Algorithmic Teaching, Fading Thought? Rethinking Engagement in the AI Era

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Abstract: As artificial intelligence becomes increasingly embedded in educational environments, the promise of enhanced efficiency, personalised instruction and expanded access to knowledge is celebrated globally. However, the pedagogical implications of algorithmic instruction remain under theorised, particularly with regard to critical thinking and epistemic engagement. This paper interrogates how algorithmic-driven content delivery and automated assessment systems may inadvertently narrow intellectual curiosity and encourage conformity while reducing learners to be passive recipients of information. Through a doctrinal study into interdisciplinary literature in education, philosophy and AI ethics, this paper critically analyses how AI tools that are used in instructional design may entrench a form of educational minimalism that prioritises standardisation over inquiry. While artificial intelligence can personalise learning pathways, it also risks eliminating opportunities for open-ended exploration and problem solving. Through comparative insights from South Africa and the UK, the study reveals how algorithmic learning environments can either support or suppress higher order thinking depending on contextual use and pedagogical design. This paper calls for a deliberate reconfiguration of AI-enabled education towards epistemically rich engagement. This is where learners are positioned as co-constructors of knowledge. It proposes a model of "algorithmic dialogism" that blends AI support with critical pedagogy. This will ensure that technology develops as a tool for liberation rather than control. This contribution aligns with ongoing global debates on the ethics of AI in education and seeks to influence curriculum design that furthers curiosity, dialogue and reflective thinking in the digital age. Ultimately, this paper calls for a shift from efficiency-driven instruction to education that values diversity of thought and the cultivation of critical consciousness.

Keywords: Artificial Intelligence in Education, Algorithmic Instruction, Critical Thinking, Student Engagements, Epistemic Justice.

1. Introduction

The Lecture room, once a crucible of unpredictable thought and spontaneous debate, is now increasingly co-inhabited by silent algorithms. These systems do not speak but they shape what is said, seen and explored. The embrace of artificial intelligence in education has been swift and expansive. It has moved from speculative novelty to functional necessity in a matter of years. Instructors across all learning levels now routinely rely on Generative Artificial Intelligence (from hereunder referred to as "GenAI") tools like ChatGPT, Claude and GitHub for lesson planning, assessment design and administrative relief (Ghimire, 2024). Meanwhile, students often outpace their educators in adapting to and deploying these tools (Ghimire, 2024). This makes AI a ubiquitous feature of contemporary learning ecosystems. Much like the conveyor belt in a factory optimised production but standardised output, algorithmic teaching promises streamlined efficiency. However, it risks flattening the intellectual texture of education. The machine moves smoothly, but does the mind? A tension arises between instructional convenience and epistemic richness. In this tension underlies the key concern of this paper.

While algorithmic tools enable unprecedented levels of personalisation and accessibility, they may also reduce the cognitive labour that underpins critical thinking (Bianchi, 2024). In their quest to eliminate friction in the learning process, these systems may also erase moments of uncertainty and exploration, which are in fact vital for deep learning (Shalaby, 2024). The fundamental question that arises would therefore be: Is the efficiency of algorithmic instruction coming at the cost of epistemic vitality? Once encouraged to wander and wonder, is the student's mind now becoming a site of managed inputs and unpredictable outputs? What is celebrated as "personalised learning" may, in fact, produce epistemic echo chambers. Learners are fed what they prefer and not what provokes. As a result, the cognitive horizons narrow (Shalaby, 2024). The learner is at risk of no longer being challenged to rearrange, reconstruct or reimagine knowledge (Shalaby, 2024). In this way, algorithmic instruction may privilege correctness over curiosity and compliance over critique. To describe this phenomenon, the author introduces the acronym T.H.I.N.K. which translates to "*Technologically Handled Ideas, No Knowledge*". This coinage captures the irony of students appearing engaged while their thinking remains outsourced. It names the condition whereby students rely on AI -generated output without deep processing or intellectual struggle. In this context, "Technologically Handled Ideas" refers to both human ideas processed and packaged by machines, as well as machine-generated ideas presented as ready-made knowledge. The phrase signals a shift from critical engagement to passive reception. It highlights the risk of learners consuming outputs without interrogating their origins or implications. This paper interrogates these emerging pedagogical tensions.

It does so with a view of reimagining AI, not as a conveyor belt, but as a dialogic partner. It argues for a shift in how we think about learning in the AI era. AI should cease to be the transmission of optimised content and rather, be a tool from the co-construction of meaning. To this end, the paper proposes a model of algorithmic dialogism, which is a mode of AI integration that preserves epistemic agency and furthers critical thinking.

2. Research Methodology

This study uses a doctrinal and interdisciplinary research approach. It is based on conceptual analysis. The focus is on understanding how algorithmic teaching affects education, especially in terms of critical thinking and knowledge production. The study draws from literature in education theory, philosophy of education, and AI ethics. Sources were chosen for their academic credibility and their relevance to current debates on AI in education. Special attention was given to work that discusses epistemic justice and critical pedagogy. Only sources that engaged meaningfully with the ethical and teaching implications of technology use were included. A comparative element is also included. The paper looks at both South Africa and the United Kingdom. These contexts help show how AI in education is being used in different systems. This comparison helps the study remain context aware. It shows where AI can help, and where it may harm learning.

3. Theoretical Underpinnings (Educational Theories, AI Ethics and the Philosophy of Education)

This paper is anchored in an interdisciplinary theoretical framework that draws from education theory, AI ethics and the philosophy of education. Together, these perspectives offer a nuanced lens through which to analyse the pedagogical implications of algorithmic instruction. They move the debate beyond technological enthusiasm and ground it in the deeper human and ethical questions that AI integration demands.

3.1 Education Theories

The works of Piaget and Vygotsky on constructivism posit that learners should construct knowledge through experience and interaction. Vygotsky's concept of the Zone of Proximal Development also adds an important social dimension. It shows how learning is scaffolded by a more knowledgeable other (the educator) (Xi and Lantolf, 2021). In the context of AI, this raises the question on whether algorithms can function as a meaningful scaffold. If designed intentionally, AI can support active learning. If not, it actually risks turning learners into passive consumers of static content. Laurillard's Conversational Framework sees learning as a dynamic exchange between teacher and learner (Yong et al., 2020). It values dialogue and iteration (Yong et al.,2020). AI, especially the large language model, can simulate this, however, to a limited extent. Most free AI tools to date, when asked for an answer, provide the answer, even if the question was unclear instead of seeking clarity from the prompter. Conversational AI ideally asks probing questions, it offers counterpoints, and it can challenge assumptions. These are all things that human educators are trained to do. This paper builds on this to propose "algorithmic dialogism". This is a pedagogical approach that positions AI not as a content provider, but as a dialogic partner in meaning making. Self-Regulated Learning theory highlights how learners monitor and direct their own learning (Pilling-Cormick and Garrison, 2007). AI has potential to support Self-Regulated Learning by acting as a metacognitive coach. It can prompt reflection and track progress. It can also suggest strategies. However, without deliberate design, it may do the opposite by outsourcing thinking and suppressing student agency. This tension sits at the core of this paper's concern as far as epistemic engagement is concerned.

3.2 AI Ethics

AI systems are only as fair as the data they are trained on (Scatiggio, 2020). If datasets are skewed, algorithms can reinforce harmful stereotypes or produce inequitable outcomes (Modi, 2023). This is especially concerning in assessment where algorithmic feedback may shape academic trajectories. Principles from UNESCO call for diverse and transparent datasets that can guide against these risks (Morandín-Ahuerma, 2023). AI's decision-making processes are also often opaque. This "black box" problem undermines trust. Educators and students need to understand how outputs are generated to engage with them meaningfully (Holland et al., 2012). Ethical integration demands explainable AI systems where logic can be challenged. Also, AI should never replace human judgement. It must support, not supplant the educator and student's relationship. Over-reliance leads to "cognitive offloading", whereby the thinking is delegated to the machine. This erodes intellectual independence. Ethical frameworks insist that AI must reinforce human agency and not automate it out of the learning process (Nguyen, 2025).

3.3 The Philosophy of Education

The philosophy of education invites a deeper inquiry. It challenges us to ask, not what AI can do in education but rather, interrogates what AI should do. Education is not merely a tool for economic productivity (Barrow and Woods, 2006). It is a means of cultivating ethical individuals (Barrow and Woods, 2006). These individuals also should develop intellectual curiosity and social consciousness (Mead et al., 2015). AI integration in education needs to be constantly judged against these values. Efficiency and personalisation, while valuable, cannot be the sole goals. This paper asks whether AI helps us produce better thinkers or just better performers. At the heart of the discussion is the nature of knowledge. The key question is, is it static content to be delivered efficiently or is it a dynamic process of inquiry and co-construction? The paper adopts the latter view. Epistemic justice demands that diverse ways of knowing are valued (Stroud and Kerfoot, 2021). However, many AI systems are built on Western-centric data, marginalising non-Western epistemologies (Zia, 2025). This raises the spectre of digital colonialism (Zia, 2025). Calls for Afrocentric AI models aim to counter this bias and reclaim local epistemic agency. Transhumanist thought invites us to reflect on what it means to learn, to create and to think in partnership with machines (Frodeman, 2019). In education, this means interrogating how AI affects our sense of self and agency. If we are to embrace AI, we must do so without abandoning human values.

4. A Double-Edged Pedagogy

The integration of artificial intelligence into education presents a paradox. On the one hand, it offers efficiency while on the other hand, it risks diminishing critical thought.

4.1 The Promise of Efficiency

AI driven tools have transformed the administrative and instructional responsibilities of educators (Pedro et al., 2019). Systems such as Canva, Curipod, Eduaide and Quizzizz assist with lesson planning, assessment design, grading and content creation (Nehe and Rahman, 2024). For many educators, especially those in resource - constrained environments, these tools offer vital relief which can save them significant hours per week. This is particularly relevant to overburdened educational systems, including those in the underdeveloped and developing countries. In those jurisdictions, educators face structural and logistical constraints. Beyond the administrative efficiencies, generative AI enables dynamic personalisation. Adaptive learning platforms adjust instructional content in real-time based on student performance. Feedback is immediate and tailored which supports differentiated learning paths that cater to individual needs and abilities. This flexibility can undoubtedly enhance a student's engagement and motivation. Studies have evidenced that gamified learning, immersive story-telling and interactive assessments indeed further augment emotional as well as cognitive involvement. AI can also serve as a catalyst for creativity. It offers novel perspectives, and it provides scaffolding for complex problem-solving. Evidence suggests that AI -facilitated learning may enhance traits associated with innovation and attentiveness (Bianchi, 2024).

That being said, the very features that make AI efficient also carry the risk of merchandising the learning experience. If it is left unchecked, the educational benefits of personalisation may give way to cognitive predictability.

4.2 The Peril of Passivity

The darker side of AI-enabled education lies in its capacity to dull intellectual engagement. Over-reliance on algorithmic support may erode a student's ability to think critically and solve problems independently. Research highlights a negative correlation between frequent AI use and critical thinking performance, particularly when it comes to the young learners (Szmyd and Mitera, 2024). This phenomenon which is often referred to as "cognitive offloading", suggests that students may be intellectually passive when mental effort is continually outsourced to machines (Risko and Gilbert, 2016). This is not a superficial behavioural trend. It signals a deeper pedagogical concern which is the restructuring of cognition itself. Students begin to prefer the fast and automated solutions over the discomfort of grappling with ambiguity. In this instance this paper submits that, sadly, most learners have already come to value completion over comprehension. The celebrated personalisation that is offered by AI can also produce epistemic fragmentation. When algorithms tailor content based on prior interests, they risk creating "educational filter bubbles" (Herm-Morris, 2023). This actually mirrors what is observed in social media environments, whereby content reinforcement limits the exposure to dissenting ideas. In the lecture room, this can inevitably suppress curiosity, and it can inhibit the formation of interdisciplinary connections that are essential for critical and even creative thinking.

More importantly, concerns around academic integrity are intensifying. Students have already been found to use AI to complete tasks without genuine engagement, which reduces assignments to mechanical exercises. Algorithmic bias is another pressing issue. If AI systems are trained on data that reflects social prejudice or exclusion, they can actually reinforce rather than rectify these inequalities. This holds the potential to affect assessment outcomes and feedback rendered. This further holds the undeniable potential to disadvantage the already marginalised students. In such contents, it goes without saying, educator oversight is not optional. It is essential. The human educator's role must shift from content delivery to epistemic stewardship. This includes interpreting AI outputs critically and contextualising information. Finally, AI is not infallible. Hallucinations, which are defined as plausible but fabricated responses, are a known feature of generative models. This is a well-known characteristic of large language models (Chang et al,. 2024). This demands continuous vigilance from both educators and their students. Trust in AI must definitely be tempered by the cultivation of epistemic responsibility.

A recent incident in South Africa, where a junior advocate faced serious repercussions for submitting AI generated legal arguments containing hallucinated case law, starkly illustrates the peril of passivity associated with generative AI (Vermeulen, 2025). This case highlights how an over-reliance on AI tools without verification can lead to professional misconduct and reputational damage. While this specific instance impacted the legal profession, the inherent danger of uncritically accepting AI outputs extends to all other professions and specialisations. This emphasises on the universal need for human oversight and accountability to prevent dissemination of inaccurate or fabricated information.

5. Epistemic Engagement and Justice in the AI Era

Epistemic engagement refers to the active, critical and reflective participation in constructing and applying knowledge. It moves beyond passive information consumption. It includes the questioning, analysing, synthesising and creation of new understanding. This kind of engagement is essential for cultivating independent thinking and complex problem solving. AI's integration into education creates a double bind as it can advance inclusion and yet it can also deepen exclusion. Many AI tools are built on Western-centric data. They reflect and reproduce the already dominant epistemologies. It can be argued that it poses the risk to undermine decolonisation efforts, and it can entrench biases. In South Africa, the #FeesMustFall Movement revealed that access to education is not just about Infrastructure. In such a context, AI is not a neutral intervention. It can be argued to also be a cultural force. The growing call for Afrocentric AI models is a demand for context and representation. Without deliberate localisation, AI has the potential to deepen epistemic injustice. It may actually reinforce global knowledge hierarchies instead of dismantling them, which would not be ideal. Unfortunately, the access to AI technologies remains uneven. Disparities in internet connectivity, digital skills and device availability limit meaningful participation for many (Mwansa et al., 2025). In low-resourced communities, this does widen the digital divide (Mwansa et al., 2025). It therefore makes equitable AI integration socio-political issue and not just a technical one. That being said, AI still also holds promise, as previously established. It can support learners with diverse needs through content delivery in multiple languages. When and if it designed with intention, AI could act as a leveller. It can help to overcome barriers and to extend quality education to the underserved groups of people.

6. Algorithmic Dialogism as a Model Co-Constructed Learning

To counter AI's potential to promote passivity, this paper proposes a pedagogical model of algorithmic dialogism. This model reframes AI and not as an all-knowing oracle but as a dialogue partner. Dialogism is a theory that suggests the presence of more than one voice (Skidmore, 2019). It encourages conversation over command. Essentially, collaboration over automation. Algorithmic dialogism is designed to preserve cognitive effort. It resists the tendency to outsource thinking. Instead, it makes thinking central. It positions AI as a co-learner, one that prompts, challenges and scaffolds, rather than solves (Jacobs et al., 2025). This approach transforms AI from a shortcut to a stimulus for deeper engagements. It will be especially useful for young learners as they are still impressionable and need to be given an opportunity to develop their critical thinking. The model draws on key pedagogical foundations in order to promote reflective learning and epistemic growth.

Algorithmic dialogism shifts AI's role from content delivery to content co-creation. It encourages learners to build knowledge with, and not from, the machine. Tools like Curriculum Genie illustrate this shift. Students contribute to brainstorming and curriculum design. Their voices shape lesson plans. This approach addresses

concerns about algorithmic filter bubbles. It hands control back to the learner. AI therefore becomes a facilitator of exploration, not a limiter to it. Students are thus encouraged to pose questions and also interrogate outputs.

The Human-Centric AI First approach aligns with this vision. Students must explicitly attribute their use of GenAI and reflect on its impact. Journaling and self-assessment become integral to the process. This builds AI literacy and ethical awareness. It also cultivates critical thinking, which is essential.

7. Comparative Overview of AI in Education Policies and Pedagogical Implications (South Africa vs. UK)

To provide grounded and comparative perspective on the pedagogical integration of AI in education, the table below contrasts the key developments in South Africa and the United Kingdom. The comparison between South Africa and the United Kingdom is particularly intrusive, as it juxtaposes responses from a historically under-resourced context and a historically industrialised and globally dominant one. These are two socio-political and economic contexts with markedly different historical, infrastructural and epistemic realities. While both countries demonstrate agility in responding too AI's educational impact, their respective emphases reveal distinct priorities. South Africa seems to primarily foreground equity and access (primarily within the public institutions), while the United Kingdom centres academic integrity and structured AI literacy.

Table 1:

Aspect	South Africa	United Kingdom	Similarities/ Differences
Approach	Agile integration into existing policies (University of Johannesburg) (Khoza, 2025); ethical/responsible guidelines (NorthWest University and University of Western Cape) (Luo et al., 2024).	Multiple tertiary Institutional guidelines on responsible use (Roberts et al., 2023); Russell Group principles on academic integrity/AI literacy (Corcoran and Russell, 2021).	Both show agile policy responses.
Key Pedagogical Focus	AI literacy, multi-draft assignments for independent thought, innovation funds.	AI-proof assessments, Socratic learning enhancement, critical evaluation of AI outputs (Chukhlomin, 2024).	Both aim to foster higher-order thinking; SA emphasizes equity and access; UK emphasizes academic integrity.
Primary Challenges	Digital divide, decolonisation (Mwansa et al., 2025), Western-centric bias (Olufemi et al., 2023), teacher readiness (Tarisayi, 2024).	Lack of long-term evidence, over-reliance, misinformation, plagiarism (Orogun et al., 2024).	Common concerns: critical thinking, bias, ethics, training.
Key Initiatives	Student Short Learning Programmes, AI literacy in core courses (Patel and Ragolane, 2024), resource hubs, peer showcases.	Designing AI-resilient assessments, Socratic learning enhancement through AI-generated examples (Chukhlomin, 2024).	Both invest in teacher training and curriculum adaptation.
Epistemic Justice/Equity Lens	Strong focus on equitable access (Mwansa et al., 2025), Afrocentric models to counter digital colonialism (Olufemi et al., 2023).	Emphasis on academic rigour, human judgment, preventing misuse, user responsibility for accuracy (Orugun et al., 2024).	SA addresses systemic inequalities as well as challenges with regards to academic integrity; UK focuses on individual academic integrity.

Table summarised and drawn up using GeminiAI.

8. Recommendations

Both South Africa and the United Kingdom have shown commendable initiative in responding to the rise of AI in education. Their respective approaches reflect a growing awareness of AI's potential to reshape teaching and learning. The integration of AI into education necessitates a proactive and thoughtful approach to ensure it serves to enhance rather than to diminish human intellectual capacities. The future of education with AI is not predetermined by the technology itself, but by the deliberate choices made in its integration. This requires a conscious shift from merely managing risks to strategically leveraging opportunities for deeper learning.

Adopting "algorithmic dialogism" as a core pedagogical approach is vital. This involves using AI as a conversational partner for inquiry, scaffolding, and reflection, rather than merely a source of ready-made answers. The intentional design of AI to prompt critical thinking and metacognition actively promotes intellectual engagement. The designing of "AI Resilient" assessments is another critical strategy. These assessments should focus on the learning process, on critical evaluation, and on originality. Additionally, they should require that students interpret AI outputs, justify their reasoning and that they engage in complex problem solving. This approach transforms assessment into a pedagogical tool for cultivating higher order thinking and originality.

AI literacy must be integrated across curriculums. This means teaching students not only how to use AI tools, but also how they work, their limitations, potential biases, and especially their ethical implications. Human-led workshops remain vital to complement AI-assisted activities, as do collaborative learning environments. Curriculum designers must revise learning outcomes to include AI-literacy competencies and skills for effective human-AI collaboration. Encouraging interdisciplinary approaches that embed AI discussions across subjects will cultivate a more holistic understanding of AI's societal role. A culture of attribution and reflection should be nurtured, so students assess AI usage in their academic work. Lastly, the comprehensive and ongoing professional development for educators is indispensable. Training programmes must focus on AI competencies, ethical use and very importantly, pedagogical adaptation. It is important to acknowledge the fact that initial training alone is insufficient given AI's rapid evolution. "Tick box" training will not be sufficient under any means. This continuous professional development for educators is a foundational requirement, as educator competency directly mediates the ethical and effective integration of AI in the classroom. Without ongoing support and a commitment to lifelong learning, educators cannot effectively navigate the complexities of AI which can potentially lead to suboptimal or even harmful pedagogical outcomes. Therefore, in a move from being knowledge dispensers, educators need to be supported in transitioning their roles to become facilitators (coaches, if you will) and critical interpreters of AI generated content.

9. Conclusion

Artificial Intelligence tools continue to present a transformative yet challenging landscape for education. While offering unprecedented efficiencies, it simultaneously poses risks to critical thinking and epistemic justice. The proposed "algorithmic dialogism" offers a human centric model for integrating AI. It allows for active engagement and knowledge co-construction by leveraging AI as a dialogic partner rather than a mere information source. Comparative insights from South Africa and the United Kingdom underscore the universal challenges alongside context specific priorities. These distinctions highlight the need for agile, ethically grounded and equitable pedagogical responses. Without such intentional design, we risk falling into what the author has termed T.H.I.N.K., Technologically Handled Ideas, No Knowledge, as a state of algorithmic convenience eclipses intellectual depth. Ultimately, the true measure of AI's success in education will not be found in computational prowess. Rather, it will be found in its capacity to cultivate minds that are not merely informed by algorithms but profoundly enriched by the enduring human spirit of inquiry and connection.

Ethics Declaration

The author declares that ethical clearance was not required for this conceptual paper, as it relies solely on the analysis of existing, publicly available academic literature and does not involve primary data collection from human or animal subjects.

AI Declaration

The author declares that the table presented in this document was drafted with the assistance of GeminiAI. The author's use of GeminiAI involved providing two paragraphs that offered a comparative analysis of the current

use of Artificial Intelligence in education within the United Kingdom and South Africa, followed by a request for this information to be presented in a tabular format.

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