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Designing Inclusive Pedagogy for AI Learning: A Framework Based on Universal Design for Learning (UDL), Ethical Guidelines, and Learning Praxes

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Abstract: As artificial intelligence (AI) permeates educational systems, instructors must reconcile the promise of personalization and access with risks of bias, exclusion, and unequal capacity to benefit. This article advances an Inclusive Pedagogy Framework for AI Teaching and Learning (IPFAITL) that integrates Universal Design for Learning (UDL), ethical AI principles, and critical learning praxis into a coherent, implementable model. Drawing from extensive research on inclusive pedagogy (Ybyrayeva, & Yermakhanova, 2022), AI ethics in education, and critical learning theory, this framework addresses the multifaceted challenges of teaching and learning with AI while promoting accessibility, equity, and social justice (Capraro, *et al*., 2023). The proposed framework provides practical guidance for educators, curriculum developers, and policymakers seeking to implement AI-enhanced education that serves all learners, particularly those from marginalized and historically underrepresented communities.

Keywords: Universal Design for Learning, AI Ethics, Inclusive Pedagogy, Learning Praxis, Educational Technology, Digital Equity.

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I. Introduction

Artificial Intelligence (AI) has emerged as a transformative force across industries, creating new opportunities and shaping future economies. The rapid proliferation of artificial intelligence technologies in educational settings has created both unprecedented opportunities and significant challenges for teaching and learning. While AI has the potential to personalize learning experiences, enhance accessibility, and support diverse learners, it also raises critical concerns about equity, bias, and the digital divide (US Department of Education, 2023). Access to AI education remains unequal, with traditionally underserved populations facing barriers that limit their participation in the AI workforce. Recent quantitative research highlights significant disparities in the representation of individuals from varying socioeconomic backgrounds within AI-related fields. These disparities not only affect participation but also influence the performance and biases of AI systems (Bircan & Ãzbilgin, 2025). As educational institutions increaseingly adopt AI-powered tools and platforms, there is a pressing need for pedagogical frame works that ensure these technologies promote rather than hinder inclusive education (Frąckie wicz, 2023).

Increasing diversity and inclusion in AI education is essential for ensuring equitable opportunities and mitigating biases in AI systems. A critical tool in this effort is to design inclusive learning environments that equip all learners with AI competencies. Currently, there is an educational emphasis on technological capabilities without adequately addressing the diverse needs, backgrounds, and abilities of all learners (Boutelier & Ludwig, 2021). This technological determinism can inadvertently perpetuate existing educational inequities and create new barriers for students from marginalized communities (Hallström, 2022).

Educators and learning designers must adopt a comprehensive framework that promotes equity and inclusion in AI learning to achieve this goal. To address these challenges, this article proposes an Inclusive Pedagogy Framework for AI Teaching and Learning (IPFAITL) that integrates three foundational elements: Universal Design for Learning (UDL) principles, ethical guidelines for AI in education, and six praxes of learning to guide the design of inclusive pedagogy for AI education (Ybyrayeva, & Yermakhanova, 2022). The proposed framework emphasizes flexibility, accessibility, and responsiveness to learner diversity while embedding ethical literacy in AI instruction.

This framework is grounded in the understanding that inclusive education requires intentional design that anticipates and addresses learner variability from the outset (Dalton, McKenzie & Kahonde, 2012). By combining UDL's evidence-based approach to accessible learning design with ethical considerations for AI implementation and critical pedagogical practices that promote social justice, the IPFAITL framework offers a comprehensive approach to AI-enhanced education that serves all learners (Capraro, *et al*., 2023).

As artificial intelligence reshapes the global knowledge economy, the responsibility falls on the educational community to equip a diverse range of learners with AI fluency. Drawing on recent literature, the framework provides a roadmap for cultivating equitable, interdisciplinary, and ethically responsive AI education

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practices at the secondary and postsecondary levels. It emphasizes multimodal engagement, ethical consciousness, and culturally responsive method ologies to prepare future innovators who reflect the diversity of global society.

II. Literature Review

Background and Context

Global evidence shows persistent representation gaps in the AI workforce—e.g., women comprise roughly 22% of AI professionals worldwide (World Economic Forum, 2021), while racialized and lower-SES learners face structural barriers across access, preparation, and belonging. These disparities correlate with downstream model harms (e.g., performance disparities, dataset coverage gaps) that have been empirically documented in high-impact domains (Buolamwini & Gebru, 2018). In education, the U.S. Department of Education urges risk-aware adoption and transparent governance of AI-enabled tools (U.S. Department of Education, 2023). UNESCO's global standard codifies human rights–aligned AI (UNESCO, 2021). Within pedagogy, UDL offers a research-based blueprint to anticipate learner variability and reduce barriers by design, not retrofit (CAST, 2024). Together, these literatures motivate an integrated framework that centers inherent dignity, capabilities, and justice while remaining operationally concrete.

Studies also indicate that individuals from higher socioeconomic statuses (SES) have greater access to AI technologies and related educational opportunities. For instance, research on digital assistants reveals that higher SES groups enjoy increased access and usage, while lower SES groups face barriers, leading to a digital divide. This divide suggests that AI technologies may predominantly serve the interests of more privileged communities, potentially exacerbating existing inequalities (Hallström, 2022).

The socioeconomic status of individuals represented in AI training datasets significantly impacts system performance. A study analyzing scene recognition models found that deep convolutional neural networks (dCNNs) exhibited lower accuracy and higher misclassification rates when processing images associated with lower SES households. These models often misinterpreted images from such backgrounds, assigning labels like "ruin" or "slum," highlighting the biases inherent in AI systems trained on non-representative data (Greene, Josyula, Si, & Hart, 2025).

Underserved communities face multiple barriers to AI education. Budget and infrastructure deficits often limit access to high-speed internet and advanced computational resources. AI concepts are often absent in K-12 curricula in poorer communities, and those school systems that do introduce AI concepts are confronted with physical and financial engagement restrictions with AI learning, leaving many students unprepared for advanced AI. Even in better funded school districts, implicit biases in instructional design can alienate marginalized learners and reinforce inequalities.

Inclusive pedagogy ensures that all learners have equitable opportunities to engage with AI content and develop the necessary skills to succeed in the AI workforce. Inclusive AI education can dismantle systemic biases, foster critical thinking, and cultivate ethical awareness among future AI practitioners (Ybyrayeva, & Yermakhanova, 2022). The Universal Design for Learning (UDL) framework provides an evidence-based approach for designing inclusive learning environments that address diverse learner needs.

Theoretic Foundations

a. Universal Design for Learning (UDL)

Universal Design for Learning (UDL) is a research-based framework developed by the Center for Applied Special Technology (CAST) that promotes inclusive learning by addressing learner variability. Universal Design for Learning emerged from architectural principles of universal design and has evolved into a comprehensive educational framework based on neuroscience research about how people learn (Barteaux, 2014). UDL is founded on the premise that there is no "average" learner and that educational environments should be designed to accommodate predictable learner variability from the outset rather than retrofitting accommodations after barriers are identified (CAST, 2024).

Universal Design for Learning (UDL) treats variability as the norm and structures design around multiple means of engagement, representation, and action/expression (CAST, 2024). Empirical syntheses support UDL's effectiveness for participation and learning outcomes when implemented with fidelity (e.g., Boothe, Lohmann, Donnell, & Hall, 2018). AI ethics scholarship converges on principles of beneficence, non-maleficence, autonomy, justice, and explicability (Floridi & Cowls, 2019), operationalized in education via governance artifacts—Model Cards and Datasheets—that improve transparency and auditability (Mitchell et al., 2019; Gebru et al., 2021). Critical pedagogy/praxis anchors reflective action toward equity, enacted through dialogic learning, culturally sustaining content, and community-situated projects.

The UDL framework is organized around three core principles that align with the brain's learning networks (Barteaux, 2014):

1. **Multiple Means of Engagement** (the "why" of learning): This principle addresses learner motivation and emotional investment in learning, recognizing that students are motivated by different factors and require various strategies to sustain effort and develop self-regulation skills. The emphasis is on providing diverse ways to motivate and engage learners based on their interests, cultural backgrounds, and prior knowledge (CAST, 2018).
2. **Multiple Means of Representation** (the "what" of learning): This principle ensures that information is presented in multiple formats to accommodate different learning preferences and abilities, including considerations for perception, language processing, and comprehension. Offering information through various modalities, including text, audio, video, and hands-on activities, accommodates diverse learning styles.
3. **Multiple Means of Action and Expression** (the "how" of learning): This principle provides learners with various ways to demonstrate their knowledge and skills, accounting for differences in physical abilities, communication methods, and executive function skills. This approach allows learners to demonstrate their understanding in different ways, such as writing, coding, and visual storytelling.

Recent research has demonstrated that UDL principles can be effectively integrated with AI technologies to create more inclusive learning environments (Boothe, Lohmann, Donnell & Hall, 2018).

When AI tools are designed and implemented with UDL principles in mind, they can provide personalized support that addresses individual learning needs while maintaining accessibility for all students (CAST, 2024). Applying UDL in AI education ensures that instructtional design accommodates diverse learner profiles, promotes accessibility, and cultivates deeper engagement. Strategies include:

- **Scaffolded Learning Pathways:** Offering personalized learning trajectories that build AI competencies incrementally.
- **Multimodal Content Delivery:** Integrating visual, auditory, and interactive learning resources to represent AI concepts effectively.
- **Flexible Assessment Approaches:** Allowing learners to showcase their AI knowledge through diverse outputs such as projects, presentations, and coding exercises.

b. Six Praxes of Learning and Application to AI Pedagogy

Learning praxis, rooted in the work of Paulo Freire and critical pedagogy (Ybyrayeva, & Yermakhanova, 2022), represents the integration of reflection and action in educational contexts (Gouthro & Holloway, 2023). Praxis involves "informed action" where theoretical understanding is continuously refined through practical application and critical reflection (Goodley, 2007). This concept is particularly relevant to AI education because it emphasizes the importance of ongoing dialogue, critical consciousness, and transformative action.

The six praxes of learning provide a robust framework for addressing diverse learning preferences and enhancing instructional effectiveness. These praxes include:

1. **Cognitive Praxis:** Focuses on the development of intellectual and critical thinking skills.
2. **Affective Praxis:** Emphasizes emotional engagement and motivation to learn.
3. **Psychomotor Praxis:** Addresses hands-on, experiential, and skill-based learning.
4. **Social Praxis:** Encourages collaborative and peer-to-peer learning.
5. **Cultural Praxis:** Incorporates diverse perspectives and culturally relevant content.
6. **Metacognitive Praxis:** Develops learners' ability to reflect on their own learning processes and adapt strategies accordingly.

Critical pedagogy's emphasis on social justice, equity, and empowerment aligns with the goals of inclusive AI education (Capraro, *et al*., 2023. *See also*, for example: https://guides.library.charlotte.edu/c.php?g=1162254&p=8484888).

Key principles of learning praxis in educational contexts include (Gouthro & Holloway, 2023):

- **Dialogical Relationship**: Creating opportunities for meaningful dialogue between teachers and students
- **Critical Consciousness**: Developing awareness of social, political, and technological systems that affect learning
- **Problem-Posing Education**: Engaging learners in identifying and addressing real-world challenges
- **Transformative Action**: Connecting learning to social change and community improvement

When applied to AI education (*see*, Table 1), learning praxis encourages students and educators to critically examine the role of technology in society, question assumptions about AI's neutrality, and work collectively to ensure that AI tools serve justice and equity (Goodley, 2007; Hallström, 2022).

Ethical Considerations in AI Education

Ethical considerations play a vital role in AI education to ensure that future AI practitioners are aware of the social, legal, and moral implications of AI technologies (Capraro, *et al*., 2023).

Ethical guidelines emphasize the importance of fairness, accountability, transparency, and privacy in AI systems (Floridi & Cowls, 2019). Ethical literacy equips learners with the ability to:

- Recognize and mitigate biases in AI models.
- Evaluate the societal impact of AI technologies.
- Make informed decisions aligned with ethical standards.

Table 1: Applying Learning Praxis To AI Education

Praxis	Teaching Framework	Application in AI Learning
Cognitive Praxis	Inquiry-Based Learning	Encouraging learners to investigate AI concepts through guided inquiry, problem-solving, and hypothesis testing.
Affective Praxis	Emotionally Responsive Pedagogy	Using real-world case studies that evoke empathy and ethical reflection in AI contexts.
Psychomotor Praxis	Experiential Learning	Engaging learners in hands-on coding exercises, building AI models, and prototyping AI applications.
Social Praxis	Collaborative Learning	Facilitating group projects wherein learners design AI solutions collaboratively.
Cultural Praxis	Culturally Relevant Pedagogy	Integrating case studies that reflect diverse cultural perspectives and encouraging discussions on AI ethics in different societal contexts.
Metacognitive Praxis	Reflective Practice	Encouraging learners to analyze their problem-solving approaches, reflect on outcomes, and refine their AI models

Embedding ethics into AI pedagogy involves *Case-Based Learning*, an Analysis of real-world scenarios to explore ethical dilemmas in AI applications. Augmented instruction that encourages critical discourse on the societal implications of AI systems teaches learners to integrate ethical considerations at every stage of AI development (Courey, Tappe, Siker & LePage, 2013).

The integration of AI in educational contexts raises complex ethical considerations that must be addressed through comprehensive frameworks and guidelines (Borenstein & Howard, 2021). Educational institutions worldwide have developed various ethical frameworks for AI implementation, typically emphasizing principles such as fairness, transparency, accountability, and respect for human agency (UNESCO, 2021). Key ethical principles identified in the literature include (US Department of Education, 2023):

- **Beneficence**: Ensuring AI is used for the benefit of all students and faculty
- **Justice**: Promoting fairness in AI applications across all user groups
- **Transparency and Explainability**: Providing clear information about how AI systems operate
- **Privacy and Data Protection**: Safeguarding personal information against unauthorized access
- **Non-discrimination and Fairness**: Preventing biases that could lead to discriminatory outcomes
- **Human Agency**: Maintaining human decision-making authority in educational processes

These ethical considerations are particularly important in educational contexts because of the potential for AI systems to perpetuate or amplify existing biases and inequities (Gouseti, James, Fallin & Burden, 2024). Research has shown that without careful attention to ethical implementation, AI tools can disadvantage students from marginalized communities and create new forms of digital exclusion (Hallström, 2022; Stone, 2025).

III. Discussion

The proposed **Inclusive Pedagogy Framework for AI Teaching and Learning (IPFAITL)** synthesizes UDL principles, ethical guidelines, and learning praxes into a comprehensive approach for AI-enhanced education. Key design principles include:

1. **Equity-Centered Curriculum Design:** Embedding culturally responsive content that reflects diverse perspectives in AI applications.
2. **Personalized Learning Trajectories:** Customizing AI instruction to address individual learning needs and preferences.
3. **Ethics-Infused AI Learning Modules:** Integrating ethical considerations in AI lessons through scenario-based learning.
4. **Praxis-Aligned Instructional Approaches:** Designing learning activities aligned with cognitive, affective, psychomotor, social, cultural, and metacognitive praxes.

This framework is designed to be adaptable across different educational contexts while maintaining core commitments to accessibility, equity, and social justice (Capraro, *et al*., 2023). To foster inclusive AI learning, educators should acknowledge and integrate diverse and cultureally relevant perspectives into AI content. Efforts must be made to ensure that AI learning environments are accessible to learners with disabilities and create opportunities for peer-to-peer learning that leverage diverse knowledge and experiences.

The proposed IPFAITL framework opens several avenues for future research. Longitudinal studies are needed to evaluate the framework's impact on learning outcomes, student engagement, and equity measures across different contexts and populations. Research comparing the IPFAITL framework to other approaches to AI integration in education could help identify best practices and areas for improvement. Case studies of framework implementation in different institutional contexts could provide insights into effective strategies and common challenges (Bircan & Ãzbilgin, 2025).

IPFAITL is a four-dimension framework realized in five phases. It embeds UDL check points into AI learning activities, wraps them with ethics-by-design, and steers instruction via six learning praxes (*see*, Table 2). Each dimension is deliberately organized to highlight and emphasize AI engagement, representation through AI, and, actions and expressions involving AI. The implementation of the IPFAITL framework follows a systematic process of five phases (see, Table 3). Each phase follows the process design of the phase preceding it.

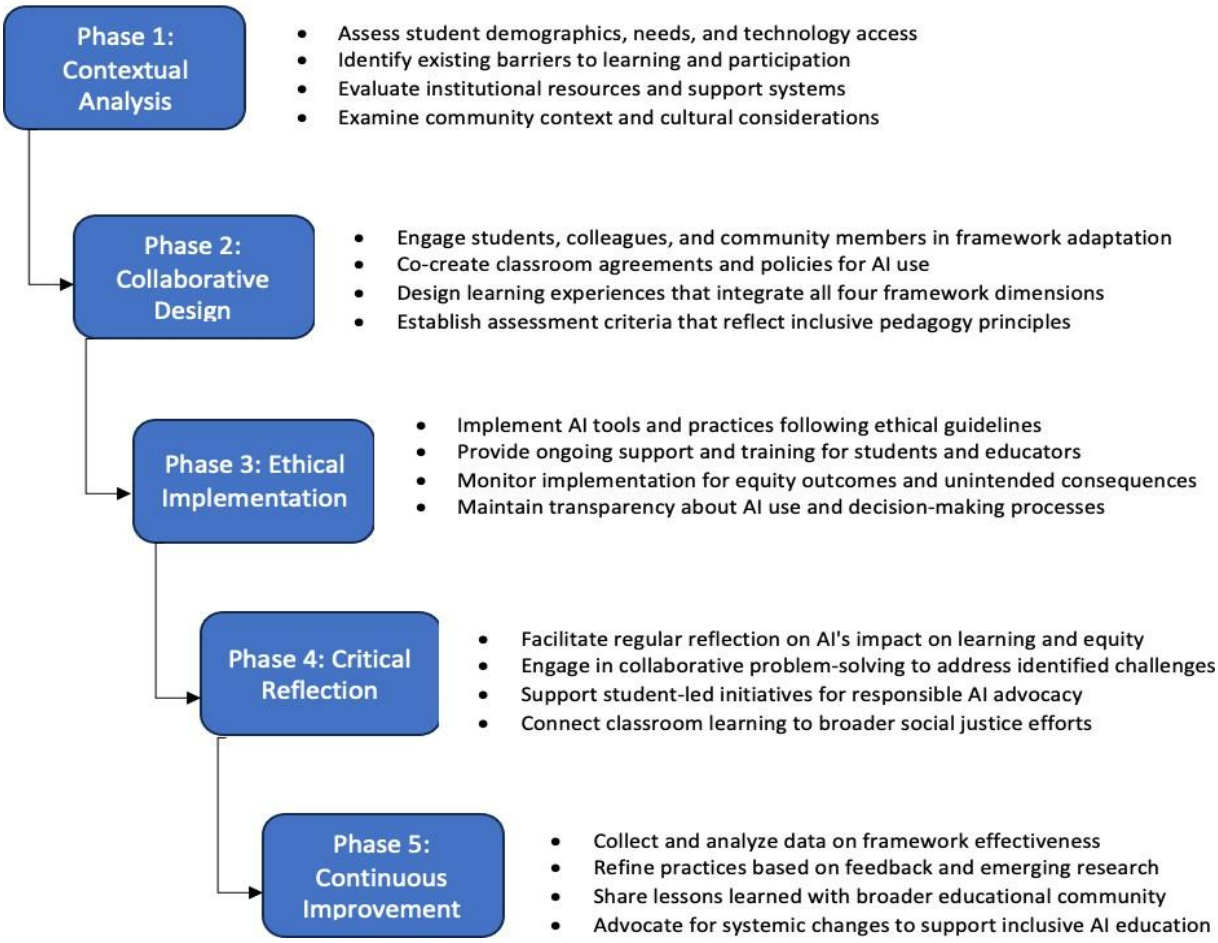
Ongoing theoretical work is needed to refine the framework based on emerging research in UDL, AI ethics, and critical pedagogy (Wiese, *et al*., 2025; Ybyrayeva, & Yermakhanova, 2022). Research on how the framework can be adapted for different cultural contexts and educational systems would enhance its global applicability. Further exploration of how the framework can be integrated with other relevant theoretical perspectives, such as culturally responsive pedagogy and critical race theory, could strengthen its foundations (Courey, Tappe, Siker & LePage, 2013).

The IPFAITL framework provides educators with a structured approach to integrating AI technologies while maintaining commitments to inclusive pedagogy (*See*, Table 4 for Course Design examples). Educators should engage in ongoing learning about UDL principles, AI ethics, and critical pedagogy to effectively implement the framework—(Borenstein & Howard, 2021; Ybyrayeva, & Yermakhanova, 2022). This includes developing technical skills with AI tools as well as critical literacy skills for analyzing AI's social implications.

Table 2: IPFAITL Framework Components

Dimension	Engagement with AI	Representations through AI	Actions & expressions involving AI
Accessible Design Dimension (UDL Foundation): ensures that AI-enhanced learning experiences are designed from the outset to accommodate diverse learner	**Learning Paradigm:** • Providing culturally relevant AI applications that connect to students' lived experiences • Offering choice in AI tools and platforms to support different interests and backgrounds • Creating collaborative opportunities for students to explore AI concepts together • Implementing feedback mechanisms that emphasize effort and growth rather than fixed ability	**Teaching Tools:** • Using AI to generate content in multiple formats (text, audio, visual, interactive) • Leveraging AI translation tools to support multilingual learners • Providing AI-generated alternative text and captions for multimedia content • Offering AI-powered text simplification and explanation tools	**Learning Objective:** • Enabling students to demonstrate learning through various AI-supported modalities • Providing AI writing assistants for students with different communication needs • Offering AI-powered assessment tools that accommodate diverse response formats • Supporting student creation of multimedia projects using AI tools
Ethical Implementation Dimension: addresses the responsible integration of AI technologies in educational settings	**Transparency and Accountability:** • Clearly communicating when and how AI tools are being used in courses • Providing students with information about AI system limitations and potential biases • Establishing clear policies for AI use in academic work • Creating mechanisms for addressing AI-related concerns	**Equity and Justice:** • Regularly auditing AI tools for bias and discriminatory outcomes • Ensuring equitable access to AI technologies across different student populations • Addressing the digital divide through infrastructure and support services • Prioritizing the needs of historically marginalized students in AI implementation	**Privacy and Data Protection:** • Implementing robust data protection policies for AI systems • Obtaining informed consent for data collection and use • Providing students with control over their data and AI interactions • Ensuring compliance with relevant privacy regulations
Critical Praxis Dimension: emphasizes critical reflection and transformative action in AI education	**Critical Consciousness Development:** • Engaging students in critical analysis of AI's social and political implications • Examining how AI systems can perpetuate or challenge existing power structures • Exploring the intersection of AI with issues of race, class, gender, and other identity markers • Developing media literacy skills specific to AI-generated content	**Problem-Posing Approach:** • Encouraging students to identify community problems that could be addressed through AI • Facilitating dialogue about AI's role in social justice and equity • Supporting student-led investigations of AI bias and discrimination • Connecting AI learning to real-world activism and community engagement	**Democratic Participation:** • Involving students in decisions about AI tool selection and implementation • Creating opportunities for peer teaching and collaborative learning about AI • Establishing classroom agreements about ethical AI use • Empowering students to advocate for responsible AI practices
Continuous Improvement Dimension: ensures ongoing reflection, assessment, and refinement of AI-enhanced pedagogy	**Reflective Practice:** • Regular assessment of AI implementation effectiveness and equity outcomes • Continuous professional development in AI ethics and inclusive pedagogy • Collaboration with colleagues to share best practices and address challenges • Student feedback mechanisms to inform pedagogical improvements	**Inclusive Assessment and Feedback Mechanisms** ▪ Assessment practices should prioritize fairness, transparency, and continuous improvement by: ● Offer Multiple Assessment Modalities to allow learners to demonstrate AI knowledge various methods ● Provide Constructive Feedback that is timely and meaningful, encouraging growth and learning.	**Adaptive Implementation:** • Flexibility to modify AI tools and approaches based on student needs and feedback • Responsiveness to emerging research on AI ethics and inclusive education • Ability to address unexpected challenges or consequences of AI implementation • Commitment to ongoing learning and growth as AI technologies evolve

Table 3: Framework Application Process



The framework emphasizes the importance of collaboration with students, colleagues, and community members in designing and implementing AI-enhanced learning experiences.

This collaborative approach helps ensure that diverse perspectives are included and that potential barriers are identified early. Educators should engage in systematic reflection on their AI implementation practices, regularly assessing both learning outcomes and equity impacts. This includes collecting feedback from students and adjusting based on emerging evidence. The Rather than retrofitting existing curricula with AI tools, developers should design learning experiences that integrate UDL principles, ethical considerations, and critical praxis from the outset (Dalton, McKenzie & Kahonde, 2012). Curricula should be designed to allow for adaptation to different contexts and student populations while maintaining core commitments to accessibility and equity. Assessment strategies should reflect the framework's principles by providing multiple ways for students to demonstrate learning while addressing the ethical implications of AI assisted assessment.

Further research should focus on developing methodologies to identify and correct biases in AI systems. Additionally, studies are needed to explore the impact of AI on various socioeconomic groups, particularly those historically marginalized. Such research can inform policies aimed at promoting equitable access to AI technologies and ensuring that AI systems serve the broader public interest.

Policymakers and educators should invest in an infrastructure that provides equitable access to Institutions should invest in professional development, infrastructure, and support services necessary for equitable AI implementation (US Department of Education, 2023). This includes addressing the digital divide and ensuring that all students have access to necessary technologies and AI learning resources. Clear policies are needed for ethical AI use in educational settings, including guidelines for data privacy, bias prevention, and student rights (Stone, 2025) These policies should be developed through inclusive processes that involve diverse stakeholders. Policy makers should consider mandating Inclusive AI Curriculum standards that establish guidelines for integrating UDL and ethical principles in AI education and equip educators with the knowledge and tools to design inclusive AI learning environments.

The underrepresentation of lower SES groups in AI development leads to systems that may not address their needs effectively (Hallström, 2022). Moreover, AI-driven decisions in areas like hiring, education, and healthcare can perpetuate existing biases if not carefully monitored. To mitigate these issues, ensuring diverse and inclusive representation in AI datasets and development teams is crucial. Institutions should establish mechanisms for monitoring and evaluating the equity impacts of AI implementation, with regular reporting and adjustment as needed. This approach promotes fairness and reduces the risk of exacerbating socioeconomic disparities through technology.

Table 4: *Course Design* Examples

Accessibility/UDL: Provide multimodal content (readings + audio + code-walkthrough videos), choice of assessments (project/report/oral defense), and assistive-tech-friendly formats (CAST, 2024).
Ethics integration: Require Model Cards for every trained model and Datasheets for any dataset—even "toy" ones. Pair with a one-page risk register (intended use, foreseeable misuse, affected stakeholders) (Mitchell et al., 2019; Gebru et al., 2021).
Equity audits: Incorporate a bias check lab (e.g., stratified accuracy; confusion matrices across subgroups). Discuss intersectional error patterns (Buolamwini & Gebru, 2018).
Policy alignment: Reference UNESCO (2021) and U.S. Department of Education (2023) in your syllabus AI-use policy; define disallowed inputs, disclosure requirements, and a red-teaming protocol with incident logging.

IPFAITL operationalizes a dignity-centered, capabilities-enabling approach to AI education by merging (a) barrier-reduction from UDL, (b) rights-compatible ethics, and (c) praxis-oriented pedagogy. Compared to ad-hoc tool adoption, the framework clarifies design responsebilities, standardizes transparency artifacts, and institutionalizes continuous improvement via equity and learning indicators. Research opportunities include quasi-experimental comparisons of UDL + ethics-infused sections vs. business-as-usual, and mixed-methods studies on belonging and self-efficacy among historically underrepresented learners.

IV. Anticipated Challenges and Limitations

While the IPFAITL framework offers a comprehensive approach to inclusive AI education, several challenges and limitations must be acknowledged. These potential barriers to *implementing Inclusive AI Pedagogy* can be organized in three specific areas: technical, political and social.

Technical limitations include access challenges to technology and instructional resources. Effective implementation requires educators to develop both technical skills with AI tools and critical understanding of their social implications (Capraro, *et al*., 2023). This dual requirement may create steep learning curves for some practitioners. There may be a need for professional development to equip educators with the skills to implement UDL and ethics based AI instruction. Thus, the framework requires significant investment in professional development, technology infrastructure, and ongoing support services. Many institutions may face budgetary constraints that limit their ability to fully implement the framework. The swift and relentless pace of AI development may make it difficult to keep the framework current with emerging technologies and their implications.

Give the current political climate, some educators and institutions may resist the pedagogical shifts required by the framework, particularly the emphasis on critical inquiry and social justice (Capraro, *et al*., 2023). The lack of an institutional commitment to diversity and inclusion by some institutions will prove ultimately fatal to a successful implementation of an IPFAITL framework.

Social and Systemic Limitations are the unfortunate legacy of political inaction. Despite efforts to promote equity, fundamental inequalities in technology access may limit the framework's effectiveness for some student populations (Stone, 2025). Even with careful attention to ethical implementation, underlying biases in AI systems may still affect learning out comes (Gouseti, *et al.*, 2024). The framework can help identify and address these biases but cannot eliminate them entirely.

V. Conclusion

The integration of artificial intelligence in educational settings presents both tremensdous opportunities and significant challenges for creating inclusive learning environments. The **Inclusive Pedagogy Framework for AI Teaching and Learning (IPFAITL)** proposed in this article offers a comprehensive approach that synthesizes Universal Design for Learning principles, ethical guidelines, and learning praxes to address these challenges.

By grounding AI integration in established principles of inclusive education and critical pedagogy (Ybyrayeva, & Yermakhanova, 2022), the framework provides educators, curriculum developers, and policymakers with practical guidance for implementing AI technologies in ways that promote equity, accessibility, and social justice. The framework's emphasis on collaborative design, ethical implementation, critical reflection, and continuous improvement ensures that AI-enhanced education serves all learners, particularly those from marginalized and historically underrepresented communities.

The literature reviewed underscores the necessity for a concerted effort to address socioeconomic biases in AI, promoting equitable and just technological advancements.

Designing inclusive pedagogy for AI learning requires a multifaceted approach that incorporates UDL principles, ethical guidelines, and learning praxes to promote equity, diversity, and inclusion. By addressing barriers to AI education and embedding ethical literacy into AI curricula, educators can empower traditionally underserved populations to participate meaningfully in the AI workforce. The proposed framework offers a roadmap for fostering inclusive and ethically conscious AI learning environments, ensuring that AI innovation reflects the diversity of society.

While significant challenges remain in implementing inclusive AI education, the IPFAITL framework represents an important step toward ensuring that technological advancement serves the goals of educational equity and social justice. As AI continues to transform educational landscapes, frameworks like

IPFAITL will be essential for guiding responsible and inclusive implementation practices.

The success of inclusive AI education will ultimately depend on the commitment of educators, institutions, and policymakers to prioritize equity and accessibility in their decision making processes. The IPFAITL framework provides a roadmap for this work, but its effectiveness will require sustained effort, ongoing reflection, and continuous adaptation to meet the evolving needs of diverse learners in an AI-enhanced world. we can work toward a future where AI technologies serve as tools for educational liberation rather than digital oppression, creating learning environments that truly serve all students and prepare them to be critical, engaged citizens in an increasingly technological society.

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