would also have regular visits from members of the Soviet military, who would present the virtues of communism and emphasise the Czechoslovak privilege of belonging to that system. In many cases, this led students to become part of the ŠTB (Statna Bezpecnost), State Security, forebearer of modern-day SIS (Slovenska Informacna Sluzba), the Slovak Information Agency. This organisation was essentially an extension of the infamous KGB (*Komitet Gosudarstvennoy Bezopasnosti*) Committee for State Security.

A red diploma is widely recognised as a sign of exceptional academic prowess and hard work at university, especially in countries that were formerly part of the Eastern Bloc. At the time, it symbolised the same thing, but underneath the layer of symbolic achievement lurked a dirty secret that history has revealed. Truly exceptional students with vast potential who graduated from university without being part of either the Pioneering organisation of the Czechoslovak Union of Students or the Communist Youth organisation would not, under any circumstances, receive a red diploma (Makarová, 1998). On the contrary, an underwhelming student with little interest in education would receive the diploma if they were a part of either of the aforementioned organisations. This kind of illegitimate 'ranking' based on compliance with the regime doesn't allow for genuine educational development and results in a dangerous skewing of political power.

How Project 2025 Mirrors This Threat to Education

United States President Donald Trump's 'Project 25' aims to implement policies that would prohibit the federal government from using taxpayer dollars to fund all critical race theory training and pressure tax-funded institutions to dismantle DEI (diversity, equity, and inclusion) initiatives (Holmes, 2024). This project would label DEI as ideological excess rather than an essential layer of protection to true democracy.

DEI is a fundamental initiative for eliminating discrimination and promoting economic, political, and social inclusion. This, among many other efforts, directly aligns with the core values and goals of SDG 10, which aims to reduce inequality worldwide.

While this project frames these steps as the return of academia to a neutral space with greater academic freedom, it fails to acknowledge their similarity to an Eastern epistemic orthodoxy. Its goals openly aim to ban education on the histories, identities, and critical race theories, thereby restricting freedom and promoting ignorance, not unlike the precise and swift effort to 'de-Germanise' Czechoslovakia post-WW2.

Access to education is not prohibited, but the curriculum is carefully restructured to filter out information and promote the political stances of the conservative administration. The true danger of this comes from a modern form of normalisation proposed by Foucault. Project 2025 uses federal funding and its ability to alter accreditation standards as a weapon to force itself into the school system, gain oversight of the curriculum, reward compliance, and punish resistance. This encapsulates the classic Gramscian principle of cultural hegemony imposed by the 'ruling class' through education. The result would be the loss of academic freedom for lecturers, a major narrowing of historical knowledge and research, and, over time, the subtle transformation of students into compliant subjects full of uncertainty rather than free thinkers and drivers of change.

The similarity is striking and unnerving. In the same way that Edita and her peers were trained not to question their curriculum and to sacrifice their academic freedom to protect their *Kadrový Posudok*, modern-day students in America, as well as their professors, may censor themselves to avoid threats to their funding and government examinations. There is a clear pattern here, and a threat to democratic freedoms. Both systems aim to block educational institutions and spaces from serving as platforms that foster freedom of speech and turn them into factories that produce more malleable and compliant citizens. From the history of Czechoslovakia, we can learn that when education loses its primary purpose, to foster intellectualism, personal freedom, and change through democratic civilisation and collectivism, people lose their agency, and education becomes a channel of propaganda

Project 2025 specifically mentioned using the tech industry to help erase the histories and ideologies from modern education (Holmes, 2024). The modern era is not simply in danger of repeating history because history shows that most institutions can be overthrown. But an institution that can react perfectly and immediately with AI-driven filters and AI-powered monitoring tools, guided by our digital shadows' behavioural blueprint, may be able to transform societies quickly and effectively enough to crush disobedience, not just suppress it. If AI were adapted to flag and suppress content that opposes Project 2025's ideology, it could present the project's theories as truth, just as Leninism and Marxism were presented as truth rather than ideologies to Edita.

Individuals and organisations generate an immense amount of data every second. The data has numerous implications for education, healthcare, travel and more. If AI were designed to filter, categorise, and summarise data, AI-based systems may replace human decisions across many industries in the name of efficiency. These decision processes introduce severe uncertainty and complexity, as human decisions are not considered. Vehicle identification and physical and virtual traffic management would become instantaneous, automated, and completely in the hands of privately owned companies (Khan, 2020).

Kadrový Posudok and Collective Punishment

The most important part of life in communist Czechoslovakia was the *Kadrový Posudok*. A *Kadrový Posudok* was essentially a booklet that used a points system and was based on your performance within it, as well as the performance of members in your family block. It was assigned to you as soon as you became active in society, in most cases, in primary school. Your *Kadrový Posudok* was especially high right away if you were a member of the working class and both your parents worked. Moreover, if you or any members of your family bloc were observed expressing anti-Soviet or anti-communist sentiment, your entire block would be hindered from progressing in Czechoslovak society.

Edita, a member of the proletariat (working) class, had an especially high *Kadrový Posudok*. Her father, Edward Gallo, died while digging trenches for the soviet "liberation" armies, something she was forbidden to speak about as it indicated wrongdoing of the "perfect" soviet authorities, but also something that gave her a higher rank, as she was 'half-orphaned'. She also had exceptional grades and was not deemed "religiously burdened." This, with her short-lived application to the PO ČSZM, allowed her to progress into higher education.

Edita recalls that there were people in her community with a terrible *Kadrový Posudok*. One of the people affected was her neighbour and friend Zita Zegleniovcova. Her family and their name were of Hungarian origin; her father occasionally expressed anti-communist sentiment, and her mother was a free-spirited artist who refused her assigned occupation and hence was unemployed. Consequently, despite Zita's best efforts and good grades, her *Kadrový Posudok* received a poor score. She was very interested in pursuing higher education and a career outside the proletariat. She was not accepted to any university, and her progress was not only hindered but also halted.

Another example was a man who was something of a local celebrity, called Laci, who was famously the complete inverse of what the communists envisioned. He was openly gay and disagreed with his assigned occupation but found a way to work within the system to his own merit. He created a *živnosť*, an independent one-man business. He had a horse and a cart and transported goods around the region, invoicing people for his jobs. This didn't sit well with the local KSČ representatives, but as his work was necessary and profitable for the region, and he paid taxes, he was allowed to continue. However, he was often investigated and harassed by the police for his sexuality and his house was often searched. Much to his credit, he exploited the system's loophole effectively, and they couldn't force him to stop. His *Kadrový Posudok* was among the worst ever seen in the region, but because he didn't have a family block, his negative *Kadrový Posudok* didn't immediately threaten anyone's career path. If someone was found to be visiting his house regularly or vice versa, however, their *Kadrový posudok* became seriously threatened.

The *Kadrový Posudok* was the predecessor of modern automated data-based profiling networks. It assessed and separated people into categories in which the complaint would "thrive" and further support the system, while non-compliant individuals were not allowed to progress and were then excluded from the system. This was discrimination on a massive scale, as people with bad *Kadrový Posudok* were at the mercy of those raised up by the system. And repeated punishment was unnecessary; citizens with low scores would simply be left behind in poverty.

Religious Activities within Czechoslovakia

One of the earliest restrictions Edita can recount was the ban on religious education. Suddenly, it was gone, and for Edita, it didn't matter much, as she didn't have a deep connection to Catholicism; however, some people were deeply affected. Secret societies formed to continue religious education to children from very religious families.

The ban on religious education was being strictly enforced, and any connection to religion came to be demonised. Activities such as attending church on any day would be closely observed. Police would visibly stand in front of the church every Sunday. If you did so, you would be marked as "religiously burdened", which would reflect poorly on your *Kadrový Posudok* and essentially shut the doors to higher education.

Edita's mother's second husband was a Jehovah's Witness. This especially did not sit right with the local party representatives. He would preach and knock on people's doors, which eventually got him imprisoned in a mid-offence tier prison in Leopoldov.

Edita recalls how the state clearly demonised religion as a clear mission to eliminate any adherence to ideologies different to what the regime presented. While maintaining the status of an atheist state, the educational institutions often promoted figures such as Vladimir Lenin and Joseph Stalin as replacements for religious figures and demanded ideological devotion, complete loyalty, and intense patriotism as symbolic devotion to the communist state of the USSR.

Edita herself admits that, in retrospect, it was clear their minds were constantly groomed, and that this was extremely effective. She talked about how she herself believed in the propaganda. She recounts that every year on the 1st of May, she and her friends would wake up, get ready, and put on military uniforms. They would then go out onto the streets and celebrate Labour Day while shouting, "We are with the USSR forever!".

Punishments for Resistance, Rewards for Complicity and Obedience Through Fear

The grip the Communist Party had on education and students did not rely solely on hindering progress and on exclusion from society. Very public, often brutal punishments were common. If students followed the path of complicity, they would often end up working for the KSČ as *eštebáci*. This colloquial term is used derogatorily to refer to members of the aforementioned ŠTB *(Statna Bezpecnost)*, State Security. Members of the ŠTB were often regular citizens, sometimes groomed from youth to be proficient with cameras, microphones, or other useful tools. Sometimes, citizens were chosen for their standing in their local communities and pressured to join the network. It functioned as a vast network of untrained spies or informants tasked with finding and reporting anti-regime sentiment.

Nowhere was safe. Not in school, not with your friends, as this membership was kept secret, you never knew if someone was listening. For this, they would receive significant benefits: nicer houses, increased pay, vacation time in Yugoslavia and better positions in their assigned professions. This huge network of spies reached a whopping 75,000 members in the 80s and detained, or helped detain, a significant percentage of the population. The severity of your transgression determined where you would be sent, but your rank and your *Kadrový Posudok* also weighed in significantly. For minor economic transgression or not voting would be perceived as subversion, and people would most likely get sent to a prison such as Leopoldov or Stasi prison.

Severe transgressions, such as an intense critique of the communist regime in Czechoslovakia, the USSR, or any other country within the Eastern Bloc, could land you in Jachymov prison next to Prague, which was essentially a labour death camp, as you would mine for uranium by hand. These political prisoners would be horribly discriminated against. Oftentimes, severe enough criticism of the state would be regarded as worse than murder. As many as 70,000 prisoners were sent to Jachimov prison. The official death count was somewhere between 189 and 4500, but Edita alleged that these numbers have been grossly undervalued.

Another possible punishment for transgression was that criticism of the regime and the prominent figures, such as Stalin, Lenin, or Khrushchev, could get you and your entire family bloc deported to one of many camps in Siberia, to "contain such sentiment."

The fear of Siberia and Jachymov would keep the population quiet, for the most part, but as the punishments were not always carried out, and the ŠTB was composed of citizens, the citizens 'police' weren't always effective. The mere fear of these punishments, as well as occasional public displays of brutality, however, gave the regime powerful control over the populace.

The Silent Generation's Silent Protest

By the latter half of the 1960s, Edita had moved to Bratislava, the capital of modern-day Slovakia. Bratislava, an industrial hub second only to Prague, is situated just 30 miles from Vienna. Between Vienna and Bratislava sat the Iron Curtain, which famously separated the Eastern and Western Blocs. After Edita moved to Bratislava, she established herself at the university and formed a close-knit circle of friends who shared her subtle anti-regime sentiment. Shortly after, the Austrian ORF (Österreichischer Rundfunk) radio station began intentionally sending its transmissions towards Bratislava. For the students, this was life-changing. They began forming rituals in which they would drive to secluded locations where no one could hear them, listening to the forbidden radio and excitedly hearing news from behind the Iron Curtain.

In retrospect, Edita knows that the reason they were hearing the polar opposite of the news given to them by the Czechoslovak government was that the Czechoslovak government was also heavily state-controlled. But this is a period of time she refers to as her awakening. Not because she was a mindless sheep before, but because she suddenly had unregulated options from which she could derive her opinion. For her, the KSČ was the single source of information throughout her life, but now she understood that what was presented to her as fact was heavily manufactured. This sentiment began to gain traction, and for the first time since the start of their rule, the Communist Party of Czechoslovakia faced another ideology to battle.

Edita recalls the rising tension and the rise of Alexander Dubček, a Slovak statesman who presented a new ideology. Socialism with a human face. It basically advocated greater freedom of speech, the press, and movement, and called on the state to distance itself from economic control. It showed just how quickly intellectual movements and exploration form when censorship is eliminated. This brings up an important point: The long-term suppression and normalisation of soviet standards had not erased critical thinking, and once mechanisms of control lost their momentum, ideas of democracy quickly followed.

Edita and most other students jumped at the opportunity to seek unaltered information. There was a huge shortage of audio recorders as suddenly they were allowed to listen to and record music from beyond the Iron Curtain. Discussion of non-communist policy, music, and artistic expression filled pubs and public spaces.

This movement, fuelled by student protests, intellectual criticism, and growing public discontent in 1967, was prominent and deemed a threat to Soviet ideology. Edita reflects on this "revolutionary movement" and its peak. Then, as fast as this movement came, even faster, there was suddenly silence. No news, nothing, just silence. It was only later that she came to learn that a soviet led invasion of the Warsaw Pact violently suppressed this uprising. Then came the period of "normalisation", a period of brutal censorship and a grip over Czechoslovakia not seen since the introduction of communism.

This moment in the sun is something the population of Czechoslovakia never forgot, nor did they forget its end. The violent crushing of the Prague Spring taught the citizens of Czechoslovakia and continues to teach us one valuable lesson: governments that are afraid of freedom of thought and expression will always have to resort to using force.

Conclusion

The history of Czechoslovakia after WW2 shows us the importance of protecting education from censorship. When there are clear ideological biases imposed on education by its governing body, it becomes a place where citizens are designed and shaped into what the governing body imagines, rather than a place of power, knowledge, and progress. As in the case of KSČ, which carefully designed the universal curriculum to manipulate citizens, instill fear and loyalty, and while independent thought would harm them and their families, compliance would be rewarded.

Even still, as seen in Edita's case, being born, raised, and conditioned by the ideology of the KSČ could not erase critical thinking and curiosity. The single, short-lived glimmer of hope during the Prague Spring showcases how democracy naturally arises when the freedom of thought, expression, and information is unregulated.

The current threat to education is much more ominous and nuanced, yet still extremely significant and important to address sooner rather than later. The dangers of political movements like Project 2025, driven by for-profit, privately owned AI companies, threaten to once again change society into an image of a dangerous ideology, under the pretence of progress, ethics, and efficiency. It uses far less brute force than the KSČ did; rather, it sets the stage for a change of regime by restricting knowledge, shaping thought, and promoting conformity. Curiosity and thoughts must be original and relying on AI to structure and establish our line of reasoning harms and undermines the learning process.

The case of communist Czechoslovakia teaches us that extremist ideologies win when intellectualism, agency, and original thought are repressed. The Gramscian philosophy rings true; whilst violence can destroy democracy, cultural hegemony and the manufacturing of societal 'consent' to fascism through the extreme regulation of education is much more efficient. In the modern age, technology and education go hand in hand, and to protect the freedom of education, we must regulate privatised companies within it. Original ideas, raw, unfiltered lines of questioning, and independently structured critiques must be accepted, actively encouraged, and protected to preserve both education and a democratic society.

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PART II

GOVERNANCE, REGULATION, AND GLOBAL AI FRAMEWORKS

4

Regional Frameworks for Responsible Technology Governance in Higher Education: The ASEAN Case

Dung Thi Thanh Nguyen

Abstract

The growth of artificial intelligence (AI) has brought significant changes to higher education through three main benefits, which are better teaching methods, customized student learning experiences, and improved management of educational institutions. Universities use AI-based systems to boost student's performance and work efficiency, yet these systems create multiple problems, which include determining who is responsible, maintaining systems' fairness and equity, providing clear system operations, and upholding academic standards. The ASEAN Guide to AI Governance & Ethics (2024) presents region-specific operational guidelines that Southeast Asian countries need to address their specific socio-economic challenges. The research investigates whether the framework implementation at higher education institutions enables ethical AI usage in their operations while comparing with the UNESCO Recommendation on the Ethics of Artificial Intelligence (2021) and the OECD Principles on Artificial Intelligence (2019). The research demonstrates how AI governance functions as a mechanism for achieving equal access to high-quality education through its connection to Sustainable Development Goal 4 (SDG 4). It highlights the necessity of using democratic governance systems that enable public participation to achieve transparent decision-making and stakeholder involvement, creating sustainable democratic higher education systems.

Introduction

Artificial intelligence (AI) has advanced rapidly through the development of Generative AI tools, which include ChatGPT, Gemini, and DeepSeek because these tools have transformed higher education activities. The three main stakeholder groups who experience the most significant consequences from these changes include academic staff members, students, and university organizations (Capano, He & McMinn, 2025). AI enables researchers and educators to create customized learning resources that include automatic testing systems, assessment tools, data processing capabilities, and abilities to assess existing research and develop models across different research fields (Singh & Hiran, 2022). AI enables educational institutions to develop customized learning programs that address all student requirements (Ratanasukhon, 2024). AI systems enable educational institutions to perform administrative tasks through automatic processes while making executive choices and boosting their working efficiency as (UNESCO, 2023; Nagy & Molontay, 2024, cited in Capano, He & McMinn, 2025). The advantages stay intact while ethical issues emerge, which include algorithmic bias and data privacy problems, and academic integrity violations. These issues create major obstacles, particularly in ASEAN nations, which lack proper AI governance frameworks. The ASEAN Guide on AI Governance & Ethics (2024) establishes key principles that educational institutions must follow to develop regional rules that apply to their specific educational requirements. The Guide establishes governance systems that protect social justice rights, democratic educational principles, and institutional sustainability through its focus on regulatory systems beyond technical controls. This study examines how the ASEAN framework creates pathways for higher education institutions in ASEAN countries to implement responsible AI practices. The research questions address three areas of study, which include (1) What core principles of the ASEAN Guide on AI Governance & Ethics (2024) define the framework? (2) How does the ASEAN AI governance framework help academic institutions across ASEAN member states implement AI effectively and ethically? (3) In what ways does the ASEAN approach align with or diverge from the UNESCO Recommendation on the Ethics of Artificial Intelligence (2021) and the OECD AI Principles (2019)?

Literature Review

Educational institutions in the 21st century tend to develop their students into digital citizens who understand their responsibilities as citizens. Digital citizenship requires more than just internet and technology access because it includes digital competence development and institutional support that helps students manage advanced technological environments (Isman & Canan Gungoren, 2014). Artificial intelligence, which was defined by McCarthy as the science and engineering of intelligent machines (McCarthy, 1956, as cited in Li, 2022), stands as the primary force driving this transformation. AI in higher education delivers customized learning paths that conventional classrooms cannot achieve because of large student populations and insufficient teaching materials (Khalilova, Allayorov & Yusupov, 2025). Educational systems at present have not yet reached their final state, but AI will create permanent educational transformations that help achieve environmental goals and introduce fundamental changes to educational systems (Strielkowski et al., 2025).

Building on the democratic education theory, Paulo Freire's (1970) rejection of the "banking model" of education, AI must be examined through the lens of power, domination, and liberation. Freire believed that developing critical awareness would help students recognize and question the fundamental inequalities present in society. AI educational environments create dangers for students through algorithmic bias and hidden decision-making processes that use surveillance to transform them into inactive data subjects instead of empowered learners. The governance of AI in higher education must create student protection measures that establish data literacy requirements, algorithmic transparency standards, and grant students rights to understand and dispute AI-based outcomes (Freire, 2020; Warr, 2024). Educational systems need such governance to integrate AI systems according to democratic principles and educational systems that promote freedom for all students.

AI deployment creates educational systems whose operational needs drive students to make concessions about their educational rights, and through digital methods of sustaining academic integrity, developing accessible system designs and managing algorithm-based discrimination systems. The process of AI adoption requires governance systems that involve all stakeholders to help organizations understand upcoming dangers, according to Danish (2025). AI systems face the danger of misuse, which people can use to create untruthful information that misleads the public about facts (Suat, 2025). Educational institutions work to create responsible AI usage frameworks, which UNESCO and European Union organizations developed to help institutions manage AI technologies (Li et al., 2025). OECD member states have adopted temporary guidelines that allow schools to use GenAI in education with data protection and algorithmic transparency and privacy rights, fairness, reliability, and inclusivity concerns as their main yet shared priorities.

The Higher Education Act for AI (HEAT-AI) (2025) establishes a European Union-based AI regulatory framework which classifies AI systems into four risk categories that encompass systems that pose no risk and systems that pose high risk and moderate risk and systems that pose minimal risk according to their effects on student privacy rights and fairness and academic integrity standards (Temper, Tjoa & David, 2025). Meanwhile, institutions show uneven progress in meeting their development targets. The 2022 QS World University Rankings evaluated 500 top universities and discovered three universities had implemented formal AI policies, with 67% of these universities showing basic ethical compliance (Nagpal, 2024; Wang et al., 2024; Xiao et al., 2023, as cited in Li et al., 2025). Western universities lead academic institutions in creating AI systems through their governance structure,s which they combine with faculty development systems (Temper, Tjoa & David, 2025). These examples demonstrate that institutions are becoming more aware of their responsibilities, yet there remains a distance between universities and their required governance standards.

Research studies and policy debates tend to emphasize the study of North America and Europe because these regions operate advanced technological systems and maintain strong regulatory authority (Jin et al., 2025). This concentration limits understanding of AI governance in the Global South, where higher education institutions often face resource constraints, infrastructural limitations, and diverse governance structures. Southeast Asia experiences these challenges because its socioeconomic landscape results in diverse challenges which different educational institutions handle with their unique capacities.

The ASEAN Guide on AI Governance & Ethics (2024) stands as an important regional effort that aims to respect the specific contextual requirements needed for AI governance. The document provides principled guidelines that higher education systems in ASEAN countries can adopt to establish their AI governance frameworks. Only a small number of studies investigate how the ASEAN Guide affects universities throughout its member countries to achieve responsible AI usage. The study analyzes ASEAN framework implementation through its global governance frameworks to show how its universal ethical standards apply to actual higher education practices throughout Southeast Asia.

Discussion of Findings

The Introduction of the ASEAN Guide on AI Governance & Ethics (2024)

The 2024 ASEAN Guide on AI Governance and Ethics was launched during the Fourth ASEAN Digital Ministers' Meeting, which took place on February 2, 2024, according to BowerGroupAsia (2024). Although all ten ASEAN member states approved the Guide, its non-binding status prevents it from functioning as a regulatory tool. The document establishes practical guidelines to create AI systems, which include national and regional assessment methods that evaluate their effectiveness (The ASEAN Secretariat, 2024). The seven guiding principles of transparency and explainability, fairness and equity, security and safety, human-centricity, privacy and data governance, accountability and integrity, and robustness and reliability aligh with global AI governance standards (The ASEAN Secretariat, 2024). The broad formulation of these concepts enables people to interpret them in various ways. The Guide has significant implications for educational institutions at the university level. Universities should develop AI ethics education programs that require transparent processes to ensure the responsible development of new technologies. Universities need to establish ethical review procedures that will help them create systems that handle new technology while maintaining their operational responsibilities.

The educational implications of each principle become operational at the institutional level. Universities need to inform their students about the usage of AI systems, which will impact their grading and feedback, (The ASEAN Secretariat, 2024). Students and faculty can participate in decision-making through systems that use documentation and audit trails, and committees that need both groups to take part in governance. Faculty need to acquire sufficient AI knowledge, which allows them to analyze algorithm outputs, while students should receive the power to ask for a human assessment of machine-generated decisions. Demographic groups need protection through active measures to prevent algorithmic bias according to the requirements of fairness and equity (ASEAN Secretariat, 2024). Staff training needs to focus on bias detection and critical interpretation skills, which will help maintain equity standards within the organization.

In particular, the domain of security and safety requires systems to defend against cyber attacks and technical breakdowns. Institutions need to establish encryption and authentication systems to protect their operations while developing plans for incident management. The systems require human monitoring for all critical judgment decisions, which include admissions and grading. The school needs to protect students from both data breaches and harmful processes that automatically categorize their information. The human-centricity principle states that AI should support human decision-making processes instead of taking over complete control over educational activities, according to the ASEAN Secretariat (2024). AI tools need to enable customized learning experiences while teachers maintain their professional freedom, and students can still receive human assistance. Organizations need to meet legal requirements while implementing privacy protection methods that follow privacy-by-design standards, according to the ASEAN Secretariat 2024. The universities that use digital platforms to collect student information must disclose all their data handling activities to students. Students have the right to access their data and make corrections, and decide whether their information can be processed, while public consultations will boost accountability. Institutions need to take responsibility for all AI-related damage, according to the ASEAN Secretariat 2024. Institutions reinforce their responsibility through three mechanisms, which include transparent reporting systems and stakeholder-based complaint systems, and scheduled audits.

The seven principles together create a complete framework for ethical behavior. The impact of their work will change universities in Southeast Asia when they successfully integrate their research into educational programs, staff development initiatives, student rights protection activities, and governance systems that include student participation. However, implementation becomes harder because different regions of the country have varied development levels. The system faces structural issues that stem from the three different elements that exist between data protection laws, regulatory capacity, and enforcement systems. The smaller institutions face difficulties in creating real operational procedures that can help them implement core ethical values. The Guide permits organizations to modify their operations according to emerging technologies, but organizations that fail to meet mandatory compliance requirements will reduce their ability to work together as a group.

The Role of the ASEAN Guide on AI Governance & Ethics (2024) in Shaping Responsible AI Adoption in Higher Education

The ASEAN Guide on AI Governance and Ethics (2024) demonstrates how Singapore and Malaysia implement regional principles through their university governance systems. After the National University of Singapore finished eighth in QS World University Rankings 2026 and received its designation as Asia's top university (National University of Singapore 2025), the institution created an AI governance framework. NUS established the University Policy Workgroup for AI in Teaching and Learning in January 2023 and published its first set of guidelines in February 2023. The framework includes three areas: (1) instructors' use of AI tools; (2) key principles for students; and (3) regulations governing student engagement with AI in academic contexts (University Policy Workgroup for AI in Teaching and Learning 2024).

NUS operationalizes ASEAN principles through faculty training and oversight systems. Instructors must disclose AI use in teaching, reinforcing transparency. Fairness addresses digital inequality through awareness and inclusive pedagogical design. The approved tools function within their established limits while instructors maintain assessment integrity responsibility. The institutional support systems maintain academic standards by controlling plagiarism and AI misuse. The structured model enhances compliance while it clarifies responsibilities, but it creates administrative tasks that limit experimental work. NUS demonstrates regulatory coherence through its practices. Students at NUS may use AI for brainstorming and drafting, but undisclosed AI-generated submissions are prohibited. Students must ensure their work remains correct and true. The framework establishes ethical awareness through its content, but students need digital literacy to reach learning outcomes. The university's strict misconduct rules function to prevent rule-breaking, yet they do not guarantee students will achieve substantial educational results.

The Malaysia Education Blueprint (2015-2025) (Ministry of Education Malaysia 2015) creates a model that works together with existing educational systems to establish the educational framework for Malaysia. According to Mohammad et al. (2025), approximately 70% of Malaysian public university students utilize AI tools to complete their academic work. Malaysia demonstrates faster and more extensive AI adoption compared to Singapore, which implements a governance-first approach. The Generative AI guidelines established by Universiti Teknologi

Malaysia (UTM) in 2024 serve to meet ASEAN requirements as well as national legal standards. The guidelines require students to focus on human-centered learning while they must reveal any AI technology usage and follow academic integrity rules in their work. Students who produce undisclosed AI-generated content violate academic integrity rules. The implementation success requires organizations to provide staff training, monitoring systems, and necessary resources.

The different levels of funding, infrastructure, and faculty expertise create challenges for maintaining consistent enforcement.

Singapore and Malaysia thus represent two governance trajectories: Singapore prioritizes regulatory clarity and accountability before large-scale diffusion, whereas Malaysia demonstrates adaptive expansion with evolving oversight. Both institutions need to control two opposing objectives, which involve stopping AI misuse and achieving enhanced educational results through AI. Sustainable governance requires institutions to build their capacity while establishing standards that protect their integrity and support innovation.

Cambodia, Laos, and Myanmar face major challenges in developing their AI governance systems despite having developed some advanced governance systems. The ASEAN Secretariat (2024) identifies three main challenges that affect institutions: they lack digital infrastructure, they need more AI experts, and their internet access remains unreliable. Both technological limitations and political economy constraints produce regional inequality because of inadequate public funding and unsteady institutional governance. Chronic underinvestment restricts universities' ability to establish compliance units, train educators, implement secure data systems, and conduct AI risk assessments. High operating expenses force many institutions to obtain foreign commercial AI platforms, which creates problems about data ownership, regulatory authority, and digital sovereignty. The universities will transform into active players in the regional AI landscape if they develop strategic investments. Universities will remain passive customers of AI technologies unless they make strategic investments to become active regulators and innovators.

Vietnam illustrates another governance challenge. The Personal Data Protection Decree (Decree No. 13/2023/NĐ-CP) establishes fundamental legal principles for data governance (Vietnamnet, 2023); however, many Vietnamese universities lack AI ethics committees, internal auditing systems, and formal AI risk assessment procedures. Individual users who want to use AI usually create their own systems instead of following standard procedures which leads to different performance standards and accountability problems. The absence of disclosure protocols, misconduct reporting systems, and periodic policy evaluation weakens enforcement. Governance remains at a basic level because organizations lack research ethics boards, compliance officers, and institutional AI registries. Institutional sustainability needs both theoretical frameworks and operational models to achieve long-term success. The educational institutions need to create ethics committees that will evaluate AI-based educational programs and research activities while conducting risk assessments and developing compliance procedures. The implementation of transparent evaluation mechanisms through policy audits, AI incident reporting, and public governance reports will create a system that improves accountability while building trust with stakeholders. The accreditation process, which follows ASEAN standards, will help organizations build their credibility. The sustainable development of AI governance in Southeast Asia requires institutions to establish operational capacity while distributing resources fairly and maintaining control over digital asset,s and implementing monitoring systems. The establishment of binding institutional frameworks that implement ASEAN principles will create a system that enables balanced innovation while maintaining accountability and educational resilience during the AI transformation era.

Comparing the ASEAN Guide on AI Governance & Ethics (2024) with the UNESCO Recommendation on the Ethics of AI (2021) and the OECD Principles on AI (2019) in the Education Sector

The higher education sector has experienced transformative changes because of artificial intelligence tools, which have rapidly spread throughout academic institutions. The existing tensions between different groups create an urgent requirement for governance frameworks that include all stakeholders and follow ethical standards. The UNESCO Recommendation on the Ethics of Artificial Intelligence (2021), the OECD AI Principles (2019), and the ASEAN Guide on AI Governance in Education (2024) provide three major policy instruments, which Table 1 shows to offer different methods of governing educational AI.

Table 1: Comparison of UNESCO Recommendation on the Ethics of Artificial Intelligence (2021), OECD AI Principles (2019), and ASEAN Guide on AI Governance in Education (2024)

Frameworks	Main Focus	Key Principles	Education Application
UNESCO (2021)	Ethics and human rights	Sustainability, equity, human dignity, cultural diversity	Integrate AI in curricula, protect privacy, address bias
OECD (2019)	Responsible and reliable AI	Human welfare, equality, transparency, safety, responsibility	Data-driven decision-making, online skill training, improve learning outcomes
ASEAN (2024)	Regional implementation	Ethics committees, governance structures, risk assessment	Guide schools and universities, reskill teachers, ensure student well-being

UNESCO Recommendation is based on a human rights framework with ethical standards to establish guidelines for AI governance, which were then created by UNESCO in 2021. The document emphasizes core values which include human dignity and equity, cultural diversity, and environmental sustainability. The educational field requires this approach to extend beyond basic compliance requirements toward the complete transformation of educational programs. UNESCO calls for universities to establish improved AI literacy programs, which will enable students and faculty members to understand AI systems through critical evaluation (UNESCO, 2021). The educational approach follows democratic principles, which encourage active student participation and critical thinking about knowledge acquisition, since Freire's (1970) banking model method leads to students becoming passive knowledge recipients. The rights-based AI framework encourages students to investigate bias in algorithms and data management systems and all forms of digital power dynamics. UNESCO's framework supports democratic pedagogy through its establishment of active ethical agents who maintain ethical control over their educational activities. UNESCO established AI governance through its environmental sustainability methods, which include social and ethical considerations. AI systems require energy-intensive infrastructures together with vast data processing capacity, which leads to environmental issues because of carbon emissions and the need for material resource extraction (UNESCO, 2021). AI education needs sustainable practices that require students to understand ecological responsibility and sustainable innovation, and all environmental impacts that digital technologies will have on Earth in the future. The educational system considers sustainability as a core element that builds the essential structure for all educational practices and learning activities.

The OECD AI Principles establish responsible innovation as their primary goal while ensuring reliable AI systems will drive economic development. The five principles, which include benefit to people and planet, human-centered values and transparency and robustness, and accountability, form the basis of a governance system that aims to enhance organizational efficiency while maintaining institutional effectiveness. The educational system provides backing for institutions that need to make data-based choices while developing custom learning programs and online skill development platforms. The approaches increase operational efficiency, but they create a risk of establishing technocratic governance systems that need public involvement during their execution. The educational system prepares students to serve as behavioral data sources, which will operate in algorithmic systems that create optimized performance results. The OECD framework establishes rules for institutional accountability and safety, yet those rules need democratic systems to allow students to express their opinions and participate in discussions (Organisation for Economic Co-operation and Development, 2019).

The ASEAN Guide on AI Governance in Education provides regional standards that implement global guidelines through its educational system. The Guide requires institutions to develop their own governance systems through the establishment of ethics committees and risk assessment systems, and capacity-building programs, instead of enforcing identical policies for all institutions. The ethical principles become concrete through these systems, which become administrative actions and procedural activities. ASEAN acknowledges that human talent development, together with inclusive governance, creates the foundation for fair AI technology usage across all sectors through its support of teacher upskilling programs and cross-industry cooperative efforts (ASEAN, 2024). The ASEAN framework, which focuses on regional matters, puts social sustainability as its primary importance. The member states can prevent educational disparities through their efforts to improve digital infrastructure and institutional readiness, which help bridge existing gaps. The governance system establishes ethics committees, which produce official environments where stakeholders can participate, including students who might take part in decision-making processes. The ASEAN framework promotes democratic participation within institutions through its establishment of ethical practices, which organizations must follow to build their organizational values.

The analysis of Table 1 shows that AI governance frameworks extend their functions beyond regulatory control because they determine the method that educational institutions will use to teach students and maintain sustainable educational practices. UNESCO supports ethical universalism and democratic participation in educational systems, while the OECD endorses responsible innovation as the path to optimizing organizational performance. The AI governance system for higher education institutions needs to combine ethical value systems with operational enforcement and specific regional requirements to enhance environmental sustainability and active student engagement in educational activities.

Conclusion

AI systems at universities are growing fast, which creates new chances for universities to develop educational programs, but also requires them to address their ethical responsibilities. The chapter assesses the ASEAN Guide on AI Governance and Ethics (2024) as a regional framework that transforms international AI governance standards into operational systems for Southeast Asian universities. The Guide establishes ethical standards through its adaptation of UNESCO (2021) and OECD AI Principles (2019) international standards, which create common ethical standards that different economic and institutional environments need for their practical application. The National University of Singapore and Universiti Teknologi Malaysia serve as institutional models that show how universities implement human-centered values and transparency, data protection, and legal compliance requirements into their AI governance frameworks. The cases show how governance acts as a change mechanism that steers AI development toward ethical practices and user involvement instead of unrestricted technology growth. However, the ASEAN region faces major obstacles that still need to be addressed. Digital infrastructure deficiencies, AI literacy gaps, and institutional capacity limits create challenges for many institutions. The existing tension between innovation and regulation is sustained because regulatory limits create experimental barriers, while insufficient oversight presents data security risks for businesses and the general public. The analysis shows that educational transformation depends on how organizations govern their systems in the Democratic Education Network (DEN) mission, according to the AI study. The spectrum of responsible AI governance starts with basic legal obligations and builds up to include democratic participation and sustainability, fairness and accountability, and institutional resilience. The ASEAN Guide offers non-binding frameworks that help universities establish their unique operational standards by connecting global standards to domestic requirements for democratic, sustainable, and ethically responsible AI evolution.

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5 |

Great Power Politics, Digital Diplomacy, and Sustainable Institutions in the Middle East

Marharyta Andreieva

Abstract

This chapter examines how great powers shape development trajectories in the Middle East through militarisation, political interference, and emerging AI-driven geopolitics. Drawing on rentier-state and dependency theories, it argues that external intervention reinforces structural dependency, weak institutions, and authoritarian governance, thereby obstructing progress toward Sustainable Development Goal 16 (peace, justice, and strong institutions). Using the Syrian civil war as a case study, the chapter analyses the roles of regional powers, the United States, and Russia, highlighting how AI, digital warfare, and information technologies transform conflict and governance. Situating these dynamics within broader debates on education, sustainability, and human development, it demonstrates that AI-driven strategies often marginalise educational transformation in favour of regime survival and geopolitical competition. Without inclusive institutions, educational reform, and technological capacity-building, AI risks deepening inequality and dependency rather than supporting sustainable development. This chapter contributes to debates on AI and sustainable education by showing how militarised AI reshapes institutional development in fragile states and constrains efforts to transform education for sustainability.

Introduction

The Middle East is frequently portrayed in popular and academic discourse as a region defined by conflict, instability, and underdevelopment. Conventional explanations emphasise sectarian divisions, authoritarian leadership, or recurrent wars, but these often obscure deeper historical and structural processes shaping state formation and long-term development. Schwarz (2008) argues that underdevelopment stems not merely from war or social fragmentation but from enduring patterns of external intervention, militarisation, and weak institutions. These patterns have allowed great powers to embed strategic and economic interests within domestic structures, producing enduring dependencies that limit states' autonomy and capacity for inclusive development.

This chapter asks: how do great power interventions, particularly through AI-driven military technologies and digital governance, shape institutional sustainability and educational development in fragile states? By situating Syria within debates on AI, governance, and sustainable education, it examines how technological innovation interacts with historical patterns of dependency to shape human development outcomes. It contends that great powers sustain dependency through military intervention, political interference, and increasingly AI-driven geopolitics. By prioritising strategic and economic interests, external actors shape state formation, governance, and social provision, often at the expense of educational capacity and institutional strengthening. The Syrian civil war illustrates these dynamics, showing how regional powers, Saudi Arabia, Turkey, Qatar, and global actors, the United States, Russia, have influenced Syria's political economy, governance, and social infrastructure.

The conflict also highlights AI's transformative role. AI-enabled military systems, unmanned platforms, and digital propaganda reshape warfare and create new dependencies by centralising technological and strategic capacity within great powers. These tools constrain human development, educational access, and institutional reform, demonstrating how technology intersects with geopolitics in fragile contexts. Using rentierism and dependency frameworks, the chapter shows how authoritarian resilience, militarisation, and technological reliance hinder sustainable development. Educational systems are central to human capital, digital literacy, and institutional resilience. When great powers control technological infrastructure, they shape the capacity of education systems to integrate AI responsibly and equitably. In the AI era, development is inseparable from educational transformation and governance sustainability.

State Formation, External Intervention, and Development in the Middle East

The collapse of the Ottoman Empire marked a pivotal moment in the formation of Middle Eastern states. Unlike European states, which consolidated authority through centuries of war-making, taxation, and institution-building, newly formed Middle Eastern states emerged under immediate and sustained external intervention. Britain and France, acting as colonial powers under the mandate system, imposed artificial borders and governance structures prioritising imperial stability and economic extraction over local administrative capacity or social cohesion. As Lustick (2003) notes, these externally imposed structures produced states oriented toward external patrons rather than domestic constituencies, leaving them without the foundations for autonomous governance.

The colonial legacy concentrated wealth, capital, and decision-making among narrow elites while limiting domestic markets and tax capacity. In Europe, rulers relied on populations to generate revenue, gradually fostering representative institutions. In contrast, Middle Eastern elites were insulated from societal pressures by access to external rents, including oil, strategic aid, and foreign investment. This structure reduced incentives to invest in public goods such as education, infrastructure, and welfare, which could have strengthened civic engagement and institutional legitimacy. Traditional European theories of state formation, which emphasise war-making and taxation as engines of institutional development, thus fail to explain outcomes in the Middle East. Rentierism and dependency theory offer a more compelling framework: external powers entrenched authoritarian governance, militarisation, and structural dependence. By sustaining regimes financially and militarily, foreign actors embedded strategic and economic interests within domestic institutions, creating long-term reliance on external support (Schwarz, 2008). This reliance inhibited autonomous economic growth, limited opportunities for educational expansion, and undermined human capital formation.

These historical patterns continue to shape contemporary technological dependency. Weak institutions and limited digital sovereignty constrain states' capacity to regulate or develop advanced technologies, including AI. As a result, contemporary AI infrastructures often mirror earlier forms of dependency: great powers supply technological expertise, digital platforms, and surveillance systems, reinforcing asymmetric power relations in the digital age. Colonial fragmentation and externally imposed governance evolve into new forms of technological reliance, limiting domestic innovation, the integration of AI into education, and the development of sustainable, autonomous institutions. In summary, the early trajectory of Middle Eastern states was shaped less by internal state-building and more by integration into a global system dominated by great powers. Structural dependency, reinforced by rentier mechanisms and colonial legacies, created political and economic fragility that persists today. Education and technological capacity were peripheral to governance priorities, leaving states not prepared to leverage AI for institutional reform, human development, or sustainable growth. Understanding these historical foundations is crucial for analysing how contemporary interventions, particularly in Syria, continue to constrain both educational transformation and AI-driven development, maintaining long-term dependency on external actors.

Rentier State and Dependency Theories

Rentier state theory provides a critical lens for understanding how dependence on external rents reshapes state–society relations in the Middle East. States that derive most of their revenue from oil exports, foreign aid, or strategic rents are insulated from domestic taxation, weakening demands for representation and accountability. Political authority becomes concentrated in the hands of ruling elites, while institutions remain weak, personalised, and often ineffective. Schwarz (2008) argues that such systems foster corruption, bureaucratic inefficiency, and clientelism, as public resources are deployed primarily to secure regime loyalty rather than to expand human development or educational opportunities. In rentier states, education is often instrumentalised to produce ideologically compliant citizens or to maintain elite networks, rather than to foster critical thinking, innovation, or civic participation.

Dependency theory complements this perspective by highlighting how external economic, military, and technological relationships bind domestic political systems to the strategic interests of great powers. Governments exchange access to natural resources, territory, or political alignment for military assistance, technological support, or security guarantees. Owen (2004) notes that regimes often become highly militarised to ensure survival, with foreign powers supplying weapons, intelligence, and logistical support. This militarisation diverts resources from development, reinforces authoritarian control, and increases reliance on external actors for security and economic stability.

In the digital and AI era, these dynamics extend into technological governance. Rentier logic incentivises states to adopt AI systems not to improve public services or education but to strengthen surveillance, regime resilience, and elite control, a phenomenon scholars describe as digital authoritarianism. AI technologies are securitised, concentrating technical expertise within the security apparatus while limiting transparency, accountability, and institutional reform. This logic directly shapes education systems: curricula, university governance, and research initiatives are aligned with regime priorities, constraining innovation, digital literacy, and the development of independent AI research capacity. Educational institutions become tools for regime legitimacy rather than engines for human capital and institutional sustainability.

By framing Syrian development through rentier and dependency perspectives, it becomes clear that structural reliance on external rents undermines progress toward SDGs. SDG 4 (quality education) is compromised when schools, curricula, and digital literacy initiatives are subordinated to political priorities. SDG 16 (peace, justice, and strong institutions) is similarly constrained as AI governance is centralised and securitised, limiting transparency, participation, and institutional capacity. The Syrian case demonstrates how external intervention and structural dependence perpetuate authoritarianism, constrain education, and embed long-term technological dependency.

In sum, rentierism and dependency theory illuminate how both historical and contemporary patterns of external support shape state behaviour, resource allocation, and technological adoption. They explain why educational development and AI governance remain subordinated to regime security, highlighting the structural barriers to integrating AI responsibly into education and institutional reform. Without addressing these underlying incentives, interventions in conflict-affected states risk reinforcing dependency rather than fostering sustainable human and institutional development.

The Syrian Civil War: Regional Powers and Militarised Dependency

The Syrian conflict began in 2011 with peaceful protests demanding political reform and greater freedoms, part of the broader wave of the Arab Spring. The Assad regime's violent suppression of dissent quickly escalated these demonstrations into a full-scale civil war (Phillips, 2019). Regional powers, including Saudi Arabia, Turkey, and Qatar, intervened by providing financial resources, weapons, and logistical support to opposition groups. While these interventions were framed publicly as support for the Syrian population and democratic reform, their primary motivations were geopolitical. Saudi Arabia and Qatar sought to weaken Iran's influence in the Levant, while Turkey aimed to limit Kurdish political autonomy along its southern border and shape a post-conflict Syrian order aligned with its security interests.

Conversely, Iran viewed Syria as a strategic pillar of its "axis of resistance," linking Tehran to Hezbollah in Lebanon and projecting influence across the Eastern Mediterranean. To prevent the collapse of this alliance, Iran increased military support, deployed forces from the Islamic Revolutionary Guard Corps (IRGC), and mobilised allied militias. These interventions intensified the conflict, entrenched sectarian divisions, and further fragmented Syrian society along religious, ethnic, and political lines, complicating prospects for inclusive governance and post-conflict reconstruction.

Developmental Consequences

The Syrian civil war transformed the country into a militarised proxy battlefield, where strategic competition dominated over development. Infrastructure and public services collapsed, and over half of the population was displaced internally or externally. Education was particularly devastated: schools were destroyed, repurposed for military use, or rendered inaccessible due to insecurity, while millions of children suffered long-term learning disruptions. Beyond immediate humanitarian consequences, these losses represent a profound erosion of human capital, undermining economic recovery, institutional capacity, and the long-term potential for educational reform.

Unlike non-conflict contexts where AI can support education, administration, and digital governance, technological capacity in Syria became concentrated in the military and security sectors. AI systems and digital tools were prioritised for surveillance, targeting, and information control rather than human development or education. The conflict thus not only destroyed infrastructure but also reversed the developmental potential of emerging technologies. Educational institutions and research capacity became embedded within authoritarian structures, limiting digital literacy, curriculum innovation, and long-term institutional resilience.

As a result, Syria grew increasingly dependent on external actors for governance, reconstruction, and humanitarian aid, reinforcing structural dependency consistent with rentier and clientelist state dynamics. Regional interventions shaped development not through institution-building or human capital investment, but by prioritising strategic advantage, entrenching authoritarianism, and undermining the foundations for peace, inclusive governance, and sustainable human development. The Syrian case illustrates the interconnected consequences of militarised conflict, technological concentration, and external dependency for education, institutions, and broader development trajectories.

The United States: Power, Restraint, and Developmental Consequences

Despite its global dominance, the United States adopted a policy of limited intervention in Syria, reflecting a complex interplay of domestic, regional, and international considerations. President Obama's reluctance to engage fully was shaped by the enduring legacy of the 2003 Iraq War, widespread domestic scepticism toward large-scale Middle East interventions, and concerns that deeper involvement could trigger broader regional escalation involving Iran and Russia (Phillips, 2019). Consequently, the US prioritised counterterrorism and containment over regime change or comprehensive stabilisation, focusing primarily on containing the Islamic State rather than addressing governance or developmental needs.

US engagement remained selective and constrained. The United States provided political support, financial aid, and non-lethal assistance to certain opposition groups, while strictly controlling arms transfers to prevent weapon capture by extremist organisations such as Jabhat al-Nusra or the Islamic State (Gerges, 2013). Legal constraints, including the lack of UN Security Council authorisation and the structural limitations of international norms, further restricted the scope of action. In practice, this fragmented approach emphasised tactical counterterrorism over strategic development or institution-building.

Developmental and Educational Implications

From a developmental perspective, US restraint had profound consequences. By refraining from decisive engagement, the United States created a strategic vacuum that was rapidly filled by other actors, particularly Iran and Russia. This enabled these powers to consolidate their influence, reinforce authoritarian resilience, and shape Syria's political economy in line with their strategic interests. Prolonged conflict led to institutional collapse, economic disintegration, and severe disruption of public services, especially education. Millions of children lost access to schooling, administrative capacity for governance weakened, and domestic institutions became increasingly reliant on external actors for both survival and reconstruction.

Limited US intervention also indirectly influenced the governance of emerging technologies. By failing to promote multilateral oversight or ethical frameworks for AI in conflict, a vacuum emerged in which authoritarian actors controlled digital infrastructure, surveillance systems, and AI-enabled military technologies. This lack of global coordination meant that technological deployment focused on regime consolidation rather than education, digital literacy, or institutional capacity-building. Educational policy and technological innovation remained subordinated to military and strategic priorities, leaving long-term implications for human development and institutional sustainability largely unaddressed.

The US case illustrates that both action and inaction by great powers shape development trajectories. Strategic restraint, while intended to minimise risk, enabled authoritarian consolidation, deepened dependency on external actors, and limited opportunities for educational transformation, technological capacity-building, and institutional reform. The Syrian experience demonstrates that limited intervention can have unintended consequences for governance, education, and AI deployment, highlighting the need for ethical oversight and development-oriented technological governance in conflict-affected contexts.

Russia's Intervention and Regime Consolidation

Russia emerged as a decisive actor in Syria from 2015 onwards, fundamentally reshaping the conflict and the country's developmental trajectory. Moscow's strategic motivations were multifaceted: preserving its last long-standing ally in the Arab world, maintaining access to the Mediterranean via the Tartus naval base, projecting power in the Middle East, and reasserting itself as a global actor capable of counterbalancing US influence (Maher and Pieper, 2020). Russian engagement combined diplomatic, military, and economic instruments to ensure Assad's survival and secure long-term influence, with repeated UN Security

Council vetoes shielding Damascus from international sanctions and limiting accountability.

Militarily, Russia relied on airstrikes, precision-guided munitions, and special operations targeting opposition-held urban centres, infrastructure, and supply lines. This decisively shifted the balance of power toward the government, but at the cost of widespread civilian displacement, infrastructure destruction, and humanitarian crises. Russian intervention extended into economic reconstruction: contracts granted Russian firms preferential access to strategic sectors such as oil, gas, and phosphates, while military basing agreements institutionalised Moscow's presence.

Developmental and Educational Implications

From a development perspective, Russia's intervention preserved authoritarian stability but entrenched dependency. Reconstruction and institutional processes were tightly linked to Russian political and commercial interests, limiting Syria's capacity for autonomous governance or reform. Human capital formation and public service delivery, particularly in education, were deprioritised. Schools, universities, and vocational institutions faced increased oversight, curricula were securitised, and research or digital literacy initiatives were curtailed. Educational institutions became instruments of regime consolidation, reinforcing loyalty and restricting innovation. This securitisation limited Syria's ability to develop independent technological and AI capacity, embedding long-term institutional stagnation.

AI and advanced surveillance technologies further deepened dependency. Russian expertise drove the integration of drones, predictive analytics, and intelligence platforms, concentrating technological control in the hands of an external actor. Rather than fostering education, digital governance, or institutional efficiency, AI was primarily deployed to maintain regime control, monitor populations, and shape information flows. The absence of domestic AI governance or ethical oversight illustrates a broader gap in aligning technological innovation with human development, transparency, and accountability.

Russia's approach exemplifies how great power intervention stabilises authoritarian regimes while constraining sustainable development. By coupling military dominance with economic and technological leverage, Moscow reinforced Syria's structural dependency, securitised education and institutional governance, and limited prospects for autonomous, equitable, and inclusive development. This case highlights the interplay between geopolitics, AI deployment, and human development in conflict-affected contexts, demonstrating that technological advances can reinforce authoritarian resilience when institutional safeguards are absent.

AI-Driven Warfare, Digital Diplomacy, and Dependency

Russia's intervention in Syria illustrates the expanding role of AI-driven geopolitics in shaping contemporary conflict and long-term development outcomes. The civil war functioned as a testing ground for advanced military technologies, including unmanned aerial vehicles, AI-supported intelligence, surveillance and reconnaissance systems, predictive analytics, and data-driven targeting platforms (Konaev and Bendett, 2019). These systems enabled the integration of satellite imagery, real-time battlefield data, and automated threat detection, improving precision, coordination, and efficiency in military operations. By reducing reliance on ground troops, AI lowered both human and political costs, making sustained intervention feasible while concentrating technological capacity in the hands of external actors.

Beyond combat, AI underpinned Russia's digital diplomacy and information warfare. State-controlled media, social networks, and automated bot campaigns amplified narratives framing the intervention as legitimate counter-terrorism and protection of sovereignty. AI-assisted content targeting, sentiment analysis, and algorithmic amplification shaped international perceptions, discredited Western humanitarian narratives, and obscured distinctions between civilian and combatant casualties. These operations weakened accountability mechanisms, further entrenching authoritarian norms and limiting domestic and international oversight.

The Syrian case highlights the absence of effective governance safeguards for AI. International frameworks, including the 2021 UNESCO Recommendation on the Ethics of Artificial Intelligence, emphasise transparency, accountability, human oversight, and human rights protections. Yet in Syria, these principles were largely unenforced. Military AI was deployed without ethical oversight or public consultation, reflecting a broader global governance gap in the application of AI in conflict zones.

The developmental and educational consequences are profound. Syria lacked domestic technological infrastructure, trained personnel, and digital governance capacity. AI was concentrated in the security and military sectors, rather than supporting education, digital literacy, or public administration. The securitisation of technology reinforced authoritarian resilience and diverted resources away from human capital development. Schools and universities became subject to heightened monitoring, limiting opportunities for AI-enabled educational innovation or research capacity.

This case illustrates the dual nature of AI in fragile contexts: while capable of supporting institutional reform, educational access, and sustainable governance, in Syria, AI entrenched dependency, militarisation, and authoritarian control. Aligning AI with Sustainable Development Goals, particularly SDG 4 (quality education) and SDG 16 (peace, justice and strong institutions), requires ethical oversight, institutional safeguards, and multilateral governance to ensure technology supports human development rather than geopolitical competition.

Education, AI, and Sustainable Development in Conflict Contexts

Within the broader framework of transforming education for sustainability, Syria highlights both the profound missed potential and structural risks associated with artificial intelligence. In principle, AI technologies could support post-conflict recovery by expanding access to remote learning, strengthening teacher training through adaptive platforms, improving educational data systems, and enhancing the efficiency of public administration. For example, AI-assisted analytics can identify regions at risk of educational exclusion, monitor school attendance, and help allocate resources equitably. In fragile contexts, such tools can accelerate human capital formation, rebuild institutional capacity, and enable sustainable governance.

However, in Syria, these possibilities were eclipsed by the prioritisation of AI for militarisation, surveillance, and information control. Prolonged conflict destroyed schools, displaced teachers, and interrupted learning for millions of children. With limited digital infrastructure and governance capacity, the large-scale implementation of AI-supported educational systems was impossible. Technological expertise remained concentrated within the security sector, reinforcing authoritarian control rather than empowering teachers, students, or administrators. Education was securitised: curricula, universities, and research institutions were monitored and directed towards loyalty and regime survival rather than fostering innovation, critical thinking, or digital literacy.

Transforming education for sustainability, therefore, requires far more than adopting technology; it demands institutional capacity-building, digital literacy, and robust teacher-training frameworks. AI can enhance public administration by supporting data-driven planning, equitable allocation of educational resources, and monitoring of service delivery. Investing in AI for governance can strengthen institutional transparency, accountability, and trust between the state and citizens, mitigating dependency on external actors. Policy interventions should include: developing national AI ethics frameworks; integrating AI literacy into teacher training programmes; supporting independent educational institutions capable of research and innovation; and collaborating with international agencies to align AI use with UNESCO guidelines.

The Syrian case demonstrates a broader lesson: in fragile and conflict-affected states, AI alone cannot deliver sustainable development. Its benefits depend on governance structures, educational capacity, and institutional safeguards. Aligning AI with Sustainable Development Goals, particularly SDG 4 (quality education) and SDG 16 (peace, justice and strong institutions), requires coordinated international support, ethical oversight, and investment in human capital. Where these conditions are absent, AI risks deepening inequality, reinforcing authoritarianism, and undermining long-term societal resilience. Embedding AI within inclusive educational systems is thus essential for transforming post-conflict societies and ensuring that technological innovation serves sustainable development rather than geopolitical competition.

Conclusion

This chapter has demonstrated that great powers continue to shape development in the Middle East by reinforcing structural dependency through militarisation, political interference, and increasingly, AI-driven geopolitics. Drawing on rentier state and dependency theories, it has shown that reliance on external military, economic, and technological support weakens incentives for institutional reform, entrenches authoritarian governance, and marginalises societal participation. The Syrian civil war illustrates how strategic competition among regional and global powers reshaped not only military outcomes but also the country's institutional and educational trajectory.

Crucially, the analysis highlights AI's dual role in conflict-affected contexts. While AI technologies hold transformative potential for educational access, public administration, and institutional sustainability, their deployment in Syria was largely militarised and securitised. Instead of fostering digital literacy, teacher development, or institutional reform, AI systems reinforced surveillance, information control, and regime consolidation. Progress toward SDG 4 (quality education) and SDG 16 (peace, justice, and strong institutions) remains constrained when technological development is detached from governance, human development, and ethical oversight.

The Syrian case offers a broader lesson for debates on AI and sustainable education. In fragile and conflict-affected states, technological innovation alone cannot produce sustainable development. AI must be embedded within accountable governance frameworks, digital literacy initiatives, and institutional capacity-building strategies that prioritise human development over geopolitical competition. Policy recommendations include: developing national and regional AI ethics frameworks aligned with UNESCO guidelines; integrating AI literacy into teacher training programmes; supporting independent research and educational institutions to foster local technological capacity; and strengthening public administration systems to ensure equitable and transparent service delivery.

By foregrounding the intersection of great power politics, AI governance, and educational sustainability, this chapter contributes to the discourse on transforming education for sustainability in the digital era. It demonstrates that militarised AI reshapes institutional development in fragile states and underscores the urgent need for research on digital sovereignty, ethical AI governance, and post-conflict educational reconstruction. Ensuring that AI serves peace, justice, and sustainable human development remains one of the central challenges of contemporary global governance, making the alignment of technology, education, and institutional resilience an indispensable priority for the Middle East and other conflict-affected regions.

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6 |

Humanising Educational Technologies: Ethics, Equity, and Global Justice

Phuong Anh Ngoc Hoa

Abstract

Within the last ten years, artificial intelligence has transformed the educational landscape, promoting more learning opportunities than ever before and simultaneously engendering numerous advanced ethical issues. The paper explores the utilization of AI in a strategic manner to achieve the United Nations Sustainable Development Goal 4 (SDG 4), i.e., to provide inclusive, equitable, and high-quality education by implementing socially responsible practices based on fairness, transparency, and accountability. Guided by the normative framework of UNESCO's AI and Education: Guidance for Policymakers (2021), the present study is guided by the qualitative comparative method of examination of two sharply different national configurations: the centralized and efficiency-oriented Chinese educational system and the decentralized model founded on participation and trust in Finland. The data obtained reveal that, despite sharing the principles of the approach to ethics as espoused by UNESCO, the actual implementation of the two states is influenced by opposing political values and philosophies of government. This discussion goes further to explain how institutional power relations create a digital divide, thus necessitating a transition to educational democracy where technology acts as an empowerment tool in lieu of a surveillance device. The findings claim that the combination of humanistic principles with strong self-governance, participatory decision-making, and the active empowerment of educators is the only possible avenue to make AI work as a driver of social justice in the world, but not as a force of inequality.

Introduction

Artificial Intelligence (AI) is essentially transforming the models of education in the world in a fundamental way that is changing the functions of both teachers and students. AI will ensure a more inclusive future of education that complies with the objective of the United Nations Sustainable Development Goal 4 (SDG 4) through adaptive learning systems, automated evaluation, and hyper-personalized learning pathways. But this change in technology is happening in a complicated political economy where there is often a collision of interest between the private EdTech industry and the public education goals, and in some cases, there is even a contradiction. Alongside bringing about greater efficacy, there come with AI significant ethical and social dangers, including algorithmic bias, data tracking, and transparency. The fast pace of AI integration has easily outpaced the current regulatory frameworks and created a precarious trend of commercialization of education, where commercial outlets can focus on the need to grow the market instead of on the teaching principles. This creates an imperative contradiction in the relations of the market state: how do policymakers make sure that AI turns out to be a social good and not a monopoly tool of marginalization? To resolve these issues, AI governance should shift to a more human-centered approach that puts a barrier on the encroachment of automated judgment on human judgment. The focus of this paper is on how the core ethical standards, like fairness, transparency, and accountability, have been operationalized in the various models of governance. We use the UNESCO AI and Education: Guidance for Policymakers (2021) as the normative standard in comparison between China and Finland. Through the analysis of these two very opposing systems, the research helps to shed light on how various political cultures deal with the role of private actors and institutionalize morals. Finally, the study argues that it will only be possible to promote educational equity in the world through AI when the ethical principles are strongly built into the state policy and operational routines of digital infrastructure.

Literature Review

The artificial intelligence boom has rejuvenated the academic discourse on the ethical aspects of knowledge production. Although UNESCO (2021) and Jobin et al. (2019) distinguish fairness, transparency, and accountability as the current AI ethics gold standard, there is still a significant difference between the normative principles on the higher level and their practical, enforceable implementation.

On Thinking Beyond Technical Solutions: Critical Pedagogy and Power

The existing literature holds that ethical AI is impossible to attain using technical interventions only. Based on the critical pedagogy of Paulo Freire (1970) and Henry Giroux (2020), scholars believe that AI is a danger of creating a banking model of education, i.e., in which students will be turned into inactive receivers of data-intensive learning. In response, proponents of critical digital education suggest implementing AI systems that develop learner agency instead of compliance. Williamson and Piattoeva (2022) point out that algorithmic governance often uses education as numbers, which endangers the so-called pedagogical judgment of teachers, which is also a concern expressed by Holmes et al. (2019) regarding the essential critical AI literacy.

Decolonial Views and the Global South

The growing body of literature of the Global South, such as that of Boaventura de Sousa Santos (2018), challenges the alleged universality of AI methods of governance design. Decolonial critics believe that in many cases, AI consists of some sort of digital colonialism: applying Western-centric or Sino-centric concepts to a variety of educational environments and even eliminating local epistemologies. In this paper, the UNESCO (2023) requirement that AI should be used to benefit humanity and not humanity benefiting from AI, rather than AI shaping humanity, is placed in the context of a continuing fight for epistemic justice in which inclusivity, as a much-needed buzzword, can be turned into protection against structural exclusion.

Diverse Governance: China versus Finland

The modes of operationalisation of ethics vary radically in political cultures. The Beijing Consensus (2019) views AI as a national modernisation and efficiency-focused common good in China, but this centralised approach is questioned on matters of surveillance and procedural fairness. On the other hand, the decentralised system that EDUFI (2024) emphasises in Finland focuses on autonomy and trust in teachers and sees AI as a pedagogical partner. According to Niemi, Wei, and Liu (2022), China has a high value on scalability and state control, whereas Finland emphasizes participatory ethics.

Overall, the literature shows that the ethical control of AI is a controversial field between the humanisation and dehumanization of education. UNESCO provides the broad framework, but, as this chapter suggests, the real test comes as to whether national institutions can bring these principles into actual practice without sacrificing educational democracy or falling into technological determinism.

Methodology

The research design will be a qualitative, comparative, desk-based research design, because it will focus on how the ethical principles, such as fairness, transparency, and accountability, are operationalized in educational institutions using artificial intelligence. The study has a conceptual orientation, which explains why it has been conducted by means of the secondary methodological approach of qualitative research, synthesising literature based on integrative theoretical, policy, and empirical sources. The comparative aspect makes it possible to conduct a rigorous study of the way international ethical norms are construed in various systems of governance. The sources used in the review are official policy reports, peer-reviewed articles, and institutional documents published since 2018 to the current year, such as such key frameworks as AI and Education: Guidance for Policymakers (UNESCO, 2021), the Recommendation on the Ethics of AI (UNESCO, 2021), The Beijing Consensus (2019), and the Finnish National Agency for Education Guidelines (2024). The selection process was guided by four inclusion criteria, namely (1) publication in 2018 - 2024; (2) a direct orientation on AI ethics in education; (3) significant attention to fairness, transparency, or accountability; and (4) a focus on national or comparative governance. Technical or commercial reports were avoided in order to maintain a humanistic and ethical orientation.

Its methodological framework integrates thematic analysis and comparative analysis. Its previous recurring themes include equity of access and algorithmic transparency, but the latter looks at the manifestation of these themes in the conditions of China and Finland as compared to the UNESCO framework. The analysis model is based on a threefold ethical philosophy that consists of fairness (just access and non-discrimination), transparency (easy to understand the decision), and accountability (human control in machine-based processes). To bring out convergences and divergences in practice, national case studies were rated against these criteria.

However, there is critical reflexivity regarding the methodological constraints that this secondary study has. The identified results are necessarily limited by risks to secondary data, since policy documents can be described as the official or idealistic accounts of the situation, where complex realities in the classroom implementation are not always represented. This brings in an established bias against the state or institutional rhetoric, at the cost of the lived experiences of students and teachers. In addition, the analysis takes into consideration the positionality of the researcher, who understands that the meaning of the terms democracy and social justice is understood through the perspectives of certain academic frameworks that, in turn, might be biased. One of the salient weaknesses is the lack of primary field research, i.e., ethnographies and practitioner interviews. Although this study provides a much-needed conceptual groundwork, there is an urgent need to have future applications of field research to balance high-level governance theory and pedagogical practice.

In this light, findings must be taken to be a knowledgeable point of departure towards additional investigations and never a conclusive description of classroom reality.

Findings

UNESCO's Ethical Framework

The most holistic international system of connecting the ethics of artificial intelligence to the educational process and the United Nations Sustainable Development Goal 4 (SDG 4) is the article UNESCO AI and Education: Guidance to Policymakers (2021). This framework transforms the Ethical Decision-Making Model of Rest (1986), which comprises awareness, judgment, intention, and action of morality, into tangible policy expectations. It asks states to incorporate the triad of fairness, transparency, and accountability into the whole lifecycle of AI, beginning with initial design and going through to assessing it, and thus operationalizing the principles of ethics in the regulatory practice. In this model, fairness implies that AI systems should counteract and not reproduce structural inequalities. Transparency can help teachers and students to break the black box of the opaque algorithms, and accountability can help to hold legal and ethical responsibility, instead of legal accountability, enshrined in human agents, not autonomous systems. These directives are also framed by the Human-Centred Design theory (Norman, 2013), which focuses on the empathy of the stakeholders and feedback governance as the heart of ethical innovation.

However, a critical evaluation of the vision of UNESCO exposes the great political and structural limitations of the vision. Despite being a strong conceptualisation in normative terms, its framework often collapses on the implementation front in the global scale due to the presence of power asymmetries. The use of non-binding recommendations in the UNESCO system, based on soft law rather than hard law, is criticized by the fact that it does not compel mighty private EdTech corporations or repressive regimes to do anything. In addition, the universalism of the language of human rights may help to mask geopolitical undertones when the localisation of ethics is used as an excuse that states should put national security or economic competitiveness first before individual digital rights. This forms a paradox because even though UNESCO advocates participatory governance, the reality on the ground mainly dictates the future of establishing the rules of the game, and as such, the Global South ends up as a policy taker instead of a policy maker. In turn, the framework is an important moral compass, but its effectiveness is always confronted by the realpolitik of AI competition in the world and the intrinsic complexity of the process of institutionalising ethics in radically different political philosophies.

Case Study 1: China

The case of China can be viewed as an example of a centralized form of governance whereby Artificial Intelligence has been used as a national modernization driver. The Beijing Consensus (2019) views AI as a means to improve efficiency and the promotion of distributive justice, the idea that is being implemented through the mass implementation of adaptive learning systems and data-driven evaluation platforms. State investment on a large scale has achieved digital divide bridging, especially through offering these rural areas high-quality digital services, never seen before. The Chinese model of governance uses the Governance Theory created by Rhodes (1996), in which all decisions are made between the technology giants and the state. Although this structure can be scaled at a very fast rate, the transparency and civic participation are limited in most cases. Niemi, Wei, and Liu (2022) note that the communication of data in Chinese schools is not aimed at personal data sovereignty, but at national empowerment. Practically, the ideas of consent and privacy are handled as a matter of administration and not ethics, and the bottom line is utilitarian. Nevertheless, the implication of classroom-level pedagogy indicates a multifaceted conflict that concerns autonomy in learners. Indicatively, the use of AI-based intelligent tutoring systems and facial recognition as attentiveness checks can make the classroom a high-tech surveillance room. According to teachers, on the one hand, AI bypasses the administrative load, but on the other, it de-skills teachers by replacing their intuition about pedagogy with algorithms. To students, maintaining an ongoing data-monitoring process can result in a culture of compliance rather than critical inquiry. The Chinese model also agrees with the Capability Approach of Sen (2009) to some extent, where it extends the freedom of access to the digital infrastructure. However, the freedom does not have full completeness because it does not provide procedural justice and protection of individual agency. The "human - in - the - loop" principle is often overlooked when artificial intelligence determines the speed and content of learning, as has been noted by practitioners. As a result, the Chinese AI plan is quite strong in its distributive equity, but experiences serious problems with safeguarding the pedagogical autonomy and human agency of the truly democratic education.

Case Study 2: Finland

Finland conducts a decentralized, trust-based policy of artificial-intelligence (AI) governance, which is rooted in the professionalism of teachers and participatory ethics. The Finnish National Agency of Education (EDUFI, 2024) does not view AI as a replacement for human teaching but as a pedagogical companion. This paradigm realizes the Human-Centred Design framework by Norman (2013) and Ethical Leadership Theory by Brown and Treviño (2006), which predict empathy, transparency, and moral responsibility in terms of digital integration. In the Finnish context, fairness is conceptualized by personalized learning and local autonomy, where schools determine AI tools based on certain local values and pedagogical goals. Professional ethics are not built in a top-down way with accountability, but with teachers being enabled as being co-produced with ethical practice by rigorous training in algorithmic literacy and reflective pedagogy.

Using the Governance Theory that was proposed by Rhodes (1996), the system is a collaborative network that works based on cooperation, and not central control, which reduces bureaucracy in favour of collective reflection. However, the so-called Finnish Miracle is not without internal tensions, and the idyllic picture of a trust-based model may obscure the emerging inequalities. Although the decentralised design provides the ability to power well-resourced municipalities, it also poses a threat of enhancing the digital gap among different regions. Resource gaps imply that none of the schools in poorer or more remote areas have the structure or technological assistance to apply AI with the same effectiveness as urban ones. In addition, the trust placed on the autonomy of teachers assumes the homogenization of the level of digital competence in the profession. This expectation can create inconsistent learning outcomes among the marginalized learners, such as the learners with special educational needs or the learners with an immigrant background, who might otherwise be left out if AI tools are not widely installed or culturally oriented. Social trust can be a powerful force for innovations, as Niemi et.al. (2022) believe, but it should be supported with strong institutions of state structures to make sure that local autonomy will not create systemic inequity. Finland, therefore, needs to maintain its democratic government and actively solve the socio- economical voids that jeopardize the universality of its education at all levels, thus endeavoring to achieve a definitely democratic education.

Comparative Insights

The directions of attaining the idea of equity in education via the utilisation of Artificial Intelligence in China and Finland are quite similar, yet their interpretation of fairness is fundamentally different. The very centralised structure of China lays emphasis on equality of access, which makes fairness a measurable value pegged on infrastructural reach and delivery uniformity. Contrarily, the decentralised approach by Finland focuses on equity of experience as fairness is qualitatively defined by participatory engagement and individual autonomy. Applying the Governance Theory, the difference becomes even more evident: China is shown as the example of hierarchical efficiency, and Finland is an example of networked cooperation. These models just indicate a departure in ethical priorities; on one extreme, China achieves distributive fairness, frequently at the cost of agency, and on the other extreme, Finland upholds procedural ethics, though struggling with systemic scalability and regional uniformity.

However, upon scrutiny beyond the national boundaries, the two models are practiced on the basis of global knowledge and power hierarchies. In the case of the China Model and Finland Model, these are not just localized options; they serve as an opposing knowledge transfer paradigm. To the developing countries, the decision between these models often evidences ultimate inequalities in development. The Global South of low-income countries may be coerced into following the centralised Chinese approach due to its ability to scale and be infrastructure-wide in a turnkey approach at the sacrifice of long-term democratic controls. On the other hand, the Finnish model, though morally desirable, can be viewed as a luxury that cannot be achieved by states with low values of social trust and institutional weakness. This discussion highlights the fact that universal principles suggested by UNESCO have to be mediated in a gross context. Ethical governance is not an intrinsic property of technology, but a dynamic creation of political culture and world positioning. Due to this, the practical global paradigm should fill the gap between the distributive breadth of China and the participatory depth of Finland. Unless these global hierarchies in the system are tackled, the transfer of AI technology will become another source of inequality in development, other than being used as a vehicle of global social justice.

Discussion

Re-examination of the Ethical Principles

Accepting equity, transparency, and accountability are the critical ethical variables in the examined governance models. However, they are determined inherently through political and cultural conditions that are divergent socio-political contexts. Although UNESCO offers a set of universal normative guidelines, they are transformed into specific institutional practices. Accountability in China is largely developed in terms of large-scale access to infrastructure,s where transparency may follow national efficiency. Conversely, Finland combines these three principles in a whole-unit fashion, where fairness is under the social trust, transparency under the democratic dialogue, and accountability under the professional ethics. These differences can be explained further by implementing the Ethical Decision-Making Model developed by Rest (1986). Chinese moral focus is on judgment, that is, what is right according to a state vision. Finland, however, switches to the focus on moral action, whereby ethical behavior is embodied as a habitual reflective pedagogical behavior. These results are indicative of a tension that is quite critical: It is a compliance with no trust, and as such, result in a purely mechanical form of fairness; it is transparency, but no equity, and in this case, it would result in digital elitism. Ethical governance has to move beyond the top-down regulation to achieve a model of collective governance in order to overcome these limitations. It requires effective integration of student voice, when the learners should not be treated as mere points in the dataset but meaningful participants in the creation of the AI systems and their evaluation. Authentic ethical practice would entail nurturing educational citizenship in which technology serves as a forum of democratic interaction in addition to being a vehicle of optimized learning. Finally, innovation and moral responsibility should be ensured to find a dynamic balance where AI can be used to activate human agency and collective decision - making in a fair educational ecosystem.

Human-Centered Governance

Implementation of Artificial Intelligence as a collaborative factor in a learning setting needs to be premised on a strong, humanistic governance structure. As postulated by Human-Centered Design Theory by Norman (2013), empathy, repeated prototyping, and persistent feedback are not just preferences of a technical nature, but moral necessities. The use of this theoretical position can be demonstrated using the example of the co-design model in Finland, during which teachers and students actively participate in all steps of the algorithmic lifecycle. On the other hand, the centralized and top-down policy architecture of China, inasmuch as technologically effective, faces a large proportion of dialogic interaction in the periphery, and thus it limits the moral agency of the individual practitioner. In order to surpass the ideals of the concept, the problem of institutional implementation arises as the most critical. Even though the UNESCO system pushes the governance model towards participation, its international effectiveness depends on the existence of well-defined regulative entities and well-developed enforcement strategies. In the absence of these structures, the participation will be limited to mere rhetoric. Regulatory Authority: The state ministries and individual EdTech developers should not be the only ones who do effective regulation. Instead, there is a need to introduce a multi-stakeholder oversight system consisting of independent ethical boards, pedagogical officers, and data protection officials that will audit AI systems before and after deployment, and hence hold everyone in the entire lifecycle responsible. Ensuring compliance: Compliance has to be ensured via enforced transparency audits and algorithmic impact evaluations. In the kind of system used in Finland, among others, decentralized systems use professional norms and peer reviews, and centralized systems have state-led performance measures as their major pillars. Sanctions and Accountability: Ethical accountability is very performative and without actual sanctions. This should be enforced by institutions through the inclusion of protocols to de-platform non-compliant AI tools on platforms of public education and a system to impose financial fines on ethical privacy violations and ensure a right to explanation to hold administrative decisions. Due to the imperative to have effective governance, Rhodes (1996) points out that ethical regulation should be diffused throughout networks and not a strictly hierarchical structure developed. By institutionalizing these enforcement 'teeth', AI can be transformed from a technocratic master into a regulated, ethical partner and therefore protect innovation and maintain human rights and pedagogical virtue.

International Policy and Justice

The applications of ethical artificial intelligence (AI) in the field of education have to operate as the channel of global justice that transcends the borders of countries (Sen, 2009). The Capability Approach by Sen redefines Fairness not simply as formal access, but enlarging substantive freedoms, i.e., critical thinking, creativity, and civic participation. Although UNESCO (2021, 2023) and the OECD (2023) require AI to alleviate the global digital divide, the empirical evidence of the situation in low-income settings is much more complex. The Chinese model exemplifies distributive justice based on mass accessibility as opposed to Finland that represents procedural justice based on participatory pedagogical models. However, these frameworks are not often achievable by several countries in the Global South. The use of ethical AI in low-income settings, like portions of Sub-Saharan Africa or Southeast Asia, is undermined by deep institutional barriers, like unreliable access to electricity and limited high-speed connectivity. In addition, several of these states confront the issue of aid dependency, forcing them to go opaque (so-called black-box) AI technologies obtained as foreign donations or the corporation, and install without the institutional authority to control them, or without moral literacy to match them to the local value system. In order to have real global justice, the international policy should not just focus on transfers of technology, but rather on the development of human ability. The development of capacity on a personal level as well as on a structural level must be the keystone of policy formulation, where AI programs are not merely transferred but adapted and localized. In addition to infrastructure, hardware investment needs to be accompanied by the investment in teacher training and the ethical contextualization of local communities to make AI not an instrument of digital neocolonialism. This is how, through such holistic development, technology can be brought into alignment with actual educational equity. Shared responsibility can be imagined in the model of a governance network of Rhodes (1996): the ethical ramifications of the exported AI tools must be a global responsibility to which all people will contribute. Northern donor nations and technology corporations should be responsible for the effects of the AI systems they are spreading into resource-challenged spaces.

Lastly, ethical AI should be a living, reflexive system that is responsive to the particular socio-economic voids of its region. Through solving power imbalance and dependency traps inherent in any international aid, we will be in a position to dictate that AI will not only maximize learning to the advantage of the privileged but will be an actual catalyst for globalized educational equity.

Integrating Theoretical Framework

The conceptual synthesis of the research reveals that the philosophical dimension of morality, design thinking, and the political government overlap significantly and, in that way, make a solid base in the implementation of AI ethics in educational settings. However, what is actually valuable about this multidimensional model is that it can be applied directly to pedagogical work and policy-making.

Theoretical Research - Moral Reasoning and Classroom Agency (Rest, 1986)

The Rest's Ethical Decision-Making Model is not just a mere product of abstract theorisation, but it is used to create a moral existence of institutions in the educational world.

Classroom Implication: In practice, this would require a move away from opaque grading systems. The educators and learners are empowered to train moral judgment in asking critical questions of the reasoning behind the employment of AI in making recommendations. As one example, a teacher can also override a learning trajectory that is suggested by AI when the teacher has personal moral awareness that the algorithm has failed to account for the emotional or cultural background of a student.

Empathetic Co-Design (Norman, 2013)

The Human-Centered Design framework developed by Norman applies ethical concerns as working design options.

Policy Implementation: Here, a change in the principles of acquiring educational technology that is off the shelf to prototyping requires participation. The governments must require the developers of AI to include educators and learners in the process of beta-testing. The actual example is the design-for-all program, whereby AI interfaces are continually developed and improved through feedback from marginalized learners in order to achieve true accessibility.

Networked Oversight and Accountability (Rhodes, 1996)

The Governance Theory by Rhodes places moral consequences in the balance of power where the state, market, and civil society are involved. Policy Implementation: This model espouses the formation of National AI Ethics Councils in education instead of having a central authority at the state level. These councils would serve as networked centers in which the civil society actors, such as parents and non-governmental organisations, could audit the data-sharing campaign of schools and private technology companies and thus inhibit the loss of student privacy by market-state relations.

Massive Extensions of Substantive Freedoms (Sen, 2009)

The Capability Approach by Sen brings fairness to a different level, not by measuring but as a constructive instrument of human development. Implication to the classroom: It is not test scores that will judge whether the classroom was successful, but the extent to which substantive freedoms have been expanded. To illustrate, an AI application in a low-income district would be centered on the use of technology to develop creative coding and civic literacy to enable students to be creators instead of passive consumers of pre-programmed content. This paper focuses on synthesizing these frameworks, thus showing that AI ethics is not a fixed set of rules but a dynamic human-centered governance process. It incorporates rational reasoning within the social interaction and political responsibility, hence, making sure that technology is used to maximize human agency as opposed to diminishing agency.

Conclusion

This paper has explored the role of divergent forms of governance in influencing the responsible application of Artificial Intelligence (AI) to education, in the case of the universal principles of UNESCO in its manifestations in China and Finland. The findings state that despite both countries being on the way toward humanizing AI, the strategic directions are notably different: the centralized approach of China provides distributive fairness through massive scaling, but potentially fails to provide transparency and personal control over it; the participatory approach of Finland, which, nevertheless, predicts pedagogical agency, looks forward to systemic scalability challenges.

The framework offered by UNESCO (which includes such normative concepts as fairness, transparency, and accountability) remains an essential normative guide to align technological innovation with the Sustainable Development Goal number 4 (SDG 4). However, global justice cannot be achieved through the exclusive top-down imposition upon the top-down approach of imposing universal principles, but it requires a process of subtle localization, in which the cultural specificities are considered, and universal human rights are strictly observed.

The comparative analysis shows that ethical AI governance does not represent only a technical necessity but a serious moral and civic task. It is crucial to emphasize that the organizational aspect of democratic education needs to be strengthened to overcome the aspirations in which people theorize. That would involve a change of individual teacher autonomy to collective action, where schools, teaching unions, and student activists act as institutional barriers against algorithmic discrimination and data mining.

Good governance should be based on collective co-design; hence, it is necessary to make educators, learners, and local communities take active as opposed to passive roles, transforming them into digital citizens who can audit and influence AI systems. Without a strong human agency and institutional checks and balances, AI will be a tool that will further instill the existing inequalities and erode public trust in people.

The new round of research must be based on the operationalization of these principles on a classroom level, and evaluating the long-term consequences of these principles on teacher autonomy and learners' creativity. Since the emergence of AI will keep changing, the most important task that we still have ahead of us is the development of ethical intelligence, the mass ability to ensure that our adherence to human decency and the principles of democracy is not overshadowed by technological progress.

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PART III

EQUITY, INCLUSION, AND THE DIGITAL DIVIDE

7

Urban Marginality, Digital Justice, and Educational Inequality

Arika Heaven

Abstract

Equity and inclusion are central to development discourse, particularly within the United Nations Sustainable Development Goals. Yet equity is frequently reduced to access, participation, or technological inclusion, obscuring the power relations that structure urban life. This article argues that equity must instead be understood as an ongoing struggle over space, visibility and governance across physical and digital domains. It highlights the critical role of higher education and digital literacy in enabling institutions to recognise and challenge these inequalities. Focusing on public space as a site of protest, memorialisation, knife culture, and digital governance systems, the chapter demonstrates how racialised abandonment, surveillance, and mediated narratives reproduce inequality. Achieving urban equity requires not inclusion within existing systems, but transformation of the spatial and digital arrangements that organise exclusion. It situates urban justice as relational, contested, and unfinished, demanding collective resistance, institutional accountability, and democratic control over space, data, and futures globally.

Introduction: Equity Beyond Access

Equity and inclusion have become central pillars of contemporary development discourse, embedded in global frameworks such as the United Nations Sustainable Development Goals (SDGs), particularly SDG 10 (Reduced Inequalities) and SDG 11 (Sustainable Cities and Communities) (United Nations, 2015). Yet equity is too often framed narrowly, reduced to access to services, technology, or participation mechanisms. This chapter argues that equity must instead be understood as a struggle over power, space, and visibility. Who is allowed to appear in public? Whose lives are protected, whose are criminalised, and whose are rendered disposable—both physically and digitally?

Public space and digital space have become intertwined terrains of political struggle. Urban environments are increasingly shaped by privatisation, surveillance, and securitisation, while digital platforms reorganise how marginalised lives are represented, monitored, and governed. Together, they produce a new architecture of inequality in which physical exclusion and digital control reinforce one another. Within this shifting landscape, universities and higher education institutions carry growing responsibility: through curriculum design, student learning, and emerging forms of AI governance in education, they play a crucial role in shaping how future citizens understand, reproduce, or challenge these inequalities.

This chapter integrates two empirical lenses. First, it examines public space as a contested site of democracy, protest, and memory. Second, it explores urban youth violence—particularly knife culture in London—as an expression of racialised abandonment, spatial injustice, and institutional failure. These are situated within a broader discussion of digital justice, where algorithmic governance, surveillance technologies, and platform economies increasingly shape the boundaries of belonging.

Drawing on urban political economy, critical geography, and digital justice scholarship, the chapter argues that struggles over equity today cannot be separated from those over who controls space, data, and narrative. Equity is not only about inclusion in existing systems, but about transforming the systems that organise exclusion.

Equity unfolds through everyday encounters with surveillance, policing, digital mediation, and institutional neglect, as well as through acts of resistance that seek to reclaim space and visibility. It is not a fixed outcome, but a contested process shaped by unequal power relations. Cities are, therefore, terrains where competing claims to safety and belonging are continuously fought over.

Methodology

This chapter adopts a qualitative, critical approach grounded in urban political economy, critical geography, and digital justice scholarship. Rather than measuring equity through quantitative indicators, the analysis foregrounds power relations, spatial governance, and the lived consequences of exclusion.

The chapter is based on a critical review and synthesis of academic literature, policy frameworks, media analysis, and secondary empirical studies related to public space, protest, urban violence, surveillance, and digital governance. Foundational theoretical work on the right to the city, spatial justice, racialised governance, and digital extraction informs the conceptual framework. Empirical material includes studies of protest and memorialisation, research on knife culture and youth violence in London, and analyses of algorithmic systems used in policing, immigration, and urban management.

A thematic analytical approach is employed to trace how control of space, visibility, and narrative operates across physical and digital domains. This approach enables the chapter to connect everyday experiences of insecurity and exclusion to broader institutional and infrastructural processes. By foregrounding structural conditions rather than individualised explanations, the methodology aligns with the chapter's normative position that equity is inherently political and contested, and that urban justice must be understood as an ongoing struggle rather than a completed policy objective.

Public Space, Urban Justice, and the Right to the City

Public space is central to democratic life. Streets, squares, and parks are not neutral settings, but socially produced terrains structured by law, capital, and power (Lefebvre, 1996; Mitchell, 2003). Access to public space determines whose presence is legitimate, whose speech is protected, and whose bodies are policed.

The "right to the city," as articulated by Lefebvre and later expanded by Mitchell, is not simply a right of access but a right to shape urban life itself. It concerns the power to inhabit, use, and transform space in opposition to processes of commodification and exclusion (Harvey, 2008). Yet contemporary cities increasingly operate through logics of enclosure. Urban regeneration, hostile architecture, and predictive policing remake public space to attract capital while excluding those deemed disorderly.

Fieldwork, digital mapping, and participatory research methods enable learners to document spatial inequalities, analyse patterns of surveillance and exclusion, and critically reflect on how urban governance is experienced in everyday life.

The language of inclusion often masks these dynamics. Under SDG 11, cities are encouraged to become "inclusive, safe, resilient and sustainable" (United Nations, 2015). In practice, "safety" is frequently translated into intensified surveillance, private security, and the displacement of marginalised populations (Madden and Marcuse, 2016). Protest becomes regulated, homelessness criminalised, and youth presence securitised. It reveals not only inequalities of access but also deeper conflicts over whose lives are valued and those governed by discipline rather than care.

Public Space as Democratic Infrastructure

Despite these constraints, public space remains a critical arena of political expression. The occupation of George Floyd Square in Minneapolis following the murder of George Floyd exemplifies how ordinary urban space can be transformed into a site of collective memory, political education, and community governance. Residents converted an intersection into a memorialised, self-managed zone where grief, protest, art, and dialogue coexisted (Hoekstra and Sloan, 2022).

The square operated as a form of democratic infrastructure. It made visible the racialised geography of policing and disinvestment that preceded Floyd's death, while also creating a living counter-public outside formal political institutions. Similar dynamics have been visible in London, where streets and squares have hosted mass mobilisations around Palestine, climate justice, austerity, and racial violence. These gatherings bypass parliamentary channels and enact what might be called spatial citizenship—the practice of democracy through collective presence. From an educational perspective, such spaces also function as sites of civic learning and public pedagogy, where student-led projects and community-based initiatives enable learners to engage directly with urban justice as a lived, participatory process rather than an abstract concept.

Yet such spaces are always fragile. They remain subject to legal contestation, media delegitimation, and state intervention. Their temporary openness exposes the structural limits of urban democracy. As Mitchell (2003) argues, public space is never granted; it is continuously produced through struggle.

This struggle is not only episodic or spectacular but embedded in the everyday governance of everyday life. Democracy in public space is produced through practices that occupy and contest it. The acts of memorialisation, gathering, protest, and a collective presence redefine space into sites of political meaning. Where demands for justice are prevalent, it reinforces the world's attention to go beyond the reach of institutional channels. Democracy is enacted spatially: through bodies assembling, voices amplified, tragedy vocalised, and alternative publics formed.

Such enactments do not replace formal political processes but reshape the conditions under which political claims can be made and recognised. By forcing issues into the public sphere, spatial practices challenge the boundaries of whose grief counts, who is heard, and what political participation structures are deemed legitimate. Public space thus functions not merely as a backdrop for democratic life, but as a medium through which democratic possibilities are temporarily expanded.

These temporary expansions of democratic possibility are often sustained through practices of collective memory and mourning, particularly in contexts where institutional responses have failed. In the UK, the aftermath of the Grenfell Tower fire demonstrates how public space becomes a terrain where marginalised communities struggle to make grief politically legible. With community-based and led memorials, marches, and ongoing occupation of surrounding streets, the area was transformed into a living site of remembrance that resisted official narratives of accident or inevitability. Through banners, vigils, and the persistent presence of bereaved families, public space was used to insist that loss be recognised as structurally produced rather than privately endured.

Yet, as with other forms of spatial democracy, these practices remained fragile. Efforts to regulate commemorative gatherings, control visual expressions of dissent, and accelerate redevelopment reveal how quickly spaces of mourning become subject to governance once they begin to articulate political claims. Public grief is tolerated only to the extent that it does not destabilise dominant frameworks of responsibility, expertise, and urban order (Low and Smith, 2006).

Grenfell, therefore, reinforces the broader argument that public space operates as a conditional democratic resource. It allows moments of visibility and collective expression but withdraws support when those moments challenge structural power. The struggle for justice unfolds not only through formal inquiries or legal processes but through ongoing spatial practices that demand recognition, accountability, and the right to remain visible within the city (Elliot-Cooper, 2021; Isin, 2008).

Knife Culture, Urban Abandonment, and Racialised Space

While iconic squares foreground visibility, other urban spaces reveal a quieter but no less violent politics of exclusion. Knife culture among young people in London is often framed as moral breakdown or criminal deviance.

Knife carrying often emerges where youth services decline, and state encounters are dominated by policing rather than protection (Williams and Clarke, 2019). Educational trajectories are central to this landscape: rising school exclusions, limited youth education provision, and uneven access to supportive learning environments often deepen young people's marginalisation, narrowing pathways to safety and participation. For many young people, predominantly Black and racialised youth, public space is not experienced as democratic terrain but as a site of vulnerability. Streets, transport hubs, and even schools become spaces of surveillance and potential violence.

Within these conditions, knife carrying operates less as aggression than as a defensive adaptation. It is learned within environments where safety is privatised and protection unevenly distributed. Not carrying becomes exposure. Violence thus appears not as pathology but as a rational response to abandonment.

This dynamic is inseparable from racialised governance. Black communities in the UK are disproportionately subjected to stop-and-search, school exclusions, gang databases, and algorithmic risk profiling (Elliott-Cooper, 2021). These practices transform everyday urban spaces into pre-criminal zones. Youth are interpellated as risks before they are recognised as citizens.

Knife culture reflects how public space is organised through racialised fear. The spatial logics that expose young people to harm also shape how others move, gather, and seek safety within the city. Research on public behaviour demonstrates that individuals often gravitate towards white groups and distance themselves from black groups when navigating perceived risk, revealing how safety itself is racially coded (Anderson, 2015; Listerborn, 2016).

Public space becomes a terrain where some bodies are read as protective and others as threatening. When spaces like this are created with that internal fear, knife carrying emerges not as a moral aberration but as a rational adaptation to being continuously positioned outside safety.

Knife culture exposes a spatial contradiction in which young people inherit not only insecurity but a learned geography of danger that shapes how they move through the city. Where they can stand, how they must move, and when visibility becomes a liability. Knife carrying emerges as a survival practice, transmitted through peer networks, family histories, and neighbourhood reputations. It is less an expression of violence than an attempt to navigate spaces where protection is unevenly allocated, and vulnerability is criminalised.

This process is generational in communities subjected to long-term disinvestment, punitive policing, and media vilification; violence becomes normalised not through desire but through repetition. As youth clubs provision contracts, the street increasingly becomes a primary site of socialisation. Research on London's urban margins shows that the withdrawal of welfare infrastructure often coincides with intensified surveillance and enforcement, deepening young people's contact with the criminal justice system rather than addressing the conditions that produce harm (Williams and Clarke, 2019; Elliot-Cooper, 2021).

This contradiction reinforces a broader logic of abandonment. The same institutions that frame knife crime as a security threat systematically fail to provide meaningful alternatives. As Hallsworth and Young (2008) argue, territorial identities and postcode boundaries transform everyday movement into a calculated risk, embedding fear in the city's spatial fabric. Knife culture operates as a rational, if devastating, adaptation to an environment in which safety is individualised and collective care has been eroded.

This perspective reveals knife culture as spatial injustice rather than moral failing. It exposes how public space, far from being neutral, functions as a mechanism through which racialised vulnerability is produced, managed, and reproduced, setting the stage for its later amplification through digital systems of surveillance and representation. The expansion of digital learning environments introduces new risks, as data-driven monitoring, online harm, and algorithmic profiling increasingly shape how young people are tracked, supported, or excluded within educational systems.

This dynamic is reinforced by media representations that blur the line between victimhood and criminality. The case of Damilola Taylor, a 10-year-old boy who was fatally stabbed in Peckham in 2000, emphasises how black victims of knife violence are frequently framed through narratives of gang culture and urban disorder rather than vulnerability and institutional failure. Early coverage emphasised the perceived pathology of the estate and the threat posed by local youth, displacing attention from structural neglect in housing, welfare, and regional governance and embedding the victim within a broader racialised logic of danger (Scraton, 2002; Alexander, 2010). Such framings do not merely misrepresent individual cases; they reproduce public fears that legitimise punitive governance while obscuring the social and institutional conditions that render violence possible in the first place.

These narrative framings do not remain confined to traditional media coverage. They circulate, persist, and intensify through digital infrastructures that increasingly mediate public understanding of violence, risk, and responsibility. As stories of knife crime move across platforms, they are reassembled through algorithms, visual economies, and data-driven logics that strip context while amplifying racialised tropes of danger.

Digital Space, Governance, and the Politics of Visibility

Urban injustice today cannot be separated from digital mediation. Social media platforms, predictive analytics, and surveillance technologies increasingly shape how space is governed and how marginalised lives are represented. Digital space does not simply reflect urban inequality but actively reorganises it, shaping whose lives are protected, surveilled, or rendered disposable.

Violence, mourning, and protest circulate through algorithmic systems that amplify emotion while stripping context. Videos of stabbings, police encounters, and street conflicts circulate rapidly, reinforcing moral panics and racialised narratives of danger (Noble, 2018). Families and communities use digital platforms to document injustice, memorialise victims, and organise resistance.

Similarly, occupations such as George Floyd Square were sustained through livestreams, hashtags, and digital archiving. These technologies extended local struggle into transnational publics. Yet platforms are not neutral infrastructures. Their algorithms privilege visibility that is profitable, emotive, and easily commodified, while marginalising structural critique and grassroots knowledge.

Digital justice concerns not only access to technology but control over data, narratives, and infrastructural power (Couldry and Mejias, 2019). It asks who benefits from digital extraction, who is rendered transparent, and whose suffering becomes content. These questions are increasingly salient within education systems, where EdTech platforms, virtual learning environments, and university data systems now play a central role in organising student participation, assessment, and risk profiling. Responsible AI in education and DEN frameworks require not only technical competence but critical AI literacy among students and educators to interrogate how learning technologies may reproduce or challenge existing inequalities.

Universities, municipalities, and development institutions increasingly deploy AI in urban management, policing, and education. Without democratic oversight, these systems risk reproducing the very inequalities they claim to address. Within higher education specifically, learning platforms and student monitoring tools, such as engagement analytics, attendance dashboards, and predictive retention systems, introduce new forms of digital governance that can unintentionally intensify surveillance of already marginalised learners. Embedding AI literacy across the curriculum becomes essential so that students can critically evaluate how data-driven systems classify, track, and act upon their educational trajectories.

Platforms, media, and data-driven systems actively construct hierarchies of innocence, belonging, and deservingness. Visibility within digital space is unevenly distributed. For marginalised groups, heightened visibility often results in exposure to suspicion, misrepresentation or even erasure rather than protection.

This is reinforced within the digital framing of immigration. The Windrush scandal revealed how bureaucratic data regimes and hostile environment policies systematically stripped long-settled Black British citizens of legal recognition, access to services, and fundamental rights. Individuals who had lived, worked, and contributed to British society for decades were rendered suddenly illegible by digitalised documentation systems that prioritised paperwork over lived history (Gentleman, 2019). The violence of Windrush was administrative and algorithmic: people were denied healthcare, detained, deported, or forced into precarity because databases failed to recognise their humanity. The case of Paulette Wilson, a Jamaican-born woman who arrived in the UK as a child and later faced detention and removal, illustrates how immigration status became the primary lens through which suffering was interpreted. Rather than being recognised as a failure of state record-keeping, her hardship was framed as an administrative issue, subtly shifting responsibility onto the individual (Gentleman, 2019).

Bhattacharyya (2018) argues that bureaucratic forms of governance enable racialised harm to be rendered politically invisible by embedding violence within routine administrative processes. Legal recognition becomes framed as an unfortunate consequence of immigration control rather than a violation of rights. Sympathy is displaced by legality, and injustice is reframed as procedural necessity.

Digital governance was the pinnacle of this process. Immigration enforcement increasingly relies on data sharing between government departments, risk profiling, and automated decision-making systems. These infrastructures operate with limited transparency and minimal avenues for contestation, disproportionately affecting racialised migrants. As Eubanks (2018) argues, these systems convert structural inequality into technical errors, framing exclusion as a malfunction rather than a political choice. Digital bordering practices have extended immigration control into everyday life, embedding surveillance within housing, employment, healthcare, and education.

These dynamics are reinforced by narratives that frame migration as a crisis, a threat, or even a burden. The amplified headlines and viral images collapse complex human experiences into simplified tropes of illegality and risk. Migrants are rendered hyper visible as problems while remaining invisible as rights-bearing subjects. This reinforces a hierarchy, instils fearmongering among citizens, leads them to feel unsafe, decreases empathy, and legitimises punitive governance in the name of national security or public order.

These media hierarchies of deservingness have material consequences. When visibility is organised through racialised and securitised frames, it shapes not only public perception but institutional response. Policing, funding allocations, and policy interventions increasingly respond to what is seen, shared, and circulated rather than to structural evidence of harm. In this way, digital platforms function as informal policy actors, influencing which forms of suffering demand urgency and which are normalised as background noise.

This process is known as algorithmic triage. Inevitable deaths provoke national mourning, parliamentary debate, and public memorialisation, while others are absorbed into statistical abstraction. The different treatment of victims is not incidental but patterned, which reflects long-standing racial and class hierarchies that are intensified through digital circulation. As Noble (2018) argues, algorithmic systems do not merely reproduce bias; they actively reorganise it, strengthen it, and embed racialised assumptions into preeminent infrastructures that appear objective, neutral, and data-driven.

The convergence of media, data, and governance also reshapes accountability. When violence and precarity are framed through individual behaviour, lifestyle choices, or cultural pathology, responsibility is displaced away from institutions and toward communities already subjected to surveillance. This displacement is evident in responses to knife crime, migration, and urban unrest, where digital narratives foreground personal risk factors while obscuring austerity, housing, education exclusion, and policy failure. Structural violence is rendered politically invisible through repetition, familiarity, and bureaucratic abstraction.

Digital space remains a contested terrain rather than a monolithic instrument of domination. Grassroots campaigns, mutual aid networks, and activist archives challenge dominant narratives by recontextualising harm and foregrounding lived experiences. Online memorial pages, community-led data projects, and counter-mapping initiatives resist erasure by insisting on alternative forms of knowledge production. These practices demonstrate that digital space, like public space, is not inherently oppressive but shaped by struggles over control, ownership, and interpretation.

Understanding digital space as a site of governance rather than mere communication clarifies its role within border struggles for urban injustice. Platforms do not simply mediate public life; they actively structure which claims are heard, which suffering is legitimised, and which futures are considered worth protecting. Any serious engagement with equity must confront the political economy of digital infrastructures and their entanglement with racialised urban governance.

Institutional Responsibility and Public Pedagogy

Equity requires institutional transformation. Universities occupy a strategic position within these struggles. They are urban actors, data producers, and sites where young people negotiate belonging. They can either reproduce surveillance cultures or cultivate infrastructures of care (Eubanks, 2018; Williamson, 2017).

An institutional response requires rethinking curriculum models and support structures. Programmes that embed urban justice, public-space literacy and AI ethics across disciplines enable students to interrogate how inequality is produced and governed. Teaching strategies that prioritise inquiry-based learning, community-engaged projects, digital mapping, and participatory research help translate abstract theory into lived analysis (Giroux, 2004; Freire, 1970). Students are positioned not simply as recipients of knowledge but as co-investigators of urban conditions, capable of producing counter-knowledge about surveillance, exclusion, and spatial injustice.

Trauma-informed mentoring hubs, community partnerships, and critical digital literacy initiatives reposition universities away from extraction and toward solidarity. Engaging knife-affected youth not as risks but as knowledge holders challenges dominant security frameworks. Embedding public-space literacy, digital ethics, and urban justice into curricula aligns higher education with the transformative ambitions of the SDGs. Staff training is equally crucial: educators and professional services teams require support to develop AI literacy, ethical data practices, and culturally responsive pedagogies that recognise how racialised and digitally mediated inequalities shape student experience (Williamson, 2017; Holmes et al., 2022).

Institutional policy must also evolve. Responsible AI in education requires transparent governance of learning platforms, clear limits on student monitoring, meaningful consent processes, and accountability mechanisms for algorithmic decision-making. Universities should align procurement, data management, and assessment policies with emerging AI ethics frameworks that foreground fairness, explainability, and student rights (Floridi et al., 2018). Without such safeguards, well-intentioned digital innovation risks reproducing the very hierarchy that higher education claims to dismantle.

Public pedagogy beyond the classroom becomes central. Universities can function as mediating institutions between lived urban realities and policy discourse through student-led projects, community learning partnerships, and open civic education initiatives. In this expanded role, DEN (Democratic Education Network) provides a proper orientation, emphasising participatory learning, democratic accountability, and shared knowledge production across university and community boundaries. However, this requires institutions to relinquish technocratic neutrality and confront their own role in knowledge hierarchies (Giroux, 2004).

Conclusion: Toward Spatial and Digital Justice

Equity, inclusion, and digital justice converge around a central question: who has the right to appear, to belong, and to shape the worlds they inhabit? Public spaces and digital infrastructures are not peripheral to development; they are primary sites where inequality is produced and contested. The cases examined here demonstrate that justice cannot be delivered solely through policy reform or technological innovation. It must be built through spatial redistribution, narrative power, and community control. Without addressing how cities discipline bodies and how platforms organise visibility, inclusion risks becoming a managerial slogan rather than a transformative project.

Sustainable futures depend on reclaiming both streets and screens as collective goods. This reclamation requires more than symbolic recognition. It demands material shifts in how space is governed, how data is extracted, and how responsibility is assigned. Institutions that shape urban life, such as municipal governments, universities, media organisations, and digital platforms, must move beyond neutrality and confront their role in reproducing inequality. Without democratic oversight, urban technologies risk deepening racialised surveillance while safety-driven policies continue to displace care.

Moving from critique to practice, several concrete interventions follow. For universities, embed spatial justice and digital ethics across core curricula, expand trauma-informed mentoring hubs, and resource community-engagement research that treats affected youth as knowledge partners rather than subjects. For policymakers, require equity impact assessments for urban technologies, regulate predictive and data-driven policing tools, and fund participatory urban planning processes that redistribute decision-making power. For educators, adopt place-based pedagogies that connect classroom learning to local urban inequalities, integrate critical data literacy into assessment, and support student-led inquiry through fieldwork and digital mapping. For DEN, develop cross-institutional toolkits on public pedagogy and AI ethics, convene practitioner networks linking schools, universities, and community groups, and advocate for standards that align digital innovation with social justice outcomes.

Equity, therefore, must be understood as a collective and political project rather than a technical objective. It is produced through struggle, negotiation, and resistance, often by those most affected by exclusion. From protests that temporarily reclaim streets to digital practices that challenge dominant narratives, these acts expose the fragility of systems that claim universality while operating through hierarchy. Recognising these struggles as central development reframes justice not as an endpoint, but as an ongoing process shaped by power, memory, and contestation.

Only by centering spatial and digital justice within institutional practice can development move beyond managing inequality toward transforming the conditions that sustain it.

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8

Inclusive Digital Education in Vietnam: Bridging Urban-Rural Divides

Que Anh Mai

Abstract

The fast evolution of Artificial Intelligence (AI) presents groundbreaking opportunities for enhancing education systems around the world. In Vietnam, a developing nation that is undergoing rapid digitalization, AI has the potential to enhance inclusive and equitable education through the minimization of disparities in access, quality, and learning outcomes between urban and rural regions. Yet the digital divide, manifested in disparate technological infrastructure, teacher unpreparedness, and socio-economic inequalities, continues to hinder attainment of Sustainable Development Goal 4 (Quality Education) and Goal 10 (Reduced Inequalities). This paper discusses how AI can be harnessed to narrow Vietnam's urban-rural educational gap through an in-depth examination of contemporary literature, policy contexts, and socio-technical challenges. The study employs the Digital Divide Framework (Van Dijk, 2005) and the Technology Acceptance Model (Davis, 1989) to investigate the interaction between AI integration, access equity, and educational inclusion. It further considers how institutional responsibility and participatory governance mechanisms can ensure that marginalized communities have a voice in AI-driven educational reforms. Findings indicate that while AI-driven adaptive learning systems, data-led pedagogy, and intelligent tutoring tools hold promise to improve accessibility and personalization, structural constraints in the form of uneven internet penetration, digital literacy gaps, algorithmic bias, and limited institutional transparency pose significant challenges. The paper wraps up by giving policy recommendations centered on developing infrastructure, digital teacher training, inclusive AI governance, and strengthened accountability frameworks to advance social justice in learning and ensure equitable educational transformation for all Vietnamese students.

Introduction

Over the past decade, Vietnam has made substantial progress in expanding educational access and integrating digital technologies into teaching and learning. The National Digital Transformation Program to 2025, with a Vision to 2030, positions Artificial Intelligence (AI) as a strategic driver of educational modernization and national competitiveness (Government of Vietnam, 2020). Yet despite this ambitious orientation, significant structural inequalities persist between urban and rural regions.

The digital divide in Vietnam is both socio-economic and political. Rural schools often face limited digital infrastructure, inadequate teacher training, and restricted access to advanced technologies. While students in major cities such as Hanoi, Ho Chi Minh City, and Da Nang increasingly engage with AI-supported learning platforms, learners in mountainous and ethnic minority areas remain disproportionately excluded. Internet penetration reaches 93% of urban households compared to only 65% in rural areas (GSO, 2023). Moreover, only 40% of rural teachers have received formal digital literacy training (MOET, 2022). This divide is not merely technological but reflects deeper structural marginalisation rooted in historical development patterns, fiscal allocation systems, and governance hierarchies.

The increasing involvement of multinational corporations, domestic EdTech startups, and development agencies further complicates governance. Beyond infrastructure and skills gaps, disparities are reinforced by urban bias in funding allocation, where AI pilot programs and EdTech investments are concentrated in well-resourced urban schools. Such patterns reflect broader political economy dynamics in which state modernization agendas, donor partnerships, and private technology firms prioritize visible urban implementation sites. While public-private partnerships may accelerate innovation, they also reshape power relations in curriculum design, data ownership, and technological standards. Without transparent regulatory frameworks and institutional accountability, AI deployment risks reinforcing existing inequalities.

Albeit AI technologies, including intelligent tutoring systems, predictive analytics, and adaptive learning platforms, offer potential to personalize learning and support differentiated instruction, technology alone cannot resolve systemic inequities. As Zawacki-Richter et al. (2019) and Luckin (2020) emphasize, inclusive AI requires robust policy design, teacher empowerment, and participatory governance. This study, therefore, addresses a dual challenge: closing material gaps in digital access while confronting structural power imbalances in educational innovation. Drawing on Van Dijk's Digital Divide

Framework (2005) and Davis's Technology Acceptance Model (1989), the paper analyzes how AI integration interacts with access, skills, institutional capacity, and governance. It proposes evidence-based recommendations to support equitable and sustainable AI adoption in Vietnam's education system.

Literature Review

Global Scholarship on AI and Educational Inclusion

Artificial Intelligence (AI) integration in education has become central to global debates on inclusive, equitable, and quality learning. Scholars increasingly conceptualize AI not merely as a technical tool but as a transformative pedagogical force capable of reshaping how learners access, construct, and apply knowledge (Holmes et al., 2022; Luckin, 2020). UNESCO (2023) similarly argues that responsibly governed AI can advance Sustainable Development Goal 4 by enhancing personalized learning, strengthening data-informed decision-making, and addressing systemic barriers to access.

Research highlights several mechanisms through which AI may support inclusion. Zawacki-Richter et al. (2019) show that adaptive learning systems can accommodate diverse learning styles and paces, offering differentiated pathways for students underserved by standardized curricula. Holmes et al. (2021) emphasize predictive analytics and learning analytics as tools for identifying at-risk learners and enabling timely interventions. Collectively, these perspectives suggest that AI has the potential to improve both access and quality - the two pillars of inclusive education.

Yet global scholarship also underscores AI's ambivalence. Selwyn (2019) cautions that digital innovations often reflect existing socio-economic hierarchies, privileging learners with greater digital access and institutional support. Williamson and Eynon (2020) further warn that algorithmic bias, opaque data governance, and commercial data extraction may intensify inequality, particularly where regulatory capacity is weak. The OECD (2021) therefore advocates human-centered AI governance grounded in transparency, accountability, and fairness.

The Digital Divide Framework (Van Dijk, 2005) provides a structural lens for analyzing educational inequality across three dimensions: access, digital skills, and outcomes. This model is especially relevant in contexts marked by socio-spatial disparities. Complementing this perspective, the Technology Acceptance Model (Davis, 1989) explains technology adoption through perceived usefulness and ease of use. Empirical research indicates that teachers' and students' uptake of AI tools is shaped not only by technical conditions but also by institutional support, professional identity, and cultural norms (Teo, 2011). Together, these frameworks illuminate both structural and behavioral drivers of AI integration.

However, technocratic approaches alone are insufficient to capture AI's broader social justice implications. Critical pedagogy offers an essential corrective. Freire (1970) conceptualized education as either emancipatory or reproductive of domination, warning against "banking models" that reduce learners to passive recipients. AI-driven personalization, if narrowly efficiency-oriented, risks reinforcing such models. Giroux (2011) further critiques neoliberal technocracy in education, highlighting how market logics may subordinate democratic values to performance metrics. Applied to AI, this raises concerns about corporate influence in shaping curricula and data standards. Santos (2014) advances the notion of epistemic justice, arguing for recognition of marginalized knowledge systems. AI systems trained predominantly on Global North datasets may marginalize local languages, cultures, and indigenous epistemologies, reproducing global knowledge hierarchies.

Taken together, global scholarship suggests that AI's contribution to educational inclusion must be assessed beyond efficiency and access. Integrating digital divide theory, technology acceptance models, and critical pedagogy enables a comprehensive framework for evaluating how AI may either mitigate or reproduce inequality in educational systems.

AI, Digital Transformation, and Educational Policies in Vietnam

Vietnam's National Digital Transformation Program to 2025 with a Vision to 2030 positions education as a central pillar of modernization, promoting AI, big data, and cloud computing to enhance efficiency, access, and inclusion (Government of Vietnam, 2020). While policy discourse highlights innovation and competitiveness, implementation reveals a persistent gap between strategic ambitions and classroom realities.

Digital adoption remains uneven. Although more than 70% of urban schools use platforms such as VNEdu and K12Online (MOET, 2023), fewer than 35% of rural and mountainous schools possess adequate connectivity, infrastructure, or trained personnel for effective integration. World Bank (2021) data further show that rural broadband quality and affordability lag behind urban standards, constraining AI deployment in disadvantaged regions. Beyond infrastructure, many AI systems rely on standardized Vietnamese-language datasets, marginalizing ethnic minority communities whose linguistic and cultural contexts are underrepresented.

A significant policy-practice gap shapes these disparities. Nguyen and Le (2022) note that digital transformation initiatives often follow top-down administrative mandates without sufficient local adaptation or sustained capacity-building. Schools may receive digital platforms without long-term technical support, contextualized teacher training, or pedagogical redesign. Empirical studies reinforce this concern. Hoang (2021) found that while AI-supported systems increased engagement in urban schools, rural teachers reported resistance linked to limited digital literacy and workload pressures. Tran and Pham (2022) similarly observe that AI-based assessment tools frequently misalign with the realities of multi-grade rural classrooms.

Government-donor partnerships have sought to address these gaps since programs such as the Vietnam-UNESCO Education for Sustainable Development Partnership (2021–2025) and the Ministry of Science and Technology's AI Education Roadmap (2023) emphasize digital literacy and human capital development. Yet challenges persist in sustaining funding, coordinating inter-ministerial responsibilities, and ensuring that investments reach marginalized regions rather than concentrating in already advantaged urban centers. Fragmented governance structures and limited local institutional autonomy further restrict adaptive implementation.

Overall, the literature converges on a central insight: AI can promote educational equity only when embedded within coherent institutional reform, sustained capacity-building, and robust accountability mechanisms. Without structural adjustments addressing fiscal disparities, governance coordination, and inclusive policy design, digital transformation risks reproducing and potentially deepening existing educational inequalities in Vietnam.

Methodology

This study adopts a qualitative literature synthesis approach to examine how Artificial Intelligence (AI) may advance inclusive and equitable education in Vietnam. Grounded in an interpretivist paradigm, the research emphasizes contextual interpretation rather than positivist measurement, recognizing that educational transformation is shaped by socio-political, cultural, and institutional dynamics. Instead of collecting primary data, the study systematically reviews and synthesizes secondary sources to develop an integrative understanding of AI adoption within Vietnam's digital transformation landscape.

Research Design and Rationale

The qualitative synthesis design aligns with the study's aim of connecting global theoretical insights with Vietnam's localized policy context. It addresses the central question: How can AI be leveraged to reduce the urban-rural educational divide and promote inclusive education in Vietnam? Through synoptic critique, the study identifies thematic patterns, conceptual tensions, and contextual divergences across bodies of literature. Prioritizing conceptual depth over statistical generalizability, this approach is well-suited to policy-oriented educational research (Boell & Cecez-Kecmanovic, 2015).

Data Sources and Selection Criteria

Sources were drawn from three categories:

1. Peer-reviewed studies (2015-2024) on AI in education, digital inclusion, and equity, published in journals such as Computers & Education and Educational Technology Research and Development.

2. Policy and institutional reports from UNESCO, OECD, World Bank, and Vietnamese ministries (MOET; Ministry of Science and Technology).

3. National surveys and empirical research by Vietnamese scholars on digital transformation and educational inequality.

Inclusion criteria required that sources: (a) explicitly address AI or digital technologies in education; (b) engage with issues of equity or inclusion; and (c) demonstrate relevance to Vietnam or comparable developing contexts. Outdated or methodologically unclear studies were excluded to maintain coherence.

Analytical Framework

Thematic analysis (Braun & Clarke, 2006) structured the synthesis. Coding followed Van Dijk's (2005) Digital Divide Framework, including access, skills, and outcomes, to map structural inequalities. The Technology Acceptance Model (Davis, 1989) was then applied to interpret behavioral and institutional factors influencing AI uptake. Cross-contextual comparison between global and Vietnamese sources enabled the identification of convergence and divergence. This triangulated approach integrates structural, institutional, and human dimensions of AI adoption.

Reflexivity, Limitations, and Validity

As a desk-based synthesis, the study reflects the researcher's normative commitment to educational equity and social justice. While this perspective facilitates critical engagement with inequality, it may privilege equity-centered narratives. Transparent documentation of source selection and coding decisions was used to mitigate bias.

The absence of primary fieldwork limits direct engagement with rural teachers, students, and minority communities. Future research should incorporate qualitative field studies, participatory action research, and longitudinal designs to assess lived experiences and long-term impacts.

Reliability was strengthened through systematic documentation and triangulation across academic, policy, and empirical sources. Contextual sensitivity was maintained by acknowledging Vietnam's socio-economic diversity and governance complexity.

Findings and Discussion

The Digital Divide in Vietnam

Vietnam's digital divide reflects a multidimensional pattern of inequality consistent with Van Dijk's (2005) framework, encompassing disparities in access, skills, and outcomes. Although national digital infrastructure has expanded, structural asymmetries between urban and rural regions remain significant. According to the General Statistics Office (GSO, 2023), 93% of urban households have fixed internet access compared to 65% in rural and mountainous areas. This first-level divide directly shapes educational opportunity: schools in provinces such as Ha Giang, Lao Cai, and Dak Nong often operate with outdated equipment, unstable connectivity, and limited exposure to digital pedagogies. However, sustainability extends beyond initial infrastructure provision. Long-term maintenance, system upgrades, electricity reliability, and recurrent funding are frequently under-addressed. The World Bank (2021) notes that rural ICT investments in lower-middle-income contexts often deteriorate due to insufficient maintenance budgets and weak technical support systems. In Vietnam, digital platforms are sometimes introduced without parallel investment in lifecycle management and institutional capacity-building, raising concerns about the durability of AI integration.

The second-level divide, i.e., digital skills, further widens inequality. A MOET survey (2022) indicates that 82% of urban teachers have received formal ICT training compared to only 40% in rural areas. Limited digital competence constrains effective AI adoption and reduces teacher confidence in technology-enabled instruction. As suggested by Teo (2011), perceived competence strongly influences technology uptake, reinforcing structural disparities identified in the Technology Acceptance Model. Importantly, digital skill gaps intersect with broader social inequalities. The International Telecommunication Union (ITU, 2023) documents persistent gender digital divides in developing countries, where women and girls are less likely to access advanced digital training. Although Vietnam has achieved near gender parity in schooling, disparities remain in STEM participation and digital career pathways. UNESCO's (2020) Global Education Monitoring Report further highlights that learners with disabilities face disproportionate exclusion where assistive technologies and universal design principles are absent. AI platforms that fail to integrate inclusive design risk reinforcing barriers for students with visual, auditory, or cognitive impairments. Ethnic minority communities experience additional marginalization. Many AI systems rely on standardized Vietnamese-language datasets, limiting usability in multilingual classrooms (Nguyen & Le, 2022). From the perspective of epistemic justice (Santos, 2014), such standardization risks marginalizing local knowledge systems and cultural practices.

The third-level divide concerns outcomes: whether digital access translates into educational and socio-economic advancement. Even where infrastructure exists, learning gains remain uneven due to contextual mismatches, limited teacher support, and institutional constraints. OECD (2021) warns that digital transformation without governance safeguards may disproportionately benefit already advantaged learners. Broader socio-economic stratification compounds this issue, as rural households often lack resources for personal devices or supplementary tutoring. Digital inequality also reflects political economy dynamics. EdTech firms and AI pilot programs remain concentrated in urban centers, reinforcing the spatial concentration of innovation. An emerging concern is digital sovereignty. As schools adopt AI platforms developed by multinational corporations or private providers, questions arise regarding data ownership, algorithmic transparency, and national autonomy. UNESCO (2023) stresses that ethical AI requires strong data protection and public oversight. Without regulatory safeguards, educational data, particularly from marginalized communities, may be commodified within global digital markets.

Taken together, Vietnam's digital divide is not merely a connectivity gap but a complex interplay of infrastructural sustainability, institutional capacity, intersectional inequality, and governance structures. Addressing it requires redistributive investment, inclusive design, gender- and disability-sensitive policies, and strengthened digital sovereignty frameworks. Only through such multidimensional reform can AI-driven education contribute to sustainable and equitable transformation.

The Role of AI in Bridging Educational Inequality in Vietnam

Artificial intelligence technologies hold significant potential to reduce Vietnam's urban-rural educational divide through enhanced accessibility, personalization, and resource optimization. Adaptive learning systems can tailor instructional pathways to individual learners' needs, partially compensating for disparities in teacher quality and instructional resources (Zawacki-Richter et al., 2019). In under-resourced rural schools facing teacher shortages, intelligent tutoring systems (ITS) may supplement instruction through interactive exercises, real-time feedback, and automated language support. A 2023 pilot initiative led by Vietnam's Ministry of Science and Technology, integrating AI-powered reading comprehension software in northern highland elementary schools, reported measurable improvements in literacy outcomes compared to control groups. While such results demonstrate promise, long-term scalability and contextual adaptation remain critical concerns.

Beyond infrastructure and policy, AI integration reshapes classroom practice. Research by Phan, Nguyen, and Dinh (2024) emphasizes that AI's value lies not in replacing teachers but in augmenting pedagogical capacity. In rural Vietnamese classrooms, AI tools could support differentiated instruction, enabling teachers to monitor learner progress in real time and adjust instruction accordingly. Holmes et al. (2021) argue that AI-assisted formative assessment enhances feedback cycles, allowing educators to focus on higher-order cognitive development rather than repetitive grading tasks. However, meaningful integration requires pedagogical redesign. If AI systems are layered onto traditional teacher-centered models without professional development in learner-centered approaches, the technology risks reinforcing passive learning patterns rather than promoting critical engagement. In multi-grade rural classrooms, AI tools may facilitate modular learning paths that allow students to progress at different paces. Yet teachers must remain pedagogical decision-makers. Consistent with Freirean critical pedagogy, AI should function as a dialogic support mechanism rather than a technocratic authority over learning processes.

At the systemic level, AI and learning analytics also hold promise for evidence-based policymaking. Vietnam's national education platform, VNEdu, aggregates attendance, performance, and other key indicators across schools and provinces, enabling education authorities to monitor trends and identify areas needing support (MOET, 2023). Research on data use in Vietnamese schools shows that administrators are increasingly relying on aggregated performance data to inform planning and resource decisions, suggesting a foundation upon which predictive analytics could build (Trinh & Nguyen, 2022). Provincial pilots in places like Quang Nam and Da Nang have already used aggregated school data to forecast potential learning difficulties and design targeted remedial programs (MOET, 2022). While these efforts are not yet fully AI-driven, they illustrate the potential for predictive analytics integrated into national platforms to inform targeted interventions. When responsibly governed and combined with strong institutional capacity, AI-enhanced analytics can thus transform how educational equity is operationalized in policy and practice.

Ultimately, for Vietnam, AI-enabled inclusion requires alignment between technological innovation, pedagogical transformation, ethical governance, and digital sovereignty. Only under these conditions can AI function as an instrument of sustainable and equitable educational reform rather than a mechanism of intensified stratification.

Challenges and Ethical Considerations

While AI offers significant potential to advance educational equity in Vietnam, its deployment raises complex ethical, socio-technical, and governance challenges. A primary concern is the risk of exacerbating inequality. Without equitable distribution of infrastructure, AI initiatives may disproportionately benefit already advantaged urban schools, reinforcing what Selwyn (2019) describes as a "second digital divide," in which technology uptake consolidates rather than reduces disparities. Ensuring equitable access to infrastructure must therefore remain a central policy priority.

Algorithmic bias represents another critical risk. AI systems trained on homogeneous or urban-centric datasets may reproduce linguistic, cultural, and gender hierarchies. UNESCO's Recommendation on the Ethics of Artificial Intelligence (2021) warns against discriminatory outcomes, particularly in multilingual and diverse contexts. In Vietnam, AI-based grading or language-processing systems may misinterpret dialectal variation or disadvantage ethnic minority learners. Addressing bias requires inclusive dataset design, participatory validation processes, and culturally responsive algorithm development. Independent algorithmic audits, as recommended by OECD (2021), can strengthen accountability.

The rapid expansion of AI-powered platforms also generates large volumes of student data, including performance records, behavioral analytics, and predictive profiles. Williamson and Eynon (2020) caution that data-driven education risks normalizing surveillance practices in the absence of safeguards. More importantly, sustainability remains a structural challenge. Several pilot initiatives have struggled once external funding ended. Long-term integration requires stable domestic investment, transparent procurement processes, and carefully regulated public-private partnerships to avoid dependence on a single vendor. OECD's (2019) AI Principles underscore transparency, accountability, and public oversight as foundations of trustworthy AI.

In sum, AI can contribute to educational justice only within a robust governance architecture. Without enforceable regulation, independent oversight, participatory accountability, and sustained investment, AI risks amplifying rather than reducing structural inequalities in Vietnam's education system.

Policy Implications and Recommendations

Building an inclusive and equitable AI-driven education system in Vietnam requires coordinated reform across governance, institutions, and classrooms. The findings demonstrate that technological innovation alone cannot reduce the urban–rural divide; sustainable impact depends on redistributive investment, participatory governance, and robust evaluation mechanisms.

Macro-Level Policy Priorities

At the national level, infrastructure equity must remain central. Expanding broadband access in rural and mountainous regions is foundational to inclusive AI deployment. Public investment, complemented by carefully regulated public–private partnerships, should prioritize underserved districts to avoid reinforcing spatial inequalities (World Bank, 2021). However, connectivity must be accompanied by long-term maintenance funding and technical support systems to ensure sustainability.

Second, the Ministry of Education and Training (MOET) should establish a National Framework for AI in Education aligned with UNESCO's (2023) guidance on human-centred and ethical AI. Such a framework should include mandatory algorithmic impact assessments prior to nationwide AI rollout (OECD, 2021), clear data governance standards covering consent, transparency, and child data protection, and independent oversight committees to monitor bias, accessibility, and equity outcomes. Impact evaluation mechanisms must move beyond infrastructure indicators. National monitoring systems should incorporate disaggregated data (by region, gender, disability, and ethnicity) to assess whether AI initiatives reduce or reproduce inequalities.

Third, inter-ministerial coordination between MOET, the Ministry of Information and Communications, and the Ministry of Science and Technology should be institutionalized through a permanent AI-in-Education task force. This body could oversee procurement transparency, regulatory compliance, and long-term sustainability planning.

Participatory and Institutional Strategies

Participation must extend beyond central authorities. Provincial Departments of Education should establish School and Community Digital Councils composed of teachers, parents, local leaders, and student representatives. These councils would review proposed AI tools before adoption, monitor implementation challenges, and provide community feedback to policymakers. Participatory governance strengthens contextual adaptation and builds trust in digital transformation processes (UNESCO, 2021).

Student participation is equally essential. Schools should adopt structured student digital citizenship programs, enabling learners to understand data rights, algorithmic influence, and ethical AI use. Student advisory panels can provide feedback on platform usability, fairness, and inclusivity, ensuring that learners are co-creators rather than passive data subjects.

Classroom-Level and Professional Development

At the institutional level, human-centred AI pedagogy must guide implementation. Teachers require sustained professional development that integrates AI literacy with critical pedagogical skills. According to Luckin (2020), AI should function as a co-pilot supporting teacher judgment rather than replacing professional expertise. Training programs must therefore include algorithmic interpretation skills, ethical data use, and adaptive lesson design. Rural schools should develop shared Digital Learning Resource Centers to pool

AI tools, open educational resources (OER), and localized content. Collaborative networks among schools can reduce duplication and improve cost efficiency.

In sum, inclusive AI-driven education in Vietnam requires a dynamic balance between national coordination and grassroots participation. Infrastructure equity, transparent governance, community oversight, student voice, and evidence-based evaluation must evolve together. Only through this integrated approach can AI serve as a catalyst for sustainable educational justice rather than a driver of new digital stratifications.

Conclusion

This study has examined the transformative potential of Artificial Intelligence (AI) to advance equitable and inclusive education in Vietnam. Drawing on the Digital Divide Framework and the Technology Acceptance Model, it demonstrates that AI can narrow the urban-rural divide by expanding access, enabling personalized learning, and strengthening data-informed governance. Yet the findings affirm that technology alone cannot deliver justice. Structural disparities in infrastructure, institutional capacity, and socio-economic opportunity continue to shape unequal educational outcomes.

The study contributes to debates on transforming education in the AI era by arguing that inclusion must be embedded not only in access policies but in governance design. Democratic participation, institutional accountability, and community oversight are essential to ensuring that AI systems serve public rather than purely technocratic or commercial interests. Transformative innovation, therefore, requires institutional reform: sustainable financing mechanisms, transparent data governance, professional empowerment of teachers, and participatory decision-making structures at school and provincial levels.

Vietnam stands at a pivotal juncture in its digital transformation. By aligning AI deployment with equity-centred regulation, localized innovation, and inclusive civic engagement, the country can reposition AI as an instrument of social mobility rather than stratification. Future comparative research across Southeast Asian and other developing contexts would further illuminate how governance models, digital sovereignty frameworks, and participatory practices shape inclusive AI adoption. Ultimately, transforming education in the AI era demands not only smarter technologies but fairer institutions.

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9

Resources, Learning Environments, and Contextual Adaptation in Vietnamese Education

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Abstract

Since Vietnam began integrating Artificial Intelligence in Education (AIED), the results have revealed something deeper than just uneven implementation. Many projects succeed in short bursts, especially in cities, yet fail to take root once conditions change. This pattern suggests that the problem is not simply about resources or teacher training but about how technology itself is imagined. Much of global AIED research assumes that what works in one setting can easily be scaled to another. Vietnam's experience shows how misleading that assumption can be. Our paper draws on government policies, industry reports, news coverage, and classroom studies from 2018 to 2025 to examine why urban AI programs often falter. Using the TPACK framework alongside Vygotsky's sociocultural theory and Sen's Capability Approach, it develops an adaptive model grounded in frugal innovation. The focus is on simple, teacher-driven tools that strengthen human capacity rather than automate it. Seen through this lens, Vietnam becomes more than a case study; it represents a call to rethink how educational technology is designed for diverse realities. The framework outlined here invites a shift from replication to adaptation, from algorithmic solutions to context-aware collaboration.

1. Introduction: The Scalability Myth and the Vietnamese Counter-Narrative

The global discussion around educational technology often begins with one assumption: that successful innovations can easily spread and work anywhere. Artificial Intelligence in Education (AIED) promises to personalize learning, increase efficiency, and make knowledge more accessible (Holmes et al., 2019; Luckin et al., 2016). However, these promises usually come from research and experiments in wealthy, urban environments, places where stable internet access, well-trained teachers, and one-to-one device ratios are normal conditions, not luxuries (Dodick, 2024). When these tools are introduced into settings with fewer resources, the outcomes often disappoint. Yet, instead of questioning whether the original design fits, many explanations focus on supposed "implementation failures" (Selwyn, 2019).

Vietnam tells a different story. The government has ambitious goals for AI integration. Policies such as the National Digital Transformation Program (2020–2030) and Resolution No. 57-NQ/TW (December 2024) describe AI as a core part of modernizing education. The Ministry of Education even announced that AI will be an official school subject beginning in the 2025–2026 academic year (VietnamPlus, 2025; Vietnam Briefing, 2025). Despite these initiatives, deep inequalities remain. Almost half of rural students still lack access to basic technology, and secondary enrollment in rural areas is 76%, compared to 90% in cities (UNESCO, 2023; King's Think Tank, 2025). These numbers make it clear that access and readiness are far from uniform.

This paper challenges the assumption that educational technologies are automatically scalable. While some studies, such as those by Dodick (2024) and Selwyn (2019), question whether AI should be used at all, fewer explore how it might be adapted to fit local conditions. Vietnam's experience offers important lessons here. What seem like "failures" in urban AI projects can be seen instead as design lessons that highlight what truly matters for sustainability and equity.

Building on Sen's Capability Approach (1999), this paper argues that AI in education should be judged not only by its technical performance but by its ability to expand what teachers and students can actually do. The question shifts from "Can AI work in rural Vietnam?" to "What kind of AI helps teachers and students develop their skills, even in places with unstable internet or shared devices?" To explore this, the paper traces Vietnam's trajectory of AI adoption, examines urban pilot programs through key theoretical frameworks, and proposes design principles that might guide more inclusive, context-aware innovation.

2. Methodological Approach

This paper builds its argument through critical document analysis, combining insights from several kinds of evidence. The first group includes government policies such as Vietnam's National Digital Transformation Program (2020–

2030), Resolution No. 57-NQ/TW (2024), and Ministry of Education circulars on ICT integration. These materials show how the state envisions the role of AI in transforming education and how this vision is framed in official discourse.

The second group draws on reports from the education technology sector. This includes Vietnamese companies like Monkey Junior, ELSA Speak, and Topica, as well as international organizations such as UNESCO, UNICEF, and the World Bank. Together, these sources reveal both the optimism and the practical constraints shaping how AI tools enter classrooms. The 2024 *White Book on Vietnam Education Technology* was especially valuable in outlining market dynamics and describing how innovation unfolds unevenly across regions.

A third set of materials comes from Vietnamese media, including outlets such as *VnExpress*, *Tuoi Tre*, *Thanh Nien*, and *Vietnam.vn* between 2018 and 2025. These articles report on pilot projects, their outcomes, and the public reactions they generated. They help trace how the promises of AI played out in practice and how different groups, such as teachers, students, and parents, responded to those changes.

Finally, emerging empirical studies add important depth. Le (2025) explores rural students' perspectives on using AI for English learning, while UNICEF Vietnam (2024) documents teacher experiences in remote provinces. These studies ground the discussion in everyday realities and help balance the more policy-driven or industry-focused narratives.

Combining these materials helps reveal patterns of adoption and resistance. The findings are interpreted through wider debates on equity and localization in AIED (Holmes et al., 2019; Dodick, 2024; *Nature Machine Intelligence*, 2025; Selwyn, 2019; Williamson, 2021). In areas where data remains thin, the discussion offers theoretical insights that can inform later fieldwork and participatory design research.

The selection of documents was focused on their recentness (2018–2025), their applicability to national policy, and their emphasis on implementation results. Data were coded thematically into three categories: policy vision, practical constraints, and pedagogical adaptation.

3. Theoretical Framework: Integrating TPACK, Vygotsky, and Sen

To understand the role of AI in Vietnamese education, this paper draws on three complementary frameworks: TPACK, Vygotsky's sociocultural theory, and Sen's Capability Approach. Combined, they create an integrated model that helps to examine various aspects of design, practice and impact.

The TPACK framework (Mishra & Koehler, 2006) emphasizes the importance of balancing technological, pedagogical, and content knowledge. Effective use of AI requires more than just having advanced technology; it depends on teachers' ability to use it meaningfully in their teaching. Vygotsky's (1978) sociocultural theory adds depth by highlighting that learning is a social and mediated process. His ideas about the Zone of Proximal Development and scaffolding show that AI should not replace teachers but rather enhance their ability to support students. Sen's (1999) Capability Approach shifts the focus from merely accessing technology to expanding human freedoms and opportunities, asking whether AI genuinely assists people to create, learn, as well as integrate fully in society.

Considered in relation to one another, TPACK, Vygotsky's sociocultural theory, and Sen's Capability Approach present a networked trail to comprehend AI's role in education. First and foremost, TPACK clarifies how meaningful integration enhances what teachers and students can achieve, while also identifying the potential risks when the focus on tools outweighs attention to teaching goals. Building on this foundation, Vygotsky highlights the social nature of learning, pointing out that collaboration and guided instruction can become more effective with the assistance of AI. Sen's Capability Approach, in turn, offers a method to evaluate success by examining if AI truly broadens learning opportunities. Taken as a whole, these perspectives provide a coherent basis for rethinking how AI can be used in education to reflect diverse needs and local realities.

4. Vietnam's AIED Trajectory: From Digital Literacy to AI Integration

Vietnam's journey toward integrating AI in education has been gradual but deliberate. The process reflects clear phases that mirror how technological innovations typically spread through societies, as described by Rogers (2003).

The early years, roughly from 2010 to 2018, focused on building basic digital infrastructure. Schools in major cities received computer labs, and national programs promoted digital literacy. At this stage, the government aimed to modernize education through technology, though AI itself remained a distant idea.

Momentum increased between 2018 and 2024, Vietnamese edtech startups such as Monkey Junior and ELSA Speak gained international attention, with Monkey Junior reaching ten million users by 2020 and ELSA being listed among the world's top AI startups in 2019 (Tech in Asia, 2020). Yet these successes told only part of the story. Most tools targeted individual consumers in urban areas, not the classrooms where most students learn.

The COVID-19 pandemic accelerated digital adoption, forcing schools to use platforms like Google Classroom and Khan Academy. By 2024, the White Book on Vietnam Education Technology reported that about 60 percent of local edtech products included AI (Vietnam.vn, 2025). Pilot projects soon appeared in well-resourced schools in Hanoi and Ho Chi Minh City.

Vietnam now stands at a turning point. The decision to include AI as an official subject from the 2025–2026 academic year (VietnamPlus, 2025) and the creation of the National Forum on Education Innovation with AI (RMIT, 2025) demonstrate clear ambition. Yet the real test lies not in introducing more tools but in creating sustainable systems that reach beyond urban centers. The lessons from cities, both their achievements and their failures, provide a foundation for rethinking how AI can serve all Vietnamese learners.

5. Urban AI in Action: A TPACK Diagnosis of Systemic Failure

Urban Vietnam has become the main testing ground for AI in education, where innovation often reveals as many challenges as achievements. Applying the TPACK framework helps clarify why promising projects rarely last and why many systems fail to move beyond the pilot stage.

5.1. Technical Challenges

Educators often refer to a pattern they call the “pilot project graveyard.” Donor-funded or company-sponsored projects in Hanoi and Ho Chi Minh City (2018–2024) typically run for less than a year, show early promise, and then quietly disappear once external funding ends. Media reports describe cases such as an adaptive learning platform in HCMC’s Chu Van An school that succeeded during its trial but was abandoned within months after support stopped (VnExpress, 2023).

The failure is rarely technical. Many AI pilot programs in Hanoi and HCMC (2018–2024) achieved short-term success but failed to sustain once funding ended (VnExpress, 2023). From a TPACK perspective, this pattern reflects overemphasis on technology provision with insufficient investment in teacher capacity and institutional support. As one HCMC teacher told *Tuoi Tre* in 2023, “We become good at welcoming researchers, not at using technology.”

5.2. Pedagogical Challenges

Many AI tools are "plug-and-play," expecting teachers to adjust to the technology instead of the other way around. Studies and media reports (Le, 2025; VnExpress, 2024) indicate that AI tools often do not match classroom realities. They demand self-directed learning, which clashes with local teaching methods. From a Vygotskian perspective, these tools overrate students' independence and undervalue teachers' mediating role.

Le’s (2025) study of 35 rural students shows similar tensions. Students valued AI’s instant feedback but struggled with poor connectivity, shared devices, and complex interfaces. Many felt overwhelmed by tools made for digitally fluent users. From a Vygotskian perspective, these systems often functioned beyond students’ Zones of Proximal Development, demanding levels of independence where they had not yet developed. Students themselves favored hybrid models that combined AI support with teacher guidance.

Vietnamese media often echoes these experiences: Central Highlands students exploring electronic libraries felt both excitement and frustration when connections failed (VnExpress, 2024). Teachers in Đắk Lắk saw higher motivation when AI complemented familiar, teacher-led lessons (Báo Dân Tộc Miền Núi, 2024). UNESCO and SEAMEO (2024) likewise stress that educational technology must fit its context, not impose uniform solutions.

5.3. Equity and Ethical Challenges.

AI adoption raises concerns about data privacy and unequal access. In many rural areas, parents lack the digital skills to provide informed consent for data use. Limited household resources also restrict students' ability to engage with new tools. As a result, technologies that work well in well-resourced schools often do not perform as well in low-income public settings.

Nearly half of rural students still lack basic digital resources (UNESCO, 2023; King's Think Tank, 2025), and similar tools can lead to very different outcomes. From Sen's (1999) Capability Approach, this contrast shows that technology can create opportunities in one context but limit them in another.

UNICEF Vietnam's (2024) AI workshops in remote Kon Tum districts highlight this issue. Teachers reported that AI helped them create more engaging lessons and access new materials. However, short training sessions and the lack of long-term support affected their confidence to maintain these improvements. The initiative built technical knowledge but left out how to integrate teaching methods. These conditions show the need for a simple, context-sensitive design that allows teachers and students to meaningfully adapt AI to their realities, instead of copying models made for urban schools.

Table 1. Summary of Key Challenges and Adaptive Responses in Vietnam's AI Integration

Identified Challenge	Observed in Urban AI	Adaptive Principle for Rural Context
Short-lived pilots	Unsustainable after funding ends	Design long-term teacher support systems
Pedagogical mismatch	Tools demand self-paced learning	Integrate AI with guided instruction
Privacy and inequality	Data stored centrally	Use offline, teacher-controlled systems

6. An Adaptive Framework: Design Principles for Rural Translation

The difficulties outlined above, combined with insights from rural classrooms, point to a clear need for more context-sensitive design. The goal is not to replicate urban models but to rethink how technology can genuinely support learning in low-resource schools. Using Vygotsky's Sociocultural Theory (1978), this section outlines ways AI can strengthen teachers' ability to scaffold learning while keeping human judgment central.

6.1. From Real-Time Adaptation to Planned Differentiation

Cloud-based adaptive platforms such as Khan Academy rely on a stable internet and individual devices. They have worked in some Hanoi schools but proved less effective where students share computers and connectivity is inconsistent (VnExpress, 2022). Le's (2025) study confirms that continuous individual access is limited in rural areas.

A feasible alternative is an offline AI lesson co-planner. Teachers could use a single connected device to input lesson topics and indicate student ability levels. The AI would then generate differentiated worksheets, projects, and discussion prompts. Teachers would review and adjust these materials according to their understanding of students, distributing them through printouts or group activities.

This approach supports Vygotsky's concept of the teacher as the "More Knowledgeable Other." The AI assists teachers in responding to varied learning needs without requiring full connectivity or one-to-one devices. It also reinforces teacher agency: educators select and adapt materials as needed. From Sen's (1999) perspective, this enhances teachers' capability to plan diverse instruction and gives students more equitable opportunities to learn within their developmental range.

6.2. From Centralized Dashboards to Localized Diagnostic Tools

District-level dashboards that collect large volumes of data often face difficulties in rural schools with limited IT capacity and network stability. They also raise privacy concerns where data management frameworks are still developing

(Holmes et al., 2019). A simpler model could use a teacher's local device to conduct short diagnostic quizzes. Students might respond via SMS or paper forms that teachers later input. The AI would then summarize the results, identifying topics that require more attention. All data would remain on the teacher's device, addressing privacy and infrastructure challenges. Small-scale systems like this can help teachers identify learning gaps quickly and adapt lessons without external data processing. It turns assessment into a continuous, classroom-based process and preserves teacher control. From a capability perspective, it strengthens teachers' ability to make informed decisions and respond effectively to diverse learning needs.

6.3. From Consumer Apps to Pedagogical Resources

Applications like ELSA Speak and Duolingo have gained traction among independent learners in urban areas, yet their reliance on constant internet access and self-directed study limits their use in rural settings. In many schools, teachers and students must share a small number of devices, making such models impractical (Coventry University, 2024; Le, 2025). A more feasible approach is to view AI not as a personal tutor but as a source of adaptable teaching material. Educators can download pronunciation guides, grammar exercises, or videos for offline use and incorporate them into classroom activities. When used this way, AI becomes part of a shared learning experience, supporting group discussions, pronunciation practice, and other teacher-led activities that keep learning interactive and collaborative.

Building on Vygotsky's idea that learning is inherently social, AI functions best when it supports teacher-student interaction. Its use allows educators to access diverse teaching materials and creates opportunities for students to experience authentic content within a collaborative classroom environment.

6.4. Design Principles: Operationalizing Frugal Innovation

The ideas discussed above illustrate how frugal innovation can serve as a foundation for designing educational technology in resource-constrained settings. This approach begins with the principle that tools must operate effectively without continuous internet access, relying primarily on local processing. When online synchronization becomes necessary, the amount of data transferred should remain minimal to accommodate low-bandwidth environments and reduce costs. Equally important is the simplicity of design. Interfaces should be clear, intuitive, and easy to use, especially for teachers and students with limited digital literacy.

Frugal innovation also emphasizes adaptability. Open-source platforms enable local developers and educators to modify and localize content, ensuring that technology aligns with linguistic, cultural, and pedagogical contexts. At the same time, AI systems should empower teachers by supporting their professional judgment and instructional creativity, not by replacing or automating it. In doing so, technology becomes a tool for strengthening human capacity within the classroom. Finally, the ethical dimension of data privacy must guide all design choices. Student information should be collected only when necessary and stored locally whenever possible, ensuring both security and trust.

Shifting the focus from distributing advanced technologies, the model can expand the real capabilities of teachers and students to teach, learn, and create meaningfully within their own contexts. In this sense, educational innovation becomes a process of empowerment rooted in practicality, inclusion, and human-centered values.

Despite these benefits, it is also vital to acknowledge the limitations of frugal innovations. To be more specific, simplified tools and low-cost models may unintentionally lower expectations for educational quality or serve as substitutes for long-term investment in rural infrastructure. Instead of resolving disparities, frugal innovation may exacerbate them if institutional support is not used. Therefore, it must operate alongside continued state funding, teacher development, and infrastructure improvement to ensure that "doing more with less" does not become "settling for less."

7. Implications and Future Directions

7.1. For AIED Scholarship

This analysis suggests several implications for future research. First, local context should be viewed not as a secondary factor but as the foundation of design.

Effective AI in education requires more than translated interfaces or surface adaptations. It involves rethinking how technology functions in settings where infrastructure and teaching traditions differ. Dodick's (2024) call to move beyond North–South frameworks highlights the importance of design methods that respond to specific environments. Voices from rural Vietnam show that educators and students in resource-limited contexts understand their needs clearly. Research should aim to reflect and center those perspectives.

Second, unsuccessful initiatives can still offer valuable insights. The recurring pattern of short-term pilot projects highlights what sustainability requires: ongoing teacher development, pedagogical alignment, and strong institutional support. Future studies could examine why interventions fail, not just where they succeed. Recognizing this kind of evidence could help policymakers and developers design longer-lasting systems.

Third, equity in AIED depends on both research participation and design priorities. Rural teachers and students should be included as partners in study design, not only as subjects. As noted in *Nature Machine Intelligence* (2025), lower-cost and flexible AI solutions may be more appropriate for many Global South contexts. Frugal innovation, supported by frameworks such as TPACK, Vygotsky, and Sen, provides one possible path for achieving that balance.

7.2. For Vietnamese Policy

Vietnam's education strategy faces the risk of widening the gap between urban and rural areas if technological benefits continue to cluster in cities. The adaptive framework suggests a more balanced path, continuing to foster advanced innovation in urban centers while supporting the creation of lightweight, accessible tools for rural schools.

To bring this vision into practice, a number of connected efforts are needed. First, the government could establish design laboratories dedicated to frugal educational technologies, bringing together teachers, engineers, and community representatives. Locating these labs in rural provinces would help ensure that design decisions reflect the realities of local classrooms. Second, incentives should encourage edtech companies to prioritize offline, teacher-supportive tools instead of only developing applications suited to urban markets. This could be achieved through procurement preferences or subsidies for open-source development.

Another priority is to strengthen data governance before expanding AI adoption nationwide. Protecting student privacy and ensuring educational data serve public interests is essential. The offline-first approach already aligns well with this goal, as it minimizes the amount of personal data transmitted. In addition, sustainable teacher training must replace short-term workshops. The UNICEF program in Kon Tum offers a promising example, but long-term communities of practice would help teachers maintain their skills and confidence once formal training ends.

Finally, policy planning should recognize that urban and rural environments require different technological strategies. The goal is not simply to bring the same tools to every region but to create solutions that genuinely enhance teachers' and students' capacities in their specific contexts. Success should be measured by how these tools expand what educators and learners can do: valuing creativity, equity, and sustainability as the true measures of progress in Vietnam's digital education journey.

7.3. Limitations and Future Research

This study inevitably has certain limitations that open pathways for further research. Although it draws on recent evidence from rural classrooms, the adaptive framework still needs to be tested through participatory design projects involving teachers and students themselves. Future studies could use ethnographic or case study methods to explore everyday teaching practices, local knowledge, and informal learning systems already present in rural communities. Understanding what these settings offer, not only what they lack, would ground future frameworks in authentic classroom realities.

Pilot testing of specific tools such as offline co-planners, diagnostic quizzes, or content banks would also help transform theoretical ideas into practical applications. Iterative feedback from teachers and students should guide the refinement of these tools, helping researchers identify which features truly support teaching and learning. Recording both successes and setbacks would strengthen understanding of why certain models work in particular contexts and how they might evolve over time.

Long-term research following teachers as they continue using these tools could reveal whether capability expansion translates into lasting pedagogical change. Comparative studies with other Southeast Asian countries that share similar infrastructure and socio-economic challenges, such as Indonesia or the Philippines, would also add depth. Such collaborations could uncover principles that are transferable while highlighting the specific cultural and institutional factors that shape Vietnam's distinct path toward equitable AI in education.

8. Conclusion

The story of AI in Vietnamese education reflects both ambition and complexity. Urban implementations have demonstrated what is technologically possible, yet they have also revealed the structural and pedagogical limits of replicating models developed elsewhere. When viewed through the combined perspectives of TPACK, Vygotsky, and Sen, these experiences form a valuable foundation for understanding what inclusive and context-sensitive innovation might look like.

Teachers and students across Vietnam continue to adapt technology to fit their realities. Their creativity and persistence suggest that successful AI integration depends not on technical sophistication alone but on the alignment between technology and the social conditions in which learning occurs. Rural educators, in particular, show that meaningful innovation can emerge from constraint when tools are flexible enough to serve their needs.

Sen's (1999) Capability Approach offers a reminder that the measure of success in education lies not in the number of digital devices or platforms adopted but in the expansion of people's actual freedoms, their ability to teach, learn, and participate more fully in knowledge creation. Framed in this way, AI becomes not an end in itself but a means to strengthen human agency.

Vietnam's current policy direction, including Resolution No. 57-NQ/TW (Vietnam Briefing, 2025), positions AI at the heart of education modernization. Achieving this vision will require more than introducing new tools; it calls for continuous teacher development, context-aware design, and clear governance frameworks to ensure ethical and equitable use.

The adaptive framework proposed in this paper offers one pathway toward that goal. By centering frugal innovation and human capability, it envisions an approach in which technology complements the teacher and digital transformation helps unite, not divide, Vietnam's learning communities. The question at hand is not if artificial intelligence will influence education, but rather how it may increase opportunities for all students.

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10 |

Digital Inequality and Innovation in the Global South: Evidence from Vietnam

Dieu Anh Ngo

Abstract

There is a growing global movement toward using artificial intelligence (AI) in education to enhance teaching and learning. Although the educational system in Viet Nam has developed rapidly, there are significant differences between urban and rural schools. This research examines how AI can support equitable education in rural Viet Nam, where many schools face challenges such as limited devices, poor internet, and a lack of infrastructure. The study will analyze the current AI initiatives in Viet Nam's education system, identify the main obstacles to implementing AI in rural schools, and compare these experiences with those from other Global South countries. Consequently, the paper seeks to suggest practical policies and strategies that could promote the fair, sustainable, and responsible AI integration in education. The study employs a qualitative comparative analysis of policy and research literature from 2017-2025, focusing on Viet Nam, India, and South Africa. Sources were coded thematically under three dimensions: access, teacher capacity, and policy implementation.

Introduction

Viet Nam's education system has rapidly expanded and transformed over the past two decades, reflecting the nation's broader socio-economic transformation. Viet Nam has achieved near-universal primary school enrolment (99.5%) through the government's policy of free tuition in public schools. In 2012, Viet Nam also initially took part in the Programme for International Student Assessment (PISA); its rankings were significantly better than those of other developing nations that participate in this OECD-led program. These achievements show that the nation has improved both coverage and quality. Moreover, with the development of artificial intelligence (AI), the Vietnamese government enacted the National Digital Transformation Program to 2025, with a Vision to 2030 and the National Strategy on Research, Development and Application of Artificial Intelligence by 2030. Both policies focus on education as a priority sector for integrating new technologies, including AI.

However, the benefits of these policies are not shared equally. Rural schools continue to face significant obstacles, including poor internet connectivity, restricted access to digital devices, inadequate teacher preparation, and low levels of digital literacy. Such disparities undermine the potential of AI-driven education by widening the existing educational divide between urban and rural areas. In addition, unequal access to AI technologies may limit students' opportunities to develop digital competencies, participate fully in knowledge production, and in political and economic life in an increasingly digital society.

AI holds transformative potential for pedagogy and sustainable learning ecosystems. An AI-driven system can improve critical thinking, facilitate student-centered and support individualized learning. Nevertheless, the long-term sustainability of AI in education depends not only on technology but also on inclusive governance, teacher capacity, and institutional support that promotes fair participation and significant learning outcomes. Without addressing these broader structural and pedagogical dimensions, AI adoption risks becoming a technical solution that does not result in long-lasting educational changes.

Consequently, this research aims to investigate how AI can be integrated into Viet Nam's education system to promote equitable, sustainable, and transformative learning outcomes, especially in rural schools. This study would examine the current AI initiatives within Viet Nam's education system, identify the key structural and pedagogical challenges in rural contexts, and draw comparative lessons from other Global South countries, namely India and South Africa. Finally, the study seeks to propose policy and practice recommendations to guarantee the inclusive, sustainable, and equitable use of AI in Viet Nam's educational system.

Literature Review

The significant expansion of artificial intelligence (AI) has major implications for education. Previous research highlights AI's capacity to provide intelligent, adaptable, and personalized learning systems (Becker et al., 2018). According to

UNESCO's guidelines in 2021, AI technologies can improve learning, assessment, and teacher support to contribute to better management and delivery of education. AI-powered learning systems can provide interactive resources and foster more engaging learning experiences through adaptive algorithms, offering personalized student-focused learning opportunities. Research has also pointed out the potential of AI to bridge the educational gap between cities and towns by bringing high-quality educational materials to students (Kamalov et al., 2023). Further studies have shown that AI can help students in developing critical thinking and problem-solving skills, which are essential to their long-term success (Almasri, 2024).

Despite these advantages, current research often overlooks the contextual factors that determine technology's practical impact, assuming that technology by itself would automatically drive educational progress. The real implication of AI is largely influenced by the social, cultural, and infrastructural context, particularly in low-resource areas where limited connectivity, inadequate devices, and a lack of teacher training may hinder the promised benefits of AI. These difficulties are a reflection of the ongoing digital divide in education, which is defined as unequal access to digital literacy, technology, and connectivity (Cambridge Dictionary, 2019). Studies across both developed and developing countries show that rural and low-resource schools often face greater barriers to adopting new technologies compared to their urban counterparts (Kormos & Wisdom, 2021). Such barriers include financial resources from dwindling tax bases, technological access, poor teaching quality and resources, and disciplinary problems (Knoblauch & Chase, 2015; Kormos, 2018). Rural schools also face numerous logistical challenges, often relying on limited support staff assigned to multiple schools over dozens of miles (Weiss, 2019). Similar disparities have been documented in Global South countries. For example, post-pandemic rural schools in China experience limited internet connectivity and insufficient devices, hindering the deployment of AI learning tools (Li, 2024), confirming that adequate infrastructure is crucial in achieving the full potential of AI. This suggests that AI may deepen educational inequalities if the infrastructural and social conditions of rural communities are not addressed. This issue is highly relevant to Viet Nam, where the urban–rural digital divide remains significant and highlights the necessity for national policies to ensure AI in education does not reinforce current inequalities. Thus, the digital divide takes on the role of participation, deciding who benefits from innovation and who is left behind.

Besides the issues of access, several studies raise concerns regarding the social and ethical implications of AI in education. Scholars argue that AI is not a neutral tool but is influenced by and shapes human norms, values, and power systems (Yasseri, 2025). Concerns surrounding data privacy, surveillance, algorithmic bias, transparency, and fairness may reproduce social inequalities rather than mitigate them. To be specific, evidence shows that AI systems may reproduce bias based on race, gender, nationality, socioeconomic status, and disability (Baker & Hawn, 2021). These biases may exacerbate existing societal injustices and have significant consequences, especially for underprivileged populations. In response, international organizational frameworks increasingly address responsible AI development. UNESCO's Recommendation on the ethics of artificial intelligence (2021) emphasizes that AI should serve human well-being, uphold human rights, foster social justice, and protect the planet's ecosystems.

In Viet Nam, the government has acknowledged the significance of AI and digital transformation as part of its broader plan to reform education. The National Strategy on Research, Development, and Application of Artificial Intelligence by 2030, outlined in Decision No. 127/QD-TTg dated January 26, 2021, by the Prime Minister, has assigned responsibility to the Ministry of Education and Training to coordinate nationwide efforts linking AI innovation with educational practice. AI applications have been increasingly implemented in teaching, research, and administrative tasks in Vietnamese universities (Nguyễn & Nguyễn, n.d.). These initiatives demonstrate a strong political commitment to modernizing education and align with global trends. Nevertheless, the majority of existing applications remain concentrated in urban schools, where infrastructure and resources are more advanced. Rural schools still face inequalities in access to digital learning, including poor internet connectivity, insufficient teacher training, and limited digital content in Vietnamese (Ngo et al., 2025). Recent research on Viet Nam primarily highlights the potential advantages of AI, but provides limited guidance on how rural schools can effectively use and maintain such technologies.

The Gap in the Literature

Most of the research on artificial intelligence (AI) in education, which has grown rapidly in recent years, focuses on urban and technologically advanced environments where infrastructure, teacher capacity, and language barriers are less severe. However, there is still a lack of studies that target rural and low-resource environments, especially in Southeast Asia. In Viet Nam, while the urban-rural digital divide has been widely documented, there is insufficient research on how AI integration interacts with structural inequalities or evaluates its implications for educational equity and long-term sustainability in rural areas.

Furthermore, current literature provides limited theoretical engagement with issues of inclusive innovation, sustainable digital transformation, and AI governance in Global South education systems. Although responsible and ethical AI frameworks have received scholarly interest, their application and implications in Vietnamese education, particularly in rural schools remain under-explored. This includes a lack of research on the governance, localization, and integration of AI systems into current institutional and infrastructure frameworks.

Additionally, even though countries in South Asia, Africa, and Latin America face similar challenges, current research lacks a strong theoretical framework that situates AI adoption within discussions on Global South innovation, digital dependency, and inclusive technological development. The absence of such comparative and theoretically grounded perspectives limits understanding of how AI can be applied in different contexts, implemented sustainably, and governed in ways that support social justice, participation, and fair access. Consequently, addressing this gap is crucial for ensuring that AI can support educational innovation, equity, and inclusion in Viet Nam and beyond.

Conceptual Framework

AI in education (AIED)

AI in education (AIED) covers a wide range of technologies, including AI-driven, step-by-step personalized instructional and dialogue systems, AI-supported exploratory learning, student writing analysis, student-support chatbots, and AI-facilitated student or tutor matching. This enables students to take charge of their own learning. It also involves one-to-one computer interactions, whole school strategies, and mobile learning outside the classroom (Holmes et al., 2019). Moreover, AIED is understood as a sociotechnical system shaped by institutional, infrastructural, and governance factors rather than a simple technical solution (Alshahrani et al., 2024). On the other hand, AI in education warns against possible risks and limitations. It raises concerns regarding privacy, security, algorithmic bias, and academic integrity (Cardona et al., 2023). In addition, there is a lack of teachers with the necessary skills to integrate AI tools into their teaching techniques.

These issues highlight the need to invest in teacher training, offer low-cost AI solutions, and improve infrastructure to ensure AI is used properly (Tripathi & Yadav, 2025). In particular, the quality and availability of digital infrastructure determine whether AIED promotes inclusion or exacerbates inequality. Therefore, the concept of the digital divide offers a framework for examining how unequal access to devices, connectivity, and digital literacy influences the equitable implementation of AI in education.

Digital divide

This research approaches the digital divide as the distance between individuals who do and do not have access to information and communication technologies, including computers, the Internet, various digital devices, hardware, and software, like cellphones (Van Dijk, 2017). In Viet Nam, while urban schools often benefit from stronger infrastructure and human resources, rural schools face persistent technological and capacity constraints.

The digital divide is also conceptualized as a governance and capability issue that affects participation in AI-enabled learning. It illustrates the differences in digital competencies, institutional support, and infrastructure availability that establish whether AIED fosters inclusion or reinforces inequality. Therefore, the digital divide is positioned as a central condition influencing the sustainability and equity of AI integration in education.

Discussion of Findings

AI in Rural Education in Viet Nam

The current AI initiatives in Viet Nam's education system

In recent years, Viet Nam has prioritized education in its digital transformation agenda, citing artificial intelligence (AI) as a crucial tool to enhance teaching. Several efforts related to digital transformation in education have been introduced by the Ministry of Education and Training, most notably the "Plan for Enhancing IT Application and Digital Transformation in Education for the 2022-2025 Period", along with public-private collaborations supporting AI research and implementation (Tran et al., 2023). These initiatives demonstrate a centrally organized, state-led strategy that uses national policy frameworks and experimental projects to promote innovation. However, implementation depends heavily on local institutional capacity and resource allocation, which differ greatly among regions.

AI has been utilized in several ways, with the most common ones being learning analytics, virtual assistants, and personalized learning platforms. Platforms such as Topica, OLM, and Elsa Speak use AI-powered systems to customize learning routes according to each student's unique abilities. Elsa Speak is an example of how natural language processing (NLP) technology has been used to improve speech recognition and language acquisition. This involves the use of real-time feedback and pronunciation recognition algorithms. To reduce the effort for teachers, AI-driven systems have also been used for material suggestion, automated grading, and student performance evaluation (Nguyen et al., 2021). Moreover, AI has been increasingly used in teaching, research, and management at several Vietnamese universities. For example, under its "AI University transformation plan, CMC University has implemented an AI Training Assistant to help students with inquiries concerning rules, syllabi, course registration, and training-related matters. This assistant operates 24/7 to improve training management transparency while delivering timely and accurate information (Nguyễn & Nguyễn, n.d.).

Notably, Viet Nam's first provincial-level AI training model for teachers is called "Điện Biên Phủ - Hành trình phủ AI". The campaign was successfully launched at the beginning of 2025 by STEAM for Vietnam in collaboration with the Dien Bien province's Department of Education and Training, indicating the accomplishment of the goal of introducing AI to all of the province's instructors. All instructors in the province received training from the campaign in less than 60 days, training over 14,000 teachers from more than 500 primary, secondary, and high schools. Although the program shows a high level of local involvement, it illustrates the project-based nature of many digital education initiatives, which frequently lack long-term institutional integration.

AI initiatives are still mostly found in metropolitan areas, reflecting better infrastructure, higher funding, and more institutional readiness in urban schools. This pattern reveals a political economy of implementation in which areas with greater technological capacity are given priority in the allocation of resources and the execution of policies. Disparities still exist despite attempts to increase the use of AI in rural areas. Rural schools have limited authority and ability to modify technologies to meet local needs, since implementation follows top-down policy instructions. Consequently, instead of addressing systemic inequities in educational access, current AI initiatives tend to exacerbate the existing inequalities.

The main challenges to implementing AI in rural schools

Despite advancements in artificial intelligence (AI) and online learning platforms, significant challenges persist in their adoption within Vietnamese education, particularly in rural schools. A primary obstacle to integrating AI in Vietnamese rural schools is the inadequate technology infrastructure. While government initiatives aim to promote the digital transformation in education, the distribution of reliable technology and internet connectivity is unevenly spread across the nation, with rural and mountainous regions lagging. Compared to their urban counterparts, teachers and students in these areas are less likely to have access to computers and often experience slower internet speeds (Kormos & Wisdom, 2021). Limited household internet access and unstable electrical sources further constrain participation in AI-based learning. For instance, Le (2025) found that although 80% of students reported having internet and 85.7% had access to devices, a considerable number still experienced slow or unreliable connections, especially at home. As one student said, “Sometimes I can’t open the app because of slow internet, and then I get nothing done”. These constraints even caused some participants to withdraw from the survey, indicating that accessibility concerns have an impact on participation and results. Furthermore, rural schools frequently lack the required capacity for maintenance and technical assistance. While teachers may receive training on AI platforms, the absence of stable systems, on-site technicians, and school budgets for maintenance means that problems such as broken hardware or outdated software remain unresolved. Although recent national statistics are not available, similar patterns have been observed in rural Viet Nam, where teachers struggle to maintain school computers due to outdated systems and insufficient funding (Hong et al., 2025).

These limitations show a broader policy problem of Viet Nam, where digital transformation efforts are mainly designed and managed at the urban level, giving provincial and district authorities little fiscal autonomy to adapt programs to local needs. As a result, the full potential and effectiveness of technology integration in these settings cannot be fully realized.

In addition, human capital constraints, especially among teachers, present another major obstacle. In an increasingly digitalized world, it is imperative to equip teachers with the necessary skills to utilize digital learning resources effectively. This preparedness is crucial for fostering students' digital literacy and even improving their learning outcomes (OECD, 2025). However, one of the greatest challenges in Viet Nam is the inadequate provision of technological training for the majority of teachers, particularly in rural school settings. In these areas, such instruction is often brief, infrequent, and rarely accompanied by practical, hands-on technical assistance. This deficit in training contributes to a shortage of qualified specialists who can integrate cutting-edge tools, such as artificial intelligence, into their pedagogy. As a result, the majority of teachers face considerable difficulties in incorporating digital resources into their instructional practices. An example addressing this gap is the STEAM for Viet Nam "Train the Trainers" program, launched in 2025. The campaign was organized in collaboration with the Department of Education and Training of Điện Biên province and expanded on previous attempts to teach rural educators programming and AI literacy. Within a short period, thousands of teachers across elementary and secondary levels received training to apply AI-related tools in the classroom. While the program achieved notable outreach, its narrow scope reflects a broader structural issue: training initiatives in Viet Nam often operate as short-term projects rather than integrated components of national teacher development systems. This problem reflects a deeper institutional weakness, as inconsistent and repetitive execution is the result of fragmented coordination between the Ministry of Education and the local department. Without institutionalized mentorship and follow-up procedures, such efforts risk becoming symbolic rather than transformative, particularly in remote areas.

Socioeconomic barriers continue to considerably influence the unequal adoption of AI-based learning tools within Viet Nam's rural education system. Studies indicate that rural families frequently face financial challenges when acquiring personal digital devices and subscribing to learning platforms, leading to unequal access to educational resources powered by AI (Vesna et al., 2025; Pettalongi et al., 2024). Geographic isolation and income inequality make this problem much worse because students in distant locations not only deal with unstable internet connectivity but also lack the requisite digital literacy skills for effective interaction with online platforms (Pettalongi et al., 2024). Additionally, parents in rural households often have limited digital literacy themselves, which hinders their capacity to support their children's AI–based learning at home and maintains the digital divide between generations (Vesna et al., 2025). The rapid shift towards digital and AI-enabled learning methods has deepened existing inequalities, which tend to benefit students from higher-income and urban backgrounds. This result reveals a contradiction in Viet Nam's digital education strategy. Whereas AI is promoted as a tool for inclusivity, its present application serves to further structural disparities in access and opportunity. The cost of devices, maintenance, and internet connectivity remains excessive for the majority of underfunded schools and marginalized communities, hence widening the educational gap between urban and rural students (Vesna et al., 2025; Pettalongi et al., 2024). This contradiction results from a legal framework that depends mostly on household contributions and private sector partnerships, with insufficient state funding for low-income or rural families. Individuals then face the financial cost of digital learning, which deepens socioeconomic disparities. Without targeted financial and infrastructure measures, these disparities are likely to constrain the inclusive promises of AI in the Vietnamese context and deepen long-standing inequities in digital learning.

Therefore, such challenges show that Viet Nam's efforts to digitalize education through AI are hampered not only by infrastructure inadequacy but also by structural inequalities in socioeconomic conditions and teacher capabilities. Similar patterns are observed across the Global South, where urban and rural areas often face unequal advancements in digital transformation. As Viet Nam strives to provide equal and sustainable integration of AI in education, it can draw lessons from the experiences of other countries in overcoming similar obstacles.

Lessons from the Global South

India's experience with digital transformation in education offers valuable lessons for Viet Nam as it aims to integrate artificial intelligence (AI) and online learning into its national education framework. The National Education Policy (NEP)

2020 represents a transformative framework that positions technology as a crucial element for achieving access, equity, quality, affordability, and accountability in education (Bangad & Kumar, 2025). Within this initiative, two platforms are notable: DIKSHA and SWAYAM. DIKSHA, a national digital infrastructure for teachers and students introduced by the Ministry of Education in 2017, offers multilingual content, teacher training courses, and QR-coded textbooks. By 2022, it had recorded more than 5,749 minutes of learning and uploaded over 291,000 e-content items available in various Indian languages (Sharma et al., 2025). Similarly, SWAYAM, a massive open online course (MOOC) platform for higher education, features courses from leading institutions such as IITs, IIMs, and central universities. With millions of registrations and the University Grants Commission (UGC) credit transfer system, SWAYAM serves as an example of how digital education can be systemically incorporated into formal academic structures (Sharma et al., 2025). Viet Nam could consider implementing a similar credit recognition scheme to advance the legitimacy and acceptability of e-learning courses. The success of such platforms must be understood in the context of the NEP 2020, which highlights the establishment of the National Educational Technology Forum (NETF). The NETF aims to enhance the digital infrastructure and create an environment that supports innovation in blended pedagogies, online learning, and teacher training (Sharma et al., 2025). Unlike India, Viet Nam lacks a centralized organization to coordinate AI education programs. Establishing such an organization could help align different initiatives and guarantee consistent execution nationwide.

Nonetheless, India's implementation presents difficulties that Viet Nam should carefully consider before following similar models. Despite extensive deployment, India still struggles with an ongoing digital divide, particularly in rural areas, where disparities in internet access, electrical supply, and device availability remain major obstacles. With rural communities disproportionately affected, less than 25% of Indian households had access to the internet in 2021. Furthermore, issues such as gender inequality, inadequately prepared teachers, and uneven credibility of online assessments present the risk that digital education could have the unforeseen impact of exacerbating existing inequities rather than diminishing them (Vats & Malik, 2024; Kumari & Pandey, 2025).

India's experience points out both the potential benefits and inherent drawbacks of comprehensive digital education reforms in the Global South. Both nations share identical structural issues, including unequal infrastructure, socioeconomic disparities, and limited teacher capacity. However, India's case demonstrates the importance of a coordinated national framework that integrates technology with education policy. In contrast, Viet Nam's ongoing initiatives are smaller in scale, dispersed, and mainly concentrated in urban centers. The Indian strategy prioritizes that achieving digital inclusion requires not only technological advancements but also sustained investment in teacher training, development of multilingual content, and equitable access. Viet Nam could benefit from stimulating India's strategy by adopting a phased, context-specific approach. Such a strategy would need to tackle regional inequalities in particular and ensure all students, including rural and disadvantaged groups, have access to AI in education.

South Africa's experience with digital transformation in education also offers another critical perspective for Viet Nam's pursuit of AI integration. The nation's early recognition of the potential of technology to improve learning quality is demonstrated by initiatives like the Thutong Portal, launched in 2005. The portal provides free, interactive services related to curriculum, teacher development, school management, educational resources, and policy information. As an inclusive and participatory platform, Thutong fosters online communities of practice that enable educators to exchange pedagogical innovations as well as locally relevant content (*Thutong: National Education Portal*, n.d.). This foundation has been expanded into a more strategic framework under the Digital and Future Skills Strategy (2021-2025). This strategy highlights a society where individuals and the economy benefit from improved digital skills, anchored in agility, creativity, and problem-solving. It offers a coordinated roadmap for collaboration among government, academic institutions, the business community, and civil society to cultivate digital capabilities from early childhood through post-secondary education (Department of Communications and Digital Technologies, 2020). Additionally, in October 2025, Microsoft South Africa and the Department of Higher Education and Training (DHET) signed a Memorandum of Understanding (MoU) to strengthen the growing role of public-private partnership in supporting AI education. Through this collaboration, Microsoft offers the AI Engineer Programme and Digital Literacy training at TVET colleges, along with AI leadership capacity building for college principals. This partnership aims to align educational curricula with industry objectives, ensuring students acquire future-ready digital and entrepreneurial skills (Stuurman, 2025).

Compared to India, where large-scale digital learning systems such as DIKSHA and SWAYAM operate under a unified policy framework, South Africa focuses more on cross-sector partnerships and the development of digital literacy than on widespread national e-learning platforms. Rural areas are, however, not part of the digital communication system, subsequently leading to digital inequality. Evidence shows that critical perspectives on digital inclusion show that the more information is distributed through new modes of technology, the more communities from lower economic strata are excluded from the information society and participation in the digital economy. These realities underline that even comprehensive digital education policies continue to face challenges of connectivity, equity, and inclusiveness, particularly within rural and marginalized provinces (Seadira & Heuva, 2021).

Lessons learned from South Africa emphasize that Viet Nam needs to incorporate community-based inclusion mechanisms, localized digital literacy initiatives, and robust public-private partnerships for Viet Nam. This approach is crucial in making education transformation driven by AI extend to all students, especially for rural and disadvantaged students.

Policy and Practices Recommendations

Based on comparative observations from India and South Africa, as well as the existing strategy of Viet Nam, several policy and practice recommendations are proposed to improve its pathway toward sustainable, equitable, and responsible AI integration in education.

For policymakers, while Viet Nam has established a robust strategic foundation, the subsequent step involves translating it into a comprehensive implementation framework for AI in education. This framework should provide clear instructions on appropriate usage, student data protection, and guidelines for maintaining academic integrity. The government may also establish an independent AI ethics oversight organization to monitor data governance, algorithmic fairness, and the appropriate use of AI in classrooms. Importantly, the policy should be supported by a targeted financial plan to improve technological infrastructure, with a specific focus on bridging the divide between urban and rural areas (Nguyen & Pham, 2025). Long-term sustainability funding models, such as specialized digital education funds and public-private co-financing mechanisms, are necessary to ensure continuity of short-term pilot projects. Besides, Viet Nam may promote public-private partnerships to create subsidized connectivity models or community learning hubs, so all students from any part of the country benefit from digital innovations. A transparent monitoring and evaluation process should include measurable indicators of equity, learning outcomes, and technology efficacy, supported by regular policy review cycles. Mechanisms for student input, including co-design procedures and feedback platforms, should also be included to make sure AI systems respond to students and encourage democratic engagement.

It is essential to prioritize teacher capacity development through practice-based and continuous professional development programs. While short-term seminars currently dominate, experiences from both India and South Africa indicate that impactful digital continuous professional learning, mentorship, and partnerships with industry experts are essential for effective digital transformation. Viet Nam should institutionalize AI pedagogy certification programs and collaborations with technology companies to build educators' confidence and technical proficiency, especially in rural areas. Nguyen and Pham (2025) state that teacher professional training must be continuous, context-specific, and accessible to all teachers, regardless of their location.

Finally, promoting digital literacy and creating localized content are crucial for linguistic and cultural inclusion. Various regional languages and Vietnamese cultural values should be embedded in AI tools and internet platforms to enable accessibility and engagement. Collaborations between universities, EdTech, and provincial education departments could facilitate the development of open-source, AI-supported learning content that reflects local contexts. By encouraging students to utilize AI responsibly and critically, these programs support inclusive and sustainable learning environments.

Conclusion

While Viet Nam shows policy commitment to artificial intelligence (AI) in education, its implementation remains unequal, with most of the initiatives concentrated in urban areas. Structural barriers, including limited connectivity, digital divide, and insufficient teacher training, continue to hinder the transformative potential of AI. Comparative lessons from India and South Africa demonstrate that effective AI integration depends not only on technology but also on clear governance frameworks, sustained infrastructure investment, and ongoing teacher training. This study contributes to the literature by positioning AI adoption as a form of structural educational reform. It situates Viet Nam's digital transformation within a South-South framework and underlines the importance of democratic participation, inclusive governance, and sustainable learning ecosystems in reducing structural inequalities between urban and rural communities.

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11 |

Artificial Intelligence and Educational Equity in Vietnam

Thao Huong Vu

Abstract

Education is undergoing a profound transformation under the influence of Artificial Intelligence (AI), reshaping learning content, methods, and management. AI enables personalized learning, promotes self-directed learning, and supports intelligent, data-driven education. However, it also raises challenges of equitable access for vulnerable groups such as ethnic minority students, who face limitations in infrastructure, digital skills, and language. This study analyzes the relationship between artificial intelligence and educational equity in Vietnam within the context of digital transformation. It focuses on the access to and participation in AI governance of ethnic minority students in the Northern mountainous provinces. At the same time, it situates AI within the connective framework of the DEN network as a platform to promote an inclusive, community-centered model of AI in education. The research employs secondary data analysis combined with the theoretical frameworks of the digital divide and educational equity developed by the OECD (2021) and UNESCO (2023), and aligns them with Vietnam's National Digital Transformation in Education Policy (MOET, 2022). The paper is structured into seven parts: (1) Introduction; (2) Theoretical foundation and analytical framework on AI and educational equity; (3) Vietnam's educational transformation context; (4) Case analysis of ethnic minority students' access to AI in northern mountainous provinces; (5) Discussion; (6) Policy recommendations; and (7) Conclusion.

Introduction

Background: AI and the Future of Education

Over the past two decades, Artificial Intelligence (AI) has profoundly transformed education. UNESCO (2023) notes that AI can expand lifelong learning, enhance personalization, and support teachers in assessment and instructional design, while the OECD (2021) emphasizes its role in enabling smart, data-driven learning systems. Yet these benefits remain unevenly distributed, as disparities in socioeconomic and technological conditions have widened the digital divide.

Aligned with Sustainable Development Goal 4 (UN, 2015), educational equity encompasses not only school access but also technology access, quality learning, and future-oriented skills. The World Bank (2022) warns that without equitable public governance, AI adoption may reproduce existing inequalities, particularly in developing contexts marked by urban- rural and ethnic disparities.

In Vietnam, the National Digital Transformation Program in Education 2021–2030 (MOET, 2022) promotes building a digital education ecosystem and integrating AI, big data, and machine learning. However, implementation gaps persist, especially in disadvantaged regions. MOET (2024) reports over 1.8 million ethnic minority students, 8.5% of the total student population, mainly in 14 northern mountainous and Central Highlands provinces, where infrastructure, devices, and digital literacy remain limited. UNESCO Vietnam (2023) indicates that only 37% of schools in these areas have stable Internet access, and fewer than 20% of students can use online learning platforms.

From a political economy perspective, these gaps reflect not only geography but also structural constraints. According to the Ministry of Finance (2023), provinces such as Ha Giang, Dien Bien, and Lai Chau rely on central budget transfers for over 70–80% of their expenditures, revealing high fiscal dependency and weak local capacity. This centralized governance structure, combined with uneven regional development, reinforces structural inequality and constrains the equitable implementation of AI in education.

Research Objectives and Questions

The primary objective of this study is to analyze the relationship between AI and educational equity in Vietnam, with a particular focus on the case of ethnic minority students within the context of digital transformation.

Specifically, the study seeks to address the following questions:

- How is AI currently being applied in schools across Vietnam?

- What are the main barriers that ethnic minority students face in accessing AI?

- What factors influence their ability to utilize AI for learning and skill development?

- What policies and models are needed to ensure technological equity and inclusive learning for this group?

- Does the implementation of AI in education ensure the rights of students and local communities to participation, voice, and meaningful control over technology?

Theoretical Foundation and Analytical Framework

The Concept of Artificial Intelligence in Education (AI in Education)

AI refers to a field of technology that simulates human cognitive abilities, including thinking, learning, and decision-making, through computer systems and algorithms. In the educational context, AI is understood as a tool for *personalizing learning* and *enhancing educational management* (OECD, 2021).

According to UNESCO (2023), *AI in Education (AIEd)* can be categorized into three main functional groups:

1. *AI for Learning:* Supports students in learning at their own pace and according to their individual capabilities, for example, through personalized exercise recommendation systems or virtual learning assistants.

2. *AI for Assessment:* Enables automated grading, tracks students' learning progress, and identifies their strengths and weaknesses.

3. *AI for Administration:* Assists educational decision-making, optimizes resource allocation, and predicts training or staffing needs.

The Concept of Educational Equity

Educational equity is understood as ensuring that all learners have fair opportunities to access, participate in, and achieve quality learning outcomes (UNESCO, 2018).

According to the OECD (2020), educational equity can be viewed from two main dimensions:

1. *Equality of Opportunity:* All individuals have equal access to learning opportunities regardless of their background, region, gender, or ethnicity.

2. *Equity of Outcomes:* Ensuring that all learners achieve comparable outcomes in terms of competence, skills, and future opportunities.

Educational equity, therefore, goes beyond the notion of *"access to schooling"*; it also includes access to quality learning content, modern learning tools, and supportive learning environments. In the digital transformation era, this concept extends further to include *technological equity* - defined as learners' ability to access, use, and benefit from technology (Helsper, 2021).

Digital Divide Theory

The concept of the *digital divide* emerged in the late 1990s to describe the disparities in access to and use of information technology among different social groups (van Dijk, 2020). According to van Dijk's (2020) *three-level model*, the digital divide consists of:

1. *Access Divide:* Differences in technological infrastructure, device availability, and Internet connectivity;

2. *Usage Divide:* Variations in individuals' ability and frequency of technology use;

3. *Outcome Divide:* Disparities in how effectively individuals can transform technology use into learning benefits, skills, and career opportunities.

The 3A Analytical Framework: Access - Agency - Achievement

To assess the degree of equity in access to AI in education, this study adopts the *3A framework*: *Access, Agency, and Achievement* - adapted from OECD (2021) and UNESCO (2023).

1. *Access:* Refers to the availability and accessibility of technological infrastructure, devices, and AI-based learning platforms. For ethnic minority students, *access* extends beyond Internet connectivity to include linguistic and cultural relevance of learning materials, as well as adequate pedagogical support.

2. *Agency:* Reflects learners' capacity to actively and independently use AI for learning and creativity. This dimension depends on digital skills, technological awareness, and confidence in navigating digital learning environments.

3. *Achievement:* Measures the extent to which AI contributes to improving learning outcomes and expanding educational opportunities. In this study, *achievement* is not limited to academic performance but also encompasses lifelong learning abilities and adaptability to the digital society.

AI, Critical Pedagogy, and the Political Economy of EdTech

According to Paulo Freire (1970), education is inherently political, embedded in power relations that either promote emancipation or reproduce inequality. In the AI era, the key question is not only how AI improves learning, but whom it serves and who controls the data and algorithms. Henry Giroux (2011) warns that without democratic oversight, educational technology may commodify knowledge, while Selwyn (2019) highlights the growing influence of private platforms over curricula, data infrastructures, and learner behavior. Thus, AI in Vietnamese education should be viewed not merely as a pedagogical tool, but as a governance arena where the state, corporations, and communities negotiate power and authority.

Vietnam's Context in the Digital Transformation Era

Digital Transformation Policies in Vietnamese Education

Vietnam has identified digital transformation as a core driver of national development. Under the National Digital Transformation Program to 2025, with Orientation toward 2030 (Decision No. 749/QĐ-TTg, 2020), education is one of eight priority sectors, aiming to build a digital education ecosystem centered on AI, Big Data, and Learning Analytics.

Following this direction, the Ministry of Education and Training (MOET) issued the Digital Transformation Program for 2022–2025, with Orientation toward 2030 (Decision No. 131/QĐ-BGDĐT, 2022), structured around three pillars: (1) Digital governance and national education databases; (2) Digital transformation in teaching and learning through online, blended, and AI-supported models; and (3) Ensuring equity and access, particularly for disadvantaged students.

By 2023, about 65% of general education institutions had adopted online or blended learning (MOET, 2023). Leading universities such as Hanoi University of Science and Technology and Vietnam National University Ho Chi Minh City have integrated AI into teaching and management systems. However, adoption in urban areas remains two to three times higher than in rural and mountainous regions. A persistent gap also exists between policy and practice, as pilot initiatives often end with external funding, and centralized investment tends to prioritize equipment over human capacity, resulting in technology that is underutilized.

The Extent of AI Application in Vietnam's Education System

AI application in Vietnam's education system is concentrated in three areas:

1. *Online and Personalized Learning:* Platforms such as ViettelStudy, Học Mãi, and Admicro utilize AI algorithms to recommend lessons tailored to students' learning abilities and preferences.

2. *Learning Assessment and Management:* AI technologies are being used for automated grading, exam fraud detection, and tracking student progress. Examples include AI systems developed by FPT.AI and VNPT e-Learning.

3. *Teacher and Student Support:* Tools like ChatGPT, Copilot, and various virtual learning assistants are increasingly popular for lesson planning, explaining exercises, and language practice.

However, UNESCO (2023) and the World Bank (2022) note that AI adoption remains largely at the pilot stage and concentrated in major cities. In rural and ethnic minority areas, access is constrained by weak infrastructure, limited human resources, and language barriers. A VNIES (2023) survey shows that only 12% of teachers in ethnic minority regions have basic digital training, and fewer than 10% of remote schools have stable access to online platforms, limiting meaningful AI exposure for students.

Additionally, governance challenges persist. Most AI solutions operate on global technology platforms, with limited domestic alternatives and weak regulatory oversight of data and algorithms. This creates risks of student data exploitation, dependency on external providers, and commercialization of learning behaviors, raising concerns about equitable and accountable AI deployment in education.

Socio-Linguistic Characteristics and the Educational Situation of Ethnic Minority Students

According to the Committee for Ethnic Minority Affairs (2023), Vietnam has 53 ethnic minority groups with about 15 million people, including over 1.8 million students in general education, mainly concentrated in the northern mountainous regions and the Central Highlands.

A common characteristic among these groups is that they live in areas with difficult socio-economic conditions, underdeveloped educational infrastructure, and high linguistic diversity. Many students learn Vietnamese as their second language. A World Bank (2022) survey revealed that:

1. Over 45% of ethnic minority students lack personal learning devices (computers or tablets);

2. Around 60% do not have access to high-speed internet at home;

3. Nearly 70% are unaware of AI-based learning tools such as ChatGPT, reading practice software, or interactive learning applications.

As a result, this group of students is being left on the margins of digital transformation, while urban areas are rapidly adopting smart learning models. This imbalance not only limits equal learning opportunities but also impacts future competitiveness, as digital literacy becomes a fundamental skill in the global labor market (OECD, 2021).

Case Study Analysis: The Use of AI in Learning among Ethnic Minority Students in Northern Mountainous Provinces of Vietnam

Introduction to the Case Study

Using the 3A framework (Access - Agency - Achievement), this study examines how ethnic minority students in the northern mountainous provinces of Lào Cai, Hà Giang, and Điện Biên access and utilize AI in their learning. These provinces were selected because they represent regions with the highest concentration of ethnic minority students in Vietnam.

According to the Ministry of Education and Training (MOET, 2024), these three provinces have a combined total of over 200,000 ethnic minority students, accounting for more than 80% of the total student population. Many ethnic boarding schools in these areas have been equipped with digital learning infrastructure, such as online classrooms and learning management systems. However, significant barriers remain in integrating AI tools effectively into the learning process.

The selection of these localities is particularly meaningful, as they are beneficiaries of national digital transformation programs and high-tech education initiatives, including:

- “Smart Classrooms for Mountainous Areas” (a joint initiative by Viettel and MOET, launched in 2022), which provides digital infrastructure and e-learning platforms to remote schools; and

- “AI for All” (a collaborative project between UNESCO and VNPT, 2023), which aims to enhance AI literacy and promote inclusive digital learning for marginalized students.

These regions thus provide a representative case for understanding how AI-driven education policies are being localized and implemented in ethnically diverse and socioeconomically disadvantaged settings, and how access, agency, and achievement are influenced by both technological and cultural factors.

This study primarily relies on secondary data and project reports, and therefore remains limited in terms of direct qualitative data collected from students. Furthermore, the researcher’s positionality, particularly not residing within the surveyed communities, may have influenced the interpretation of findings.

Access - The Level of AI Accessibility in Learning

Within this dimension, the study focuses on three key aspects: (1) Technological infrastructure and devices, (2) Language and learning materials, and (3) Financial accessibility and resources.

First, Technological Infrastructure and Devices

According to Viettel (2023), only about 42% of ethnic boarding schools in the Northwestern region have access to high-speed Internet, and merely 25% have computer labs available for student use. Most of the learning equipment, such as computers, projectors, or smart boards, comes from short-term aid projects, while maintenance and upgrades remain a financial burden for under-resourced schools.

In Đồng Văn District (Hà Giang), for instance, only 3 out of 16 secondary schools are equipped with standard-level IT classrooms (MOET, 2023). This highlights that despite the government's policy commitment to ensuring "technological access for disadvantaged students", the infrastructure gap between mountainous and lowland areas remains substantial.

Second, Language and Learning Materials

Language barriers are among the most significant challenges. Most AI-powered learning platforms, such as ChatGPT, Grammarly, Duolingo, and AI-based English learning chatbots, operate primarily in Vietnamese or English, while many ethnic minority students are not yet fluent in Vietnamese.

A UNESCO Vietnam (2023) survey found that nearly 60% of H'Mông and Dao students in Lào Cai reported difficulties using AI tools in Vietnamese, and over 80% were unable to use educational applications without teacher assistance. This indicates that AI technologies have not yet been localized to fit the multilingual and multicultural realities of highland learners, an essential condition for educational equity.

Third, Financial Accessibility and Resources

Many ethnic minority households earn less than 2 million VND (≈80 USD) per month (World Bank, 2022), making it difficult to afford digital devices or pay for Internet services. Around 70% of students in Điện Biên and Hà Giang must share devices with family members, severely limiting their ability to study online or use AI-based learning tools.

Overall, along the Access dimension, ethnic minority students remain at a low level in terms of infrastructure, language accessibility, and financial capacity. Consequently, they have limited opportunities to engage with and benefit from the transformative potential of AI in education. Beyond initial access, issues of long-term maintenance and financial sustainability must also be addressed. Technological equipment typically has a short lifecycle, while local budgets remain constrained, creating a risk of continued dependence on external funding.

Agency - Learners' Agency in Accessing and Using AI

This dimension focuses on three key aspects: (1) Digital skills and self-directed learning, (2) Teachers' role and pedagogical support, and (3) Awareness and attitudes toward AI.

First, Digital Skills and Self-directed Learning

According to UNESCO (2023), *digital literacy* refers to the ability to find, evaluate, use, and create digital content safely and effectively.

In Vietnam, there is a significant gap in digital competence between ethnic minority students and their urban peers. The Digital Literacy Survey (VNIES, 2023) shows that only 24% of students in ethnic minority areas possess basic digital skills, compared to 68% in urban areas. Many highland students have never received formal training in AI technology and often perceive AI applications, such as ChatGPT, as something "distant" or "for city people only".

Second, Teachers' Role and Pedagogical Support

Teachers play a decisive role in developing students' agency. However, according to MOET (2023), more than 70% of teachers in ethnic minority regions have not been trained in using AI for teaching. In practice, "AI in the classroom" remains fragmented and superficial, mostly limited to using digital tools for lesson preparation or visual presentation rather than true pedagogical integration.

A teacher from Bắc Hà Boarding School (Lào Cai) shared: *"We would love to use ChatGPT or AI-based applications to help students learn Vietnamese, but weak Internet and outdated devices make it almost impossible".* (MOET, 2023)

Third, Awareness and Attitudes Toward AI

In many localities, students perceive AI as something *foreign* or *hard to understand*. A small-scale survey by VNIES (2023) across three northern mountainous provinces found that only 15% of students believed AI could help them learn better, while over 40% were indifferent due to a lack of Internet access or unfamiliarity with the tools.

This reveals a concurrent “awareness gap” alongside the digital divide, both of which undermine the agency of ethnic minority students - their capacity to actively engage with, adapt to, and benefit from AI in learning. From a participatory pedagogical perspective, AI can genuinely foster agency only when students are involved in co-creating content, providing feedback to the system, and understanding how algorithms function. This requires a shift from a model in which “students use AI” to one in which “students co-design with AI”.

Achievement – Learning Outcomes and the Impact of AI on Education

This dimension focuses on three key aspects: (1) Positive impacts of AI in pilot projects; (2) Limitations in learning outcomes; and (3) Implications for social competence and future opportunities.

First, Positive Impacts of AI in Pilot Projects

Several pilot initiatives demonstrate that AI can generate significant educational benefits when properly implemented. For instance, in the “AI for All” project jointly launched by UNESCO and VNPT in Lào Cai (2023), Tày and Dao students in grades 8 and 9 used an AI-based Vietnamese reading app featuring voice feedback. After six months, the proportion of students reading fluently increased from 54% to 78%, and over 60% reported feeling more confident when learning Vietnamese.

Similarly, the “Smart Classrooms for Highland Areas” program by Viettel in Điện Biên enabled H’Mông and Thái students to access digital lessons and use AI-based virtual assistants for Q&A and reading comprehension practice. These results indicate that, when appropriately localized and supported, AI can help narrow knowledge gaps, enhance language skills, and boost learning motivation among ethnic minority students in disadvantaged regions.

Second, Limitations in Learning Outcomes

However, large-scale implementation of AI in education (AIEd) for ethnic minority students has yet to produce strong results. According to MOET (2024), the digital competence level of ethnic minority students remains 40% lower than the national average.

One key reason is that AI is often used passively, as a supplementary tool rather than being fully integrated into teaching and learning processes. Moreover, the lack of AI tools in ethnic languages and the limited availability of localized learning resources hinder students from applying AI effectively in core subjects. This has led to what researchers call *"AI for the privileged"*, where AI-based learning primarily benefits urban or well-resourced students, while leaving behind those from marginalized communities.

Third, Implications for Social Competence and Future Opportunities

Beyond academic achievement, AI access also shapes students' social and career prospects. The World Bank (2022) identifies basic digital literacy and AI literacy as two of the five essential skills for the 21st-century workforce. Without early exposure to these skills, ethnic minority students risk being excluded from future labor markets, where AI technologies permeate nearly every sector - from agriculture and manufacturing to public administration and services. In this sense, limited access to AI is not only an educational issue but a long-term question of social equity, determining who can fully participate in the digital and knowledge-based economy of the future.

Thus, limited access to AI is not merely an educational issue but a matter of long-term social justice. The impact of AI should be assessed from an intergenerational perspective, considering whether current digital skills can enhance students' future employment opportunities and income prospects.

Discussion

The research findings reveal a common paradox in the process of digital transformation in education: AI can both expand learning opportunities and exacerbate educational inequalities if implemented without adequate preparation (UNESCO, 2023).

In Vietnam, while urban students have quick access to AI-based learning applications, ethnic minority students continue to face significant barriers in terms of infrastructure, language, and digital literacy. This indicates that AI itself does not inherently create equality; rather, its impact depends on the level of institutional readiness, human capacity, and technological culture (OECD, 2021). This assertion is reflected in several key issues as follows:

The use of AI in education raises ethical concerns and issues of information equity. The World Bank (2022) warns that "when AI training data fail to capture cultural diversity, technology may embed hidden biases (algorithmic bias)". In Vietnam, most AI-based educational systems are trained on standard Vietnamese-language data, which leads to the risk of linguistic bias, causing AI to misinterpret or respond inaccurately to ethnic minority students.

Existing a significant gap between policy orientation and implementation capacity at the local level. Although the Ministry of Education and Training has introduced multiple initiatives to promote digital transformation in education, most resources and projects are concentrated in urban areas, while ethnic minority regions lack qualified personnel and clear mechanisms for implementation. According to the Vietnam National Institute of Educational Sciences (VNIES, 2023), only 26% of AI training programs in schools include components assessing their impact on disadvantaged students. This has resulted in a situation of "equity in policy, but inequality in practice".

The measurement of AI's impact in education remains limited. Most current reports focus on the number of devices distributed or the number of students participating in AI-based projects, rather than assessing actual learning outcomes and digital competencies achieved. UNESCO (2023) recommends that countries develop an equity-based framework for evaluating digital education, including indicators on access, usage, and learning outcomes disaggregated by gender, region, and ethnicity. Vietnam could adopt this framework in future assessments of its educational digital transformation. AI in education should be situated within a framework of democratic governance, incorporating mechanisms for community consultation, algorithmic transparency, and clear accountability between the state and private enterprises.

Policy Recommendations

These recommendations aim to develop an equitable, sustainable, and localized AIEd ecosystem in Vietnam, structured around three pillars: equitable access; human capacity and contextualized content; and governance, ethics, and cooperation.

Group 1: Developing Digital Infrastructure and Ensuring Equitable Access

Close the urban–mountain infrastructure gap by expanding high-speed Internet to all ethnic boarding schools, providing devices and subsidized connectivity for disadvantaged students, and establishing community digital learning centers in remote areas.

Group 2: Developing Localized and Multilingual Learning Content

Build digital linguistic databases for ethnic minority languages; encourage enterprises to develop AI learning tools in ethnic languages; and create open educational resources (OER) that integrate local culture while supporting mainstream knowledge acquisition.

Group 3: Teacher Training and Digital Capacity Development for Communities

Launch a national "AI Pedagogy" training program; implement a "Digital Teachers for Mountainous Areas" model with online training and university mentorship; and organize digital skills workshops for parents and students to strengthen community-based learning ecosystems.

Group 4: Strengthening Public-Private Partnerships and International Collaboration

Mobilize resources through partnerships with major technology firms and international organizations; expand cooperation under inclusive AI education programs; and establish an "AI for Equity Fund" to pilot educational technologies in disadvantaged provinces.

Group 5: Strengthening Legal, Ethical, and Monitoring Frameworks for AI in Education

Develop a national Code of Ethics for AI in Education aligned with international standards; introduce an AI Equity Index to monitor access and outcomes; and issue clear guidelines on learning data governance to ensure privacy, safety, and accountability.

Group 6: Strengthening Community Governance and Social Oversight in the Implementation of AI in Education

Institutionalize participatory governance by establishing school-level technology councils, applying participatory budgeting to edtech projects, and piloting social oversight mechanisms for student data governance to ensure transparency and accountability.

Conclusion

The study examines the relationship between artificial intelligence (AI) and educational equity in the context of digital transformation in Vietnam, with a focus on ethnic minority students in the Northern mountainous region. The findings indicate that although AI holds significant potential to narrow learning gaps, its implementation faces multiple barriers, including weak technological infrastructure, limited digital skills, and a lack of culturally and linguistically appropriate learning materials. Under the 3A framework (Access – Agency – Achievement), inequality manifests across three dimensions: restricted access to technology, low levels of agency among teachers and students, and modest learning outcomes, as AI has not yet been deeply integrated into the formal curriculum.

In a context where AI is reshaping knowledge structures and power relations in education, transnational academic networks such as DEN function as soft infrastructure for global knowledge governance, fostering critical analytical capacity and digital citizenship. Expanding DEN's collaboration with Vietnamese higher education institutions is therefore a strategic step toward democratizing access to global knowledge and cultivating a new generation of scholars and policymakers capable of engaging responsibly in AI governance in education.

In sum, AI can serve as a tool for equity only when implemented with clear direction, ethical grounding, and a human-centered approach, moving toward an "AI for All" ecosystem in Vietnamese education.

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12 |

Educating for Peace, Sustainable Development and Civilian Protection

Ariadna Rita Lemos De Oliveira

Abstract

This chapter examines the connections between armed conflict, International Humanitarian Law (IHL), and sustainable development, particularly emphasising the role of higher education institutions. These institutions play a crucial role in educating students about their legal rights, ethical responsibilities, and the importance of active citizenship. The chapter also explores the impact of emerging technologies, especially Artificial Intelligence (AI), on the protection of civilians and the support of IHL, as well as their contributions to sustainable development. It highlights both the opportunities and challenges presented by these technologies, examining educational models that promote teamwork and hands-on learning of legal concepts to improve understanding and use of humanitarian norms as practical tools for building peace, ensuring accountability and supporting sustainable development. Conflicts cause significant humanitarian and social harm, including civilian casualties, displacement, infrastructure destruction, and increased inequality, greatly hindering progress toward the United Nations Sustainable Development Goals (SDGs), especially those related to peace, justice, education, and sustainable institutions. IHL provides a legal framework for protecting civilians, limiting violence, and maintaining human dignity during armed conflict. However, the effectiveness of IHL relies not only on legal norms but also on their dissemination, education, and ethical interpretation within societies and institutions.

Introduction

International Humanitarian Law (IHL) governs and seeks to protect civilians by limiting human suffering through restrictions on attacks against civilians, their population and infrastructure. IHL aims to preserve humanity and dignity, morality, and a legal order during armed conflict. Besides being a set of legal rules, IHL is a crucial framework for sustainable development that regulates violence, safeguards humanitarian principles and serves as the source of law ensuring accountability after conflicts.

The nature of armed conflict has significantly changed in recent decades. While reaching their highest levels since the end of the Second World War (Council on Foreign Relations 2025), armed conflict tends to be confined within territories, rather than involving other States. Despite this shift, armed conflict remains a source of humanitarian and societal harm, causing civilian deaths, displacement, essential infrastructure destruction, growing inequalities, disruption of education and erosion of public trust. These effects represent a significant obstacle to the 17 Sustainable Development Goals (SDGs) set by the United Nations in its 2030 Agenda, addressing global challenges for peace and prosperity. Yet, armed conflict undermines nations' efforts and ability to achieve those goals (Wang et al., 2024: 1).

The effectiveness of legal norms depends on understanding, dissemination and implementation. IHL education is therefore essential and required under the Geneva Conventions and Additional Protocol I; this chapter contributes to this specific aim by shifting IHL education from dissemination to military personnel, legal practitioners and humanitarian actors to a broader audience, promoting transformative and interdisciplinary education. Linking IHL education to sustainable development demonstrates the importance of this field in contributing to sustainable governance and peacebuilding frameworks, positioning higher education institutions as key actors in conflict prevention. The position of universities in the educational ecosystem allows them to reach a wide range of societal actors who have direct and indirect impacts on the drafting, implementation, and enforcement of IHL, and foster ethical reasoning, critical thinking and interdisciplinary responses to global crises. Universities also function as key knowledge infrastructures advocating for human rights and dignity, contributing to post-conflict recovery and peacebuilding strategies, and supporting the justice process and accountability. It is our mission to systematically bring this debate to light and support any initiatives that safeguard and improve social sustainable development, contributing to effective democratic organisation and political challenges.

Technological progress also contributes to reshaping the nature of armed conflict. While these developments bring new opportunities to protect civilians during armed conflict and to support SDGs, they also raise legal, ethical and educational challenges. Integrating AI and digitalisation into IHL pedagogy reshapes IHL education itself, and prepares students to responsibly and critically engage with these new technologies, an essential step toward sustainable higher education both in peacetime and in more fragile contexts.

This chapter outlines the legal framework of IHL with a focus on civilian protection, explains the relationship between armed conflict and SDGs and presents higher education institutions as knowledge-generating platforms for IHL education. It continues with an analysis of AI opportunities and risks posed to IHL and sustainable development, outlining the necessity of a democratically inclusive governance framework. It concludes by examining educational models that promote sustainable education, interdisciplinarity, law clinics and international collaboration, demonstrating how North–South partnerships can improve global justice and IHL education.

International Humanitarian Law and the Protection of Civilians

IHL is the body of international rules designed to limit the human cost of war. Its central purpose is to protect civilians and civilian objects, while recognising that armed conflict, by nature, involves violence (AP I, 1977, art. 57(1)). Rather than legitimising war, IHL seeks to restrain it by ensuring that military operations respect human dignity and preserve the foundations necessary for recovery, stability and long-term development.

The modern IHL framework applicable to international armed conflict is built on a series of widely accepted legal instruments. The Hague Conventions of 1907 represent the first comprehensive codification of the Laws of War, focusing on the means and methods of warfare on land (Sassòli, 2024, 28). The four Geneva Conventions of 1949 placed civilian protection at the heart of the laws of war, with the Fourth Convention dedicated to civilian persons' protection in times of war (Geneva Conventions, 1949). Additional Protocols supplement these rules, notably Additional Protocol I (1977), which clarifies the conduct of hostilities and strengthens protection for civilians caught in warfare. These rules constitute customary international law, meaning they bind all states, regardless of treaty ratification (Sassòli, 2024: 37). The ICRC also issued interpretive guidance on Direct Participation in Hostilities (DPH), which, although non-binding, is widely regarded as reflective of Customary International Law (Melzer, 2009: 9). Accountability is reinforced through international criminal law, particularly the Rome Statute of the International Criminal Court, which classifies serious breaches of the Geneva Conventions as war crimes (Rome Statute, 1998: art. 8).

At the core of civilian protection lie three interconnected principles: distinction, proportionality and precaution. Together, they regulate the use of military force and aim to reduce civilian casualties and suffering. The principle of distinction requires parties to a conflict to distinguish at all times between civilians and combatants, and between civilian objects and military objectives (Hernández, 2022, 427; AP I, 1977, art. 48(1)). Attacks may only be directed against lawful military targets, and in cases of doubt, armed forces should refrain from attacking (AP I, 1977: arts. 48(1) and 50(1)). Intentionally targeting civilians constitutes a war crime under the Rome Statute (1998, arts. 8(1) and 8(2)(a)). By restricting attacks to military objectives, distinction reduces risks to civilians and civilian objects. Distinction also plays a critical role in safeguarding essential infrastructures such as homes, schools, hospitals, water systems and cultural sites. Preserving civilian infrastructure directly supports SDGs related to human security and resilience, including SDG 3 (Good Health and Well-Being), SDG 6 (Clean Water and Sanitation), and SDG 11 (Sustainable Cities and Communities) (United Nations, n.d.). When civilian infrastructure is spared, communities are more likely to survive conflict and recover afterwards.

Even when a military objective is lawful, the principle of proportionality limits the incidental harm that may be inflicted on civilians. Military attacks are prohibited if the expected civilian casualties or collateral damage would be excessive in relation to the concrete and direct military gain anticipated (Dinstein, 2010: 128-130). While proportionality does not eliminate civilian harm, it seeks to prevent unnecessary loss of life and destruction (Prosecutor v Stanislav Galić, 2003: para. 58).

Excessive civilian harm undermines trust in institutions, fuels resentment and increases displacement and inequality, all of which hinder peacebuilding and long-term development. In this sense, proportionality contributes directly to SDG 16 (Peace, Justice and Strong Institutions), while also contributing to SDG 10 by mitigating social and humanitarian inequalities resulting from conflicts (United Nations, n.d.).

The obligation of precaution complements these principles by requiring parties to actively and passively minimise harm to civilians (AP I, 1977: arts. 57 and 58). Those planning an attack must verify targets, choose means and methods of warfare (Dinstein, 2010: 143), assess proportionality and provide advance warning to civilians when possible. Attacks shall be suspended or cancelled if circumstances change such that the objective ceases to be military or the incidental harm becomes disproportionate (AP I, 1977: arts. 57(2)(a), 57(2)(c) and 57(2)(b)). Precaution encourages foresight and restraint, helping to protect vital resources such as electricity networks, water supplies and civilian transport systems. Safeguarding these infrastructures supports SDGs 6 and 12 by preserving access to essential services, reducing the long-term humanitarian and environmental costs of conflict and protecting civilians' lives and dignity.

IHL also recognises limited circumstances in which civilians may temporarily lose protection, namely when they directly participate in hostilities. This exception is narrowly defined and time-limited. Civilians are protected unless and for such time as they engage in specific acts that directly harm an opposing party to the conflict (AP I, 1977: art 51(3)). Once such participation ends, civilian protection is restored. Determining DPH requires the cumulative fulfilment of three criteria: a threshold of harm, direct causation, and a belligerent nexus (Sassòli, 2024: 383-84). These limitations are essential to prevent the erosion of civilian immunity and the normalisation of violence against civilian populations. By maintaining clear legal boundaries, IHL reinforces legal certainty and accountability, and strengthens respect for the rule of law during armed conflict.

Civilians' protection under IHL is not only a humanitarian obligation but a prerequisite for sustainable societies. Respect for distinction, proportionality and precaution contributes to human dignity, institutional legitimacy and post-conflict recovery, reinforcing the close relationship between humanitarian law and the global commitment to peace, justice and sustainable development (United Nations, n.d.).

Armed Conflict Hindering Sustainable Development

Armed conflict and poverty are interconnected, forming a self-perpetuating cycle that directly undermines SDG 1 (No Poverty). Armed conflict disproportionately affects civilians by destroying livelihoods, displacing populations and disrupting access to food, healthcare, education and basic services. Civilian casualties, famine, disease and infrastructure damage generate human insecurity and pressure State capacity. Unemployment and living costs increase, public services weaken and trust in public institutions declines, entrenching poverty and long-term vulnerability (Goodhand, 2001: 4 and 13-14). The consequences of war further expose civilians to poverty, in turn, increasing the risk of conflict (Shad, 2023). Economic stagnation, long-term unemployment and social exclusion weaken State legitimacy, deepen inequality and increase susceptibility to violence and recruitment by armed groups (Goodhand, 2001: 20). This cycle erodes economic growth, destabilises institutions and obstructs sustainable development by undermining long-term institutional resilience (Marks, 2016: 2).

Healthcare systems are particularly affected, impeding the achievement of SDG 3 (Good Health and Well-Being). Whereas earlier conflicts primarily affected combatants, civilians now constitute the majority of victims (Goodhand, 2001, 8). Despite their protected status under international law, hospitals and healthcare personnel are frequently targeted or rendered non-functional. Armed conflict reduces life expectancy, increases conflict-related disabilities and malnutrition, and facilitates the spread of infectious diseases (Olu, Petu and Osman, 2024: 1). Simultaneously, mass civilian deaths and injuries overwhelm already fragile healthcare systems, accelerating institutional collapse and weakening regulatory and professional networks. The erosion of healthcare capacity deepens social inequities as marginalised communities face disproportionate barriers to health access, prolonging post-conflict vulnerability and undermining long-term public health sustainability.

Education, essential to reduce child labour and poverty, is also disrupted, undermining SDG 4's objective of inclusive and equitable Quality Education and lifelong learning opportunities for all. The destruction of schools and educational infrastructures leaves children in conflict-affected or displaced settings without access to learning, increasing exposure to hazardous labour and exploitation (Global March, n.d.). Prolonged educational disruption contributes to generational loss of skills, knowledge and professional capacity, particularly limiting learning opportunities for children and women (Wang et al., 2024: 2). Educational resilience is therefore essential not only to post-conflict recovery and peacebuilding but to sustaining governance, economic stability and social cohesion. Children deprived of schooling because of conflict represent the future actors whose exclusion threatens long-term development and democratic continuity.

Gender equality is both a fundamental right and essential for peaceful and prosperous societies (Office of the Special Representative of the Secretary-General for Children and Armed Conflict, n.d.). Yet, armed conflict disproportionately affects women, significantly obstructing SDG 5's objective of Gender Equality and reinforcing pre-existing structural inequalities (Wang et al., 2024: 8). Gender-based violence is widespread during war and sexual violence is frequently weaponised (Goodhand, 2001: 20), taking advantage of the prevailing lawlessness and impunity (Independent Commission for Aid Impact, 2019: 1). Beyond its profound and life-altering impact on survivors, such violence has serious health, economic and social consequences, often leading to exclusion from employment, education and community participation. The marginalisation of women who may face ostracism from society (Goodhand, 2001: 20), weakens household resilience, reduces economic productivity and undermines inclusive institutional development essential for sustainable peace (Khisaf, 2024).

Finally, urban infrastructures are often targeted during armed conflict, undermining SDG 11 (Sustainable Cities and Communities). Strategic attacks on transport networks restrict the supply of goods, services and humanitarian assistance, while damage to schools, hospitals and public facilities deprives civilians of essential services (Khisaf, 2024). Beyond immediate destruction, such attacks fragment urban governance systems and disrupt planning, regulation and service delivery. Effective post-conflict recovery, therefore, requires international cooperation, long-term investment and resilient reconstruction strategies prioritising safety, sustainability, institutional capacity and community participation to rebuild inclusive, secure and durable urban environments capable of withstanding future conflicts (Khisaf, 2024).

Higher Education as IHL Dissemination Platform

IHL is often perceived as a complex and, despite its pragmatic nature, an abstract field of study in countries not directly affected by armed conflict. In such contexts, IHL may appear distant from everyday realities. Nevertheless, its relevance extends beyond countries experiencing active hostilities (Devine and

Coffey, 2007: 67). Refugee displacement, terrorism, hybrid warfare and cyber operations demonstrate that contemporary violence and armed confrontation are not confined to traditional conflict zones.

The obligation to disseminate IHL is established in the four Geneva Conventions of 1949 and Additional Protocol I. These instruments require High Contracting Parties, in both times of peace and wartime, to ensure the widest possible dissemination of IHL within their territories, including its integration into military programmes and civil instruction, so that the law is known to the entire population (Geneva Conventions, 1949: Common arts. 47, 48, 127, 144; AP I, 1977, art. 83(1)). However, academic research has shown that dissemination alone does not ensure compliance. Simply transmitting legal rules rarely leads to behavioural change or respect for humanitarian norms in practice (Stubbins Bates, 2015: 2). Consequently, responsibility for IHL education is shared among multiple actors, including schools, universities, the ICRC, National Red Cross and Red Crescent Societies, State institutions, civil society organisations and individuals acting in their professional or personal capacities (Kuster, 2018: 9-10).

Within a broader educational landscape, universities hold a significant role. As centres of knowledge, critical thinking and public engagement, they contribute to building a shared civilian understanding of the laws of war. Teaching IHL in higher education enables its understanding and interpretation through social, ethical, and humanitarian perspectives, reinforcing awareness of limits on the use of force and of accountability mechanisms for violations. Universities contribute to conflict prevention and strengthen respect for civilian protection and human dignity, while being spaces for ethical reflection, civic responsibility and democratic engagement (Hulbert and Harkins, 2024).

Although States retain discretion in implementing IHL training, research reveals a paradox between IHL training and compliance. More effective outcomes emerge when IHL is taught through interdisciplinary frameworks incorporating education theory, social and organisational psychology, and military ethics, supporting moral reasoning and individual conscience alongside legal understanding (Stubbins Bates, 2015: 2-3). Carefully designed curricula allow IHL norms to be taught across disciplines, including law, international relations, peace and development studies, ethics and psychology, forming future professionals, practitioners and leaders shaping tomorrow's societies, while ensuring relevance to all sectors directly affecting civilians.

Armed conflict destabilises societies across social, economic and political dimensions. Cross-disciplinary teaching helps students understand how IHL relates to civilian protection, infrastructure, public services and environmental sustainability, enabling them to recognise their role during and after conflicts. Integrating development studies further highlights how armed conflict undermines SDGs and encourages engagement with post-conflict recovery strategies.

Universities also bridge academic knowledge and field realities (Kuster, 2018: 12-13). Interactive teaching methods such as group discussions about case studies and real-life examples, or role-based learning, encourage analytical, ethical and critical thinking about humanitarian values, promoting transformative education by linking theory to practice (ICRC, n.d.).

Multidisciplinary IHL education contributes to the formation of globally engaged citizens equipped with sustainability competencies, ethical responsibility and democratic engagement skills. By preparing future professionals to prevent violence, promote accountability and contribute to peacebuilding, while reinforcing respect for humanitarian norms and awareness of the legal consequences of their violation, universities play a vital role in advancing peace, justice, and sustainable development.

AI, Digital Innovation and International Humanitarian Law

The evolution of digital technology, specifically Artificial Intelligence (AI), presents both opportunities and risks to IHL education and practice. AI systems using Open-Source Intelligence (OSINT) information enable the rapid collection, processing, analysis of large volumes of data and their prediction (Winter, Gallacher and Harris, 2023). OSINT has become an increasingly important tool for the application, monitoring and compliance of IHL, provided that its use itself respects IHL norms. By relying on publicly available information such as social media content, videos, and satellite imagery, OSINT contributes to documenting human rights abuses, gathering criminal evidence, improving military targeting accuracy, and monitoring ceasefires (Millett, n.d.). In conflicts such as Syria, Ukraine, Gaza and Sudan, where access for independent investigators and journalists has been restricted, OSINT analysis has enabled investigators to identify potential IHL violations and war crimes. However, careful filtering of irrelevant content and identification of misinformation is necessary to ensure the veracity and reliability of the content (IMSL Web Team, 2023).

Following the unprecedented level of publicly available intelligence, Europol has created an OSINT task force supporting the investigations of alleged war crimes committed in Ukraine since 2022. 14 countries agreed to dedicate OSINT capacity to the Dutch and German-led task force, demonstrating the global collaboration between states and the International Criminal Court in support of justice and accountability (Europol, 2023).

While the United States and Britain have relied on OSINT to expose Russia's military aggression in 2022 (Colley and Dylan, 2025: 148), Google Maps allowed the exposure of Russian coordinated troops activity traffic data at the Ukrainian border, while NASA satellite images from space-based SAR sensors revealed preparation and stockpiling in Russian warehouses (Karalis, 2022). It is also alleged that the Ukrainian army requested its citizens to provide strategic information about Russia's military activity (Baffa, n.d.). The civilian contribution proved to be an asset for Ukraine's defence strategy but also blurs the lines of protection status under IHL, rendering civilians potential lawful targets as they directly participate in hostilities for such time they provide such valuable strategic information to their army. In this context, the use of OSINT by both the military and civilians underscores the need for interdisciplinary collaboration and education, ensuring that IHL rules are understood and applied, and that AI use complies with these legal obligations.

AI-enhanced wargaming systems based on OSINT can simulate real-time data and probabilities, supporting proportionality assessment in responses to self-defence attacks in populated areas. By predicting civilian casualties, blast radius and infrastructure damage, such tools can help minimise civilian harm (Roscini, 2025: 97-98), contribute to IHL compliance and enable the monitoring of SDGs related to energy and infrastructure, health and education when civilian structures are targeted. NATO's planned implementation of an AI-supported 'automated zone' along Europe's border with Russia illustrates this trend, relying on sensors, drones, partially autonomous vehicles, unmanned ground robots and automated air and missile defences for surveillance and deterrence, while ensuring human control over decisions to deploy weapons and defensive operations (AFP, 2026).

Despite these potential benefits, AI relies on algorithms that identify patterns, correlate objects in a technical sense within their contexts but cannot understand meanings, concepts or resonate with abstract ideas in the way humans do (Roscini, 2025: 99). This limitation, referred to as the 'semantic gap', highlights that AI machines do not understand the weight of human life, lack empathy as well as ethical judgement, increasing the risk of errors that human decision-makers could avoid (International Review of the Red Cross, 2019: 477).

Comprehensive legal frameworks, ethical guidelines and human oversight remain essential to ensure that AI does not undermine IHL norms (Roscini, 2025: 104). Education plays a central role in this process. Interdisciplinary training for military forces and civilians on both AI systems and IHL helps clarify AI's capabilities and limits, ensuring informed and accountable decisions by users. By promoting digital literacy, ethical awareness and critical reasoning, AI-focused IHL education supports SDG 4 (Quality Education) and reinforces SDG 16's commitment to Peace, Justice and Strong Institutions, ensuring that technological innovation remains guided by human judgment and humanitarian values.

Interdisciplinarity as an Educational Model

Applying IHL in meaningful ways requires educational approaches that connect legal principles to the lived realities of armed conflict. Higher education institutions are well placed to develop learning models emphasising interdisciplinary, practical engagement and global collaboration. Through these approaches, IHL education can contribute to civilian protection, peacebuilding and sustainable development.

Integrating IHL into interdisciplinary programmes, such as peace and development studies, engineering, medicine, journalism or environmental science, enables students to understand how humanitarian rules influence their responsibilities and decisions during a conflict, while clarifying whether they benefit from protective status or bear additional obligations under IHL (The Law Institute, 2024). Embedding sustainable frameworks further highlights the long-term societal costs of armed conflict and the opportunities arising for post-conflict strategies.

Virtual classrooms offer additional possibilities for inclusive and collaborative learning. By enabling students from conflict-affected and non-affected regions to study together, these platforms facilitate the exchange of perspectives and the joint analysis of case studies. Such engagement supports SDGs 4 and 10 by empowering conflict-affected students to defend their right to education while reducing structural inequalities (Right to Education, 2024). Exposure to diverse conflict experiences encourages ethical reflection, allows the application of legal norms to human realities and supports global citizenship and democratic engagement.

Humanitarian law clinics also play a key role in helping students apply IHL to real or simulated situations involving civilian harm, humanitarian access, or accountability mechanisms. By partnering with NGOs or international organisations, clinics can strengthen practical skills, ethical awareness and professional responsibility, while contributing to institutional capacity in fragile or post-conflict environments. Students can take ownership of independent projects, while developing their IHL knowledge in near-professional settings, demonstrating how legal education can directly support humanitarian practice (Blank and Kaye, 2014: 951).

Post-conflict education partnerships illustrate the importance of sustained international cooperation. Collaboration between universities in the global North and South strengthens research networks and benefits both perspectives (Flint et al., 2022: 81). This student-led cooperation encourages locally grounded solutions, community engagement and long-term resilience.

Together, these educational models demonstrate how interdisciplinarity, experimental learning and global collaboration can transform IHL's abstract legal doctrine into a practical tool for peace, accountability and sustainable development.

Conclusion

Education, particularly higher education, is central to translating IHL into effective protection for civilians and sustainable peace. Armed conflict continues to disrupt lives, infrastructures and social cohesion, undermining progress towards the SDGs set out in the United Nations 2030 agenda. By fostering knowledge of IHL principles, universities equip students to understand the legal, ethical and practical dimensions of civilian protection, bridging the gap between abstract norms and real-life application. As neutral yet critical peacebuilding actors, higher education institutions nurture globally engaged professionals capable of preventing harm, supporting post-conflict recovery and strengthening resilient societies.

Technological developments present both opportunities and governance challenges in armed conflict. AI-enabled tools, including OSINT and predictive analytics, can enhance monitoring, reduce civilian harm, and support accountability for war crimes. Still, they require careful oversight, ethical awareness and human judgment. Universities must therefore prepare students to engage critically with emerging technologies, ensuring that innovation reinforces, rather than undermines, compliance with IHL and the protection of civilians.

Long-term civilian protection depends on sustained, interdisciplinary and globally connected education. Policy implications include supporting university-led initiatives, integrating AI governance into humanitarian and security strategies, and promoting equitable access to conflict-informed education. Curriculum design should prioritise interdisciplinarity, experimental learning and international collaboration, linking IHL to relevant fields, fostering ethical reasoning and practical competence. Research directions include investigating the effectiveness of AI-assisted humanitarian monitoring, cross-cultural educational partnerships and the role of higher education in post-conflict reconstruction and SDG implementation.

By teaching IHL through diverse disciplines and practical perspectives, universities become proactive instruments of civilian protection, sustainable development and peacebuilding, equipping future leaders with the knowledge, ethical awareness, and moral accountability needed to act responsibly in today's uncertain and conflict-affected world.

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PART IV

CLIMATE RESILIENCE, POLITICAL ECONOMY, AND SUSTAINABLE INNOVATION

13 |

Climate-Resilient Education and Rural Transformation in Southeast Asia

Minh Anh Phan

Abstract

Rural and marginalized communities in Southeast Asia are experiencing the most severe effects as climate change challenges intensify across the region. While education is recognized as a key driver of resilience, numerous schools still operate under "bamboo classroom" conditions, relying on insufficient resources and conventional methods that fall short in equipping students for climate-resilient futures. Although international debates increasingly emphasize sustainability and digital innovation, the integration of climate-related competencies and AI literacy into rural education has not been sufficiently examined. This study explores how rural education can evolve from bamboo classrooms to AI labs by applying innovative teaching reform and digital collaboration tools, narrowing the divide between traditional learning and modern sustainability needs. It highlights how curricula can be redesigned to integrate sustainability competencies and AI literacy in ways that are both interdisciplinary and culturally responsive. The research emphasizes participatory governance, institutional reform, and ethical AI integration in fostering democracy, thereby contributing to the DEN by offering a framework for reimagining rural education as a foundation for climate-resilient communities, linking indigenous knowledge with global digital tools to empower students and teachers not only to adapt to environmental change but also to actively shape sustainable futures.

Introduction

Southeast Asia is widely recognized as one of the areas most exposed to the effects of climate change. The continuous rise in sea levels, prolonged droughts, intensified storms, and irregular rainfall patterns have already disrupted agriculture, infrastructure, and livelihoods across the region. According to the ADB (2024), global climate shifts could decrease Southeast Asia's gross domestic product by up to 17% by 2070, with Vietnam alone projected to lose nearly 30% of its GDP under high-emission scenarios. Beyond these long-term projections, climate- related disasters already displace millions and cause severe economic shocks each year. The World Bank (2021) reports that floods and storms in Southeast Asia affect more than 10 million people annually, threatening not only income security but also the provision of basic services, including education. When floods or storms strike, many rural schools are forced to close, leaving children- especially those from poor households-struggling between learning and helping their families survive.

Education, however, remains one of the most powerful tools to enhance community resilience against climate change. By equipping learners with sustainability knowledge, problem-solving skills, and adaptive capacity, schools can function as local hubs for resilience-building. Yet in rural Southeast Asia, this potential is far from being realized. The unequal access to education and rural marginalization are not accidental, they are the result of political economy systems that keep power and resources concentrated in cities, leaving rural communities with little voice in decisions that affect their lives. Despite policy commitments to expand access and improve quality, many schools still operate under what is often described as "bamboo classrooms", a metaphor for fragile learning environments characterized by poor infrastructure, insufficient resources, and reliance on rote-based teaching. A joint UNICEF–UNESCO report (2021) highlights that over 60% of rural schools in low-income parts of Southeast Asia lack adequate infrastructure and digital learning resources. This not only limits the quality of education but also perpetuates a cycle in which rural students are left unprepared for climate-resilient futures.

Global debates increasingly highlight the twin imperatives of sustainability and digital innovation. On the one hand, sustainability education is viewed as central to preparing communities for a climate-challenged world. On the other hand, the integration of AI and frontier technologies is reshaping how knowledge is created, shared, and applied. Yet, while each of these trends is gaining traction in education policy and research, their integration in the specific context of rural Southeast Asia remains underexplored. Existing studies often treat sustainability education and digital literacy as separate domains, leaving a critical gap in understanding how they can be combined to transform vulnerable educational systems.

This study addresses this gap by investigating how rural education in Southeast Asia can transition from "bamboo classrooms" to "AI labs". It examines the potential of innovative pedagogy and technology-enabled collaboration to narrow the gap between traditional teaching environments and the competencies required for climate resilience. Specifically, it asks:

1. How can rural curricula be redesigned to integrate sustainability competencies and AI literacy in ways that are interdisciplinary and culturally relevant?

2. What role can digital collaboration tools and innovative pedagogy play in reducing educational inequalities in rural settings?

3. How can indigenous knowledge be connected with global digital resources to empower rural learners and educators?

Theoretically, it advances scholarship on the intersection of sustainability, AI, and rural education by proposing a framework for integration. Practically, it offers guidance for policymakers, educators, and development agencies on reimagining education as a foundation for climate-resilient communities.

Theoretical Background

Rural Education Under Climate Stress

Southeast Asia is consistently ranked among the world's most climate-vulnerable regions, where recurrent floods, typhoons, droughts, and landslides directly disrupt rural schooling. According to UNICEF (2025), climate hazards are now among the leading causes of school closures and learning disruptions within the East Asia–Pacific context, with millions of children affected annually. In 2024, Typhoon Yagi forced the suspension of classes for more than 1.5 million children across Viet Nam, Myanmar, Thailand, and Lao PDR (UNICEF, 2024). Such events are not isolated: the 2023 UNICEF East Asia and Pacific Situation Report highlights that countries in Southeast Asia account for some of the highest levels of child displacement caused by climate-related disasters worldwide, placing rural and coastal communities at greatest risk.

Beyond immediate interruptions, climate-related hazards degrade already fragile learning environments by damaging school infrastructure, disrupting access to clean water and sanitation, and undermining safe spaces for education (UNICEF, 2025). From a political economy perspective, rural education under climate stress reflects deeper structural inequalities in resource distribution and infrastructure investment. These cumulative effects disproportionately impact low-income rural households and marginalized groups, including ethnic minority children and those in remote areas, and therefore reveal not only environmental vulnerability but also state capacity constraints that limit equitable educational access. When schools are closed, children may be pulled out of education to assist in livelihood work or household recovery, thereby heightening long-term risks of dropout and learning loss.

In this context, rural education systems in Southeast Asia are not merely service providers but frontline mechanisms for building adaptive capacity and resilience. Strengthening schools against climate disruptions thus represents a central safeguarding of children's rights and preparing communities for increasingly volatile futures.

The "Bamboo Classroom" Phenomenon

The metaphor of the "bamboo classroom" has gained traction in Southeast Asian educational discourse to describe fragile, makeshift learning environments. These are typically rural schools constructed from temporary or cheap materials such as bamboo, nipa palm, or corrugated tin, reflecting deep resource constraints and infrastructural inequities. Beyond their physical fragility, bamboo classrooms symbolize systemic neglect of rural education and the persistence of low-quality learning environments.

After Typhoon Haiyan (Yolanda) struck in 2013, the Philippines reported that over 3,600 schools were damaged or destroyed, forcing students to study in temporary bamboo classrooms with minimal resources (UNESCO, 2014). In Cambodia and Laos, World Bank assessments reveal that more than 40% of rural schools lack access to safe drinking water, electricity, or digital tools necessary for modern pedagogy (World Bank, 2022). Similar challenges are documented in upland Vietnam, where ethnic minority communities often rely on makeshift or temporary classrooms. In other areas, primary schools have been described as fragile wooden or bamboo structures, with walls of pallet wood or woven bamboo, tin or fibro-cement roofs, and plastic sheets used for ceilings, reflecting highly precarious conditions (Nhan Dan, 2024).

The persistence of bamboo classrooms demonstrates how structural underinvestment perpetuates cycles of educational inequality. Rural students taught in such environments are disadvantaged not only in terms of infrastructure but also in exposure to digital skills and future-oriented learning. This raises critical questions about how innovation, particularly digital and AI-based solutions, can penetrate contexts defined by fragility.

Climate Competencies in Education

Climate change education has been increasingly recognized as a critical foundation for resilience, particularly in vulnerable regions such as Southeast Asia. According to UNESCO (2024), climate change education involves empowering learners with the competencies, values, and mindsets needed to comprehend and take meaningful action on the climate crisis, encouraging them to become active agents of transformation rather than passive knowledge receivers. Within sustainability science, Wiek, Withycombe, and Redman (2011) further outlined key competencies encompassing abilities in systems thinking, anticipation, ethical judgment, strategic planning, and collaboration- which have become central to curriculum design aimed at preparing students for long-term ecological and societal challenges.

For rural learners, these competencies are particularly relevant. In Southeast Asia, where agriculture remains the primary livelihood for millions, the development can be evaluated through formative assessment methods such as reflective and community impact projects rather than depending on sustained teacher support systems, including professional development in climate pedagogy, access to digital tools, and institutional mentoring networks. Thus, equipping students with climate competencies such as sustainable farming practices, disaster preparedness, and water resource management provides actionable skills that strengthen household and community resilience.

AI Literacy in Emerging Contexts

The notion of AI literacy has gained traction as education systems begin to prepare learners for a future shaped by automation and digital technologies. Long and Magerko (2020) conceptualize literacy in artificial intelligence as a collection of skills that include understanding how AI systems function, having the capacity to operate AI tools, evaluating their outputs, and recognizing ethical implications. Similarly, Ng et al. (2021) highlight the significance of incorporating AI literacy into school curricula to foster involvement of technical expertise alongside ethical and critical consciousness.

However, in Southeast Asia, the implementation of AI literacy faces significant infrastructural and pedagogical barriers. Many rural schools lack reliable internet connectivity, devices, and educator training for digital instruction. For instance, UNESCO data shows that in countries with limited economic resources, less than 30% of primary schools have internet access for teaching purposes, with rural schools disproportionately affected (UNESCO Institute for Statistics, 2024). This “digital divide” not only limits exposure to AI-related content but also reinforces broader educational inequalities between urban and rural areas.

Integrating Climate and AI Competencies: The Gap in Rural Education

Although there is growing scholarship on climate education and AI literacy, most research addresses these areas separately. UNESCO’s GCG (2024) focuses on integrating environmental sustainability into teaching and learning, while intelligent systems studies emphasize competencies for engaging with emerging technologies. Few studies provide a systematic framework that bridges the two, that is, using AI both as a tool for climate learning and as a literacy domain in its own right.

This absence is especially evident in Southeast Asia’s rural “bamboo classrooms”, where fragile infrastructure, resource constraints, and teacher shortages already hinder basic education delivery. The challenge lies not only in introducing separate curricula for climate and AI but in developing interdisciplinary and context-sensitive approaches that connect local knowledge (such as agricultural practices and disaster preparedness) with digital innovations. UNESCO’s Global

Education Monitoring Report (2023) stresses that educational technology must be adapted to local realities, particularly in low-resource environments, yet practical guidance for integrating AI and climate competencies in rural schools remains scarce. This gap highlights the urgency of reimagining rural education as both climate and digitally-resilient, linking traditional educational settings to the evolving needs of sustainable development.

Methodology

This study adopts a qualitative research design, specifically a desk-based and case-oriented approach, to explore how climate and AI competencies can be integrated into rural education systems in Southeast Asia. A qualitative design was chosen because the research questions emphasize understanding processes, experiences, and contextual realities rather than testing numerical relationships. Instead of large-scale quantitative surveys that may risk oversimplifying fragile contexts such as "bamboo classrooms", qualitative inquiry through secondary data allows for more nuanced insights into the challenges and opportunities facing teachers and students. By focusing on meaning-making, it seeks to uncover how rural education actors conceptualize resilience, innovation, and integration of new competencies within their specific environments.

Data are drawn from secondary sources, including national education policies, NGO project reports, and international guidelines. As a result, the findings may be constrained by the limitations of existing sources and the absence of field-based empirical validation. The research acknowledges this positionality and calls for future fieldwork to capture lived experiences and institutional dynamics more comprehensively.

The research employs thematic analysis to review and synthesize findings from the selected sources. Key themes such as structural constraints, pedagogical innovation, and community-based resilience are identified through systematic coding and comparison across documents. Although this study does not involve primary data collection, it maintains academic integrity by ensuring all secondary sources are properly cited and interpreted transparently.

Findings & Discussion

From Fragile Classrooms to Digital Futures: Gaps and Opportunities

Rural schools across Southeast Asia often remain vulnerable in form and function. Many such classrooms are built with lightweight materials, susceptible to harsh weather, and lack stable electricity or wiring. This structural precarity sharply contrasts with the promise of “AI-enabled labs” - making the transition not just technical but symbolic of inequality.

Equally critical is the gap in teacher capacity. In rural settings, many educators have not received training in digital pedagogy, let alone competencies in AI literacy or climate education. Evidence from Indonesia shows that during the COVID-19 period, 44 % of teachers participated in online training, but many struggled to apply their learning, partly due to a lack of coaching and adaptation support (Yarrow et al., 2022). These findings suggest that even when teachers access training, translation into classroom practice in resource-constrained settings remains a challenge.

Finally, curricula in many rural schools still emphasize rote learning, memorization, and narrow disciplinary content, with limited incorporation of higher-order skills or cross-disciplinary themes. Incorporating qualitative data from the students themselves would enrich the findings and offer a more nuanced understanding of the rural educational landscape. And need to pay attention to how gender and marginalized identities influence a learner’s ability to access and participate in climate-related decision-making.

The Rural-Urban Digital Gap in Southeast Asia

The digital divide in rural Southeast Asia remains not just a technical issue but a severe barrier to equitable education. Globally, only 23% of children in rural areas have internet access at home, compared with 42% in urban areas (UNICEF & ITU, 2020). In Vietnam, the urban-rural gap is evident: as of early 2024, internet penetration nationwide is high, yet many rural and remote areas lag substantially behind urban centers in both access and reliability (Tech Space 2.0, 2025).

In the Philippines, based on findings from the 2024 National ICT Household Survey, 48.8% of households had internet access at home, an increase from 17.7% in 2019; yet regions such as the BARMM reported much lower rates, underscoring rural & urban disparity (Philippine Statistics Authority / DICT, 2025). Meanwhile, many students in rural provinces still lack devices or stable connections, forcing reliance on offline or low-bandwidth materials.

These gaps are deeply intertwined with socio-economic inequality. Urban students explore AI tools, virtual labs, and blended learning, while rural counterparts grapple with unstable signals or shared devices. As one Vietnamese report puts it, although over 82% of households have fiber internet, 3,551 villages continue to lack fiber-optic connectivity (VietnamNet, 2024). Reliance on short-term donor funding leaves many rural digital initiatives in a state of constant vulnerability. This means ensuring local communities have the power to govern their own data and technology, providing a more sustainable path for rural digital development.

Innovative Teaching Reforms and Digital Collaboration

In rural Southeast Asia, innovative teaching reforms are emerging as a response to connectivity gaps and the demand for more inclusive education. Vietnam has piloted blended learning models through EdTech initiatives, where online modules supplement in-class instruction (UNESCO, 2023). These pilots show promise in enhancing engagement, yet they depend heavily on stable infrastructure and consistent teacher training- conditions often absent in remote districts.

Similarly, Cambodia has experimented with mobile learning, allowing students without computers to access lessons through basic phones. While this expands outreach, reliance on shared household devices and prepaid mobile data means that learning is often interrupted or uneven. In the Philippines, educators have tried AI-based applications such as Duolingo and classroom chatbots to support English language acquisition. Students reported higher motivation and interactive experiences, but teachers expressed concerns about losing classroom authority. As one Filipino teacher reflected: “AI made my students excited, but I felt I lost control of the classroom” (UNESCO, 2023).

Across these contexts, a common limitation emerges: innovation is fragile without systemic support. Funding shortages, teacher resistance, and difficulties in scaling pilot projects prevent isolated successes from becoming transformative reforms. Moreover, digital collaboration across schools is often constrained by bandwidth and policy fragmentation, further limiting sustainability.

Instead, these experiences suggest something deeper: innovation is not just about technology but about rethinking pedagogy itself. AI and mobile platforms can spark student curiosity, yet they also challenge educators to reconsider their roles not as gatekeepers of knowledge but as facilitators of digital collaboration.

Integrating Climate Competencies with AI Literacy

Across global frameworks, the dual imperatives of climate education and AI literacy are increasingly seen as complementary, not competing. UNESCO promotes both Climate Change Education (CCE) and AI literacy as essential to preparing learners for climate-resilient futures (UNESCO, 2023). Yet in practice, they are often siloed and climate taught in science or geography, and AI in computer labs. What is needed is interdisciplinary integration, where AI is both a tool and content.

In Southeast Asia's rural settings, this might look like combining STEM curricula with indigenous ecological knowledge and AI-based modeling. A notable example is the ACER-SEA pilot in Southern Laos, where flood susceptibility mapping using AI and geospatial tools helped local communities visualize flood exposure and prioritize adaptation interventions. Such tools enable technical competence and foster community agency in identifying where risk is highest and what local solutions are viable.

This blended vision can be framed as "Climate-smart AI literacy". In this paradigm, AI is not simply a new subject, but is embedded as a contextual tool for climate understanding (forecasting, adaptation) and as a reflective domain (ethical awareness, algorithmic bias in climate models). As Oxford Insights puts it: "We don't want machines replacing us - we want them helping us respond to climate risk".

Culturally Responsive and Community-Based Curriculum Design

Indigenous knowledge remains a key asset in Southeast Asian communities for sustainable environmental management through traditional practices like organic farming, watershed conservation, and household-level water safety. At Pavia National High School in Iloilo, Philippines, a water sensor network was installed using telemetry sensors to monitor water quality and water levels, transforming science classes from abstract concepts into hands-on, locally meaningful learning (Philippine News Agency, 2020). Students involved not only collect data but also experience how technology complements indigenous understandings of water sources and seasonal patterns.

The real potential emerges when global innovation converges with local wisdom. Instead of displacing indigenous practices, digital tools can validate and amplify them, turning education into a bridge between heritage and innovation. This approach resists the risk of "AI colonialism", where imported technologies impose one-size-fits-all solutions and marginalize local voices (Mohamed, Png, & Isaac, 2020). By positioning technology as an enabler rather than a replacement, rural schools can cultivate what some scholars call "humanizing technology" tools that empower learners as cultural agents rather than passive users.

In this way, culturally responsive curricula not only strengthen ecological resilience but also protect cultural identities from erosion. The journey "from bamboo to AI" is therefore not a rupture with the past, but a transformation where the wisdom of elders and the tools of the future coexist to create truly sustainable education.

Policy, Governance, and Stakeholder Engagement

Transitions in rural education increasingly depend on coordination among multiple stakeholders: governments, NGOs, the private sector, and communities. By implementing a budget, resource allocation can be shifted away from centralized bias and toward local rural needs. National policies in Southeast Asia often mandate ICT in schools, yet implementation is uneven, especially in remote zones (UNESCO, 2023). Non-governmental organizations like Save the Children and UNESCO itself frequently pilot localized interventions and capacity-building programs. Meanwhile, tech donors and private actors contribute digital tools or grants; for instance, Google.org supports AI initiatives in Philippine education. However, despite such efforts, policy implementation often follows top-down pathways with limited local adaptation or stakeholder inclusion.

A central paradox emerges: investment and innovation race ahead, but unless authority and agency are redistributed, reforms may collapse under local realities. Multi-level governance is essential: national vision must be linked with district-level flexibility, school autonomy, and community voices. Public–Private Partnerships (PPPs) can catalyze resource inflows, but when communities lack representation, such models risk becoming extractive.

Thus, only when governance becomes a bidirectional conversation rather than a broadcast can rural schools evolve from bamboo classrooms into climate-resilient, AI-enabled ecosystems.

Toward a Framework for Reimagining Rural Education

Transforming bamboo classrooms into AI-enabled, climate-resilient learning spaces requires more than isolated reforms. It calls for a systemic framework where four interdependent pillars reinforce each other: infrastructure, teacher training, integrated curriculum, and community - policy support.

Taken together, these four pillars create a cycle rather than a ladder: infrastructure enables teacher capacity, which activates curriculum innovation, which then gains reinforcement through community and policy backing. Translating into practice requires a phased implementation roadmap that includes long-term systematic reform. This framework envisions futures where rural children are not left behind but stand at the forefront of climate-smart, AI-enabled transformation

Pillar 01: Infrastructure	Without stable electricity, affordable internet, and accessible devices, all other innovations stall. Providing infrastructure is not only about physical access, but also about ensuring reliability and equity so that marginalized learners are not excluded from digital opportunities.
Pillar 02: Teacher Training	Teachers need competencies in both AI applications and climate education. As OECD (2018) emphasizes, teachers are no longer only knowledge transmitters but must become designers of learning environments, able to integrate innovation and technology into pedagogy. This training allows teachers to transform infrastructure into meaningful learning experiences rather than just hardware distribution.
Pillar 03: Integrated Curriculum	The third pillar is the integrated curriculum, blending STEM skills with climate knowledge and AI literacy. A climate-smart AI curriculum would not only teach technical skills but also enable students to simulate local risks, design solutions, and critically assess technology's societal impacts.
Pillar 04: Community - Policy support	Multi-level governance and public–private partnerships can mobilize resources, but their legitimacy depends on sharing power with local communities. When indigenous knowledge and grassroots voices are embedded, technology becomes humanizing rather than extractive.

Conclusion

This study examined how rural education in Southeast Asia can transition "from bamboo classrooms to AI labs" to meet the twin challenges of climate resilience and digital transformation. Findings highlighted that rural schools often struggle with fragile infrastructure, long-term governance challenges, undertrained teachers, and outdated curricula, while urban peers advance with access to AI tools and blended learning platforms. The digital divide remains the central obstacle: without reliable connectivity, devices, and teacher training, ambitious reforms risk widening inequities rather than closing them.

The study contributes by proposing an integrative framework for reimagining rural education as climate-resilient and AI-enabled, anchored in four pillars: infrastructure, teacher training, integrated curricula, and community–policy partnerships. This framework advances Democratic Education as a vehicle for expanding equitable decision- making within rural education systems. To put these findings into practice, national governments should prioritize a "Rural Digital Equity Policy" that ensures universal school connectivity by 2030. Education departments could collaborate with telecom providers to establish shared infrastructure for remote schools, while embedding AI and climate modules into teacher certification programs. Regional collaborations such as ASEAN's digital learning initiatives should fund community- based AI labs that foster both technological advancement and adaptability. NGOs and private sector actors can scale up pilot projects through partnerships, while community stakeholders should be empowered to co-design locally relevant curricula. Ultimately, reimagining education in fragile rural contexts is not just an academic exercise; it is a prerequisite for resilient, equitable futures.

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14 |

Renewable Energy, Education, and Sustainable Growth in Central Asia

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Abstract

Sustainable economic growth is determined by different indicators. This study investigates the relationship between renewable energy consumption and sustainable economic growth in Central Asian countries. As a proxy for sustainable economic growth, the study uses the World Bank Open Data on Adjusted Net Savings. Renewable energy consumption (as a percentage of total energy consumption) is the main variable for determining sustainability impact. The study also controls for several indicators, including Adjusted Savings: carbon dioxide damage, Adjusted Savings: energy depletion, Adjusted Savings: education expenditure, ores and metals exports, Foreign Direct Investment (FDI), and energy intensity. Using the GLS Random Effects model, the results show a statistically significant and negative correlation between renewable energy consumption and adjusted net savings.

Introduction

Renewable energy transitions are conceptualised as both technical and economic solutions to the challenges posed by climate change and environmental degradation. However, the process of energy system transformation occurs through social elements that interact with institutional frameworks and educational systems to establish rules for designing, managing, and preserving energy systems across different periods. Resource-dependent areas with unequal institutional strength require financial support, regulatory frameworks, and trained personnel who can adapt to new knowledge to achieve sustainable, renewable energy policy success.

This chapter's research investigates Central Asian renewable energy development through the principles of sustainable development. The study examines how changes in energy systems affect national economic frameworks and administrative institutions. It uses empirical data to evaluate sustainability and policy performance, determine the region's sustainable development, and identify barriers to creating environmentally friendly energy systems. The current body of research treats education as a secondary factor that developers use in their analysis, but this chapter presents education as the primary force driving sustainable energy transformation.

The United Nations 2030 Agenda serves as the basis for this chapter, which establishes renewable energy as a component of the SDGs through its focus on SDG 4 (Quality Education) and SDG 17 (Partnerships for the Goals). The document shows that universities, along with training institutions and cross-sectoral partnerships, need to collaborate to establish the required human resources and institutional framework which supports renewable energy governance. The chapter also engages with the growing role of digitalisation and data-driven tools in energy planning, introducing a light digital and AI governance perspective that considers both opportunities and risks.

The chapter establishes connections between renewable energy policy and educational development, skill development, and knowledge creation to support sustainability governance research in developing countries of the Global South. The framework is based on education, which serves as its core system to enable communities to develop their capacity to manage complex changes brought by technological progress.

Literature Review

Sustainability, with its varied historical origins, is a context-dependent and philosophically flexible concept (Purvis, Mao, and Robinson, 2019). However, for this study, sustainability is examined through the lens of its three core pillars: economic, social, and environmental (Hansmann, Mieg, and Frischknecht, 2012).

This research adopts adjusted net savings as an indicator of sustainable economic development, as it captures both economic and environmental elements of growth (Greasley et al., 2014). Koirala and Pradhan (2019) claim that adjusted net savings enable an economy to maintain its wealth and consumption by compensating for the annual depreciation of both created and natural capital.

Unlike Gross Domestic Product, which reflects only current output, ANS accounts for investment in human capital, depletion of natural resources, and damage from pollution, making it a more comprehensive indicator of economic sustainability.

Studies consistently show renewable energy reduces carbon emissions and supports sustainability goals. The United Nations (2019) reports that energy consumption accounts for 76% of global emissions, while Güney (2019) and Omer (2008) highlight that transitioning from fossil fuels to renewables significantly mitigates pollution.

Building on the importance of reducing fossil fuel emissions, Neve and Hamaide (2017) examine how sustainability metrics like ANS correlate with carbon emissions. Their research reveals that growth in ANS, driven by its human and natural capital components, leads to a decrease in carbon dioxide (CO2) emissions, indicating an inverse relationship between ANS and CO2. Their analysis shows that as an economy matures, CO2 emissions initially increase and later decrease after reaching a specific threshold of ANS.

Moreover, several studies examine the correlation between the ANS and human capital indicators. Pezzey's 2024 research provides evidence of a positive correlation between human capital and sustainable development. It indicates that knowledge investment in a growing population and its increasing returns positively influence sustainable economic development. Furthermore, the study by Soeparno et al. (2025) finds that exports of metals and ores have a positive short- and long-term effect on economic growth; however, these effects are not statistically significant.

FDI is also widely studied as a determinant of economic development and sustainability. However, the sustainability impact of FDI varies across countries, especially when correlated with ANS. While Arthur et al. (2024) find FDI can hinder sustainability in general, their study also shows that in high-income countries, FDI contributes positively to sustainable development. In another study, Kukharets et al. (2024) argue that for FDI to be truly contributing, a country must have high environmental tax revenues. That is, foreign investment on its own may not have a significant impact if the country has weak environmental sustainability systems or lacks mechanisms to direct FDI toward green projects through tax policy.

Reducing energy intensity is a necessary factor for achieving a carbon-neutral society (Sueyoshi and Goto, 2023). Research by Chakraborty and Mazzanti (2020) shows that green energy innovations can significantly reduce energy intensity in the short and long term. Azhgaliyeva, Liu, and Liddle (2020) examined the factors influencing energy intensity and found that these variables have a negative impact, as they are linked to GDP and energy prices.

In general, existing research points to renewable energy sources, adjusted net savings, and carbon intensity as important factors for sustainable development. However, due to differences in economic and environmental conditions across regions such as Central Asia, there is a lack of region-specific research. This study contributes to the literature by empirically analyzing these interrelationships within the distinct economic and environmental contexts of Central Asian economies.

Methodology

This study examines the causal link between ANS and REC using secondary annual panel data from 1999 to 2023. Statistical data on five Central Asian countries — Uzbekistan, Kazakhstan, the Kyrgyz Republic, Tajikistan, and Turkmenistan — were gathered from the World Bank Open Data. The variables and the databases from which the data are collected are described in the table below (see Table 1. Definition and Sources of Variables).

Table 1: Definition and Sources of Variables

Variable	Measurement	Source
ANS	Adjusted net savings, including particulate emission damage (% of GNI); measures sustainable economic development by accounting for investment in human capital, resource depletion, and pollution	World Bank Open Data
REC	Renewable energy consumption (% of total final energy consumption); key sustainability metric that reflects transition to low-carbon energy sources	World Bank Open Data
ASCD	Adjusted savings: carbon dioxide damage (% of GNI); quantifies environmental degradation from CO_2 emissions, important for assessing environmental sustainability	World Bank Open Data
ASED	Adjusted savings: energy depletion (% of GNI); measures the cost of extracting fossil fuels, indicating resource sustainability	World Bank Open Data
ASEE	Adjusted savings: education expenditure (% of GNI); proxy for human capital investment, relevant for long-term sustainable growth	World Bank Open Data
OME	Ores and metals exports (% of merchandise exports); shows natural resource dependency, which can influence sustainable development differently across countries	World Bank Open Data
FDI	Foreign Direct Investment, net inflows (% of GDP); included to assess the impact of external capital flows on sustainability	World Bank Open Data
EI	Energy intensity level of primary energy (MJ/$2017 PPP GDP); captures how efficiently energy is used in production — lower values imply more sustainable energy use	World Bank Open Data

The GLS regression approach is used to analyse the association between variables. When choosing between the fixed- and random-effects tests of GLS, the data are examined using the Hausman test (Hahn, Ham, and Moon, 2011). The null hypothesis, that there is no systematic difference in the coefficients, cannot be rejected based on the Hausman test results for our data, which yielded a chi-square statistic of 1.19 and a p-value of 0.756. Based on the findings, a random-effects model was selected as the most efficient estimator for this study. Below are the descriptive statistics of the variables in Table 2.

According to the summary statistics table, REC has the largest range (0 to 64.60) and the highest standard deviation (21.71) among the variables. This suggests that renewable energy consumption levels differ significantly within the dataset. Moreover, in the table of variables, ANS and FDI show negative minimum values (-23.65 and -4.85, respectively), which can refer to economic losses or net disinvestments during the period. Besides, the ASEE variable shows the least standard deviation (1.92) among the others, indicating its stability over the time period. From the observations in the column, the variable shows different numbers of values for the given period due to omissions in different years.

Table 2. Descriptive Statistics

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
ANS	80	4.34	9.75	-23.65	27.27
REC	115	16.85	21.71	0	64.60
ASCD	113	7.66	5.93	0.92	27.43
ASED	113	7.64	9.79	0.01	45.49
ASEE	115	4.22	1.92	1.92	9.20
OME	67	14.85	15.61	0.40	62.40
FDI	91	4.45	4.04	-4.85	17.13
EI	111	9.55	5.45	4.03	30.44

The regression analysis is conducted by adding variables to the model one at a time. Initially, the main independent variable, REC, is regressed on the dependent variable, ANS; subsequently, the remaining control variables are added. In each step, the models were examined for multicollinearity using the variance inflation factor (VIF) test (Gómez, Beatriz, and García, 2020). The main regression models are as follows:

Initial Model: Without control variables

$$ANS_1 = \beta_0 + \beta_1 REC + \hat{u}$$

Full Model: With control variables

$$ANS_2 = \beta_0 + \beta_1 REC + \beta_2 ASCD + \beta_3 ASED + \beta_4 ASEE + \beta_5 OME + \beta_6 FDI + \beta_7 EI + \hat{u}$$

The study developed the following hypothesis:

H_0: $\beta_{REC} = 0$

H_a: $\beta_{REC} \neq 0$

The Random-Effects GLS regression test's results will be analyzed and discussed concerning the literature review in the results section.

Results

In parentheses, standard errors are reported. ** $p < 0.01$, * $p < 0.05$, $^{+}$ $p < 0.10$

According to the results, our initial model is built as follows:

Initial Model: Without control variables

$$ANS_1 = 10.27 - 0.26REC + \hat{u}$$

In this model, 80 observations were recorded, and our methodology provided evidence against the null hypothesis, yielding a chi-square value of 0.04. Even though there is no multicollinearity among the variables (VIF = 1.00), the R-squared for this model is 0.00, indicating that the REC variable alone is not the best predictor of sustainable economic growth. However, our finding does not align with the study by Güney (2019) in the literature review. Güney (2019) found a significant and positive relationship between REC and ANS, but in the case of our Central Asian countries, REC alone is significantly and negatively related to ANS. Sari Hassoun and Ayad (2020) developed a model based on two primary variables: the factor of sustainable development (adjusted net saving) and the use of renewable energy. In a random-fixed-effect panel, they found that, in the short term, renewable energy sources significantly and negatively affect adjusted net savings. Nevertheless, using the panel ARDL model, they demonstrated that renewable energy exhibits a favourable long-run trend and contributes to increased adjusted net savings. Although we obtained the same results for the short-term effect, our study did not test the model for long-term effects.

Table 3. Results

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
REC	-0.26*	-0.45**	-0.20**	−0.13*	-0.43**	-0.43**	-0.41**
	(0.13)	(0.13)	(0.07)	(0.07)	(0.08)	(0.07)	(0.07)
ASCD		-1.51**	-0.95*	-1.51**	-2.50**	-2.46**	-1.90**
		(0.31)	(0.39)	(0.42)	(0.39)	(0.35)	(0.40)
ASED			-0.63*	-1.71	-0.74**	-0.58*	-1.00**
			(0.27)	(0.30)	(0.25)	(0.23)	(0.27)
ASEE				2.29**	1.66*	1.92*	1.30*
				(0.77)	(0.82)	(0.75)	(0.72)
OME					0.44**	0.44**	0.46**
					(0.06)	(0.06)	(0.06)
FDI						-0.52**	-0.51**
						(0.16)	(0.15)
EI							1.08
							(0.85)
constant	10.27*	22.87**	16.57**	5.91	14.87**	15.72**	9.70
	(4.14)	(4.78)	(3.31)	(4.80)	(4.96)	(4.54)	(6.02)
R squared	0.00	0.03	0.19	0.28	0.76	0.81	0.82
Prob > chi^2	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Mean VIF	1.00	1.58	2.11	2.37	2.50	2.32	3.26
N	80	80	80	80	56	56	54

The following model represents the overall results of the study, including all control variables:

Full Model: With control variables

$$ANS_2 = 9.70 - 0.41REC - 1.90ASCD - 1.00ASED + 1.30ASEE + 0.46OME - 0.51FDI + 1.08EI + \hat{u}$$

Examining the main independent variable with all control variables, the study reported an R-squared of 82%, indicating the best explanation of the exogenous variable ANS. Based on the chi-square value of 0.00 in the model, we reject the null hypothesis and conclude that at least one variable in the model is significantly influential on sustainable economic growth. In this model, the number of observations is lower than in the initial models due to data omissions in several time periods. Nevertheless, the model reports a lower VIF of 3.26, indicating no multicollinearity among variables.

The REC again showed a statistically significant negative correlation with ANS in the entire model ($p < 0.01$). The study cited in Neve and Hamaide's (2017) literature review, which found that an increase in ANS, driven by its human and natural capital elements, results in a decrease in CO_2 emissions, indicating an inverse relationship between ANS and carbon dioxide, was confirmed by the ASCD variable's -1.90 coefficient, which is statistically significant in correlation to ANS in our model.

Followingly, the ASED showed a negative, statistically highly significant influence on ANS, indicating that, keeping all other variables constant, a 1 per cent increase in Adjusted Savings: Energy Depletion reduces sustainable economic growth by 1 unit. However, the subsequent variable, ASEE, showed a positive and significant correlation with ANS ($r = 1.30$). The results confirm our finding in the literature review that increased population and investment in knowledge yield higher returns, which quickly translate into a positive impact on sustainable economic growth.

The next included control variable OME, is found to be really significant and positively correlated to the ANS. The model indicates that keeping all variables constant, a 1 per cent increase in metal and ores export increases the sustainable economic growth by 0.46 units, as these materials are found to be one of the main drivers of the local economy in Central Asian countries,s as mentioned in the literature review by Gusseinov and Sultonazarov (2019). Our finding aligns best with the study by Soeparno et al. (2025) in Indonesia, which was explored in the literature section.

The FDI variable is highly statistically significant and negatively correlated with ANS, with a coefficient of -0.51. The finding confirms the literature review that FDI is negatively correlated with ANS in developing nations such as Singapore, compared with developed economies (Arthur et al., 2024). The last control variable EI, determined to have a positive but insignificant impact on ANS contradicts our finding in a literature review by Azhgaliyeva, Liu, and Liddle (2020), where their study found a negative relationship between sustainable economic growth and energy intensity. According to the results, a 1 unit increase in EI, contributes to ANS by 1.08 per cent, keeping all other variables constant.

Education And Capacity Building For Sustainable Energy

The shift to renewable energy systems needs more than just new technologies and funding. We must also focus on education, skills, and digital capacity to support this transition.

We need to change our educational systems and institutions to support energy transitions. To make these changes sustainable in the long run, we must combine human skills with financial resources and effective learning systems. We also need to invest in the right regulations and infrastructure. In Central Asia, the success of renewable energy depends on education programs that teach people new skills. This is crucial because the region still relies heavily on fossil fuels and resource extraction.

Universities and vocational training institutions play a crucial role in the shift to renewable energy. They can help this change by training engineers, planners, policymakers, and researchers. These professionals will be responsible for managing, developing, and governing complex energy systems. Universities in Central Asia connect local communities with global technological progress. They focus on the specific environmental, economic, and political needs of their regions. By developing programs in renewable energy engineering, environmental economics, and sustainability governance, universities can effectively address existing expertise gaps. This approach will cultivate independent experts who are prepared to enter the workforce.

This initiative supports Sustainable Development Goal 4 (Quality Education) by ensuring equitable access to education and promoting learning that fosters sustainable development. The United Nations established Target 4.7 to highlight how education equips individuals with the skills necessary for sustainability, allowing them to become responsible global citizens who actively protect the environment. By integrating renewable energy education with climate knowledge and practical learning methods, universities and vocational schools can successfully meet these objectives. These programs teach students important skills for protecting the climate and developing energy systems.

Universities should form official partnerships with government agencies and businesses to help students develop skills. Educational institutions can adapt to technological and job-market changes by establishing research programs, training initiatives, and international partnerships. These collaborations support Sustainable Development Goal 17 (Partnerships for the Goals) by promoting cooperation across different sectors and countries. Central Asian countries possess various capabilities that can support the development of curricula, staff training, and research in renewable energy and sustainability through regional and international partnerships.

Digitalization is transforming the way education interacts with the energy transition. As digital energy systems, such as smart grids, energy modelling platforms, and data forecasting methods, become increasingly prevalent, it is essential for workers to acquire specific digital and analytical skills. In the Central Asian energy sector, artificial intelligence (AI) is utilised for energy planning, demand forecasting, and environmental monitoring, utilising data modelling and algorithms. The educational system needs to teach students effective methods for handling these technologies while they develop their critical thinking abilities.

The light digital governance perspective indicates that digital governance systems can produce both positive and negative outcomes throughout their operational phases. Organisations utilise data analytics and modelling tools to enhance operational efficiency by optimising renewable energy systems and formulating policies informed by analytical data. Digital systems face problems because they rely on technology to operate, making it hard to monitor decision-making processes and ensure that all users have equal access to technological resources. Digitalization maintains existing social and geographical inequalities because it lacks sufficient training programs and institutional monitoring systems. Education serves two purposes: it provides technical skills and creates an environment where people can develop their ethical thinking and learn about governance systems, enabling them to use digital tools to achieve sustainable, inclusive outcomes.

Education functions as a driver of development, enabling communities to handle change through their ability to adapt and innovate, and to establish governance systems. Universities play a vital role in supporting sustainability through various avenues. They generate research that guides policy development, provide educational programs that equip professionals to implement reforms, and promote public awareness of environmental issues. By establishing educational initiatives centred on renewable energy and digital governance in Central Asia, these institutions can drive economic benefits and strengthen the resilience needed to prevent social and institutional breakdown.

To transition to renewable energy, we need solutions based on knowledge. Developing the necessary infrastructure requires equal funding for education, skill development, and building institutional knowledge. Central Asian countries should focus on education for sustainable governance. This will help them manage their energy transition while also meeting development goals like social fairness, community involvement, and sustainability.

Conclusions

This chapter investigated how Central Asia underwent renewable energy transitions through three interconnected factors: economic structure, policy framework, and institutional strength. The research demonstrated that renewable energy sustainability needs equal focus on infrastructure development, financial backing and regulatory systems. In addition, we demonstrated that long-term sustainability depends equally on education, skills development, and knowledge systems that enable societies to adapt to technological and environmental change.

The chapter assessed education as its core subject to link energy policy with SDG 4 (Quality Education) and shows that sustainable outcomes require learning processes, institutional development, and capacity building activities. Universities and training institutions operate as fundamental organisations that provide technical education while conducting research, developing innovation, and establishing ethical standards for responsible decision-making. Their role is stronger because they work with governments, businesses, and international groups. This shows how. Important SDG 17 (Partnerships for the Goals) is in addressing ability challenges.

The discussion of digitalisation and data-driven energy systems highlights the growing importance of digital literacy and governance capacity. The implementation of energy modelling and forecasting systems provides substantial advantages, yet creates problems which affect how transparent systems are and how they affect different social groups and their ability to hold others responsible. The educational system serves two vital purposes by teaching professionals to operate technology systems and by teaching them to recognise the social and ethical effects which digital and AI systems create.

The renewable energy transitions require knowledge-based development that operates through existing institutional systems. Building physical infrastructure needs equal financial support for education and skill development programs, as well as collaborative learning platforms. In the Central Asian region, we can achieve sustainable renewable energy transitions by improving education and institutions, promoting social inclusion, and strengthening our ability to cope with climate change. This chapter explains methods for teaching energy transition analysis, which helps students understand how sustainability governance works in the AI era.

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15 |

AI, Sustainability, and the Rentier State: A Comparative Analysis of the UAE and Saudi Arabia's SDG Strategies

Asal Kalantari

Abstract

This article examines Saudi Arabia and the United Arab Emirates in analysing how Middle Eastern rentier states use artificial intelligence technologies and the Sustainable Development Goals (SDGs) to achieve sustainable development. It looks into whether rentier political and economic systems allow for new developmental transformations or hinder sustainability strategies. The study uses the frameworks of rentier state theory and resource curse theory to examine renewable energy policies, institutional alignment with the SDGs, and the expanding role of AI in sustainability governance, drawing on political economy theory. The article argues the case that moving away from reliance on fossil fuels and implementing structural changes to centralised governance structures are both necessary to achieve inclusive sustainability. AI has the potential to improve productivity and environmental management, but it can also strengthen current power structures, making sustainability a tool of state legitimacy rather than a driver of structural change. The study also shows how analysing rentier sustainability strategies can enhance AI literacy and sustainability education in higher education. Asal Kalantari is a final-year undergraduate at the University of Westminster, pursuing a BSc in Politics and International Relations. Her academic interests include Middle Eastern politics and development, international relations theory, sustainable development, global governance, and political economy.

Introduction

The sustainability of the world has become a characteristic challenge of the twenty-first century, with climate change, population increase and environmental degradation compelling governments to redefine development and governance. The 2030 Agenda of the UN and its 17 Sustainable Development Goals (SDGs) offer a guideline on how economically, socially and the environment can be balanced, however it all hinges on the political and economic set-ups of nations.

The tension is represented in Saudi Arabia and the United Arab Emirates. They both possess huge financial resources and have some of the best technology and are still too reliant on hydrocarbons. Their centralized form of governance allows quick sustainability, though the idea of rentier states can restrain the transparency, participation, and transformational change in the long term.

The concept of artificial intelligence compounds the issue: it promotes energy efficiency and city management and climate policy, as well as enhancing state control. To develop an understanding of sustainability in the Gulf, it is thus necessary to examine AI as a technological and a governance application.

The questions posed in this article include: how do Saudi Arabia and the UAE seek to achieve SDG-consistent sustainability by using AI-driven policies, and How far are rentier political economies limiting these endeavours? Through a comparative politics-economy approach, it evaluates renewable energy undertakings, megaprojects and AI governance in the two states, and then concludes by evaluating what it means to policy and research.

Theoretical Framework

This paper explores sustainable development in the UAE and Saudi Arabia with comparative political-economy analysis in the framework of rentier state theory, resource curse theory, education governance, sustainability education, and responsible AI. These views describe how political, economic, and knowledge systems influence the capacity of the states to realize the SDGs, in particular SDG 16 on accountable and inclusive institutions. According to rentier state theory (Beblawi and Luciani, 1987), hydrocarbon-dependent economies are characterized by the formation of a centralized political system due to the lack of taxation leading to lack of accountability by people and thus, the elite are able to dictate how resources are distributed and the way modernization is managed (Ross, 2001).

The resource curse model also demonstrates the way in which resource abundance can impair diversification, innovations and institutional building

(Ross, 2012). Oil revenues both can support infrastructure and sustainability projects, but they also introduce susceptibility to price spikes and constrain institutional discretion. Education governance throws an incisive facet: universities generate knowledge, educate professionals and develop policy capacity, yet its high reliance on state funding in rentier systems can suppress academic autonomy. Sustainability education, in turn, focuses on social learning, moral thinking, and decision making that involves participation as the bases of long-term development (Sterling, 2010; UNESCO, 2017).

More tensions are brought about by responsible AI in education. The AI-enhanced systems will have the potential to make systems more efficient, although the risk is that they will consolidate power, create bias, and become opaque (Holmes et al.). Digital citizenship models emphasize ethical consciousness, media literacy, and civic engagement as the conditions of institutional trust (Ribble, 2015; Choi, 2016). These views combined indicate that Gulf sustainability approaches are an amalgamation of fast-moving technological advancements and constraints on involvement and knowledge pluralism, i.e. SDG 16 cannot be attained solely through the resources and technological innovation, but also responsible institutions and strengthening education.

Methodology and Analytical Approach

The paper will consider the way in which the United Arab Emirates and Saudi Arabia seek to achieve sustainable development by implementing SDG-oriented policies and AI technologies in rentier politics. The evaluation of government structures, institutional practices and the policy framework is conducted with the help of a qualitative comparative design, which enables the establishment of similarities and differences between the two states that could not have been indicated by quantitative indicators.

The analysis is based on governmental policies, national policies like Saudi Vision 2030 and UAE frameworks, SDG reporting sites, scholarly articles on rentierism and resource curse, and publications of international agencies and climate bodies. It also examines policies and plans of higher education, university strategies and publicly accessible curricula on sustainability and AI to assess how the production of knowledge and student interactions can facilitate national development agendas.

UAE and Saudi Arabia were chosen due to their economic size, the abundance of hydrocarbons, and ambitious sustainability and AI strategies, which serve as excellent examples to study the issue of tensions between structural limits and reform agenda. Integrating the study of political economy, policy, and education will enable evaluation of whether SDG-consistent and AI-driven projects will contribute to real change or strengthen centralised governance, and to take into account constraints of document-based research, such as possible policy bias and the lack of interview data.

Case Study 1 : The United Arab Emirates

A) Governance and SDG Institutionalisation

Since the adoption of the SDGs in the year 2015, following the adoption of the UN 2030 Agenda, the United Arab Emirates has established itself as a regional sustainability leader. Loung et al. (2020) discuss its implementation by the National Committee on SDGs across 17 federal entities, which are centrally governed by the Minister of State for International Cooperation with assistance of the Federal Competitiveness and Statistics Authority. SDGs 2, 3, 4, 7, 8, and 13 (Ministry of Industry and Advanced Technology, 2024) fit national priorities, including clean energy, food security, healthcare, education, economic growth, and climate action, and foreign aid contributions above 1% of GNI enhance global development interactions (UN, 2022).

Nevertheless, the system of governance is highly centralised, minimising civil society's participation. Despite increased knowledge of the SDGs among students and professionals, this knowledge is not often linked to accountability mechanisms (Almulla et al., 2024). This is the characteristic of rentier states, in which legitimacy is based on the provision of services rather than involvement, leading to a clash with SDG 16 (Beblawi and Luciani, 1987; Ross, 2012). Universities work to meet SDG objectives by offering sustainability courses, training on AI, and experiential research learning (Holmes et al., 2022; UNESCO, 2021; Sterling, 2010), but they cannot make decisions because their work relates to state-based governance structures (Marginson, 2011; Altbach et al., 2009).

B) Renewable Energy Transition

The United Arab Emirates have their sustainability strategy based on renewable energy, and it contributes to clean energy objectives. There has been large-scale investment in major projects like the Noor Abu Dhabi Solar Plant (1.2 GW), the Al Dhafra Solar PV expansion (~ 2 GW), and Dubai Mohammed bin Rashid Al Maktoum Solar Park (4,660 MW), among others, where solar energy is increasing their contribution to more than 0.3% in 2014 to approximately 8.3% in 2023. Such developments demonstrate technological improvement, but the economy remains largely based on hydrocarbon revenues, which keep on funding diversification and renewable projects as well as maintaining the dependence on fossil fuel.

This is a characteristic of late rentier development, in which income of oil is used to finance modernization without changing the underlying economic structures. Meanwhile, the growth of renewable development is associated with the policy of education: more universities provide engineering, sustainability, and energy courses, educating students in modelling, project management, and energy systems supported by AI. These efforts create technical capacity to the green transition, where workforce skills and tertiary education would play a role in the sustainability outcome.

C) AI for Sustainable Urban Management

The UAE uses AI in its National AI Strategy 2031 to enhance efficiency, economic development, and sustainable environmental protection, aligning with SDG 9, 11, and 13. Smart buildings,

AI-based waste management, and predictive analytics maximize urban system efficiency, and UNDP collaborations monitor SDG indicators for evidence-based policy.

Universities play a role in educating students in data analysis, urban sustainability, and clean energy innovation. Practical research enhances abilities for future smart city systems and connects education to the country's sustainability objectives. But AI also poses governance issues. Monitoring systems might lead to a concentration of power, causing a conflict between efficiency and participatory governance, even as educational initiatives seek to build technical and ethical expertise.

D) Critical Assessment

The UAE's green revolution shows quick progress due to centralized control and oil resources, but the voices of the ordinary citizen are rarely heard in decision-making. Solar energy and AI initiatives grow quickly, enhancing infrastructure and global image, but power is centralized, and dependence on hydrocarbons persists.

Education systems in schools and universities teach sustainability and AI capabilities, connecting learning in the classroom to practical action on climate issues. Experiments, student projects, and university initiatives develop decision-making and resource management capabilities while cycling back information from projects into decision-making (Sterling, 2010; Holmes et al., 2022; Marginson, 2011; UNESCO, 2017).

The UAE demonstrates strong governance capacity despite its reliance on oil. There is little emphasis on participatory development, but education is slowly cultivating critical thinking and practical knowledge to help transform institutions and decrease dependence on fossil resources.

Case Study 2: Saudi Arabia

A) Vision 2030 and Centralized Transformation

Starting back in 2016, Saudi Arabia set out on a path to change how it runs things using something called Vision 2030. Instead of relying so much on oil, the country aims to grow different parts of its economy while lifting up daily life for people there. This plan fits alongside several global goals meant to fix big problems - like making health care better, giving everyone access to education, pushing clean power sources, creating fair jobs, and tackling climate shifts.

Money moves through one central hub - the Public Investment Fund - which holds vast amounts of wealth collected by the government. Big building efforts, new ways to produce energy, and tech upgrades get their funding from this single system that pulls decisions together under one roof (Cammett et al., 2015).

From the top, decisions flow downward without much give or take, typical in countries fueled by resource wealth instead of citizen taxes. Reforms appear because leaders choose them, not because people demand them through open debate. Women now join the workforce more widely - changes tied to Vision 2030 - but political space stays narrow. Without citizens funding the government through widespread tax systems, scrutiny fades into the background. Elite circles hold firm on power, shielded by weak transparency rules. Green plans emerge under slogans of progress and global ranking, sidestepping deeper shifts toward shared authority. Inclusion lags behind growth targets, creating quiet friction with SDG 16's call for fairer rule-making.

There is growing alignment between education and the Vision 2030 agenda. Reforms in universities to incorporate curricula on sustainability, AI training programs, and skills development initiatives are preparing students for involvement in energy, infrastructure and smart-city projects (Holmes et al., 2022; UNESCO, 2021). International partnerships between public and private universities have led to the development of programs focused on responsible AI, digital citizenship, applied sustainability research, and more to build technical proficiencies with ethical awareness for students (Altbach et al., 2009; Marginson, 2011). In these add-on programs, knowledge production is broadened, skills for the workforce are secured and student learning is aligned to national development goals — all of which can help alleviate some of the exclusionary effects of centralized governance.

Generally speaking, Vision 2030 indicates that Saudi Arabia has the ability to make ambitious sustainability and environmental reforms within a rentier-state structure. Advancing economic and technological objectives is important, but it must also integrate education, AI literacy, and institutional learning to ensure that reforms contribute to participatory governance more broadly and sustainable knowledge production for the long term.

B) Renewable Energy and the Oil Contradiction

Renewable energy is one plank of Saudi Arabia's sustainability efforts, but the initiatives highlight internal contradictions. With this, the Kingdom has committed to a 278 million ton reduction in annual emissions and achieving 50% of electricity from renewables by 2030 (Climate Action Tracker, 2024). The expansion illustrates how far from its target the renewable energy sector is — providing just over 2% of total electricity.

At the same time, the Kingdom keeps increasing oil extraction, aiming for 12 million barrels a day. This rentier paradox — whereby hydrocarbon revenues underwrite sustainability initiatives that also reinforce fossil fuel dependence — is illustrated through this dual approach (Luciani, 2012). While more than USD 187 billion has been pledged by the Saudi Green Initiative for emissions reduction, afforestation, and environmental protection, such initiatives are predominantly funded through ongoing oil extraction (CARE Saudi Arabia, 2024). Such investments enhance environmental performance, yet the economic dependence on hydrocarbons essentially continues to exist.

A paradox also lies in the field of education and workforce development. Saudi universities and technical colleges have rolled out STEM programs, curricula of renewable energy engineering, and sustainability competencies training to ready their students for the clean energy and green technology sectors, according to Holmes et al., 2022 and UNESCO, 2017. These initiatives connect the implementation of SDGs with skills development and experiential learning, thus graduates are technically and problem solving capable to support the country's renewable energy goals.

Education by producing a workforce knowledgeable in sustainable operations can to some extent, at least, free the limits of the rentier system, therefore, the energy sector can be transformed slowly without the country's economy suffering from instability (Sterling, 2010; Marginson, 2011).

C) NEOM and Mega-Project Sustainability

The NEOM mega-project is the most radical application of the sustainability plans of Saudi Arabia. The Line is a car-free linear city, where the goal is to make the residential population as dense as possible and minimize land use, as well as eradicate car-borne pollution. AI systems control the energy distribution, transportation, and city infrastructure, helping with SDGs 7, 9 and 11 (CARE Saudi Arabia, 2024).

NEOM has received significant criticism even though it has potential in terms of its technology. The violation of SDGs 10 and 16 has been identified in the Climate Scorecard (2025) because ecological damage and forced displacement of the Howeitat people have been pointed out. The project shows how the mega-developments can emphasize environmental advancement and international marketing above the neighborhood involvement and community justice, strengthening centralized power instead of promoting inclusive government.

Knowledge production and education is becoming a vital component of NEOM. Ai-based urban planning, sustainability analytics, and environmental engineering are being developed by research institutions and universities, creating knowledge and data to inform the development of projects (Holmes et al., 2022; UNESCO, 2021). Practical learning in form of internships and research partnerships offers the student to engage in learning, although displacement and limited access to project areas restrain certain educational activities. Through these initiatives, SDG implementation can be connected to learning outcomes, and tensions between technological innovation, social justice, and learning capacity in institutions are emphasized (Sterling, 2010; Marginson, 2011).

D) AI and Smart State Capacity

The Saudi Data and Artificial Intelligence Authority (SDAIA) is the main agency of the AI investments in the Kingdom which increases government capacity and sustainable governance. Applications of AI technologies are present in the field of healthcare, diagnostics, education systems, and energy optimization, such as water desalination, and aligned with SDGs 3, 4, 6, and 7 (Development Aid, 2024). Desalination using AI enhances water-constrained areas by minimizing energy use, whereas AI-driven energy optimization optimizes electricity power grids.

The key aspects of AI deployment are education and workforce development. AI ethics education is provided at universities and technical schools, along with

EdTech governance courses and student data protection courses, and this practice is in line with the focus on building human capital and workforce preparedness as stated in Vision 2030 (Holmes et al., 2022; UNESCO, 2021). Students also have hands-on experience in urban planning, energy systems, and sustainability analytics with AI application, which they associate with implementing SDGs and using technology responsibly.

Although such advantages exist, the implementation of AI has governance issues. According to Trottier and Fuchs (2015), authoritarian governments may utilize digital technologies to increase efficiency, surveillance, and control, which is typical of them. In Saudi Arabia, AI enhances performance and environmental results in the administration, whereas strengthening centralized control, reducing transparency and participation of citizens. Educating AI, training on ethics, and implementing EdTech governance can reduce such risks, as ethical skills and responsible use of technology can be raised among the students and the future workforce.

E) Critical Assessment

The green transition in Saudi Arabia demonstrates the advantages of sustainability policies of the state in the oil-reliant economies as well as their drawbacks. High investments and a strong centralized government will facilitate quick policy implementation and mass projects granting the state the power to mobilize infrastructure, technology and investment faster as compared to decentralized systems. Such an ability brings foreign collaborations and enhances the efficiency of implementation. Nevertheless, there are a number of structural limitations that still bring about long term sustainability. Continual growth of fossil fuel development coupled with highly centralized political power constrains transparency, participatory government and continuity of dependence on hydrocarbon resources even as the governments profess renewable energy programs.

Institutional reform and the quality of education also are influenced by these dynamics. Even though sustainability and AI investments are leading to new sources of training, institutions with disparate learning capabilities limit the efficiency with which education systems can modify curricula, research agendas, and pedagogical approaches in accordance with sustainability objectives. In the absence of better governance and accountability systems in higher education, there is a danger that innovation will be technocratic as opposed to becoming a social construct. AI-based modernization also strengthens the central authority, creating administrative effectiveness, as well as fear of academic freedom and critical thinking.

Altogether, sustainability projects can improve the international image, as well as domestic credibility of Saudi Arabia, but its success in the long run would require more profound institutional change, empowering education systems, enhancing policy transparency and inclusive knowledge creation with economic diversification.

AI, Sustainability and Authoritarian Governance

Saudi Arabia and the UAE use artificial intelligence to control environmental resources through centralized governance structures. In the UAE, AI improves energy efficiency, city governance, and SDG achievement through smart energy grids, cooling infrastructure, and data-informed governance coordination (UNDP, 2024). Saudi Arabia uses AI in energy, healthcare, desalination, and megaprojects to enhance operational efficiency and support Vision 2030 goals (Development Aid, 2024).

These AI systems, although achieving tangible environmental outcomes, lack transparency and public engagement. Environmental monitoring technology further consolidates elite power, causing a conflict between effective environmental governance and the achievement of SDG 16 (Feldstein, 2019).

Higher education institutions can resolve this conflict by incorporating public pedagogy, sustainability education, and ethical AI education into curricula. Digital citizenship and AI ethics courses encourage student participation in governance and civic responsibility, promoting knowledge production that reconciles centralized efficiency with learning participation (Holmes et al., 2022; UNESCO, 2017; Ribble, 2015; Choi, 2016).

Discussion: Structural Contradictions of Rentier Sustainability

Comparative analysis reveals that rentier political economies both enable and limit the transition to sustainability in the UAE and Saudi Arabia. Oil wealth offers significant financial means for investments in renewable energy, smart infrastructure, AI governance, and other technological solutions, which promote a number of SDGs. However, oil dependency weakens the motivation for comprehensive economic diversification and societal change, making sustainability a performative act to improve the international image rather than transform political and economic systems (Ross, 2012; Hvidt, 2013).

Both countries are increasing their fossil fuel production while using technological solutions such as carbon capture and storage to address the contradiction between growth and climate goals. The lack of public participation and centralized governance obstructs inclusive governance, which undermines SDG 16 (Beblawi & Luciani, 1987). The UAE has better implementation and coordination of policies, while Saudi Arabia focuses on its vision projects such as NEOM, indicating the structural limitations inherent in oil-based development.

Knowledge institutions and innovation ecosystems are essential in resolving these contradictions. Universities, research institutions, and student-driven sustainability projects are involved in skills development, application-oriented research, and learning by doing, which helps to align technological, environmental, and governance goals into effective solutions (Sterling, 2010; Holmes et al., 2022; UNESCO, 2017). Through the development of critical thinking, AI literacy, and collaborative problem-solving, higher education can mitigate, to some extent, the effects of centralized decision-making, which promotes innovation and prepares future generations to deal with the contradictions between fast-paced technological uptake and participatory and accountable governance.

Conclusion and Implications

The comparison between Saudi Arabia and the United Arab Emirates illustrates that AI-based sustainability strategies can make significant progress regarding energy efficiency, renewable energy infrastructure, urban planning, and service delivery. Both states utilize their centralized political systems and oil resources to implement large-scale projects at a pace that cannot be reached by more decentralized systems. These successes underscore the use of AI and smart infrastructure to promote the achievement of SDGs 7, 9, and 11.

However, the comparison also shows that there are structural barriers that hinder long-term sustainability. The reliance on oil resources sustains the rentier state paradigm, which keeps decision-making power at the top and hinders participatory governance. Although AI and technology improve efficiency, they also sustain centralized decision-making, which obstructs transparency, public accountability, and the equal attainment of SDG 16. Sustainability in these systems, therefore, may become technocratic rather than socially transformative. If the achieved success does not lead to changes in political, institutional, and economic dependencies, the success might be merely symbolic or internationally oriented, improving international image while leaving the governance system unchanged.

Universities and higher education institutions are found to be important players in closing these gaps. By integrating sustainability education, AI ethics, and responsible technology use into the curriculum, institutions can educate students in decision-making, urban planning, and sustainable innovation. Policy recommendations should encourage universities to develop interdisciplinary programs that connect AI, engineering, and environmental management to real-world sustainability issues. Institutional changes that promote academic freedom, research autonomy, and collaborative learning will further enhance the knowledge ecosystem, ensuring that AI not only optimize systems but also foster critical thinking and civic engagement.

Future research should investigate how AI governance in education can be framed to pursue efficiency and democratic participation, analyzing case studies of student-led sustainability projects and curriculum changes that improve technical and ethical skills. Comparative analysis in other rentier states can also provide insights into the relationship between political systems and innovation ecosystems and their impact on long-term sustainability outcomes. In conclusion, sustainable development in oil-dependent countries is not just a technological issue; it demands a comprehensive approach to ensure that AI-driven projects produce not only environmental benefits but also socially inclusive and accountable governance.

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Education, the SDGs and AI in the Era of Globalisation

Fatimata Sidi Mamadu

Abstract

This chapter examines cross-border, participatory education as a crucial component of democratic infrastructure in an era shaped by globalisation, artificial intelligence (AI), and urgent sustainability challenges. It argues that higher education must move beyond a model of knowledge transmission towards education as a democratic social practice that fosters critical engagement, ethical awareness, and global citizenship. Drawing on a partnership between the University of Westminster and Kasetsart University in Thailand, the chapter presents a pedagogical framework combining online collaboration, an international field trip, and a Model United Nations (MUN) simulation at Kasetsart University (KUMUN). Grounded in theories of participatory democracy, deliberative democracy, decolonial critique, and experiential learning, the chapter positions education as a space for epistemic justice and civic capacity-building. It aligns with the United Nations Sustainable Development Goals and critically engages with UNESCO's AI ethics guidelines, exploring how technology reshapes governance and public spaces. This chapter demonstrates how student-centred, collaborative learning empowers participants to navigate global power disparities and translate democratic theory into practice, concluding that such pedagogical approaches are essential for cultivating ethical, reflective, and politically engaged citizens from the perspective of an international student from the UK taking part in her first educational trip to Asia. It will also touch on how AI could be used to achieve some sustainable development goals by analysing it use in education and development.

Introduction

Education increasingly operates at the intersection of democratic uncertainty, rapid technological change, and urgent sustainability challenges. As AI reshapes governance, communication, and public life, and as global inequalities persist, higher education must evolve. Traditional classroom-based models are insufficient for preparing students to engage critically with power, difference, and responsibility in a globalised world. Education should therefore be understood not merely as knowledge transmission but as a democratic and social practice through which students learn participation, accountability, and ethical engagement.

This chapter discusses how working together across borders and using participatory education helps students experience democracy in action as the big question is 'Can students create a change with their voice?'. It focuses on a partnership between the University of Westminster and Kasetsart University. This partnership included online collaboration, a field program in Thailand, and involvement in the Kasetsart University Model United Nations (KUMUN) simulation. Through these activities, students took part in democratic processes like dialogue, negotiation, representation, and policy design, both online and in person. The chapter links these experiences to democratic theory and hands-on learning. It also addresses concerns about how knowledge is produced and how students put this knowledge to use in the field to create a difference, particularly in the era of AI, where its ethical use and principles are questioned in relation to the Sustainable Development Goals achievements in terms of education and governance. It will also examine how students manipulate AI and the possible impacts it has on learning and social building while referring to the UNESCO principles of AI.

Theoretical Framework

This framework conceptualises education as a democratic infrastructure, an institutional system that structures participation, distributes epistemic authority, and shapes access to both physical and digital public life. Rather than treating democracy as an external political system, the framework understands it as a practice cultivated through institutional design, communicative norms, and participatory governance. Education therefore becomes a site where democratic capacities are not only discussed but structurally enacted.

The framework integrates four core theoretical orientations, participatory democracy, deliberative democracy, decolonial critique, and experiential learning but moves beyond abstract citation to show how these perspectives inform institutional redesign in an AI-mediated and sustainability-oriented world.

Participatory democratic theory argues that democratic competence develops through practice. Participation has an educative function: individuals become capable democratic actors by engaging in decision-making processes rather than merely observing them. Applied to education, this implies that institutions must embed participatory governance structures and student representation in curriculum decisions, collaborative assessment models, and shared responsibility in research and problem-solving. Without such institutional redesign, democratic education risks becoming rhetorical rather than formative. Participation must be institutionalised, not simulated.

Deliberative democratic theory further emphasises that legitimacy emerges through inclusive, reasoned communication among free and equal participants. Educational institutions can serve as micro-public spheres where communicative competence, reflexivity, and critical reasoning are cultivated. However, deliberation today is increasingly mediated by digital infrastructures shaped by algorithms and platform governance. This shifts the democratic challenge. Education must therefore incorporate AI literacy and digital governance awareness as core democratic competencies. Students must understand how algorithmic systems shape visibility, bias, and influence in public discourse. Without this, digital participation risks being distorted by opaque technological power structures.

This theoretical orientation directly informs AI governance within educational institutions. If democratic legitimacy depends on transparency and accountability, then AI systems used in admissions, assessment, and content delivery must be subject to oversight. Institutions must adopt clear policies governing AI use, ensure human review in high-stakes decisions, and assess risks of algorithmic bias and digital exclusion. Democratic infrastructure in the digital age therefore requires governance mechanisms that regulate technological mediation rather than assuming neutrality.

A decolonial perspective adds an epistemic dimension to this framework. Democratic participation is incomplete if knowledge hierarchies privilege Eurocentric or dominant epistemologies while marginalising others. Education must therefore be redesigned to recognise plural knowledges and lived experience as legitimate forms of expertise. This is particularly relevant in sustainability education, where local ecological knowledge and community practices are often overlooked in favour of technocratic solutions. Epistemic justice becomes central to democratic sustainability: whose knowledge counts determines whose futures are prioritised.

Sustainability competencies such as systems thinking, anticipatory reasoning, ethical responsibility, and collaborative problem-solving align closely with democratic practice. Addressing climate change, inequality, and global instability requires collective learning processes rather than individual competition. Education must therefore move beyond content transmission toward cultivating capacities for navigating complexity and interdependence. Sustainability is not only a technical challenge but a governance challenge requiring participatory decision-making and long-term civic responsibility.

Experiential learning theory provides the pedagogical foundation for operationalising these commitments. Democracy is learned through interaction, inquiry, and shared problem-solving rather than passive instruction. Simulation exercises, transnational collaboration, and community-based research embed democratic norms cooperation, accountability, reflexivity within lived practice. When learners engage directly with global challenges, digital tools, and intercultural negotiation, democratic and sustainability competencies become embodied rather than abstract.

Bringing these strands together, the framework argues that education must be deliberately redesigned across three interrelated dimensions:

- Institutional governance: Embed participatory structures and transparent AI oversight mechanisms.
- Curricular design: Integrate AI literacy, digital participation skills, and sustainability competencies as core democratic capacities.
- Epistemic inclusion: Recognise plural knowledges to address global inequalities and ensure democratic legitimacy.

In this model, theory does not sit above practice. It shapes institutional design choices: who participates, how decisions are made, how technology is governed, and whose knowledge is legitimised. Education becomes democratic infrastructure not by declaring democratic values, but by structurally organising participation, regulating AI mediation, and cultivating competencies necessary for sustainable collective futures.

AI and Digital Dimension

A central contemporary dimension of democratic infrastructure within the module was the role of artificial intelligence in shaping participation, knowledge production, and governance. While the UNESCO recommendation on the Ethics of Artificial intelligence (2021, pp. 2-4) emphasises that AI systems must uphold human rights, inclusion, and sustainability, the practical use of AI during our collaboration revealed both its democratic potential and its structural risks. For instance, AI- assisted research platforms supported policy drafting and comparative analysis during the KUMUN simulation. These tools expanded participation by reducing informational asymmetries, enabling more inclusive deliberation across borders. However, they also reshaped democratic participation by mediating which sources were prioritised, how information was summarised, and whose knowledge was amplified through algorithmic systems.

This experience underscored the importance of AI literacy as a democratic competence. Participation in digital mediated public spheres now requires more than communicative skills; it demands the capacity to critically evaluate algorithmic outputs, recognise embedded bias, and understand how data0driven systems influence political discourse and decision –making. Without such literacy, citizens risk becoming passive recipients of machine generated knowledge rather than active agents capable of scrutiny and resistance.

AI governance structure further compli2cate this terrain. Although frameworks such as those proposed by UNESCO (2021, pp. 18-20) advocate for transparency, accountability, and Ethical Impact Assessments, regulatory capacity remains uneven across regions. The concentration of AI development within a small number of powerful states and corporations generates structural inequalities in technological influence, limiting the agency of less technologically resourced countries. This creates a form of AI inequality, where access to infrastructure, data, and monetisation systems in distributed unevenly, reinforcing global hierarchies rather than dissolving them.

Moreover, significant democratic risks accompany AI integration. Algorithmic bias often embedded in training datasets. Can reproduce racial, gendered, and geopolitical discrimination, particularly in areas such as content moderation, welfare distribution, or migration management. Digital exclusion persists where limited connectivity, infrastructure gaps, or monetisation restrictions prevent equal participation in digital economies and civil discourse. At the same time, AI enabled surveillance technologies raise concerns about privacy and political freedom, especially in contexts where dissent is already constrained, these risks demonstrate that AI is not neutral infrastructure but a site of political power that must be subjected to democratic oversight.

Integrating AI into education, therefore, is not merely about technological adaptation but about cultivating critical awareness of how algorithmic systems shape global citizenship, participation, and governance. Within this framework, education functions as a democratic infrastructure by equipping learners with the analytical tools necessary to engage ethically and critically with AI-mediated public spheres.

Dimension

Engagement with The Sustainable Development Goals 9SDGs) provided more than a descriptive policy framework; it functioned as a critical lens through which to interrogate the politics of global development. My work focused particularly on SDG 4(Quality Education), SDG 13 9Climate Action), and SDG 16 (Peace, Justice, and Strong Institutions). The 2030 Agenda presents sustainable development as an integrated and universal projects grounded in equity, participation, and global partnership (United Nations, 2015, pp. 3-5). However, discussions with students at Kasetsart University revealed how these goals are interpreted through distinct geopolitical and development priorities. For many Global North contexts, sustainability debates often centre on technological innovation and carbon reduction targets, whereas Global South perspectives frequently emphasise poverty alleviation, infrastructure development, and institutional strengthening as preconditions for environmental transition. These divergences expose structural tensions embedded with the SDG framework.

Resource inequality further complicates implementation. While the SDGs are framed as universal, the financial, technological, and institutional capacities required to meet them are unevenly distributed. States with stronger governance structures and fiscal capacity can invest in climate technologies, digital education systems, and data monitoring capacity therefore becomes a decisive factor in whether SDGs function as transformative tools or aspirational rhetoric. This reinforces Escobar's critique that global development agendas risk reproducing hierarchical knowledge and power structures when local priorities and constraints are subordinated to globally standardised benchmarks (Escobar, 2007, pp. 24-26).

The issue of measurement also emerged as significant. The SDGs rely heavily on indicators, targets, and data-driven assessment mechanisms to track progress. While such measurement promotes accountability and comparability, it can privilege quantifiable outputs over qualitative social transformation. For example, improvements in school enrolment statistics under SDG 4 do not necessarily capture educational quality, critical thinking capacity, or epistemic justice. Similarly, climate metrics may prioritise emissions reductions without fully accounting for distributive justice or community resilience. This highlights the limits of technocratic governance and underscores the importance of systems thinking understanding how economic, social, environmental, and political systems interact dynamically rather than in isolation.

Within this context, sustainability must be understood not merely as a policy objective but as a competency. Addressing SDG 13, for instance, requires the ability to think intergenerationally, anticipate unintended consequences, and balance competing priorities across sectors. The module fostered long-term sustainability competencies such as ethical reasoning, collaborative problem-solving, and reflexive analysis skills essential for navigating complex global challenges. Rather than treating the SDGs as fixed endpoints, the experience encouraged critical engagement with their assumptions, trade-offs, and implementation gaps.

A contemporary dimension of these discussions concerned artificial intelligence in development governance. The UNESCO Recommendation on the Ethics of Artificial Intelligence (2021, pp. 2–4) stresses that AI should promote inclusion and sustainable development while avoiding harm. In SDG contexts, AI can enhance climate modelling, optimise resource allocation, and support public administration. Yet reliance on AI-driven measurement systems may also intensify inequalities where data infrastructure is weak, reinforcing a digital divide between technologically advanced and resource-constrained states. Ethical Impact Assessments (UNESCO, 2021, pp. 18–20) therefore become essential to ensure that technological innovation does not override democratic accountability or exacerbate structural asymmetries.

Methodologically, the integration of lectures, simulations, and fieldwork strengthened this analytical engagement by linking theory to practice. Lectures introduced conceptual tools for understanding global governance, while simulations and collaborative work exposed the practical constraints of policymaking, including negotiation under time pressure, conflicting national priorities, and communication barriers across time zones and accents. Representing countries with which I had little personal affiliation required intellectual discipline and empathy, mirroring the practice of real diplomacy. These experiences cultivated adaptive thinking, intercultural competence, and transferable skills in strategic collaboration, aligned with systems thinking and long-term sustainability practice. Rather than simply learning about development frameworks, the module required active participation in navigating their tensions, trade-offs, and power dynamics.

Cross- Cross-Border Collaboration: Thailand

The in-person collaboration in Thailand significantly deepened the intellectual and relational dimensions of the partnership. Face-to-face engagement enabled forms of dialogue that extended beyond formal academic exchange, allowing informal conversations, contextual explanations, and embodied cultural experiences to reshape prior assumptions. Working alongside Thai students challenged my understanding of developmental policy, education reform, and political participation. Although both Thailand and United Kingdom are constitutional monarchies, the permissible boundaries of public criticism and political expression differ hugely. Grappling with these differences required moving beyond normative assumptions about liberal democratic participation and recognising how historical, legal, and cultural contexts shape political practice. This encounter concretely altered my analytical approach: rather than evaluating governance structures against a single democratic benchmark, I became more attentive to contextual variation, institution constraints, and culturally embedded political norms.

This shift reflects Escobar's argument that dominant development discourses frequently marginalise non-Western epistemologies by universalising Western liberal frameworks (Escobar, 2007, pp. 19-22). Engaging directly with Thai perspectives made this critique tangible rather than abstract. Evidence of this transformation was visible in group deliberations: policy proposals became more context-sensitive, assumptions were more frequently interrogated, and students demonstrated greater reflexivity in acknowledging positionality. Rather than reproducing theoretical models uncritically, participants began adapting them to local conditions.

The collaboration also provided an empirical testing ground for deliberative and participatory democratic theory (Pateman, 1970, pp. 42-44; Habermas, 1996, pp.305-307). Structured discussions and joint problem-solving exercises mirrored deliberative democratic ideals by prioritising communication, justification, and consensus-building. However, the experience simultaneously exposed the limits of formal equality. Differences in language fluency, confidence, and familiarity with institutional procedures influenced who spoke most frequently and whose arguments carried persuasive weight. This aligns with Young's critique that liberal democratic models often assume equal participation while overlooking structural inequalities that shape influence (Young, 2000, pp. 16-18). Observing these dynamics sharpened awareness of how power operates subtly within ostensibly egalitarian spaces.

Cross-border collaboration in higher education thus functioned not merely as international exposure but as democratic practice. It enabled the co-production of knowledge across geopolitical and epistemic divides, creating what Dahlgren describes as mediated public spheres (Dahlgren, 2005, pp. 153-155). Online platforms extended this interaction, operating as digital public spaces where authority, norms, and voice were negotiated (Fraser, 1990, pp.67-68). Importantly, the innovation of this model lies in its hybrid design: combining structured digital collaboration with reciprocal in –person engagement. This integration moved beyond passive virtual exchange by embedding dialogue within shared academic tasks, simulations, and local contextual immersion.

The most significant changes in students were visible in three key areas. Fist, thier analytical skills deepened. Instead of discussing policies in isolation, they began comparing different national factors shape outcomes. Second, their intercultural competence improved. Students adjusted their communication styles, clarified assumptions, and showed greater patience and openness during negotiations. Third, their confidence in transnational engagement increased. Participation became more balanced over time, and students were more willing to question ideas respectfully and refine arguments collaboratively. These developments suggest that intercultural learning moved beyond surface-level awareness toward genuine reflection and mutual transformation (Bannett, 2008, pp.98-100).

In terms of Scalability, the model contains several replicable elements: structures digital dialogue, simulation-based collaboration, and reciprocal field engagement grounded in local expertise. Because much of the interaction took place online, the approach can be adapted by institutions with limited travel resources, provided partnerships remains reciprocal and epistemically balanced. The innovation lies not in the use of technology alone, but in the intentional pedagogical design that integrates systems thinking, intercultural reflection, and participatory practice. When implemented with sensitivity to power asymmetries and contextual differences, this framework offers a scalable model for democratic education in an interconnected world.

Power and Inequality

However, cross-border collaboration also brings power asymmetries into sharp focus. Institutions in the global North that are privileged have curriculums designed to shape academic prestige, language dominance, and structural inequalities in resources. English frequently functions as the default language of instruction, shaping whose knowledge is most easily articulated and legitimised (Phillipson, 1992, pp. 47–49). Acknowledging these asymmetries is essential for ensuring that collaboration does not reproduce hierarchies under the guise of partnership. The Kasetsart collaboration addressed this challenge by foregrounding local expertise, encouraging Thai students and scholars to lead discussions on regional issues, and situating learning within Thailand's socio-political and environmental context. This helped rebalance epistemic authority and foster more equitable knowledge exchange. Relatedly, cross-border collaboration promotes knowledge pluralism by recognising that no single epistemic tradition holds a monopoly on valid knowledge. The engagement with Thailand highlighted the importance of indigenous knowledge, local policy practices, and context –specific development strategies. Rather than treating

Western Theories as universally applicable, the collaboration encouraged students to critically assess their limits and adapt them to local realities (Escobar, 2018, pp. 78–80). Knowledge pluralism thus emerged as both a pedagogical principle and a democratic practice, valuing diversity in ways of knowing and resisting intellectual homogenisation.

Part 2: Education as Democratic Infrastructure.

Democratic infrastructure refers not simply to values or ideals, but to the institutional arrangements that make democratic participation materially possible. Schools and universities are not neutral spaces for knowledge delivery; they are governance sites that generate civic capacity, distribute epistemic authority, and structure access to public life. If democracy depends on citizens who can interpret information, question power, and engage institutions critically, then education must be intentionally designed to cultivate these capacities.

This requires moving beyond general claims that education promotes democracy. Institutions must be redesigned in at least three specific ways.

First, governance structures within educational institutions must model democratic practice. Decision-making processes should incorporate participatory mechanisms, including student representation in curriculum design, policy development, and institutional review. Democratic learning cannot occur within hierarchically rigid systems that deny voice in practice while preaching participation in theory. Schools must therefore align internal governance with deliberative principles transparency, accountability, and inclusion.

Second, curriculum design must embed critical literacy, particularly media and digital literacy, as core democratic competencies. In contemporary societies, public discourse increasingly unfolds through digital platforms shaped by algorithmic systems. Education must therefore equip learners not only to consume information but to interrogate its sources, recognise misinformation, and understand how digital infrastructures shape visibility and influence. Democratic participation now requires algorithmic awareness and AI literacy, not merely traditional civic knowledge.

Third, educational institutions must address structural inequalities that undermine equal participation. Formal equality admitting diverse students is insufficient if institutional culture privileges certain linguistic styles, cultural norms, or epistemic traditions. Schools must actively counter discrimination and ensure pluralistic representation in knowledge production. This involves diversifying curricula, recognising multiple epistemologies, and designing inclusive assessment practices.

AI policy implications further reinforce the need for institutional redesign. As artificial intelligence increasingly mediates assessment systems, admissions processes, and content delivery, governance mechanisms must ensure transparency and accountability. Institutions should adopt clear AI usage policies, conduct ethical impact assessments, and guarantee human oversight in high-stakes decision-making. Without such safeguards, algorithmic bias and data-driven profiling risk reproducing inequalities rather than expanding democratic access.

In this sense, education must be reimagined as a regulatory and ethical space within the broader democratic ecosystem. Rather than simply transmitting knowledge, it must cultivate civic agency, institutional literacy, and technological responsibility. Democratic infrastructure is sustained not by abstract principles alone, but by institutional design choices that structure who speaks, who decides, and who is heard.

Methodology: Experiential and Reflective Study

This chapter adopts a reflective case study approach grounded in experiential learning. The analysis draws primarily on first-hand participation in cross-border educational collaboration, including digital dialogue, simulation-based exercises, and in-person field engagement. While not a formal ethnographic study, the approach incorporates elements of auto-ethnographic reflection, as it critically examines personal participation within institutional and intercultural contexts.

The methodology can be characterised as practice-informed reflection. Rather than collecting quantitative data, the chapter analyses lived experience as empirical material. Observations of group dynamics, participation patterns, negotiation challenges, and intercultural communication shifts serve as evidence for evaluating how democratic infrastructure functions in practice.

This approach aligns with experiential learning theory, which holds that knowledge emerges through reflection on action. By participating directly in simulations, digital collaboration, and policy discussions, theoretical frameworks such as participatory democracy and deliberative governance were tested against lived institutional realities. The methodology, therefore, combines reflective analysis with normative evaluation, assessing not only what occurred but how institutional design shaped democratic participation.

Importantly, this is not presented as a universal model but as a situated case. However, the insights generated, particularly regarding governance structures, power asymmetries, and AI-mediated participation, offer transferable lessons for institutional reform. The strength of this methodology lies in its capacity to bridge theory and practice, revealing how democratic infrastructure operates not only in abstract political systems but within educational institutions themselves.

Conclusion

In conclusion, the Thailand field experience was pivotal in deepening these learning outcomes. While online collaboration laid the foundation for dialogue, the field trip brought abstract discussions to life. Visiting urban and rural development sites, participating in simulations, and engaging directly with local institutions revealed the complexities of sustainable development in practice. The experience also challenged traditional student-expert hierarchies, as local actors became teachers and knowledge producers, reinforcing a democratic ethos grounded in accountability, presence, and real-world impact. The Kasetsart University partnership exemplifies Global South innovation rather than a peripheral collaboration. Kasetsart's expertise in agriculture, sustainability, and development demonstrates locally grounded solutions that address both regional and global challenges. This partnership shows that innovation does not flow unidirectionally from North to South; the Global South actively generates methodologies and insights with global relevance. Recognising this reframes international education as a space of mutual learning rather than one-way knowledge transfer, contributing to scholarship on equitable cross-border pedagogy and knowledge pluralism. The collaboration also functioned as an

SDG-embedded learning environment, connecting learning to sustainable cities, climate action, reduced inequalities, and global partnerships. Kasetsart's commitment to the SDGs was visible in campus design and policies that prioritise green, healthy living. Rather than treating SDGs as abstract goals, the programme embedded them into curriculum design, simulations, and fieldwork. Students actively imagined and evaluated policy responses within specific socio-economic contexts, linking theory to practice and reinforcing education's role in advancing global public goods. One clear policy recommendation is for universities to integrate field-based experiential learning into sustainability curricula. An institutional reform recommendation is to adopt reciprocal partnerships that recognise Global South institutions as co-creators of knowledge. In terms of AI governance, SDG-related AI tools should prioritise transparency, inclusivity, and contextual sensitivity to avoid reinforcing power imbalances. Thoughtfully designed cross-border collaboration operates as a democratic practice that fosters digital public spaces, intercultural learning, and knowledge pluralism while engaging critically with power asymmetries. The Kasetsart partnership demonstrates that Global South institutions can lead innovation and provide SDG-embedded learning environments that enrich global education. Such collaborations are pedagogically and politically significant, advancing more inclusive, reflexive, and democratic forms of global knowledge production.

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Environmental cost of Generative AI

Lucia D'Urbano

Abstract

Generative AI in the 21st century has experienced a massive boom, with OpenAI and its product ChatGPT becoming increasingly popular in schools, workplaces, and personal life. However, AI is incredibly taxing on the environment, with the mining of required minerals causing evictions and lives lost, while data centres that power ChatGPT and other related tools require potable water as the primary coolant, leaving surrounding neighbourhoods without fresh water. Overworking these servers has led to droughts and widespread environmental damage to the global climate. Some speculate that demand for AI will grow to encompass trillions of gallons of water to keep it functioning at its current rate. This article attempts to explain how taxing ChatGPT, and by extension GenAI, is on the environment and how regulation and a separation from these tools will benefit the future of humanity.

Introduction

Artificial Intelligence (AI) is being integrated into everyone's daily life through work, school, personal technology, and art. Once introduced to the public, it seems to be here to stay, and we, as humans, must adapt to make AI fit into our society. The original forms of AI are not what we see on our phones and computers; what has been seen as inevitable is generative artificial intelligence. Beyond simple pattern recognition, generative AI has been touted by its creators as the solution to all our problems. We shouldn't need to think anymore. AI will do it for us. Why put in the effort in school when AI will give us the answer immediately? Is the answer correct? Well, that would require research and knowledge to develop an answer that circumvents the use of generative AI (GenAI).

The rise of the use of generative AI has been tracked by governments and the companies that run them. The United Kingdom is seeing a rise in the use of chatbots from 34% to 40% in personal life and 24% to 28% in work life, within a year, from 2023 to 2024. OpenAI, the creator of the popular generative AI program ChatGPT, reached over $20 billion USD in revenue as of 2025. Offices have integrated GenAI tools into their workers' jobs, particularly in human customer service, where robots pull from a store of information that ends in talking in circles for the consumer. Schools are battling for control over their students in trying to provide guidelines for its use, while unfortunately, teachers have to go on metaphorical witch-hunts to figure out if what they are looking at is human-made or stolen from an AI server.

Additionally, AI's cost to the environment will affect education systems goals for sustainable learning.

These are common in people's complaints on generative AI in prevalent conversations but there is still one important complaint which isn't reported on as much as the copyright issue. Due to global demand on AI and the capitalist belief in exponential growth no matter what, the concern is that demand will require withdrawal of 4.2-6.6 billion cubic meters of water by 2027 (Li et. al, 2025). All of it would be fresh potable water; water that is often taken from residents of the surrounding neighbourhoods by the data centres. Without government legislation and active change in society to limit the damage that generative AI is causing on the environment in return for profit for their shareholders, the world as we know it will drastically devolve and cause further climate and environmental disaster.

Progression of Generative Artificial Intelligence and How the System Functions

The development of AI begins with the work of the Russian mathematician Andrey Markov on probability theory. He created the Markov chain, a probability sequence that has been used throughout history for many different forms of statistical models in the 1900s, and without the Markov chain model, generative artificial intelligence wouldn't exist (Jebara, 2004).

Generative Artificial Intelligence has been a concept in the digital age since the early 1970s. The first documented demonstration of a GenAI model's ability to generate new images from imputed data was by Harold Cohen. Cohen generated abstract art through a series of computer programs he called AARON through the late 1900s into the early 2000s. As Cohen improved his program, the AARON became able to create colour images by the 1990s, then evolved from abstract to recognisable images such as rocks, plants, and even people. AARON's outputs drew the art community's fascination, even being displayed in museums and galleries. Cohen's opinion on whether he believes that AARON has the capability to be creative and develop art on its own remains nuanced, writing in a letter to the Stanford Humanities Review "AARON exists; it generates objects that hold their own… it does so with a stylistic consistency that reveals an identity as clearly as any human artist does," (Cohen, 1994: 13) while equally denouncing the idea that AARON is creative and can think for itself, due to its inability to create new styles or images of its own, as each output was coded by Cohen, a human. Cohen, while making great leaps in human advancement of Artificial Intelligence, has never made his source code public. In doing so, Cohen kept his creation insular in a way and not produced at a mass scale.

Cohen's fascination with GenAI was the step needed to create the state of AI today. In the late 2000s, generative AI was advancing away from a simple computer program into a 'deep learning technology'. While still rudimentary, the machine learning capabilities were able to use abstract layers of an input to classify the inputs, leading to developments in image classification, speech recognition and many other processing programs (Jebara, 2004). The real AI boom came with the 2020s, with the COVID-19 pandemic causing the human dependence on technology to increase. In 2022, Midjourney and ChatGPT were released to the public and the craze over AI as a tool began in earnest. OpenAI is a company based out of America, partnered with Microsoft, and as of 2023 are responsible for the creation of multiple popular AI programs, many of which students use (Jin and Kruppa, 2023). OpenAI has come under scrutiny over how their programs have been trained and used, with multiple copyright infringement lawsuits in recent years. In 2023 OpenAI was sued by a variety of authors including Sarah Silverman, John Grisham and George R. R. Martin. In a class action lawsuit brought by the Authors Guild against OpenAI, it was revealed that the two largest datasets called 'books1' and 'books2' were used to train ChatGPT-3. These datasets contained over 100,000 published worlds, which is an estimate of 67 billion tokens of data, an equivalent of 50 billion words (Rafieyan and Chowdury, 2024).

With looking at OpenAI's program ChatGPT it becomes easier to understand why there is pushback on its use in education and the workforce, instead of humans completing tasks. ChatGPT is a large language model, essentially an algorithm that uses human language with no real understanding of what they are saying. The program breaks down each word from the input and what the order of the words means, assigning 'tokens' to determine what the meaning of the question is. ChatGPT predicts outputs based on the input, guessing the most likely word that would follow the previous one; see Figure below for the architecture it uses to generate its answers.

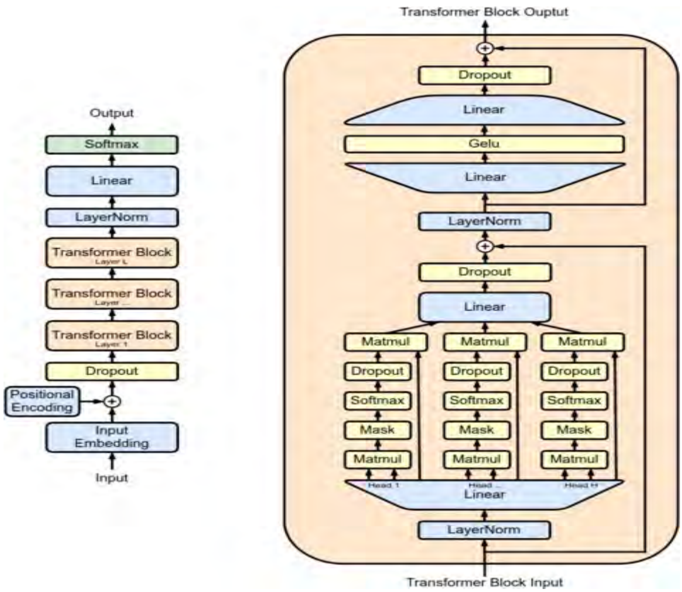

Figure 1: Chat GPT's transformer model-based architecture (Source: Vafadar, M. and Ali Moradi Amani: Academic Education in the Era of Generative Artificial Intelligence)

ChatGPT, while more complicated than AARON, still uses the Markov chain model as its base, relying on probability to answer questions or to determine the image presented. But unlike AARON's, whose inputs were created and finetuned by Cohen its creator, OpenAI updates ChatGPT to make it sound more human, developing its own personal voice using data sets made up of other authors' works. So much so that recently OpenAI turned slightly away from humanisation to prevent parasocial behaviour between humans and machine with the latest update, ChatGPT-5. Despite OpenAI denying that the current iteration of ChatGPT contains copyrighted datasets, the 2023 Authors' Guild lawsuit shows that without large files of information for ChatGPT to pull from, the program isn't as friendly to the consumer. Nor is it as profitable, as the 2022 ChatGPT program helped amass OpenAI billions of dollars.

AI data centres across the globe use water as coolant to keep their servers functioning, projecting to consume from 300,000 gallons to 5 million gallons of water daily on average (Silverstein, 2026, Nguyen, 2024). In an article written by Li, Yang, Islam and Ren titled 'Making AI less 'thirsty': Uncovering and Addressing the Secret Water Footprint of AI Models', the three scopes of on-site water consumption cooling systems are explained as to

Why is so much water necessary? Scope 1 water usage refers to the direct consumption of freshwater, which is required to cool the servers. There are two stages of scope 1: server level and facility level cooling (Li et al, 2025: 3). In server level cooling, the "heat is transferred from the servers to the facility through either air or liquid cooling". In this method there is no consumption or evaporation of water. However, data centres dedicated to AI training often are reliant on "liquid cooling due to the high server power densities". For water-based cooling systems, there are two distinctive methods: cooling towers and air evaporation systems. Cooling towers dissipate heat by evaporating water into the environment; however, the non-evaporated water can only be recycled a limited number of cycles before it must be replaced with fresh potable water (Li et al, 2025: 3). The evaporation-assisted air-cooling system uses outside air for cooling, but the method only works when the air is under 30°C with humidity, if exceeding 30°C or low humidity, the cooling towers and other water evaporation methods are used. In the report Li et al note that just with the training of GPT-3 of Microsoft's US training centres has resulted in 700,000 litres of direct scope 1 water consumption (Li et al, 2025: 2). Scope 2's water usage takes thermoelectric power, which while using water, is more commonly associated with electricity consumption. Used in power plants, there are separate techniques that depend on the cooling systems. "Typically, water withdrawal due to hydropower generation is excluded, but water consumption due to increased water evaporation rates from hydropower generation is included". Scope 2 is easier to measure and can be reported on by the private companies and the U.S. government (Arman et al., 2024). Scope 3's water usage is through chip and server manufacturing: "ultrapure water is needed for wafer fabrication and water is also needed for keeping semiconductor plants cool." (Li et al., 2025: 4).

AI's Prevalence in Society and Education

Since 2022, the popularisation and integration of GenAI has skyrocketed. As one of the largest companies owning this technology, OpenAI has exceeded $20 billion in 2025, which is over a 300% rise in profit earnings from the $6 billion in revenue in 2024 and only $2 billion in 2023 (Zhang, 2026). The use of AI has become popular for tech companies to integrate into their systems. Microsoft added an AI tool called Copilot onto all their products and Google added an AI summary at the top result of search engine results pulling from websites with little internal protections against pulling from websites with false or debunked information (O'Flaherty, 2025). Even Google Docs is affected where spell check no longer relies on dictionaries and the defined rules of grammar to assign possible solutions. Instead, it runs through an AI program to predict whether the document is being 'fed' correct or incorrect grammar and spelling (Herrera et al, 2025, Hoskere, 2019). With the COVID-19 pandemic, the adoption of AI accelerated with digital platforms having to be adopted on a global scale to account for the demand of stay-at-home laws. OpenAI's ChatGPT was created during the lockdown, and the human isolation caused a shift in socialisation. People relied on technology to supplement human connection, with users responding positively when ChatGPT sounded more human, giving more sociable answers. OpenAI leaned into that aspect promoting their products as a useful tool to bounce ideas off and to replace conversations to keep their users interested and hooked (Hershock, 2020).

The prevalence and widescale adoption of AI tools can be measured. With a series of surveys released in waves from November 2021 to August 2024, the UK Government surveyed 5,000 people across the United Kingdom to create a comprehensive view on the public sentiment of AI. While the study's purpose was to aid in the creation of new Data protection laws, the study is useful to see how the adoption of AI tools and chatbots have changed through the lockdown and with the founding of OpenAI and ChatGPT's creation. It was found that the concept of AI is nearly universal, with a majority of adults being able to understand the concept, while young people or those from a higher socio-economic class show a deeper understanding of the topic, a majority of those surveyed can explain what it is and can identify when something is an AI tool compared to a separate technological tool. The broad public seem to have more negative concerns about AI, with younger people being more positive, possibly due to how long one has lived life without the access to the internet and who grew up with the digitalisation of society. It was found that six out of ten people have admitted to using a chatbot within the last three months, with four out of ten having used chatbots within one month. What the government has discovered is that while there is a knowledge of Artificial Intelligence, there is a lack of knowledge amongst a majority of those surveyed on how AI works and how it is trained (UK government, 2024). see figure below, Wave 2 was conducted in June and July of 2022, Wave 3 conducted from August to September 2023 and Wave 4 conducted from July to August 2024

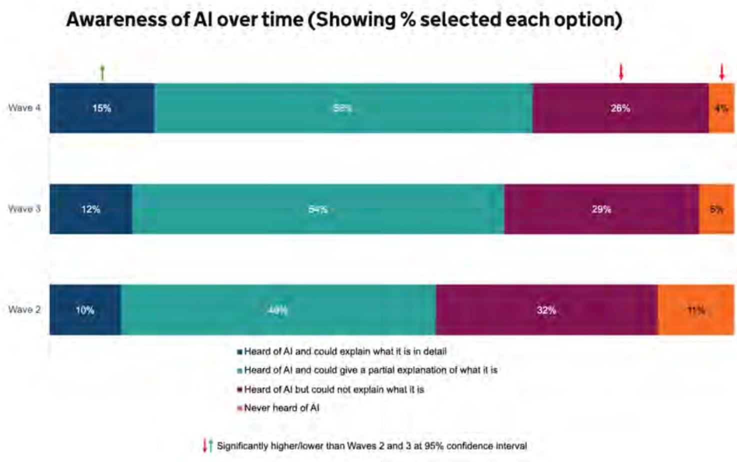

Figure 2: Chart showing awareness of AI through the different survey waves (Source: UK Government: Public attitudes to data and AI: Tracker survey (Wave 4) report)

The growth of the general knowledge of AI rises with the release of ChatGPT and subsequent integration from tech companies in 2022. From 2023 to 2024 the growth of people who use chatbots at least once a month for personal use grew 6% from 34% to 40%, while use of chatbots uses for one's job grew 4% from 24% in 2023 to 28% in 2024, (UK Government, 2024). In these years the prevalence of students using AI has grown as well. Education has been forced to adapt to students using AI to complete their assignments, the educational system and teachers must fight to figure out if work is written by a student or AI. The metaphorical cat and mouse game have only grown more frequent as with every new guideline and advancement in this technology students find a way around the system to cheat on their assignments. Schools have turned to AI systems to alleviate the stress AI causes on the educational system. For example, allowing students to use Grammarly as long as it is cited on assignments and submission through Turnitin to check for plagiarism and AI writing. The reliance on AI damages the very root of the educational system when the reliance on a tool to think for the student leads to worse retention of information and the AI detection tools inaccurate at their function more times than not further eroding the student teacher relationship.

What it Takes to Run AI Chatbots

As generative Artificial Intelligence has become more integrated into the mainstream for mass use by the public, the environmental cost is becoming more dire. When tech companies have integrated AI into their existing products everywhere, it causes pressure on the demand for critical minerals and metals which are essential for data centres. Since the turn of the century Artificial Intelligence has grown in popularity and capability, with the technology costs for the average person going down and the expansion of processors such as GPUs (Agarwal, Chakraborti, 2025: 1). The minerals required to produce the scale of electronics needed to create the programs are materially dense and eventually create e-waste as systems advance past their initial stage. A variety of metals such as copper and cobalt are required for the advancement of new technology including reusable electronics. The extraction of these metals come at great societal and environmental costs. OpenAI is unable to gather these materials from their home base in America; they rely on deals with other companies working in other countries to collect their minerals. The extraction of minerals is a vulnerable and dangerous mission for the workers. With Africa being the home to large mineral deposits that are needed to run AI models, holding 30% of the world's critical mineral reserves (Chen, Laws and Valckx, 2024). The Democratic Republic of Congo (DRC) holds significant copper and cobalt mines and the expansion of industry in these cobalt and copper mines has led to the “forced eviction of entire communities and grievous human rights abuses included sexual assault, arson and beatings” (Amnesty International, 2023). The destruction of homes and neighbourhoods come at the expense of the people, with little forewarning or compensation, all because their homes were built upon mineral deposits.

Companies' greed for growth and profit only leads to the destruction of people’s lives. It is not just AI companies abusing the system but also tech companies that require rechargeable batteries, with “the average vehicle battery requires more than 13kg of cobalt and a mobile phone battery about 7g”, the current demand of cobalt have tripled within 15 years reaching 222,000 tonnes by 2025 (Amnesty International, 2023). The expansion of the use of AI is not just a western issue instead it harms people across the globe in a variety of different ways

American Data Centres’ Water Issue

The data centres used to power AI contribute to mass water consumption and environmental disparity in the surrounding areas to cool the data banks. The water consumption levels are difficult to track, making the task of regulating the use near impossible, with different studies resulting to different numbers of total and predicted water use. This is because the companies who are using the water are not being reported on accurately internally to limit the true extent of the consumption to the press. Because AI data centres are dedicated to training their systems and running multiple tasks near simultaneously to get responses to users, the

infrastructure of the centres generate heat which require cooling systems to operate at a safe level (Herrera et. al., 2025). Data centres as of 2023 are currently accounting for 1% to 2% of the global electricity consumption which is “expected to increase significantly as AI models become more complex and widespread”. The surge in consumption of AI leads to a surge in the infrastructure of AI which in turn leads to an increase for the need for cooling systems (Herrera et al, 2025: 2). AI's water footprint is set to consume 1.7 billion litres of water per day by 2030 with ChatGPT in August 2023 reached 1.4 billion site visits and was estimated to have used a quarter of a gallon of water for every 40-100 queries, (Li et al, 2025: 5). It is important to understand that unlike agriculture which uses 'green' water, stored in soil and used by plants, AI uses 'blue' water, "extracted from rivers, lakes, or groundwater, which is directly accessible for human use but more often more limited in availability." (Li et al., 2025: 4).

A combination of the three scopes of water cooling systems are used across the United States' data centres with the US Energy Department stating in 2023 that "U.S. data centres consumed an estimated 17 billion gallons of water…projected to consume 16 to 33 billion gallons per annum by 2028" should the current rates of consumption and growth continue (Silverstein, 2026).

The United States views Artificial Intelligence as a large part of their economic future, integrating it into many parts of their life, from finance and economics to their military and defence systems (Silverstein, 2026). This is a cause for concern as the building projects for these data centres are being approved at a fast rate without the basic level of infrastructure needed for the data centres to function at a steady rate without damaging the local ecosystems, (Hullinger, 2025). Even regions that are considered water dense are discovering that availability is seasonal and unpredictable as climate change alters precipitation patterns and raises in temperatures, (Sickinger et. al, 2018: 5). With rapidly changing environments the system being created is not sustainable nor is useful for the lives of the people who live there.

West Virginia is highlighted as a state in the US that is opposed to further construction of data centres, with their concern over water scarcity. As often the projects are planned in regions with limited local resources, state bargaining power and economic value to the federal government. Silverstein's article reflects on how West Virginia's history with coal mining parallels the current construction on data centres likening the over mining to each other. While coal is a finite resource, the AI data centres are seen as an infinite source, (Silverstein, 2026). Across the United States two thirds of new data centres since 2022 are in locations that have been suffering with high levels of water stress. There is a high concentration of data centres in five states, Virginia, Illinois, Arizona, Texas and California, which account for 72% of recorded high stress areas, (Nicoletti et. al, 2025).

Focusing on the economic issues to water scarcity in towns across the United States, while data centres are used for their exponential growth of the US economy "water scarcity and unpredictability could slow GDP growth up to 6% in areas already impacted by water stress," (Nguyen, 2024). JP Morgan in collaboration with the ERM Sustainability Institute understands that with the growing demand for data centres and AI, the current infrastructure is not being built upon and with the changing climate due to rising temperatures, changing the landscapes of America, the report states that the technology needs to have decentralised circular waste systems in order to remain sustainable for the future, (JP Morgan, 2024).

The distinct human cost is vast, with people's drinking water being stolen by the data centres. In a story published in July 2025, the BBC reports on Beverly Morris, a retired woman who bought a home in Georgia in 2016, which is now without water because she lives just 366 meters from an Artificial Intelligence data centre. She admitted to BBC, "I can't live in my home with half of my home functioning and no water," and further quoted "I can't drink the water,". This is due to her belief that in the construction of the building, Meta disrupted a private well which led to a buildup of sediment rendering her potable water undrinkable. She states that she is afraid of drinking the water she does get but cannot do anything about it so she continues to cook and brush her teeth with it. (Fleury, 2025).

Volunteers and members of Flint Riverkeeper, a non-profit group, has made work to monitor the water in Georgia's Flint River, (Fleury, 2025). The group suggests that the cloudy and brown water coming out of faucets and taps in their local area is due to "sediment runoff - and possibly flocculants." (Fleury, 2025).

Ethical implications of OpenAI and Generative AI

With the draining of fresh potable water of 300,000 gallons daily causing water scarcity in the surrounding areas, AI poses a significant ethical concern over the adoption of use in daily life, overtaking the use of existing technology. With Li, Yang, Islam and Ren's article concluding that there needs to be more transparency from AI companies of what it takes to run and train their AI models, and from a comprehensive report society can address "the water footprint along with the carbon footprint to build truly sustainable AI" (Li et al, 2025: 7). Within this scope, there is an effort for recycling the water through the system and "semi-conductor plants can effectively reduce water withdrawal, the recycling rate in many cases remains low, e.g., the average recycling rate for wafer plants and semiconductor plants in Singapore are 45% and 23%, respectively" (Li et. al, 2025: 4). AI companies omit scope 2's water usage from model reports. This suppression of full information can prevent and impede developments to improve the sustainability of water usage from data centres as well as keeping the public in the dark about the true environmental cost of AI. Suppression of information impedes global sustainability goals outlined by the United Nations and other international bodies, as well as continuing to hide the plight of those in the global south from the western nations. Not only concerning the local consumption of resources being funnelled away from the people and into the cooling systems, but there is also ethical concerns over hazardous waste discharged from the building during and after construction as sediment is disturbed and when the chemicals used to manufacture AI chips are not disposed of correctly, (Fleury, 2025, Li et. al, 2025: 4).

But what is there to be done? AI is here to stay, no matter the damage to the planet and the life living upon it. There needs to be full transparency from GenAI companies to governments and the public about their internal practices, how they work to achieve their sustainability goals and where they source their materials. Keeping AI as a for-profit company-based venture is only harming the people, and the private companies need to be held accountable for the damage they have caused. Global organisations such as the United Nations, European Union and the World Health Organisation need to come together to create a global target for keeping AI from exploiting the planet's wealth. Within education, the struggle that teachers across all year groups to give our deep well of knowledge to the next generation need to go back to the basics that hundreds of years of education was built on. A return to pen and paper, written assignments and class notes will not only ensure that students are more likely to retain the knowledge they have written but also limit the use of AI tools such as ChatGPT as a crutch for life skills. Old fashioned written assignments will also help teachers in making sure that students aren't copy and pasting from an AI chatbot.

Teaching computer literacy is important, keeping ICT classes separate from a math lesson will enrich the students' lives better than keeping a Chromebook or iPad in front of them at all times.

Conclusion

Generative AI is a tool used in school, work and most aspects of life. Since 2021 Generative AI has been adapted and integrated into most aspects of society. The thought that AI is here to stay is ubiquitous and is likely to continue that way. However, there needs to be changes to how AI is created and maintained, especially Generative AI as it is one of the most commonly used versions of Artificial Intelligence across the world by the public. This cannot be done without proper sustainability guidelines and procedure, Artificial Intelligence needs to be regulated and contained. There is a concern over how the global demand for Artificial Intelligence will demand 4.2-6.6 billion cubic meters of water withdrawal by 2027 (Li et. al, 2025: 1). Destroying the fresh potable water supply and potentially poisoning people, the companies do not show care about the human cost if it boosts their profits. Governments need to provide legislation to limit the damage AI has already caused and shoulder the responsibility from private companies by addressing the future damage.

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PART V

CROSS-REGIONAL DEMOCRATIC EDUCATION AND EXPERIENTIAL LEARNING

18 |

Cross-Regional Learning and Democratic Education in a Digital Era

Kwanhatai Koh, Phornpailin Gebben, & Busakorn Methakulchai

Abstract

In the rapidly evolving Age of Artificial Intelligence, where digital information is everywhere, the essence of transformative learning often lies in physical, cross-regional encounters. This chapter provides a reflective account of a cross-regional learning experience in Turkey, examining the intersection of culture, education, and sustainability. Drawing on qualitative field notes, site visits, and interpersonal encounters by student representatives from Kasetsart University during the ECIT 2025 conference, the study explores how local traditions and informal knowledge practices challenge the data-driven nature of AI. The findings reveal that while AI provides efficient 'direction,' human-centric experiences provide necessary 'meaning,' particularly in the context of SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 10 (Reduced Inequalities), and SDG 17 (Partnerships for the Goals). This chapter argues that cross-regional dialogue, mediated by shared cultural and religious experiences, remains an irreplaceable pedagogical tool for fostering global citizenship in a digitalized world.

Introduction

The pre-dawn air in Istanbul was filled with the aroma of roasted Ottoman coffee and the echo of the Adhan from a nearby minaret. Walking through the historic streets with colleagues from the University of Westminster, students we had known only through a travel itinerary weeks earlier, we were gradually drawn into a shared rhythm of exploration. In an age increasingly shaped by Artificial Intelligence, where global information is accessed instantly through digital tools and platforms, this experience of embodied, face-to-face learning offered a striking contrast (Pregowska et al., 2021), reminding us that technology can facilitate connection but cannot replicate the depth of intercultural encounter. The city unfolded as a space of learning, dialogue, and shared understanding (Shonfeld, 2024).

As we walked along the boulevard, our peers highlighted the architectural harmony of mosques and explained how the city's pace aligned with their spiritual practices. On the same day, Dr Farhang Morady, an academic from the University of Westminster, introduced us to another dimension of Istanbul, demonstrating how murals and graffiti in Kadıköy function as tools of political expression for young people in increasingly restricted public spaces. With his guidance and our discussions, the mosques, bazaars, and streets became an open classroom. We were no longer just Faculty Representatives from Kasetsart University observing a foreign culture; we became active participants in a shared human experience.

The conference on Engaging with Contemporary Issues in Turkey (ECIT): Economics, Politics and the SDG Agenda in Istanbul demonstrated the importance of cross-regional collaboration in addressing shared global challenges. In a world growing increasingly divided, such collaboration is vital to achieving the Sustainable Development Goals (Filho et al., 2022), particularly as student exchanges can foster dialogue in contexts where formal diplomacy is limited. In today's world, challenges including sustainable development, social inequality, and global governance cross national borders, making cross-regional partnerships not merely beneficial but necessary.

This chapter draws on qualitative field notes collected by all three authors during and after ECIT 2025, sharing our experiences as scholarship recipients and Faculty Representatives from Kasetsart University. We collaborated with students from the Democratic Education Network and the University of Westminster, engaging in dialogue on cultural assumptions, religious practices, and exploring together under a gender equality mindset. Cross-regional collaboration is understood here as a social process involving cultural exchange, personal relationships, and shared reflection (Gill, 2002). This chapter demonstrates that such experiences support the achievement of SDGs 4, 5, 10, and 17, and that global understanding begins not with policy but with people.

Europe, Asia, and the Middle East: Turkey as a Crossroads of Learning

The collaboration that emerged during the ECIT workshop was situated within a wider context of interaction linking Europe, Asia, and the Middle East. Turkey was shown to be a historical and contemporary crossroads between these regions. Europe and the Middle East are closely connected through trade, migration, shared ideas, and common challenges. Exchanges between Europe and the Middle East have shaped religion, science, and trade over time. Today, these connections appear in migration patterns, discussions about multiculturalism, and the increasing presence of Muslim communities in Europe (Esposito, 2016). Although public conversations often highlight tensions related to integration and Islamophobia, these views do not reflect the full range of experiences and interactions between these regions. (Kaya, 2015).

In academic spaces, particularly international conferences and student-led initiatives, provide important alternative arenas in which these complexities can be explored critically and constructively. As Marginson and Rhoades (2002) argue, higher education increasingly operates beyond national boundaries, shaped by global, national, and local forces simultaneously. This dynamic was clearly evident in the cross-regional dialogue that emerged during ECIT 2025 . During ECIT 2025, participants from multiple countries engaged in dialogue on issues including economic inequality, governance, migration, and sustainable development. These discussions demonstrated that challenges facing Europe, Asia, and the Middle East, such as development disparities, social exclusion, and environmental vulnerability, are deeply interconnected.

Within this context, Turkey served not only as a geographical meeting point but also as a pedagogical space where cross-regional learning could unfold in practice. Through collaborative engagement, participants recognised that addressing the SDGs requires shared responsibility, intercultural understanding, and sustained partnerships. The ECIT experience thus exemplified how academic collaboration can contribute to more inclusive, dialogical, and globally responsive forms of education, in line with the values promoted by the Democratic Education Network. (United Nations, 2015).

This dynamic resonates particularly with the Thai participants in this study, as Thailand and Turkey occupy analogous geopolitical positions as bridge countries navigating relationships between competing regional powers. Thai policymakers have navigated great power rivalries over centuries through bamboo diplomacy, balancing competing powers to preserve Thailand's independence and autonomy, while Turkey similarly mediates between NATO, Russia, and regional Middle Eastern actors. Both nations demonstrate that countries positioned at geopolitical crossroads develop distinct diplomatic cultures shaped by the necessity of flexibility, making cross-regional dialogue not merely an academic exercise but a deeply familiar mode of engagement (Busbarat, 2016; Marginson & Rhoades, 2002).

Turkey as a Lived Crossroads Between Regions

Turkey is located at the crossroads of Europe and the Middle East, both geographically and culturally. Its society shows this mix: Islamic traditions are important in daily life, while many institutions, infrastructure, and academic networks are linked to Europe. Turkey's relationship with the European Union has changed over time, moving from being a candidate for membership to a more strategic partnership. The European Union External Action Website (2021) marked this shift by the suspension of most accession chapters since 2005 and a reorientation toward security, energy, and migration cooperation, reflects a broader transition from normative integration to transactional geopolitics. This situation reflects the collaborating with Europe while maintaining independence, influenced by political interests, migration management, and economic. Experiencing Turkey firsthand made this hybridity especially evident. Urban infrastructure and transportation systems in Istanbul felt highly European in terms of efficiency and technological development, while social behaviours and everyday interactions carried familiar characteristics of Asian contexts. Practices such as informal street crossings and fast-paced traffic reflect social flexibility rather than rigid regulation. This coexistence of order and spontaneity challenges the distinctions between “European” and “Middle Eastern” identities.

Traveling between conference venues, religious sites, and public spaces adds meaning to the educational experience. Instead of walking pointlessly, the time spent traveling allows you to observe, reflect, and engage emotionally. Each journey offers chances to learn through being present, showing how Turkey is a place where learning happens in everyday life. However, Turkey also faces ongoing challenges, especially with gender inequality.

As we noted from the ECIT conference and according to İlkkaracan (2012) determined that women in Turkey struggle to participate in the labor market and decision-making, women's labour market participation in Turkey remains at approximately 36%, compared to 71% for men, with women disproportionately concentrated in informal, low-paid, and part-time roles. Despite legal frameworks including ILO conventions and CEDAW, enforcement remains weak and cultural barriers persist. revealing deeper social and cultural issues related to modernization. Even though Turkey has laws and some economic progress, women still encounter barriers in finding jobs and participating in public life. These contradictions deepen our understanding of Turkey as a nation that connects different regions but also faces challenges in achieving full progress. While Turkey is significantly influenced by Islamic traditions, it also maintains strong institutional ties with Europe. Hosting an international conference on economics, politics, and the SDGs in such a context fostered dialogue across cultural and regional boundaries. (Esposito, 2016; Bowen, 2012)

From our observations, Bangkok and Istanbul shared certain urban realities, yet Turkey offered a social and cultural context that differed. Unlike Bangkok, where Buddhist temples coexist with enormous malls, Istanbul's skyline is dominated by tall minarets and historic mosques, offering a wholly different urban rhythm shaped by Islamic tradition. At the same time, working with students from the UK added another layer of diversity, particularly as many of them shared the Islamic faith with the host society. This intersection of regions, cultures, and religions highlighted the multidimensional nature of cross-regional collaboration.

Muslim Identity in the United Kingdom as a Connecting Experience

The involvement of students from the United Kingdom, many of whom shared a common identity, added an intriguing aspect to the cross-regional collaboration promoted through ECIT 2025. For example, the Muslim students from the UK, whose background may be shaped by complex migration histories, multicultural policies, may have to constantly negotiate between their heritage within a predominantly secular public sphere. Some of the students we spoke with are second- or third-generation citizens who have grown up navigating religious commitment alongside national, cultural, and professional identities. This positioning allows them to navigate smoothly across various social contexts, embodying hybrid and transnational forms of belonging. Interacting with peers has challenged the initial assumption that Europe is primarily non-Islamic or culturally disconnected from Muslim societies. While public discourse often frames Islam in Europe through political debates related to security, integration, or identity, personal interactions have uncovered a more nuanced and relational reality. Our Muslim colleagues from the University of Westminster engaged with peers as individuals, sharing their religious practices, ethical principles, and daily routines through open and reflective dialogue. This approach cultivated a supportive environment for mutual learning and intercultural trust, demonstrating that meaningful cross-cultural understanding grows from genuine human connection rather than formal representation. This non-imposition approach cultivates a supportive environment for mutual learning and intercultural trust. (Bowen, 2012).

In this collaborative setting, British Muslim students help connect people from different religious, cultural, and regional backgrounds. They do this not through formal authority but by listening, explaining, and showing empathy in everyday situations. These interactions help create valuable transnational identities that serve as resources for working together across regions. This shows that social connections can form through everyday encounters, not just through formal institutions.

Together, these complex regional and cultural contexts formed the foundation for the experiences examined in the following section.The continental relationship provided the structural backdrop, Turkey offered a lived space of intersection. These interactions exemplify how democratic, inclusive, and dialogical learning contributes to SDGs 4, 5, 10, and 17 by fostering respect, reciprocity, and shared responsibility in global education.

Religion, Culture, and Interpersonal Learning

Islamic practices in Turkey shaped daily interactions and learning. Our Muslim colleagues from the University of Westminster served as cultural mediators, explaining Islamic beliefs, prayer practices, and values like modesty and community to Thai students through everyday conversations. The journey to the mosque involved local transportation by bus, boat, metro, and car. (Bowen, 2012).

Our Muslim colleagues from the University of Westminster invited us to take a look inside. We removed our shoes and entered the vast, silent interior. The women's prayer space was separate and smaller than the men's hall; this initially confused us, though we later learned it relates to modesty and concentration practices.

We put on full-coverage prayer clothing and entered the women's area. Following our friend's guidance, we stood, bowed, knelt, and prostrated while reciting in Arabic. Even though we didn't understand arabic words, yet the rhythm was calming and peaceful. Subsequently, our friend clarified that personal supplications are a common aspect of their practice. We took a quiet moment to experience and felt a deep sense of gratitude for it. While this moment did not alter our beliefs, it allowed us to perceive prayer as a means to reflect, express gratitude, and engage with spirituality. It taught me to respect and connect with diverse beliefs, transforming religion from an abstract concept into a genuine and empathetic experience.

An important part of this experience was how religion, especially Islam, influences daily life and learning. In Turkey, Islamic practices are part of everyday routines, affecting social norms, time management, and public spaces. For students who are not familiar with these practices, understanding them is essential to participate respectfully in academic and social settings.

Urban Exploration: Lived Learning in Istanbul

The discovery of Istanbul was more than just touring tourist landmarks; it was a learning experience formed by locations, people, and discussions. Each venue we visited exemplified the city's history, religious diversity, and modern way of life.

One of the most popular sites was Hagia Sophia, which clearly depicted Istanbul's religious and political upheavals. Christian and Islamic art can both be found in the same edifice. What grabbed out was the sense of calm and respect among people using the area. Rather than being just a tourist attraction, Hagia Sophia is a spiritual centre of significance for individuals of all religious beliefs. Standing in an architectural environment that reflects the "coexistence of differences" was a particularly remarkable experience, sparking contemplation on Thai temples, which perform a definite religious function but seldom express the overlapping presence of many religions inside the same place.

Another important site was the Sultan Ahmed Mosque, or the Blue Mosque, which continues to function as an active place of worship. Notable observations included a sense of order and tranquillity, and a clear spatial arrangement separating tourists from worshippers. Friends from the United Kingdom who practice Islam explained appropriate etiquette for entering the mosque and shared the significance of daily prayers in everyday life. One especially meaningful moment was learning about religious practices through personal explanations from friends rather than through written informational displays.

Kadıköy, where we stayed, exemplified the city's current urban life. There were cafés, marketplaces, bookshops, and street art throughout the neighbourhood. As noted in our field observations, Kadıköy had the combination of individuals and the free use of public space, which created a lively, welcoming urban atmosphere.

Finally, travelling by ferry was a particularly memorable experience. Navigating Istanbul's complex urban landscape was itself a form of learning. We relied on AI-powered navigation tools(Google Maps) to move between conference venues, religious sites, and neighbourhoods across the city, which lowered practical barriers to participation, particularly as Southeast Asian students unfamiliar with the city. However, we observed that AI navigation offered direction not meaning. It could tell us which ferry to board or which metro line to take, but it could not explain why the journey mattered. The significance of crossing the Bosphorus emerged not from an app but from conversations with peers who understood it as a boundary between continents, histories, and identities (Klimova & Chen, 2024). Mobility in Istanbul is an integral part of daily life rather than a special occasion.

Overall, for students engaging in cross-regional collaboration, AI tools are valuable companions but incomplete teachers, affirming SDG 4's vision of education as transformative and cultivated through lived engagement rather than digital mediation alone.

Challenges and Intercultural Adaptation

The challenges encountered during our travel to Turkey as a student from Thailand were primarily related to differences in religion, language, food, and everyday cultural practices. As a Buddhist Thai participant travelling alongside a

Christian friend, both of us were accustomed to a predominantly Buddhist social context. Entering a society in which Islam plays a significant role in shaping social norms and daily life therefore required careful observation, sensitivity, and cultural adaptation. Although Thailand is religiously diverse, Buddhism remains a major cultural reference point. This experience thus provided an important opportunity to engage respectfully and thoughtfully with unfamiliar cultural frameworks.

Language barriers represented one of the most immediate challenges. While English functioned as the main medium of communication, differences in accents, idiomatic expressions, and culturally embedded meanings sometimes hindered mutual understanding. In everyday situations, such as ordering food, interactions were occasionally complicated by the limited English proficiency of local residents. Nevertheless, the creative use of gestures, visual cues, and digital translation tools enabled effective communication. These experiences demonstrated that meaningful engagement can occur even when verbal communication is restricted.

Differences in everyday social practices also required adjustment. Expectations regarding modest dress for women were initially unfamiliar and prompted personal reflection and adaptation. Rather than being experienced as restrictive, these practices offered insight into how religious and cultural values shape public space and social interaction. Other social norms, such as the prevalence of smoking in café culture, contrasted with practices in Thailand and highlighted variations in social behaviour across societies. Similarly, mealtime customs, including the widespread use of forks rather than spoons, reflected subtle but meaningful cultural differences in everyday life.

Overall, these challenges fostered critical reflection, learning, and personal growth. The experience emphasised the importance of openness, cultural awareness, and respect for diverse ways of life. Rather than functioning as barriers, religious and cultural differences became opportunities for developing global understanding and mutual respect. In line with the principles of the Democratic Education Network, such experiential learning is central to cultivating intercultural competence, ethical responsibility, and collaborative capacity, which are essential for advancing cross-regional cooperation and contributing to SDGs 4, 10, and 17 in an increasingly interconnected world. (United Nations, 2015).

Cross-Regional Collaboration and the Sustainable Development Goals

The experience of cross-regional collaboration at ECIT 2025 demonstrates how interpersonal and intercultural exchange can contribute meaningfully to the United Nations Sustainable Development Goals (SDGs). Rather than treating the SDGs as abstract policy frameworks, this experience illustrates how everyday interactions, informal learning, and shared reflection can translate global commitments into lived practice. In particular, the collaboration aligns closely with SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 10 (Reduced Inequalities), and SDG 17 (Partnerships for the Goals), reflecting the core values promoted by the Democratic Education Network.

First, the experience advances SDG 4 (Quality Education) by highlighting the importance of informal and experiential learning beyond formal classroom settings. Learning about Islamic practices through observation, participation, and peer guidance at the Grand Çamlıca Mosque enabled religious understanding to emerge through practice rather than abstract instruction. This process fostered empathy, cultural awareness, and religious literacy, in line with UNESCO's emphasis on global citizenship education. It demonstrates how meaningful education can be cultivated through trust-based, dialogical, and relational encounters.

Second, the experience contributes to SDG 5 (Gender Equality) by making visible the ways in which gender shapes access to public and religious spaces. Our encounter with the separation of men's and women's prayer areas at the Grand Çamlıca Mosque initially prompted confusion, but through dialogue with UK Muslim peers, we came to understand these practices within their cultural and religious frameworks rather than through external judgment. More broadly, observations of women's participation in Turkish public life raised important questions about how gender equality is understood and pursued differently across cultural and legal contexts. These reflections align with Kandiyoti's (1988) concept of bargaining with patriarchy, which highlights how women navigate structural constraints within specific cultural systems. Rather than imposing a single standard of equality, this experience deepened our understanding that SDG 5 requires culturally sensitive and contextually informed approaches to achieve meaningful and lasting progress (Thomsen, 2023).

Third, the collaboration contributes to SDG 10 (Reduced Inequalities) by encouraging reflective engagement with social and cultural differences. The visible separation between men's and women's prayer spaces prompted critical reflection on gender, access, and religious interpretation. Rather than reinforcing stereotypes or judgment, this experience supported a nuanced understanding of inequality as context-dependent and historically shaped. Furthermore, interactions with Muslim peers from the United Kingdom highlighted how Islam operates differently as a majority religion in Turkey and as a minority identity in Europe, deepening awareness of the structural challenges faced by religious minorities. (Kandiyoti, 1988).

Finally, the experience embodies SDG 17 (Partnerships for the Goals) by demonstrating how cross-regional partnerships can develop organically through everyday human relationships. Shared travel, guidance during religious practices, and reflective dialogue functioned as informal yet meaningful forms of collaboration built on trust, reciprocity, and mutual learning. Turkey's position as a crossroads between Europe and the Middle East further facilitated these interactions, transforming urban spaces, religious sites, and public transport into platforms for connection rather than division (Filho et al., 2022).

This experience illustrates that cross-regional collaboration contributes to the SDGs not only through institutional agreements or policy frameworks, but through lived relationships and collective practice. Informal education advances SDG 4, culturally sensitive reflection contributes to SDG 5, engagement with difference supports SDG 10, and interpersonal connections across regions embody SDG 17. Grounded in everyday interaction, sustainable development emerges as a shared, relational, and democratic process rather than a distant global objective.

Conclusion

When the conference in Istanbul ended, what remained most vivid was the experience of moving through the city together. Walking between conference venues, ferry piers, mosques, and quiet streets, learning unfolded gradually and often unnoticed. As Faculty Representatives from Kasetsart University, we found that cross-regional collaboration is not built only in formal academic spaces, but also through ordinary interactions that enable people to learn from one another in human, relational, and unstructured ways. In an age increasingly shaped by AI, these irreplaceable human encounters remind us that technology can support learning but cannot substitute for the depth of understanding that emerges through lived experience (Klimova & Chen, 2024).

This experience demonstrates that the SDGs are not only global targets but practices embedded in daily life. SDG 4 was reflected in learning that took place outside classrooms, through observing religious rituals, navigating an unfamiliar city, and listening to diverse perspectives. Knowledge was exchanged through trust, curiosity, and mutual respect rather than formal instruction. SDG 5 was made visible through our encounters with gendered spaces and social expectations in Turkey, prompting us to reflect critically on how gender equality operates differently across cultural and religious contexts, and how dignity and respect must be understood within those frameworks (Kandiyoti, 1988; Thomsen, 2023).

Encounters with difference also made inequality visible in subtle and reflective ways. Navigating unfamiliar social expectations prompted questioning rather than judgment, reinforcing that reducing inequality, as emphasised in SDG 10, begins with listening and reflection rather than comparison or evaluation. Finally, the partnerships formed across Thailand, the United Kingdom, and Turkey, built through shared meals, journeys, and conversations, embodied the spirit of SDG 17, demonstrating that global cooperation begins not in institutions but in the spaces between people (Filho et al., 2022). Together, these experiences affirm that sustainable development is a shared, relational, and democratic process, one that starts with the willingness to understand one another. (United Nations, 2015; UNESCO, 2015).

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19 |

Student Voice Across Borders: Identity, Resilience and Democratic Education

Negena Mahmoud

This interview is designed to centre student voices and lived experiences as a vital form of knowledge. In this conversation, we discuss how ethnicity, culture and migration affect education. We go beyond personal stories to examine how individual experiences connect with broader issues of power, inclusion and inequality in education worldwide.

In this interview, Negena Mahmoud shares her educational journey and links her experiences to key global issues, including the Sustainable Development Goals, democratic participation and the ethical use of artificial intelligence in education. She emphasises the importance of resilience, identity and student agency in creating education that is more sustainable and fairer.

This conversation aims to create a clear narrative that connects personal experiences with global responsibilities. It seeks to contribute meaningfully to discussions about the future of education among students and educators.

1. YOUR STORY, IDENTITY AND JOURNEY

Can you tell us about your educational path and what led you to your current role?

I was born in London, and my early education started in nursery school before my family moved to Afghanistan. I learned English, Science and the national second language Pashto, as part of the national curriculum from Reception to Year 4 at a private school.

A bomb explosion near my school remains one of my clearest memories, even though most other memories from that time are hazy. The school remained under lockdown for several hours until the area was safe and my father could bring me home. This event taught me about the elements of risk and survival while demonstrating the significance of security and education.

The move back to London in 2015 led me to join Year 5 at Hazelbury Primary School. During my 2 years at that school, I learned to adjust quickly to my new surroundings while making numerous friends. My interest in politics developed at Hornsey School for Girls during my secondary education, so I can now study Politics and International Relations (PIR) at university.

My time at Hornsey included debating in the debate club from Year 7 through Year 9, as well as student leadership positions during both 2019-2020 and 2021-2022. Through First Give, I helped my class raise £180 and then secured an additional £1,000 for our chosen charity. I led my GCSE Active Citizenship campaign in 2022 to support a local homelessness charity, raising more than £250. This experience strengthened my political interest while fuelling my desire for social transformation.

After finishing my GCSEs, I started my education at Enfield County Sixth Form to study Government and Politics together with Business and Health and Social Care. My February 2023 assembly focused on the Iranian protests alongside the Taliban's control of Afghanistan. Public speaking became more natural for me after this experience, which forced me to step outside my usual comfort zone.

A significant achievement during my sixth form education was participating in Kate Osamor's Politics Summer School, held at Portcullis House in Westminster. The experience allowed me to meet Jeremy Corbyn, Deputy Prime Minister Angela Rayner and other motivational political figures. We travelled through Parliament while we watched debates of the Northern Ireland Troubles Bill and PMQs, which focused on NHS funding.

After finishing my A Levels, I started my studies at the University of Westminster, where I chose Politics and International Relations as my major. Since then, I haven't experienced any regrets. I joined the Global Diplomacy Initiative (GDI) society at the university and participated in many activities beyond campus. The

Democratic Education Network (DEN) welcomed me when I joined the organisation and gave me motivation and a positive reception.

Ever since I joined DEN, I have written and reviewed blogs, chaired meetings, helped with events planning, served as treasurer and social media manager for a field trip to Thailand, led workshops and served as the Logistics and Student Experience Lead for the DEN Summer School 2026. I have been very privileged to partake and take on more responsibilities while learning from others and giving back in any way possible.

How would you describe your cultural or ethnic background, and what does it mean to you?

I would describe my cultural or ethnic background as both fruitful and hopeful. I am Afghan, and I have always been an advocate for Afghanistan and its people. It's a beautiful country filled with beautiful people, and I wish more people could recognise its worth. It truly is an unforgettable place, and I will forever call it home. I have bittersweet memories from my time in Afghanistan, but I always have the longing feeling of going back home again. I have not been back to Afghanistan in over a decade, mainly due to the country's political instability and danger, as well as other commitments, but it has always been at the forefront of my mind and a topic I'll forever be passionate about.

In what ways do you think your background has influenced how you learn, think, or connect with others?

My background has helped me realise how much of a privilege it is to be educated and to be safe, without worrying every day whether I would make it out alive. In the majority of my experience, people have been very respectful and empathetic of the horrors I've witnessed or experienced but I will admit, there have been times where I've realised how unaware certain people can be of traumas and experiences which seem so bizarre or unrealistic to them but is very much true for so many people back home but also across the world.

2. INCLUSION, EXCLUSION AND BELONGING IN EDUCATION

Have there been moments in your education when your background helped you feel included, valued, or strong?

The most recent example of when my background has helped me feel included and valued is preparation for KUMUN 2025 in Thailand. I was able to share my knowledge and Afghanistan's history to my fellow classmates since the KUMUN that we were participating in was focused on Afghanistan and the Taliban in the United Nations Security Council (UNSC). I was able to answer my classmates' questions and provide guidance on the MUN based on my previous experience in TIMUN 2025. My background has been a strong pillar in my life and something I am proud to represent and speak persistently about, despite the continuous negative media portrayals over the years.

Have there also been moments when your ethnicity, language, religion, nationality, or accent made you feel different, excluded, or misunderstood?

I think language and religion have been one of the biggest challenges I have and continue to endure. Living in a Western country means the environment is completely different from that in Afghanistan. This means I can't communicate with everyone I meet in Dari, since the UK is an English-speaking country and not everyone here speaks Dari. This does make me feel different and sometimes misunderstood when translating a Dari saying into English, as an example.

In terms of religion, it has been somewhat of a lonely journey too, since the UK is not like back home to announce the call to prayer 5 times a day out loud on the speakers in the streets everywhere. This, in turn, also makes me miss the people and communities coming together to pray, which is also very similar to other countries with Islam as their main religion/commonly practised and the feeling someone experiences hearing the call to prayer for the first time or after many years later.

What helped you cope, and what do you wish educators had done differently?

Persevering through is what helped me cope alongside my family's support. I wish educators would speak up more about conflicts in Afghanistan and other countries and regions. Afghanistan is often one of those countries overlooked by everyone, and there definitely needs to be more education and awareness about the huge population that lacks the attention it needs to address the serious humanitarian crisis' it has been facing for many years.

3. VOICE, POWER AND DEMOCRATIC EDUCATION

When have you felt that your voice really mattered in education?

When the fall of Kabul happened in 2021. I remember being in a complete state of shock upon hearing the news from the country through family and the news. I knew I was put on this earth for many reasons, but that moment in time proved to be my biggest reason. I needed the world to hear and understand the severity of the situation in Afghanistan. It has been a driving force in what I believe and stand up for, and something I'll forever use my voice to preach the rights of the Afghan people, especially women and girls.

Do you think some voices are heard more easily than others in universities?

Yes, one hundred per cent.

Why?

Because certain voices don't seem to tick all the criteria in order for people's voices to be heard. Because we don't look or sound a certain way. And although it is unfortunate, it is something that has long been in the system and will take the actions of many to overcome for the greater good.

What would democratic education look like for students from minority, migrant, or refugee backgrounds?

Democratic education would look like a true representation of history to me. It would be the true and honest education of the lives of the minority - not the British version. It would mean making education and employment within education more accessible than it currently is. It would mean limiting the restrictions placed on certain backgrounds to gain entry to high-achieving educational places and spaces. It would mean freedom to me.

How familiar are you with the democratic systems and processes in the UK? Have you ever interned at any political institutions? If so, how did you get in, and why? Would you advise students to do it?

I would say I am very familiar with the democratic systems and processes in the UK. After all, I have been active in politics in various ways for the last 9 years of my life. As a matter of fact, I did an internship at the House of Commons with a Labour MP from October 2025 to January 2026. As I mentioned before, I completed a summer school with Kate Osamor in 2023 and through that connection, I contacted her to ask for the opportunity to intern with her. I decided to intern in parliament because I wanted to see and experience the daily life of a parliamentarian. I would definitely advise students to do it because it is such a unique place to work. You'll be walking in the same places where the decisions of the country are made and it is so profound to even comprehend the capacity at which you are participating in bringing change to the country - whether it's on a local or national level. I have no regrets and am so grateful to have had the opportunity to complete my internship at a monumental place with amazing colleagues who always guided and supported me on my journey.

4. SUSTAINABILITY, JUSTICE AND LIVED EXPERIENCE

When you hear the word 'sustainability', what does it mean in your own life or community?

Sustainability means looking out for my home. What I mean by home is the planet we're all living on. We all have a duty to protect the beautiful world we live in and pass on the great wonders of nature to future generations, so they can also enjoy its wonderful beauty. In my own life and community, it means managing waste properly by reusing and recycling products, purchasing items that follow ethical sustainable practices to keep our planet safe, reducing plastic usage, using public transportation, walking, etc.

Are there struggles linked to inequality, gender, displacement, racism, poverty, or conflict that feel personal to you?

All of the above feel personal to me. I have experienced or witnessed others go through tough challenges in their lives and it has been difficult. It’s difficult to see some people enjoy so many of the world's luxuries, yet others on the other side of the world struggle to provide food for their families, as one example. My heart breaks knowing how much inequality people face on a daily basis just because of the place and family they’re born into, alongside other factors. While it is challenging, it also gives me hope that, slowly but surely, we, the people, will use our voices and opportunities to do more and give more to those who are less fortunate than us and address the difficulties.

Which of the SDGs connects most strongly to your experience, and why?

SDG 16 ‘Peace, Justice and Strong Institutions’ connects most strongly to my experience because it is all I have ever wanted. Peace. Peace for Afghanistan. Peace for the people around me. Peace for the world. And although it is a long and tumultuous journey, I am more than willing to be part of the positive change and go through whatever it takes to guarantee a freer and just world for everyone around me.

5. AI, TECHNOLOGY AND INCLUSION

How do digital tools and AI affect you as a student?

Some ways that digital tools and AI have affected and aided me as a student are by explaining concepts I had never heard of before, brainstorming and creating new things and keeping in touch with friends I’ve made internationally.

Do you think technology reduces inequality, or sometimes reproduces it?

I think it is a bit of both. Inequality can be lessened by technology, but it can also be reproduced or even intensified. Who creates it, who can access it and how it is regulated are the main concerns.

On the one hand, technology clearly has the ability to level the playing field. Digital tools can increase access to political involvement, information and education. Social media, open-access research and online learning platforms have reduced obstacles for those who might otherwise be shut out because of their location, income or marginalisation. In this way, especially for people who have historically been marginalised, technology may amplify voices, facilitate group action and open new possibilities.

But technology frequently deepens already-existing disparities. A persistent digital divide results from unequal access to digital infrastructure along racial, gender, class and geographic lines. As more social, economic and political processes shift online, people without dependable internet, devices or digital literacy become even more disadvantaged. In this sense, rather than reducing disadvantage, technology might exacerbate it.

How could AI be designed to better support students from diverse cultural and linguistic backgrounds?

When AI is inclusive by design, culturally aware, pedagogically grounded and democratically regulated, it can better assist a diverse student body. Without these pledges, AI risks perpetuating the very injustices it promises to address.

6. CROSS-CULTURAL LEARNING AND GLOBAL SOLIDARITY

What has it been like studying in a multicultural environment?

It has been a really rewarding opportunity to study in a multicultural environment. I have gotten to meet and connect with people from all over the world across so many disciplines and it's so refreshing to engage and participate in meaningful conversations and experiences with them.

Have your perspectives on other cultures or on your own changed?

Yes it has, in a positive way. I've learned how loving and respectful people are and how you feel a sense of community with people from all over the world when you share the same beliefs and morals. It truly is a liberating feeling knowing you've got people supporting you in all the brilliant endeavours you may set upon.

What does global solidarity mean to you as a student?

Global solidarity as a student means standing up for injustices we see and potentially experience. It means being the voice for change in a world full of lies and deception. It means speaking out when others are complacent to the wrongdoings of others. It means being on the right side of history. It means being human.

7. GROWTH, CONFIDENCE AND LEADERSHIP

How has being part of DEN or similar spaces influenced your confidence and sense of belonging? When have you felt proud of your identity, voice or achievements?

DEN has increased my confidence through continuous public speaking opportunities. DEN is a family on so many levels and definitely creates a sense of belonging no matter your background. It is the perfect space to be in order to enhance your qualities and work on your shortcomings to become a better person in all aspects of life. DEN has changed my life in ways I never thought possible and made it a hundred times better than it probably would have been. I'll forever be grateful to DEN and champion its benefits and positive effects for the foreseeable future because it's made me part of an amazing network of people - people who I'll always have a connection to and am glad to have met.

There are many moments when I have felt proud of my identity, voice and achievements, but one that currently stands out is when I spoke up against the 'skit' some Thai students performed at KUMUN 2025 during my field trip to Thailand. I was completely uncomfortable with what unfolded during the 'skit' and chose to speak up and defend the lives of millions of people who were essentially mocked and undermined during that moment - considering we were all there, partaking in something meant to resemble the real-world UNSC. It felt good to stand up and protect the dignity of my people in a space where it wasn't respected as it should have been, and something I do not take lightly, as otherwise suggested.

What kind of leader or graduate do you hope to become?

I hope to become a leader who continues to stand up and address injustices and provide comfort to those who need it. We live in a very cruel world, and I want to leave an amazing legacy so people remember the positive attributes and contributions I made to society, despite the dark world we all live in.

8. REIMAGINING EDUCATION

If you were designing a university that welcomes students from all backgrounds, what would it look like?

If I were creating a university that truly welcomed students from all backgrounds, it would be based on shared power, dignity and belonging in addition to access. Instead of being symbolic, inclusion would be structural. There would be access without hidden barriers, a curriculum that reflects the world, pedagogy rooted in care and participation, language and support as strengths not deficits, democratic governance and student power and community, not competition. Essentially, my university would view diversity as a source of knowledge, innovation and democratic potential rather than as a management burden. It would enquire about how the institution must adapt to accommodate its students rather than how students can fit into it.

What changes are necessary for education to become genuinely inclusive, ethical, and globally responsible?

Change at the level of institutions, knowledge and power - rather than just policy language or diversity initiatives - is necessary for education to become genuinely inclusive, ethical and globally responsible. What is needed is a change in how education views its role in society and its goals. There needs to be structural inclusion not symbolic access as previously mentioned, decolonising knowledge and curricula, pedagogies grounded in care and democracy, technology governed by ethics not efficiency, global responsibility beyond mobility and democratic governance and accountability. In conclusion, rethinking education as a public, democratic good dedicated to justice, caring and global interconnectedness rather than rivalry and prestige is necessary for truly inclusive, ethical and globally responsible education.

What message would you like educators and policymakers to take away from your ideas?

One message I would like educators and policymakers to take away from my ideas is to start listening to the younger generation, especially students. The younger generation has long been undermined in terms of decisions being made that will affect their generation without their input, and this must come to an end sooner rather than later. It is time to have discussions and include young voices at decision-making tables where positive change is bound to happen. You won't know all the good that could come into life unless you give a seat at the table to voices like mine to speak and bring about the changes we all crave to see and be a part of.

9. CLOSING REFLECTIONS

Is there something about students from your background that you feel is frequently misunderstood or overlooked?

Yes, constantly. It is common to view students from my background solely through a perspective of conflict, trauma or deficit, rather than as multifaceted persons with agency, aspirations and intellectual resources. Therefore, the ability of students from my background to contribute critical perspectives on power, ethics, migration, resilience and global responsibility - if educational spaces are prepared to listen without predefining who they are supposed to be or do - is most frequently disregarded rather than needed.

What does "transforming education" mean to you based on your experiences?

"Transforming education" means shining a new light on learning beyond traditional ways. It means partaking in new ways of learning and engaging with our work as students that will leave us forever impacted and reminiscent of the amazing opportunities we took to become and do whatever our hearts desire.

What gives you strength or hope?

My dreams give me hope. My family. My friends. My country. My professor, Farhang Morady, gives me the strength to become the best version of myself. My university experience would not have been what it is had I not met the brilliant man behind the phenomenal initiative, the Democratic Education Network (DEN).

20 |

Storytelling, Culture, and Education

Niki Karimi

Cinema has always been more than just entertainment. At its best, cinema serves as a powerful medium for telling human stories, illuminating the tensions, hopes, and contradictions that define societies. Few artists embody the connection between film and social reflection as clearly as Niki Karimi, one of the most internationally recognised figures in Iranian cinema.

Karimi's journey into cinema began unexpectedly during her teenage years when she was discovered by a well-known Iranian actor during a school performance. This marked the beginning of an extraordinary journey that would place her at the forefront of modern Iranian cinema. Her international breakthrough came with her performance in "Sara" (1992), directed by the renowned filmmaker Dariush Mehrjui. This film brought her global recognition and earned her the Silver Shell for Best Actress at the San Sebastián International Film Festival, establishing her as one of the most compelling actors of her generation.

Over the following decades, Karimi created an outstanding collection of work through performances that examined social life, identity, and human relationships. She appeared in many important Iranian films and earned respect for her work. People admired her ability to add emotional depth and detail to stories that reflect everyday experiences.

Her creative ambitions, however, extended beyond the screen. In the early 2000s, Karimi started directing films and developed her voice as a filmmaker. Her debut feature film, "One Night" (2005), premiered in the Un Certain Regard section at the Cannes Film Festival, marking a significant moment in her career. Since then, she has directed several successful films and has become a prominent figure in both Iranian and international cinema. She is well recognised worldwide and has served on juries for prestigious film festivals, including Cannes, Berlin, and Tribeca.

Currently, Karimi is part of the academic community at the University of Westminster, where she is pursuing a Master's degree in Diplomacy and Global Politics.

Her presence in the programme reflects the growing intersection between culture, storytelling, and international affairs, reminding us that cinema can function not only as art but also as a form of cultural dialogue in an increasingly interconnected world.

In this conversation, students from the Democratic Education Network (DEN) engage with Niki Karimi to discuss her journey in cinema, the unique voice of Iranian filmmaking, and how storytelling can help people understand societies beyond their own. The discussion emphasises the importance of creativity in international academic environments and explores the opportunities and challenges that the next generation of filmmakers will face in a rapidly changing digital landscape.

1. PERSONAL JOURNEY

To begin, we would like to learn about your personal path into cinema.

1. Your career in film began at a very young age. Could you tell us how you first became interested in acting and filmmaking?

My interest in acting actually started quite early, during school. I was very involved in school theatre and really enjoyed performing on stage. It quickly became something I felt very passionate about. Later on, through a family friend, I was introduced to a well-known film director. That opportunity opened the door for me to enter the professional world of cinema. In that sense, I was quite lucky, but at the same time, it happened in a field that I genuinely loved and had already been deeply interested in.

2. What was your childhood like growing up in Iran, and how did your early environment shape your interest in storytelling and the arts?

I grew up at a very particular moment in Iran's history. My first year of school coincided with the Iranian Revolution. At the same time, my family environment was quite different from what was happening in the wider society. Before I was seven, we had travelled across much of Europe, and at home my father would listen to music like the Bee Gees and the Beatles. So when I began to become aware of the world around me, I was experiencing two very different realities at once — what was happening in Iranian society after the revolution, and the more open, cultural atmosphere inside our home. That contrast shaped my early understanding of the world and probably influenced my artistic sensibility later.

3. What role did cinema, literature, or storytelling play in your daily life?

Literature and cinema have always played an important role in my life. I've always been an enthusiastic reader, and books were a big part of how I understood the world growing up. These days, literature, cinema, and the arts in general remain at the centre of my life and creative thinking.

4. Were there particular filmmakers, actors, or artistic traditions that influenced your early work?

Many people have influenced me over the years. I've always had the habit of exploring an artist's work in depth — whether it's an actor or a director — and watching or reading as much as I could about them. Among the classic figures, Alfred Hitchcock had a strong impact on me as a filmmaker, and Marlon Brando was also very influential. I remember even reading his memoir when it was translated into Persian.

5. What motivated you to continue your studies at the University of Westminster?

When I came to the UK and had the opportunity to study, I decided not to focus on something I had already spent many years practising, like cinema and the arts.

Instead, I chose to study something that had always interested me: politics and diplomacy. I've always been curious about how societies and international relations work. I also did some research and saw that the University of Westminster has interesting work and research in this field, which made the decision even more appealing for me.

2. IRANIAN CINEMA AND CULTURAL EXPRESSION

Iranian cinema is widely respected worldwide for its artistic depth and storytelling.

6. How would you describe the distinctive qualities of Iranian cinema?

For several reasons, Iranian cinema developed in a very particular way. Because entertainment options were often limited and censorship was strict, filmmakers and writers had to think more carefully about how to express their ideas. As a result, Iranian cinema gradually became more reflective and poetic, focusing on deeper themes rather than just entertainment.

7. What social themes or human experiences do Iranian filmmakers often explore in their work?

Iranian cinema has several different strands. There is social cinema, which focuses on real social issues; quieter, more contemplative films that often appear at international festivals; and family-oriented films that explore everyday life. I think all of these deserve deeper study. Social cinema in particular is often inspired directly by real events. For example, my film *Final Whistle* came from a documentary I once saw about a woman facing execution. At the time, there were many discussions in Iran about women's rights and complex legal issues surrounding testimony and justice. So many social films in Iran grow directly out of real experiences and societal tensions.

8. In your view, how does cinema help audiences understand everyday life and social realities in Iran?

For many years, Iranian filmmakers have worked under quite strict censorship. I often imagine what it would be like if artists could freely write the books they want, write the poems they wish, and make the films they truly want to create. I think in that kind of environment we would see many more stories and a much richer reflection of society's realities, because there are already so many powerful stories waiting to be told.

9. What challenges do filmmakers face when balancing artistic expression with social or political constraints?

One of the biggest challenges over the years has been the process of getting permission to make a film. In Iran, filmmaking involves several complicated steps. First, the script has to be submitted and approved, and there are many subjects that filmmakers are not allowed to address. After the film is made, it must be reviewed again to obtain a screening permit. Even then, circumstances can change — sometimes a single objection can lead to a film being withdrawn from festivals like the Fajr Film Festival. So, filmmaking in Iran often involves navigating a lengthy and complex approval process.

3. CINEMA, SOCIETY, AND RESPONSIBILITY

Film can often shape how people understand the world around them.

10. Do you believe filmmakers have a social or ethical responsibility toward their audiences?

I think a filmmaker doesn’t necessarily have a specific obligation to the audience in the sense that they must create something to please them. A filmmaker should be free to make the work they truly believe in. However, the question of whether filmmakers have a social or ethical responsibility is more complex. Cinema is a powerful medium, and films can influence how people think about society, culture, or human relationships. So while artistic freedom is essential, filmmakers are often aware that their work can have broader social or ethical implications.

11. Can cinema help people see political or social issues from a new perspective?

I believe cinema can play an important role in helping audiences engage with social realities and see them from a new perspective. It can open a window onto experiences that people might not otherwise encounter. This is especially meaningful for international audiences, who may not be familiar with the complexities of another society. In that sense, cinema — like literature — can do more than entertain; it can create awareness and encourage deeper understanding.

12. Have you ever worked on a film that changed your own understanding of society or human relationships?

Acting is fascinating because it requires a deep understanding of psychology. When you analyse a script and try to understand a character, you are also engaging in a kind of self-exploration. It pushes you to reflect on a range of emotions, motivations, and human behaviours. In that sense, acting helps you discover different layers of yourself while also deepening your understanding of society and the people around you.

4. STUDYING AND CREATING IN AN INTERNATIONAL ENVIRONMENT

As a student in London, you are now part of an international academic community.

13. How has your experience of studying and working in London differed from your experiences in Iran?

Studying and living in London has been a very interesting experience for me. I haven't had the chance to work here yet, but being here as a student has been quite refreshing. One thing I've really enjoyed is that many people don't recognise me here, and in a way that has given me a sense of freedom. Of course, I've always appreciated the connection with my audience back home, but being in a place where I can simply be myself — share my opinions freely and move around without the pressure of being constantly recognised — has been quite liberating.

14. How does being in an international university environment influence your creative thinking?

People often say that in creative work you shouldn't rush to constantly make films or write books. You need time to live, observe, and gather experiences — to "fill the hard drive," so to speak. Only then can you really understand what you want to express. I think this period of studying and living here will definitely influence whatever I create in the future. Meeting students from different countries and experiencing student life in this international environment has been a very valuable and inspiring experience.

15. What have you learned from collaborating with people from different cultural backgrounds?

One of the most interesting parts of studying here has been the international environment. Being surrounded by students from many different countries and backgrounds creates a space where students can exchange ideas, learn from one another, and see the world through different perspectives. For me, that kind of open and diverse academic atmosphere is one of the most valuable aspects of student life.

5. CINEMA IN THE DIGITAL ERA

The film industry is rapidly changing due to new technologies.

16. How have digital technologies changed filmmaking and storytelling?

Digital technology has had a huge impact on filmmaking. In the past we worked with 35mm film, and everything—from shooting to screening—was more complicated. If you wanted to show a film at a festival, you had to physically transport large film reels. Today, with digital cameras and distribution, a film can be sent anywhere in the world with just a click. At the same time, the limitations of 35mm created a certain discipline in filmmaking. Film stock was expensive, and there was always a clear limit to how much you could shoot, which meant every shot had to be carefully planned. With digital technology, filmmaking has become much more accessible and flexible. I think overall it has brought many positive changes, but it's also interesting to reflect on how this shift has influenced the creative process in cinema and other arts.

17. Do you think streaming platforms and social media have transformed how audiences engage with cinema?

I don't necessarily think social media has fundamentally changed audiences themselves, but I do feel that something of the depth of engagement with art may be fading. In the past, people often had a stronger connection to literature, and that background helped them appreciate films or theatre on a deeper level. Today it seems that reading has become less common, and I sometimes wonder whether that affects how we experience storytelling. Platforms and fast digital content can be very convenient, but I'm not sure they always encourage the kind of reflection and imagination that reading literature—and especially books—can inspire.

18. What new opportunities do these changes create for young filmmakers?

That's an interesting point. Social media platforms have definitely made it easier for young filmmakers to create and share their work. The tools are more accessible, and films can reach audiences much more quickly. But whether these works gain real significance, and whether they help someone develop into a serious filmmaker, is another question. At the same time, I don't want to resist these changes simply because I come from a different era. I'm actually curious and open to seeing what kinds of strong and meaningful films might emerge from these new platforms.

6. ADVICE FOR STUDENTS AND EMERGING ARTISTS

Many students are interested in creative careers.

19. What advice would you give students who want to pursue careers in film or the creative industries?

That's a difficult question, but if I had to give one piece of advice, it would be not to be afraid to start. Whether you want to make films, work in the creative arts, write a script, or submit your writing to a publisher, the most important step is simply to try. Don't be afraid to experiment or put your ideas out into the world. Everyone has something meaningful to say, and the only way to discover your voice is to begin.

20. What qualities or skills are most important for young filmmakers today?

Beyond learning the technical side of any medium—whether it's cinema, literature, or another art form—it's very important to understand its history. Watching films, reading books, and exploring the traditions behind them with curiosity and attention really matters. For example, knowing writers from different countries or understanding major traditions in world literature, such as Russian literature, can deepen your perspective. The same is true with classic films. Without that kind of exploration, it's harder to develop the experience and understanding that shape meaningful creative work. For any student interested in the arts, that kind of curiosity and research is essential. I would also add that experience is very important. Sometimes it may not be easy to enter the professional world of cinema right away, but any kind of experience related to the field can be valuable. Working on small projects, observing, collaborating with others, or simply practising your craft all help you grow and understand the medium better. Every experience contributes to building your path.

21. How important are collaboration and teamwork in the filmmaking process?

That's a very important question. Cinema and theatre are deeply collaborative arts, so teamwork plays a central role. Whether you are a filmmaker, an actor, or part of the crew, you are constantly working with others to bring a story to life. That kind of collaboration can have a strong impact on a person. It begins within a small creative community, but the experience of working together, sharing ideas, and trusting one another can shape how people understand cooperation and human connection in the wider world.

7. CULTURE, IDENTITY, AND GLOBAL DIALOGUE

Cinema often connects cultures and communities.

22. How does your cultural background influence your artistic voice?

I was born and grew up in Iran during the revolution, but I've always felt, in a way, like a global citizen. I was fortunate to travel quite a bit from a young age, which helped me develop a more open perspective. At the same time, living in a particular country inevitably shapes how you see the world and the kinds of stories that resonate with you. What I've also noticed over the years is that artists from very different places can sometimes think in surprisingly similar ways. There have been moments at film festivals when I watched another filmmaker's work and felt a strong connection—almost as if we were exploring similar ideas from different parts of the world. In that sense, the world of art often creates unexpected connections between people and between creative minds.

23. What role can cinema play in helping people understand different cultures and societies?

One of the important things cinema can do is help people discover and understand different cultures. Of course, there are many discussions about Westernisation and the influence of American films, but beyond those debates, cinema and literature both create ways for people to explore the world. Personally, when I become curious about a country or a place, I often try to learn about it through books or films. Watching a film or reading a novel from another culture can open a window into how people live, think, and experience life there. In that sense, both cinema and literature can help societies develop a better understanding of different cultures and perspectives.

24. In a world that sometimes feels divided, can storytelling help build empathy and dialogue?

Yes, I think storytelling and cinema can play an important role in creating empathy. In a world that sometimes feels more divided every day, stories can remind us of our shared human experiences. Through films or literature, we can see life from another person's perspective, understand different cultures, and connect with universal emotions. In that sense, storytelling has the power not only to entertain but also to bring people a little closer together.

8. LOOKING AHEAD

Finally, we would like to ask about your future creative work.

25. What kinds of stories or themes are you most interested in exploring in your future projects?

That's actually a difficult question to answer. At different periods of my career, I've made very different kinds of films. At times I focused on social themes, at other times on family stories, and more recently I've been drawn to more poetic and introspective films. I think it really depends on the moment and on the subject that comes to you. When a story appears, you instinctively feel what kind of tone or approach it needs. It's not always something you can plan— it often grows naturally from the idea itself.

26. If you could tell one story about Iran to a global audience, what would it be and why?

Right now, I feel that many people have stories they want to tell. There are so many different perspectives and personal experiences in people's minds, especially when it comes to recent events in Iran. Everyone seems to carry their own stories and reflections about what they have witnessed. I'm sure many of these voices and ideas will eventually find their way into films, books, and other forms of storytelling.

CLOSING QUESTION

27. Most of our students come from diverse areas and communities in London. They are children of immigrants who moved to the city in search of better opportunities for their families. If you were to create a film project with students at the University of Westminster, what kind of story would you encourage them to tell?

I always encourage people to tell their own personal stories. One idea could be to invite students to share their experiences and memories—almost like an open call for personal stories. When you talk to people, you often discover that everyone carries interesting and meaningful moments in their lives. Those experiences can easily become the starting point for a film. I would encourage them to write about themselves, their families, or their communities, and then develop a story from there. This can also include the difficulties and bittersweet moments many of us experience when living in large cities. Very often, the most powerful narratives come from something deeply personal.

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Conclusion: Reclaiming Human Agency in the Age of AI and Global Sustainability

Farhang Morady, Afra Bhuiyan & Salman Aziz, Mawera Kazmi, and Joshua Morton

This edition of DEN began with a fundamental question: How can education maintain its human and democratic character? We then discussed the sustainability of education in an era increasingly shaped by artificial intelligence (AI). The chapters in this volume span a variety of regional contexts, including rural classrooms in Southeast Asia, the mountainous provinces of northern Vietnam, ASEAN governance frameworks, cross-regional student collaboration in Istanbul, and contributions from the UK and Uzbekistan. Collectively, the students' chapters demonstrated the significant impact of AI. However, as some of the chapters demonstrated, AI is neither inherently liberating nor automatically oppressive. Its impact is influenced by the institutional, cultural, ethical, and pedagogical environments in which it operates. The transformation of education under AI is not merely technological; it is political, ecological, cognitive, and relational. The question is therefore not whether AI will reshape education, but how AI's influence reproduces inequality or cultivates sustainable human development.

Different chapters highlighted the uncritical adoption of AI because of so-called efficiency tools. The study of coded cognition demonstrated that algorithmic systems can encourage cognitive offloading, restrict epistemic diversity, and limit opportunities for deep reasoning. As some chapters suggested, using AI systems for writing, analysis, or problem-solving can harm, weakening the intellectual skills that education aims to build. It is important to support human decision-making and maintain skills such as self-reflection, ethical judgment, and critical thinking. Hence, education should not rely on automated feedback or predictive analytics. However, AI has the potential to enhance human abilities when used appropriately.

Sustainability encompasses cognitive health alongside environmental issues. A society that abandons critical thinking in favour of automated systems jeopardises its democratic strength over time. Thus, AI-integrated education should focus on strengthening intellectual independence rather than diminishing it.

The chapters addressing governance and ethics underscore that the adoption of AI cannot be left to market forces alone. Regional frameworks, such as the Association of Southeast Asian Nations (ASEAN) Guide on AI Governance and Ethics, along with principles established by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) and the Organisation for Economic Co-operation and Development (OECD), underline the critical importance of transparency, fairness, accountability, and a human-centred design approach. However, having regulatory guidelines in place is insufficient to guarantee equitable outcomes. Significant implementation gaps persist, especially in rural and marginalised communities. The discussions surrounding governance and ethics emphasise that the adoption of AI should not be driven solely by market dynamics. Despite the existence of regulatory frameworks, these challenges remain largely unresolved, particularly in underserved areas.

Under-resourced institutions often lack the necessary infrastructure and educational capacity to turn these normative commitments into practical action. Therefore, governance must be viewed as more than just regulatory compliance; it also involves issues of distributive justice. We must consider who benefits from AI innovation, whose data influences its systems, and whose knowledge might be excluded.

Effective ethical governance necessitates coordination across multiple levels—national policies, regional collaborations, institutional accountability, and local participation. Without such integration, AI may exacerbate existing structural inequalities.

The tensions surrounding technological equity are especially evident among ethnic minority students in Vietnam. The 3A framework, Access, Agency, and Achievement, offers a useful perspective for understanding this issue. While access to technology remains uneven, with ongoing challenges in infrastructure, unstable connectivity, and a lack of devices in mountainous and rural areas, having access alone is not enough. Agency, defined as the capacity to use AI meaningfully, depends on digital literacy, linguistic inclusion, and teacher support. Achievement measures whether AI enhances learning outcomes and expands opportunity. The findings reveal a paradox in which AI-based innovation flourishes in urban centres while rural communities risk exclusion. Without deliberate intervention, AI becomes a stratifying force. However, pilot initiatives show that when educational tools are adapted to local contexts, responsive to different languages, and accompanied by teacher training, they can significantly enhance reading fluency, motivation, and confidence among marginalised learners. However, achieving equity does not happen automatically through the spread of technology; it requires intentional design, funding, and evaluation.

The metaphor of transitioning from bamboo classrooms to AI labs effectively captures both vulnerability and opportunity. Rural schools in Southeast Asia face various challenges, including inadequate infrastructure, the impacts of climate change, and insufficient teacher training. Nevertheless, these obstacles underscore the pressing need to integrate climate education with digital literacy.

Climate-smart AI literacy underscores the vital role of artificial intelligence (AI) in tackling environmental challenges. Digital tools that incorporate Indigenous ecological knowledge empower communities to strengthen their resilience. These tools facilitate various methods, such as flood mapping, predictive modelling, water monitoring, and agricultural adaptation systems. This approach illustrates the interconnectedness of traditional knowledge and contemporary technologies. Indigenous knowledge systems are essential for fostering sustainability and honouring cultural heritage.

AI operates at its peak when it assists local knowledge systems, as this approach develops technology that serves humanity rather than exploiting it. A sustainable transformation requires a comprehensive system that links infrastructure funding to teacher education, educational content development, and active community participation. A technology system which lacks social elements will not develop authentic resilience.

Cross-regional collaboration emphasises that sustainability and AI literacy are not merely technical matters; they also involve building relationships. In Istanbul, learning took place not only through formal presentations but also through shared travel, dialogue, and cultural exchange. These experiences illustrate the principles outlined in global development frameworks, demonstrating that quality education and partnership are lived practices rather than just abstract goals. In a period marked by geopolitical fragmentation, student-led collaboration represents a form of soft power grounded in empathy and reciprocity. AI governance debates may occur in policy arenas, but the cultivation of global citizenship emerges in everyday interactions. Democratic pedagogy remains indispensable. AI may reshape tools and processes, yet the relational core of education, grounded in dialogue and trust, cannot be automated.

Across the volume, a recurring paradox emerges. AI can personalise learning yet widen structural divides. Governance frameworks can promote equity yet can fail in practice. Rural schools can adopt innovations while remaining fragile. Climate literacy can expand knowledge yet may remain disconnected from lived realities. This paradox reveals that technological progress does not guarantee social advancement. Without ethical anchoring and distributive justice, innovation reproduces hierarchy. The volume, therefore, advances not an anti-technology argument but a critique of technological determinism. AI is not destiny. It is design, and design reflects power relations embedded within institutions and societies.

The chapters provide a clear understanding of sustainable AI education. Cognitive sustainability involves maintaining essential skills such as reasoning, creativity, and ethical judgment. Institutional justice requires governance frameworks that ensure fair implementation of policies. Technological equity means designing AI systems that address the needs of marginalised communities. Finally, democratic engagement encourages participation and discussion in learning environments that use AI.

These elements are interconnected and do not occur in a specific order. Infrastructure supports individual agency; agency leads to accomplishments;

achievements reinforce legitimacy; and legitimacy, in turn, strengthens governance reform. The future of AI in education must therefore be human-centred, not merely in rhetoric but in structure.

If AI continues to accelerate, the temptation will be to optimise and automate ever more aspects of learning. The evidence presented in this volume indicates a different perspective. The aim is not merely frictionless efficiency but rather ethical sustainability. Education in the AI era must prioritise the protection of linguistic and cultural diversity, incorporate climate responsibility into digital literacy, and support rural learners without disregarding their traditions. Additionally, it should establish regulatory systems that address bias and promote international partnerships grounded in equality rather than exploitation. Ultimately, human dignity, not just technological capability, should be the foundation of development.

The shift from bamboo classrooms to AI-enabled environments, along with the move from local traditions to global governance discussions, highlights the pivotal role of education in building sustainable futures. As artificial intelligence continues to advance, climate challenges will become more severe, and geopolitical landscapes will transform. However, the crucial question remains: which human capabilities should education strive to develop?

If AI can enhance critical thinking, cultural respect, ecological awareness, and democratic collaboration, it can make a significant contribution to global sustainability. However, if it fails to achieve these goals, it may widen existing divides.

The future isn't dictated solely by algorithms; it is also shaped by our collective choices. To improve education in the age of AI and global sustainability, we need to take control of our choices. We should create technologies that help communities rather than harm them, and we must focus on supporting the most vulnerable learners. Sustainable development starts with people, not machines, and education is where we can shape a better future.

TRANSFORMING EDUCATION

INNOVATION FOR SUSTAINABILITY IN THE AI ERA

Congratulations to Farhang and the many students from Westminster and internationally on this latest volume from DEN, which explores the relationships between educational innovation, AI, and a sustainable future. This is exemplary work— inclusive, boundary-pushing, collaborative, insightful, and thought-provoking. It represents exactly the kind of thinking and cooperation the world needs for a better future. Well done to all involved.

Professor Peter Bonfield OBE FREng FIET
Vice-Chancellor and President
University of Westminster

In a world where geopolitics and artificial intelligence increasingly shape our future, education must equip learners with global perspectives and real-world experiences. This book shows how transformative education can empower students to address global challenges, advancing democracy, creativity, and sustainability while contributing to the ambitions of the Sustainable Development Goals.

Assistant Professor Dr. Ngamlamai Piolueang
Dean of the Faculty of Social Sciences
Kasetsart University

The latest volume of the annual DEN book asks us to engage with urgent questions about the relationship between AI, education, and sustainability. It brings together diverse global voices to show why ethical governance and democratic participation are essential if technology is to serve the public interest.

Alan Porter
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