

**Ethical AI in Education:  
A Review of AI Literacy, Policy, and Integrated Ethics**

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### **Abstract**

It's not uncommon for computing education and adjacent fields to sideline important ethical discussions regarding the use of data and algorithms [1]; with more recent developments in AI literacies echoing the same story [2]. Ethical competency frameworks and ethically driven policy for AI in education (AIED) are improving, but K-12 teachers still raise concerns about not being prepared to teach with AI in the classroom including Professional Development (PD) overemphasizing AI tools possibly relating to 'overhype' [3, 4], a lack of actionable AI literacy frameworks [5, 6], and a lack of knowledge and trust in AI technologies [7, 8, 9]. These challenges can ultimately lead teachers to opt out of engaging with AI literacy in the classroom: opting out of developing important competencies in themselves and their students for navigating an increasingly technologically driven world [10]. This literature review attempts to summarize the state of AI ethics in K-12 education as it relates to the competencies, policy, and empowerment needed to teach and teach-with AI in the classroom.

### **Introduction**

#### **AI Literacy**

Artificial Intelligence (AI), defined by Chiu and colleagues as the “ability of a digital machine to carry out tasks that are typically performed by intelligent beings” has exploded in popularity with developments in technologies including Large Language Models (LLMs), Natural Language Processing (NLP), and computer vision [11]. Accessible to the public and largely managed by private corporations, the ethical, societal, and environmental impacts of AI technologies requires careful consideration: Built-in LLMs have come under scrutiny for repeated data privacy violations [12], LLM powered chatbot companions are driving forks into human relationships [13], and privately owned AI data centers are harming the environment [14]. Out of these potential issues, AI literacy developed naturally as an AI analog of other technical literacies like digital literacy and data literacy. In the field of AIED, the most

commonly cited definition of AI literacy comes from researchers Long and Magerko as “a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace” [15]. AI literacy emphasizes competencies required for human interaction at a citizen level. Laupichler and colleagues define AI literacy as “encompass[ing] AI competencies that the general population should possess and accordingly [focus] mainly on learners without a computer science background (“non-experts”)” [16]. When a citizen interacts with AI in the workplace or through online interactions they should ideally be able to identify and evaluate its use before engaging with the technology, also relying on the transparency of tool developers and policy makers to verify its safety on the backend.

While non-expert users of AI should not be expected to understand AI at the level of a developer, a major challenge for AI literacy and what differentiates it from similar technical literacies is the true “black box” nature of AI algorithms like LLMs [17]. Unlike digital literacy where a user might learn the logical process of running a computer program, some AIs, and LLMs in particular, have stochastic and probabilistic processes built into the model, making it difficult or impossible to determine the steps it went through to produce an output. For AI literacy, this means putting a greater emphasis on educating users on how to evaluate LLM output instead of understanding its process.

### **Harms Relating to AI in Education**

Parents, educators, and institutions alike are worried about the potential harms of AI in education, specifically how students interact with the technology. Harvey and colleagues categorize the harms associated with LLM use in education into three categories: technical harms, human-LLM interaction harms, and harms from broader impacts of LLM use in education [4]. Technical harms result in human oversight in the tool design: most recognizably, toxic outputs, bias, and hallucinations. Educators, parents, and Ed-Tech developers all express concerns over the technical harms associated with LLM use in the classroom [4, 15, 18, 19]. Problems related to stochastic/irreplaceable outputs and a dependence on

private companies with constantly changing LLM models also fall under technical harms especially when AI-EdTech design is focused around “GPT wrappers”, which incorporate User Interface (UI) design and prompt engineering on an existing LLM model [20]. Human-LLM interaction harms like student plagiarism and cheating are forms of academic dishonesty, and while LLM detection algorithms have seen significant improvement in recent years, they face a constant challenge of having to keep up with new and evermore convincing LLM models [21]. This has led many K-12 educators to change their assessment practices, with many not assigning take-home work and having work done completely in class. Popular LLM models including Open AI’s ChatGPT line have been shown to have racial, sexual, ability, and gender biases which manifest in the training data and can discriminate based on user inputs [6, 22, 23]. The broader impacts of LLM use in education are of significant concern to educators and researchers in many fields of education and the social sciences. A recognized broader impact of LLM use in education surrounds how it will impact student learning and cognition, for example, parents and educators raise concerns that students might ‘miss-out’ on learning or ‘normalize mediocrity’ by outsourcing their critical thinking to AI [19]. Like the introduction of other technologies in education, socioeconomic inequity is exacerbated when access to technology is a barrier: Yang recognizes the reliance on privately owned models like OpenAI’s ChatGPT, and Microsoft’s Copilot for LLMs in education as an issue since private tech companies have a trend of turning free services into tier-based subscription services, “running counter to the democratization of knowledge” [24]. On the same note, researcher Neil Selwyn emphasizes that “conversations around AI in education need to be seen as politically profound in nature” [25]. The potential harms of AI use in education must inform tech design, policy, and AI literacy.

### **Positionally**

The profit-driven nature of AI development, and the concentration of power it places in the hands of already advantaged individuals, is a political action. AI is not a neutral tool, and any motion to adopt its use or study in the classroom must be met with immense scrutiny.

AI has shown and continues to show an acute capacity to discriminate against race, gender, and ability [23, 26, 27, 28] as well as exacerbate systemic inequalities like access to education [29, 30]. Environmental consequences of AI development and use, like its demand on the energy and fresh water supplies; epitomize the political struggle, with ethical, societal, and sustainable policy playing catch-up with the rapid growth in AI technology, stimulated by private and political interests.

My background as a non-identifying person of colour with a university education and previous background in AI research requires me to continually evaluate how I conduct research on this topic. I am not equally affected by the negative impacts of technologies and AI technologies on marginalized populations and the environment, and it's important to lift up and advocate for the voices of others that do not have that privilege. Already mentioned, "scrutiny" describes the position and approach I must take in the literature when addressing AI's place in education and society. Permitting AI without it, considering it merely inevitable, is an adherence to the status quo: an adherence to a state driven by profit and power over others.

The body of AI and AIED research is conducted predominantly in North America, Europe, and China where AI technology infrastructure has existed in some form for over a decade; as such, the literature in this review is centered mostly around K-12 North American, European, and Chinese education systems, cultures, and values. With this in mind, the ethical competencies and principles collected in this review ideally reflect a human-centered approach that can apply to diverse populations but inescapably encode Western values: bias and limitations will be acknowledged when necessary.

## **Literature Review**

### **A Call for Ethical Frameworks**

With the introduction of LLM chatbots like ChatGPT3 starting in early 2022, increasing calls from educators, institutions, and governments have been made for the development of AI literacy frameworks; however, as educators and researchers have pointed out, existing

frameworks today still leave much to be desired in the way of addressing ethical concerns and the social impact of AI [2, 27].

The need for greater ethical focus in AI literacy frameworks is a consequence of AI’s rapid growth and inclusion in society and education for which policy has only started catching up. Education researcher, Neil Selwyn, warns that the motivation for introducing AI into the classroom often blurs a line with the private interests of Educational Technology (EdTech) companies and a general AI culture of ‘overhype’ [25]. Overhype manifests in capital interest, including the over-saturation of “AI powered” startups but also bleeding into AIED research with cycles of hype, disillusionment, and dry funding [31]. The external push for AI EdTech should be viewed critically and AI literacy frameworks should give careful ethical consideration to addressing AI overhype and limitations.

*Going forward, AI will be used as a catchall for the specific technologies under the AI umbrella term like LLMs and NLPs.*

## **A Review of Leading AI Literacy Frameworks**

### ***UNESCO’s 2024 AI Competency Framework for Teachers***

The leading global AI literacy framework for teachers comes from the United Nations Educational, Scientific and Cultural Organization (UNESCO)’s 2024 *AI Competency Framework for Teachers* [32]. The framework is designed to align with UNESCO’s more general Information and Communication Technology competency framework and serves to inform the creation of national policy and teacher training. It breaks AI literacy into five aspects: human-centered mindset, ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional development. The first two aspects define a foundation for critical thought of AI and its place in education before then applying AI to teach, assess, and facilitate PD. Encompassing both ethical and practical dimensions of AI literacy, UNESCO’s framework puts an emphasis on developing dispositions related to human-centered AI decision making and accountability; ethical considerations are mostly based on legality, creating policy, and teacher advocacy. Important notes on inclusivity, fairness, and sustainability are included

but reference an undefined list of ethical principles. The document ends with suggestions for local governance bodies developing their own AI literacy frameworks and suggestions for policy with regulatory considerations and a call for teacher PD. Understanding UNESCO as an international organization with the role of developing educational frameworks, it presents a general structure for developing local AI literacies and policies with a need for concrete guiding ethical principles for AI use in K-12 education.

### ***Tagare’s Ethical Competencies for AI Literacy***

Researchers Tagare and colleagues conducted a systematic literature review comparing AI competency frameworks across 76 papers and documents [33]. Their review identified a lack of K-12 AI literacy frameworks that tackled ethical competencies while also breaking them down into knowledge, skills, and dispositions; ultimately creating their own set of ethical competencies that filled the gap.

The framework takes agreed upon values and ideas across the literature and categorizes them according to the Competency Learning Framework (CoLeaF), a knowledge – skills – dispositions framework structure designed specifically for IT and computing education [34]. Tagare’s proposed framework includes ‘human-centered AI decision making’ and ‘limitations of AI’ mentioned previously with the addition of ‘socio-political awareness’ under knowledge competencies: things teachers should know. Pointing towards specific examples of profit-driven companies taking advantage of its users, such as Instagram’s infamous algorithm, and examples of AI’s ability to discriminate, like facial recognition’s race bias, the framework provides more insight into AI’s political nature and its capacity to discriminate against marginalized populations.

Skill competencies include the capacity to critically analyze and explain AI processes, facilitating a “glass box” approach, being able to evaluate when AI should be used, and parsing out false outputs and misinformation. The “glass box” approach to evaluating AI is a response to the “black box” nature baked into AI models, where AI is used only if its input and output processes can be reasonably explained. Culturally responsive and inclusive pedagogy

is included as its own skill, emphasizing that teachers should dismantle gender stereotypes in tech and develop authentic activities based around real life issues of their students.

The underlying dispositions for Tagare’s ethical AI literacy framework include a critical attitude towards AI and sense of ethical sensitivity. When AI is brought up in school, work, or the media, approaching it from a skeptical perspective and asking questions like “is AI necessary here?” and “Does any one party seek to benefit more than others?” are important for identifying unethical practices. Selwyn, mentioned earlier, agrees with this skeptical approach: “the very idea of AI is something that needs to be extensively scrutinised, challenged and questioned by those who make decisions that affect education, and those who work in the field of education” [25].

At its core, Tagare’s ethical AI literacy framework and similar ethical AI literacy frameworks in the literature attempt to expand upon normative AI literacies that often emphasize “overhyped” use cases without providing the proper ethical support. Ethical AI literacy frameworks do not seek to hold back AIED and the implementation of AI as a technology or content in the classroom, but rather ask the important questions about teacher readiness to engage: do teachers fully understand the ethical impact of AI on education, society, and the environment?

### **Ethical Principles to Guide Policy**

Education policy makers and AI EdTech developers alike depend on a set of fundamental ethical principles to govern how AI should be taught and used in the classroom. When a school board wants to introduce a new AI-based assessment tool, it should be held up to rigorous ethical standards that are widely agreed upon by the relevant stakeholders: teachers, parents, and students should be both informed in evaluating ethical AI and have a say in how it is included in schools. Across the literature a consistent set of ethical principles for AI in education are widely accepted: governance, regulation, inclusivity/fairness, human-centeredness, transparency, accountability, sustainability, safety, privacy, and beneficence (See Table 1). *This section will cover three of those principles.*

Source	Governance	Regulation	Inclusive/Just	Human-centered	Transparency	Accountability	Sustainability	Safety	Privacy	Beneficial
Holmes et al. (2022) [35]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Nyugen et al. (2023) [6]	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Anagnostopoulou et al. (2024) [36]	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Harkins-Brown et al. (2025) [23]		✓	✓	✓	✓	✓		✓	✓	
Chiu et al. (2024) [11]			✓		✓	✓		✓	✓	✓
Hermann (2022) [37]			✓	✓	✓	✓		✓	✓	
Zhou et al. (2025) [5]	✓		✓		✓	✓		✓		
Yin et al. (2025) [38]					✓				✓	
Deng & Joshi (2024) [19]	✓		✓		✓	✓	✓	✓	✓	
Celik (2023) [39]			✓		✓	✓				
Yan et al. (2024) [40]			✓	✓		✓			✓	✓

Table 1: *The ethical AI principles and where they appeared in the literature.*

### ***Human-centered***

Though AI is fundamentally non-human, it is human-made and must prioritize human values. The human-centered principle assures that when discussions of AI occur regarding its development, its role in policy, or its impact in the classroom, human values like safety, beneficence, and accountability prevail. Highlighting the interdependence of the ethical principles, human-centeredness underlies the rest. It asks "whose voices are being heard in the design and implementation of AI in education?" and "do AI implementations benefit schools, teachers, and students over private interest and revenue?". Harvey and colleagues interviewed both AI EdTech developers and teachers to see where they agree/disagree on the introduction of AI in classrooms [4]. Apart from the main finding that AI EdTech developers prioritize mitigating technical harms while teachers prioritize the broader harms of AI use in society, multiple teachers mentioned that they feel like they can be better centered in the design process of AI EdTech that will eventually reach their classroom. Similarly, Atabey and colleagues studied young children’s perceptions of fairness and data privacy in regards to AI, through semi-structured interviews and value sketching they found young children expect AI to be inclusive and responsive to their needs, presenting an argument for child- and student-centered policy and AI EdTech design principles [41]. Teachers and students at the forefront of where much of the impact of AI in education occurs, deserve to be centered in the design processes behind tools and policy. Human-centeredness respects human rights, empowers educators and learners alike, granting greater political agency and say in how AI

enters the classroom.

### ***Transparency***

Transparency, relating to the “glass box” approach, is one of the most discussed principles across the literature but often goes overlooked by teachers in favour of ethical principles like safety and fairness [38]. AI technology needs to be explainable to the relevant stakeholders so that its purpose, fitness, and potential harms are mutually recognized. For example, teachers and students should be informed on how AI auto-grading tools distribute marks so teachers can be sure the tool is operating properly and that students receive fair grades. Algorithms are not the only component of AI that requires discussions of transparency, data ownership and collection must be clear since the training data used to create AI models can both infringe on personal privacy and be inherently biased in its collection [42]. Relating to the ethical principle of privacy, Holmes and colleagues point out that students and teachers should have the right to control when and how their data is being used in the classroom, with a clear understanding of the terms and the freedom to opt out of AI services at any moment [35]. Lastly, transparency also appears in simply stating when AI is being used: teachers might ask “is AI being used for school administrative purposes like resource allocation?” and students similarly, “is AI being used in the grading of my essay?”. As an ethical principle, transparency assures that stakeholders are aware and informed on how AI is being used in education.

### ***Inclusivity and Fairness***

Discussed throughout this review, the ethical principle of inclusivity and fairness covers a range of contentions with AI use in the classroom, both in the tool itself and its broader impacts (see Harms Relating to AI in Education). Bias in the training data, bias in the algorithm, and systemic inequalities like internet access, gender-based stigma in computing education, and issues of power and private interest are all relevant topics that must be addressed before introducing AI in the classroom. Work remains to be done in creating equitable AI education opportunities for all students, particularly in special education

and anti-racist education where frameworks and structure are yet to be developed [23, 28]. Similarly, Anam and colleagues conducted an AIED study in Bangladesh, where AI infrastructure is both in its infancy and underfunded, finding that unethical use of AI in education was widespread without a proper framework at any level [43]. AI literacy *is* education and should therefore be a human right: the ethical principle of inclusivity and fairness asks “who gets to do AI?”.

The ethical principles allow policy makers and schools to decide on how they want to implement AI, while also allowing teachers, students, and parents to hold them accountable for their actions, placing power and political agency in the hands of the relevant stakeholders that interact with AI technology and learning in the classroom. That said, some point to valid concerns about the merit in defining ethical AI principles in the first place, warning that ethical principles can be idealized and isolated, running into problems like inactionability, a lack of consequences, and an adherence to the interests of private corporations [44]. In education, abiding by ethical principles without challenging broader issues of powers can act as a distraction from achieving larger equitable and socially-just goals; as such, a common response has been developed in the fields of computing education outside of AI to tackle the problem of ethical principles being isolated from real world issues: integrated ethics.

### **Research Gap: Integrated Ethics in AI Literacy**

Integrated ethics, also known as ‘embedded ethics’ is a subfield of computing education focused on developing students’ ethical sensitivity and ability to incorporate ethical considerations into the design and deployment of computer science technologies [45]. As a response to Computer Science (CS) programs often creating separate ethics requirements in standalone courses, integrated ethics looks to embed ethical dilemmas and situations throughout program-required course material and assignments, making ethical consideration inseparable from doing CS. For example, an integrated ethics module in an introductory Python course might have students create a university admissions algorithm, giving students hands-on experience with navigating algorithmic bias and how systemic inequality presents in the data

[46]. Integrated ethics is a relatively small field within computing education, still facing barriers for implementation at large scales [47] but its potential to be expanded into AI literacy education is promising and can be done naturally with the helpful overlap of existing integrated ethics work. Wein and colleagues added an open data ethics module to the final project of an introductory CS course at the University of Georgetown: the project saw students analyzing datasets using basic Python routines but included an in-depth report of the open data set they used [48]. Discussed previously in the course, the module required students to answer questions about their data regarding the 5 W's and how their data was collected, emphasizing ethical principles of data ownership and data transparency. At the University of Toronto, Chui and colleagues conducted a pilot study which involved adapting a set of integrated ethics modules into an introductory information sciences course, providing a new context for integrated ethics with students from non-technical backgrounds [49]. The modules were adapted from an existing set of integrated ethics modules by researcher Evan Peck [50]. Findings showed that students from non-technical backgrounds found value in integrated ethics modules, increasing their sense of ethical sensitivity without taking away from their learning of the technical content. Continued studies by Horton and colleagues at the University of Toronto round out the topic of integrated ethics in introductory CS, demonstrating that integrated ethics, when incorporated consistently, increases students' ethical sensitivity in regards to data ethics, algorithmic bias, and systemic injustice in computer science, carrying into the workplace [51, 52]. It should be noted that integrated ethics is still in its infancy, facing challenges related to resourcing, getting departments and institutions onboard, and making interventions engaging and empowering for students [1, 53].

AI literacy shares many of the ethical topics found in computing education: data privacy, algorithmic bias, and societal impacts of tech design to name a few; however, while integrated ethics flows most naturally into education surrounding the development of AI EdTech, it should rather focus on incorporating ethical discussions into AI literacy education at the citizen level. Integrated ethics research has shown that it can be done effectively with

learners from non-technical backgrounds, meaning that room for integrated ethics in the field of AI literacy is a logical next step. It can be used to prepare both teachers and students for working and learning alongside AI as a tool and content, contextualizing ethical AI principles through engaging with them hands-on and in the real world. The contextualization of ethical AI principles should inform teachers and students alike on the ethical, social, and environmental impacts of AI, empowering them to raise concerns about its place in society, educational policy, and how AI EdTech is designed and implemented.

While calls have been made for the integration of ethics in AI literacy [10], much work remains to be done. AI literacy aims to be non-technical and accessible to the general public, meaning that ethics modules will need to be redesigned as such. AI literacy will look different for K-12 teachers and their students where one form will be integrated into PD and teacher training while the other will be administered by a teacher to their class. Lastly, integrated ethics solves the issue of ethical principles being isolated from world applications, providing learners with the ethical awareness and sensitivity to critique and analyze the decisions made around them, but “what do learners do after recognizing the issues?” is its own question. Avenues, in the way of policy and EdTech design, need to exist so that the relevant stakeholders impacted by AI in the classroom can raise their concerns and see change.

### **Conclusion**

More and more, K-12 education is living with the reality that AI technologies will have a tremendous impact on the field going into the future. At the forefront of the discussions about AI in education are its potential harms: impairing learning, exacerbating systemic inequalities, and impacting the environment. AI presents a unique challenge to teachers as its black box nature and complex design means learners must understand how to evaluate its use, outputs, and impact without a full understanding of its decision making processes. Thankfully the development of AI literacy bridges the gap by informing teachers, students, and citizens alike on the impact and importance of AI technologies on the environment,

themselves, and society at large.

A rapidly developing technology, drafts and frameworks for K-12 AI literacy competency frameworks attempt to keep up with the demands of the changing education landscape, often overemphasizing how AI can be used for good and underemphasizing ethical concerns and the negative social impacts of AI technologies. In response to these concerns and in opposition to political and private interests, ethical AI competency frameworks have been developed for K-12 teachers, putting sole emphasis on the knowledge, skills, and dispositions needed to critically teach- and teach-with AI in the classroom.

The ethical principles that shape K-12 educational policy and EdTech design such as transparency, fairness, and human-centeredness provide accountability to decision makers that choose how AI is ultimately implemented in schools; however, to truly hold accountability, education stakeholders including teachers and students must be heard and empowered to raise their concerns. Integrated ethics has potential to better contextualize ethical issues surrounding AI in education, allowing teachers and students to identify unethical practices and issues of power from a hands-on approach but it also relies on actionable pathways being in place to have concerns see actual change. The future of AI in K-12 education will likely continue to remain uncertain, but the ethical competencies, principles, and voices that protect the rights of individuals and society as whole must dominate all discussions of AI and its place in the classroom.

### **Reflection on Critical Research Literacy**

Copilot generated a literature review that was helpful only in that it presented me with broad topics to talk about. I ended up considering one of these topics that I had not thought of yet which was ‘Barriers to AI Literacy’, leading me to conclusions regarding gender based stigmas in STEM and socioeconomic status on access to tech. The additional papers that were explicitly referenced were either non-existent or not of value, but I used the broad topic to search for literature myself. Copilot, perhaps unsurprisingly, did not discuss political agency, private interest, broader issues of power surrounding AI in society,

and environmental impact. Generating a literature review on this topic presents itself as a unique demonstration of how AI is not a neutral tool, it is human-made and reflects human values, controlled by the private corporations: It is itself, an argument for the importance of the research laid out in this review.

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### **Appendix: Disclosure of AI Use**

The use of AI in the research and writing of this paper was minimal. Built in spellcheck and grammar correction software in LaTeX and Google Docs was used but not for generating ideas or complete sentences. AI was not used in the literature search or summary other than what was assigned in the coursework.