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Technological Literacy in the AI Era

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Abstract

This study examines the transformation of technological literacy in the context of the AI era and proposes a school-based educational framework for its development. Through a comprehensive literature review, it analyzes the evolving definition of technological literacy—from practical tool use to a broader competency encompassing algorithmic thinking, ethical reasoning, and critical understanding of AI systems. Drawing on frameworks such as ITEEA's Standards for Technological Literacy and the DigComp model, the study identifies current barriers including infrastructure gaps, insufficient teacher training, and fragmented curricula.

Key findings highlight that technological literacy must be scaffolded across educational levels: First, elementary education should focus on basic digital fluency and ethical awareness; Second, middle school should introduce structured AI concepts and data reasoning; Third, high school should engage students in interdisciplinary, project-based learning that critically examines AI's societal implications. The study concludes that integrating AI literacy into school curricula is both essential and achievable, requiring updates in policy, curriculum design, and educator training.

This research contributes a developmental roadmap for cultivating technologically literate, ethically grounded citizens prepared to thrive in an AI-driven society.

Keywords

AI Literacy, Algorithmic Thinking, Data Literacy, K–12 Education, Technological Literacy, Technology Education

INTRODUCTION

Necessity and Purpose of the Study

As artificial intelligence (AI) increasingly permeates daily life, work, and learning environments, fostering a form of technological literacy that encompasses not only functional competencies but also ethical awareness, data consciousness, and an ability to critically engage with algorithmic systems becomes essential for preparing future citizens who can meaningfully participate in, and shape, AI-mediated societies.

Technological literacy is increasingly recognized as essential in navigating the complexities of contemporary society, especially with the rapid integration of AI technologies into various aspects of daily life. The rise of AI has significantly altered the nature of work, education, communication, and decision-making processes, necessitating a reassessment and redefinition of what constitutes technological literacy [1]. As AI technologies become pervasive, individuals must possess not only foundational technological skills but also a nuanced understanding of AI's capabilities, limitations, and ethical considerations [2].

This paper explores technological literacy within the context of the AI era, aiming to provide clarity on how technological literacy should be conceptualized and taught amidst these transformative changes. Specifically, the paper addresses two key research questions: (1) How has the concept of technological literacy evolved in response to advancements in AI technologies? and (2) What are the current challenges and opportunities for promoting effective technological literacy in the AI era? Through a review of existing literature, frameworks, and educational practices, this study seeks to contribute to the ongoing dialogue about preparing individuals for active and informed participation in an increasingly AI-driven world.

This study addresses the need to redefine and restructure technological literacy in the AI era, particularly within school-based education. It aims to explore how existing standards, such as ITEEA's Standards for Technological Literacy [3] and the European Union's DigComp framework [4], can be expanded or adapted to support AI-specific learning. It also investigates emerging educational practices and barriers, offering a roadmap to help educators and policymakers implement technological literacy programs that prepare students for future challenges. Through a comprehensive review of literature and frameworks, this paper contributes to the growing discourse on educational reform in the digital age.

This study adopts an integrative literature review methodology to critically analyze and synthesize existing theoretical frameworks, policy documents, and curriculum guidelines related to technological literacy and artificial intelligence (AI) education. The review focuses on key international standards, such as ITEEA's Standards for Technological Literacy and the European Commission's DigComp framework, to identify core competencies relevant in the AI era. Through conceptual analysis and framework-based comparison, the study reconstructs the definition of technological literacy by incorporating dimensions such as algorithmic understanding, ethical awareness, data agency, and co-agency with AI systems. Drawing on this synthesis, the study proposes a developmentally appropriate model of technological literacy that can be scaffolded across K–12 education. This qualitative and conceptual approach enables the formulation of actionable educational implications tailored to the needs of future learners and societies shaped by AI.

Review Methodology

This study employed an integrative literature review methodology to critically examine and synthesize research related to technological literacy in the AI era. To ensure transparency and rigor, the review process involved systematic searches in ERIC, Scopus, Web of Science, and Google Scholar databases. The search covered publications from January 2000 to June 2025, reflecting the period in which technological literacy has significantly evolved alongside digital and AI advancements. Sample search strings included combinations such as (“technological literacy” OR “technology literacy”) AND (“artificial intelligence” OR “AI”) AND (education OR “school curriculum”) AND (“framework” OR “standards”).

The inclusion criteria comprised peer-reviewed journal articles, conference proceedings, and official reports that explicitly addressed technological literacy in the context of AI or digital transformation, and were published in English. Exclusion criteria included publications unrelated to education or technological literacy, articles lacking sufficient methodological detail, and opinion pieces without empirical or conceptual grounding.

A two-stage screening process was applied: first, titles and abstracts were screened to remove irrelevant records; second, the full text of remaining papers was reviewed to confirm relevance and quality. Quality appraisal was conducted using adapted criteria from the Critical Appraisal Skills Program (CASP) checklist, focusing on clarity of research aims, methodological rigor, and relevance to the research questions. Finally, a PRISMA-inspired diagram was used to illustrate the flow of records through the identification, screening, eligibility, and inclusion stages.

AI AND TECHNOLOGICAL LITERACY

Defining Technological Literacy

Evolution of the Concept

Technological literacy, initially perceived simply as the ability to operate specific tools or perform technical tasks, has undergone substantial transformations over the past century. Historically rooted in vocational and industrial education, technological literacy was primarily focused on practical skills necessary for employment in manufacturing and technical trades. As societies advanced into the information age in the latter half of the 20th century, the scope of technological literacy expanded to include digital skills and the ability to interact with and manage increasingly sophisticated technologies [1], [5].

By the late 20th century, the concept had evolved further to encompass broader cognitive and critical dimensions. Modern definitions of technological literacy now highlight the importance of understanding technological processes, critically assessing the implications of technology, and making informed decisions regarding its use and development [5]. The rapid growth and integration of digital technologies, especially AI, have added new layers to technological literacy, introducing computational thinking, algorithmic understanding, and an appreciation of the ethical implications associated with advanced technologies [2].

Components and Dimensions of Technological Literacy

Contemporary technological literacy is multifaceted, comprising several interrelated dimensions that include knowledge, skills, and attitudes. The knowledge dimension involves understanding fundamental technological principles, including how systems operate, the interaction between humans and technology, and the broader societal context in which technology functions [3]. Skills constitute another critical dimension, involving practical abilities such as operating digital tools, engaging in computational thinking, solving problems through design processes, and critically evaluating technological solutions. Digital literacy, algorithmic understanding, and data literacy are increasingly prominent skill areas, especially relevant to the AI era [2]. Attitudes and values represent a vital third dimension, highlighting the importance of developing critical awareness and ethical sensibilities regarding technological development and its broader societal implications. In the context of AI, this involves considering fairness, transparency, accountability, and ethical decision-making related to AI systems and their impact on society [1],[2].

Thus, technological literacy today is viewed not merely as a set of technical competencies, but as a holistic set of capabilities essential for informed, critical, and responsible participation in a technology-driven world.

AI and Its Influence on Technological Literacy

Emergence and Integration of AI Technologies

Artificial Intelligence has rapidly emerged as a transformative force across multiple sectors, including industry, healthcare, finance, transportation, and education. Originating from theoretical foundations in the mid-20th century, recent advances in computing power, data availability, and algorithms have accelerated AI integration into everyday life. Technologies such as machine learning, natural language processing, robotics, and autonomous systems now play central roles in numerous applications, reshaping how tasks are performed and decisions made [6].

AI's emergence has also led to the rise of intelligent systems that can analyze large volumes of data, identify patterns, make predictions, and perform decision-making processes previously requiring human intelligence. These capabilities, while enhancing efficiency, also introduce complexities in accountability, explain ability, and trust in machine-driven outcomes. The increasing presence of AI in consumer technologies—virtual assistants, recommendation engines, and language translation tools—illustrates how deeply embedded AI has become in daily life.

Impact of AI on Society and Education

AI technologies profoundly impact societal structures and educational paradigms. On the societal level, AI enhances productivity, efficiency, and innovation but also raises concerns regarding job displacement, privacy, surveillance, and algorithmic biases. For instance, automation powered by AI is transforming labor markets, particularly in manufacturing, transportation, and administrative sectors, where repetitive tasks are increasingly performed by machines [7]. Simultaneously, AI-driven platforms shape public opinion and access to information through algorithmic filtering and personalization, which can reinforce echo chambers and misinformation.

In education, AI promises personalized learning pathways, adaptive assessments, and intelligent tutoring systems that can respond to individual learners' needs. However, its implementation also demands critical reflection on the role of educators, curriculum content, and equitable access to AI-enhanced resources. Educators must grapple with how to prepare students for a world in which AI systems are not just tools but active agents in shaping knowledge, communication, and decision-making [8].

New Demands on Technological Literacy

The pervasive integration of AI necessitates an expanded understanding of technological literacy, incorporating AI-specific competencies. Key competencies include algorithmic thinking, data literacy, critical evaluation of AI-generated information, and ethical reasoning. Students and citizens alike must understand how AI systems work—not necessarily in terms of coding algorithms from scratch, but through grasping key concepts such as how data is used, how models are trained, and where biases may arise.

Moreover, critical AI literacy requires the ability to question and evaluate AI-driven decisions. This includes understanding that AI models are probabilistic and based on historical data, which may perpetuate existing biases. Ethical awareness must also extend to the broader implications of deploying AI in areas such as hiring, policing, finance, and healthcare. Thus, technological literacy in the AI era must promote not only technical competence but also socio-ethical reflection and civic responsibility [9].

In summary, the influence of AI on technological literacy goes beyond skill acquisition—it reshapes the very framework through which individuals understand and engage with technology. As AI continues to evolve, so too must our educational models and societal expectations of what it means to be technologically literate in an age defined by intelligent systems.

Review of Existing Frameworks and Standards

International Standards and Approaches

Over the past two decades, international organizations and academic institutions have increasingly recognized the need to define and standardize competencies related to technological literacy. Notably, the International Technology and Engineering Educators Association (ITEEA) developed the "Standards for Technological Literacy" [3], which emphasizes the understanding of technology's nature, the development of design and problem-solving skills, and the ability to evaluate the societal impacts of technology.

The ITEEA framework outlines 20 core standards grouped into five major categories: The Nature of Technology, Technology and Society, Design, Abilities for a Technological World, and The Designed World. These standards advocate for a comprehensive understanding of technology that goes beyond tool use and includes critical thinking, systems understanding, and design application. They provide specific benchmarks for students in Grades K–12, highlighting age-appropriate learning outcomes and aligning with the principles of lifelong technological literacy.

One of the key strengths of the ITEEA standards is their emphasis on interdisciplinary learning, encouraging integration of science, mathematics, engineering, and social studies to contextualize technological understanding. Furthermore, they promote an iterative design process—identifying problems, generating ideas, testing solutions—which is highly relevant to the processes involved in AI development and evaluation.

In the European context, the DigComp framework (Digital Competence Framework for Citizens), developed by the European Commission, serves as a comprehensive model for digital literacy that aligns closely with emerging needs in AI literacy. It identifies key competence areas such as information and data literacy, communication and collaboration, digital content creation, safety, and problem solving [4]. Although not focused solely on AI, DigComp's adaptability has allowed it to incorporate AI-relevant competencies over time.

Additionally, UNESCO's guidance on AI in education emphasizes the ethical, inclusive, and human-centered use of AI. It advocates for policies that promote AI literacy, focusing on equity, access, and responsible AI use, especially in low-resource environments [10].

These international standards and frameworks share a common vision: fostering technologically literate citizens who can critically engage with emerging technologies, including AI, in a responsible and informed manner.

Educational Practices in Promoting AI Literacy

Recent educational initiatives have begun to integrate AI literacy into curricula, recognizing that future generations must understand not only how AI works but also how it affects their lives and societies. For instance, structured AI learning modules within middle school technology education significantly improved students' AI competency, confirming the pedagogical feasibility of AI integration in K–12 settings [11]. AI literacy programs often include elements of computational thinking, ethical reasoning, and socio-technical systems analysis. For instance, projects like MIT's "AI + Ethics Curriculum for Middle School" introduce foundational AI concepts alongside discussions about fairness, accountability, and bias [12].

In higher education, interdisciplinary programs are emerging that combine computer science with philosophy, sociology, and education, preparing students to both develop and critique AI systems. Moreover, many countries are adopting national strategies to introduce AI concepts at earlier educational stages. South Korea, Finland, and Singapore have all integrated AI and data literacy into K–12 education, setting examples of scalable policy implementation.

At the grassroots level, non-profit organizations and public-private partnerships play a significant role in democratizing access to AI literacy. Initiatives such as AI4ALL and the Elements of AI course developed by the University of Helsinki exemplify inclusive, accessible education models aimed at broad public engagement.

Overall, while the integration of AI literacy into education remains uneven across regions and systems, these efforts mark significant progress in redefining technological literacy for the AI era.

CHALLENGES AND OPPORTUNITIES

Barriers to AI-Related Technological Literacy

Despite growing efforts to promote technological and AI literacy, several persistent barriers hinder progress. One of the most significant challenges is unequal access to digital infrastructure and educational resources, particularly in underserved and rural areas. The digital divide not only limits access to devices and internet connectivity but also affects the availability of trained educators capable of teaching AI-related content [13].

Another barrier lies in the complexity and abstraction of AI concepts. Unlike basic digital skills, AI literacy requires a foundational understanding of data, algorithms, and machine learning processes—topics that can be difficult to integrate into existing curriculum without substantial teacher training and curriculum redesign. This issue is compounded by a shortage of teacher professional development programs tailored to AI education.

Cultural and institutional resistance to educational change also plays a role. Some educators and administrators may view AI as too advanced or tangential to traditional subjects. Additionally, there is often a lack of policy-level guidance and funding to support systematic integration of AI literacy in schools, leading to fragmented or pilot-only initiatives rather than sustained efforts.

Finally, ethical and societal concerns around AI, such as surveillance, bias, and misinformation, can create hesitation among educators and parents, who may lack confidence in their own understanding of the implications of AI technologies.

Promising Strategies for K–12 Implementation

Despite these challenges, a range of promising strategies and best practices are emerging worldwide. One effective approach is the incorporation of AI literacy within broader digital literacy or STEM education frameworks. By embedding AI concepts into existing subjects such as computer science, math, or social studies, educators can contextualize learning and reduce curriculum overload.

Professional development and pre-service teacher training programs are critical to equipping educators with the knowledge and confidence to teach AI. Collaborative efforts between universities, tech companies, and governments have led to the creation of modular, adaptable curriculum and open educational resources (OERs) that support both teachers learning and classroom implementation [14].

Inquiry- and project-based learning models encourage students to address real-world problems using AI, fostering technical skills, critical thinking, collaboration, and ethical reasoning. This approach was further validated through the implementation of classroom modules on bias and filter bubbles, showing measurable gains in AI awareness and ethical reasoning among middle school learners [15]. For example, students might use datasets to examine environmental issues or social trends, demonstrating AI's potential as a tool for social good. New AI-literacy scales and performance-based tests enable more reliable assessment across secondary grades [16],[17],[18],[19],[20].

Inquiry- and project-based learning models encourage students to address real-world problems using AI, fostering technical skills, critical thinking, collaboration, and ethical reasoning. For example, students might use datasets to examine environmental issues or social trends, demonstrating AI's potential as a tool for social good.

To address age-appropriate implementation, technological and AI literacy must be scaffolded across different school levels. At the elementary level, students can be introduced to AI through interactive storytelling, basic coding, and robot programming activities that build foundational understanding. In middle school, curriculum can incorporate more structured lessons on how AI works, along with data analysis and ethical dilemmas. High school students can engage in deeper exploration of machine learning, algorithmic bias, and the societal impacts of AI through interdisciplinary courses that combine computer science with humanities or social studies.

Partnerships between schools and industries are also key. Programs like Google's AI for Education and Microsoft's AI School for Educators provide scalable platforms and tools to support AI education at various levels. Furthermore, initiatives that emphasize inclusivity and representation - such as those targeting girls, minorities, and underrepresented communities - help ensure that AI literacy becomes a universal and equitable educational goal.

By leveraging these strategies, educators and policymakers can overcome existing barriers and build robust, future-ready AI literacy programs that empower all learners.

Exemplar Modules for Implementation

Exemplar Module 1 – Middle School (Grade 7–8)

The first exemplar module, *Detecting Bias in AI Recommendations*, aims to cultivate students' ability to critically analyze algorithmic outputs. The learning objectives are threefold: (1) to explain the basic mechanisms by which algorithms recommend digital content (e.g., videos, articles) based on user data; (2) to identify potential bias in AI-generated recommendations; and (3) to propose strategies for improving the fairness of such recommendations. The instructional materials consist of internet-connected devices, example datasets (e.g., simulated e-commerce logs, anonymized YouTube recommendation histories), and simple spreadsheet or visualization tools.

Implementation proceeds in two core activities. First, students examine the provided datasets to detect patterns in recommendation outputs. Second, small-group discussions are held to evaluate whether certain topics or demographic groups are disproportionately represented or excluded. Assessment is conducted through group presentations in which students propose at least one concrete strategy to enhance fairness in recommendation systems.

Exemplar Module 2 – High School (Grade 10–11)

The second exemplar module, *AI for Climate Data Analysis*, is designed to foster data literacy and ethical reasoning within an environmental context. The module's learning objectives are: (1) to interpret climate-related datasets using AI-based analytical tools; and (2) to evaluate the ethical implications of employing AI in environmental decision-making. Instructional resources include open-source AI platforms (e.g., Google Teachable Machine, Weka), publicly available climate datasets (e.g., temperature trends, atmospheric CO_2 levels), and a classroom display medium for group discussions.

The module involves two main activities. First, students train a simple AI model to classify climate patterns based on the provided datasets. Second, they engage in a structured classroom debate regarding whether AI-generated outputs should directly influence environmental policy decisions. Assessment is based on an individual reflective essay in which students critically evaluate both the capabilities and the limitations of AI in addressing climate-related challenges.

Equity/Access, Privacy/Safety, and Resource Constraints

Both modules are intentionally designed to accommodate equity and access considerations by employing free and open-source tools and by offering low-bandwidth, offline alternatives. Privacy and safety are addressed through the exclusive use of anonymized datasets and by explicitly reviewing digital citizenship principles at the outset of the modules. To address resource constraints, each module includes parallel implementation options for computer-equipped classrooms and paper-based analytical activities, thereby enabling adaptation to low-resource educational settings.

CONCLUSION

Summary of Findings

This paper has explored the evolving concept of technological literacy within the context of the AI era. The term has shifted from a narrow focus on tool use and practical skills to a multidimensional construct encompassing knowledge, skills, values, and critical thinking. The expanded components of technological literacy now include algorithmic thinking and ethical reasoning, which are essential in a world shaped by AI technologies.

AI is fundamentally transforming society and education. Individuals are increasingly required to critically and ethically engage with complex systems that influence communication, labor, and learning. In response, structured frameworks such as the ITEEA Standards for Technological Literacy and the European Commission's DigComp model offer comprehensive approaches to integrating technological and AI literacy into education systems.

Despite these advancements, several persistent barriers remain, including unequal access to digital infrastructure, gaps in curriculum, and limited teacher preparedness. To overcome these, strategies such as scaffolded instruction, project-based learning, and inclusive policy initiatives have been emphasized.

In conclusion, the integration of AI into daily life has redefined the landscape of technology education. Technological literacy today encompasses a broader understanding of AI systems, their ethical implications, and their societal impact. To prepare learners for a future shaped by intelligent technologies, education systems must evolve through coordinated efforts across policy, pedagogy, curriculum, and research. Technological literacy must become a foundation for lifelong learning and responsible citizenship in the digital age, and be embedded into all levels of education.

Table 1 presents a competency roadmap for K-12 technology and AI literacy. This competency roadmap scaffolds technological and AI literacy across grade bands, linking core competencies to exemplar activities and assessment ideas. The roadmap emphasizes a progressive development from foundational digital skills in early grades to advanced critical thinking and interdisciplinary problem-solving at the high school level. Competencies such as data literacy, algorithmic thinking, and ethical reasoning are embedded at each stage, ensuring that students develop both technical capabilities and socio-ethical awareness in relation to AI systems.

Table 1. Competency Roadmap for K–12 Technological and AI Literacy

Grade Band	Core Competencies	Exemplar Activities	Assessment Ideas
K–2 (Early Elementary)	Basic digital fluency, introductory coding logic, ethical awareness in digital use	Story-based coding games, unplugged algorithm activities, class discussions on 'right and wrong' online behavior	Teacher observation checklists, simple digital creation projects
3–5 (Upper Elementary)	Data awareness, problem-solving through design, collaborative digital projects	Collecting simple data (e.g., class survey), building basic robotics, designing digital posters	Rubrics for teamwork and creativity, presentation of projects
6–8 (Middle School)	Algorithmic thinking, data analysis, AI concept introduction, ethics in technology	Analyzing datasets, exploring AI applications in daily life, debating ethical dilemmas	Structured project reports, peer evaluations, formative quizzes
9–12 (High School)	Advanced data literacy, machine learning basics, interdisciplinary AI projects, critical evaluation of AI systems	Designing and training simple AI models, investigating algorithmic bias, community-based tech solutions	Portfolios, performance tasks, reflective essays on AI ethics

The development of technological literacy across school levels can be concluded as follows:

First, in elementary education, technological literacy should begin with foundational digital skills, basic programming logic, and early exposure to concepts such as automation, digital citizenship, and ethical behavior online. At this stage, playful, story-based, and experiential learning approaches should be used to nurture curiosity and comfort with technology.

Second, in middle school education, students should engage with more structured content on computational thinking, systems understanding, and basic AI principles. Lessons should introduce real-world applications of AI and encourage learners to think critically about the role of algorithms and data in decision-making.

Third, in high school education, the emphasis should shift toward advanced understanding of AI systems, data analysis, and design thinking. Students should be equipped to evaluate the social, legal, and ethical dimensions of technology and apply interdisciplinary knowledge to address complex problems. Project-based learning, interdisciplinary coursework, and collaboration with industry can deepen learning and relevance.

By scaffolding technological literacy in this progressive manner, aligned with students' cognitive and developmental stages, schools can cultivate a generation of critically aware, ethically grounded, and technologically capable citizens who are prepared to thrive in the AI society.

Figure 1 illustrates the Teacher Professional Development (PD) Pathway. This teacher PD pathway aligns with the competencies in Figure X, providing a structured approach to building educators' capacity to teach AI and technological literacy effectively across K–12 contexts.

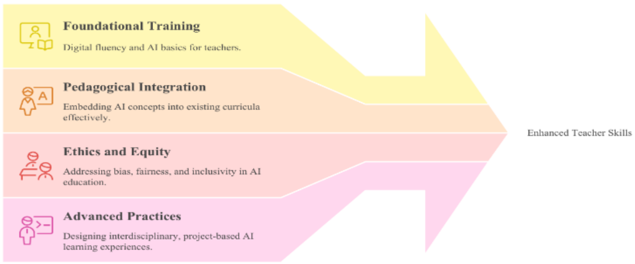

Figure 1. Teacher Professional Development (PD) Pathway

Implications and Recommendations for Future Research

The findings of this paper suggest that fostering comprehensive technological literacy, particularly in the context of AI, is both urgent and achievable. For policymakers, this means updating national education standards to reflect AI-related competencies and supporting initiatives that bridge access gaps. For educators, there is a need for targeted professional development that equips them to teach AI content with confidence and sensitivity to ethical issues. Teacher perceptions and readiness play a critical role in the sustained adoption of AI literacy curricula, suggesting that long-term support and reflective practice are essential for scalability [21]. Curriculum designers should prioritize age-appropriate, interdisciplinary models that integrate AI literacy across subject areas. For policy and design implications, both meta-analytic and systematic evidence synthesize effective patterns for K–12 AI education implementation [22], [23].

Future research should explore the long-term impact of AI literacy initiatives on student learning outcomes and civic engagement. Comparative studies across educational systems could offer valuable insights into best practices and scalable models. In addition, further inquiry is needed into how AI literacy can be effectively assessed, particularly with regard to critical thinking and ethical decision-making. Research should also examine how marginalized communities are affected by AI technologies and how inclusive literacy programs can empower these groups.

As AI continues to reshape human experiences and capabilities, equipping all individuals with the knowledge, skills, and values to navigate this transformation responsibly must be a central aim of technology education.

Limitations and Future Work

This review is primarily narrative in nature rather than a fully systematic review. Although multiple databases and clearly defined inclusion/exclusion criteria were applied, the possibility of selection bias remains, particularly in the emphasis on English-language publications and the researcher's interpretation in synthesizing diverse findings. Consequently, some relevant studies, particularly in non-English contexts or unpublished gray literature, may not have been captured.

Future research should empirically pilot the proposed K–12 competency roadmap in varied educational settings to examine its feasibility, scalability, and impact on student learning outcomes. The importance of measuring student attitudes and AI self-efficacy alongside cognitive outcomes has been emphasized, providing a foundation for future mixed-methods investigations [24]. Additionally, there is a need to develop and validate reliable assessment instruments for measuring AI-related technological literacy across grade levels, ensuring that such tools are sensitive to both cognitive and ethical dimensions. Comparative studies across cultural and resource-diverse contexts would further enhance the generalizability of findings and inform localized adaptations.

Glossary

Technological Literacy – The ability to use, manage, assess, and understand technology, encompassing technical and socio-ethical dimensions.

AI Literacy – The knowledge, skills, and attitudes enabling individuals to understand, interact with, and critically evaluate AI systems, including their underlying mechanisms, societal impacts, and ethical considerations.

Algorithmic Thinking – A problem-solving approach that involves breaking tasks into step-by-step procedures that can be executed by humans or machines.

Data Literacy – The ability to collect, interpret, and communicate data accurately and responsibly.

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