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Integrating Ai Literacy into Media and Information Literacy Education for Pre-Service Teachers: Pedagogical and Methodological Foundations

Ermatov Sh.L.

Andijon State Pedagogical Institute, Uzbekistan

Mirzaev A.U.

Andijon State Pedagogical Institute, Uzbekistan

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ABSTRACT

The rapid penetration of generative artificial intelligence technologies into the contemporary media ecosystem has fundamentally transformed competency requirements for media and information literacy education. Algorithmic content curation, AI-generated media (including deepfakes), and recommender systems have made integration of AI literacy with media and information literacy an urgent pedagogical-methodological task in pre-service teacher education. This study substantiates the pedagogical-methodological foundations of integrating AI literacy development into media and information literacy education for pre-service teachers, identifies the didactic conditions for this integration, and proposes a Bloom taxonomy-based methodology for systematic AI literacy development. The study employs theoretical-conceptual analysis, comparative pedagogical analysis, didactic modeling, and expert evaluation. The experimental research base included Gulistan State Pedagogical Institute, Andijan State Pedagogical Institute, and Fergana State University. A panel of 14 experts (PhD holders in pedagogical sciences) evaluated the proposed framework with strong inter-rater agreement (Kendall's coefficient of concordance $W = 0.81$, $p < 0.001$) and confirmed content validity (Lawshe's CVR = 0.79). The study substantiates five interconnected didactic conditions: integrated content, interactive methods, reflective analysis, ethical deliberation, and authentic media practice. A Bloom taxonomy-based methodology distributes AI literacy development across six cognitive levels — remembering, understanding, applying, analyzing, evaluating, and creating. Four developmental levels are identified: initial, intermediate, advanced, and innovative. The integration of AI literacy into media literacy education through the proposed framework provides a coherent foundation for developing pre-service teachers' competencies in conscious, critical, and responsible engagement with AI-mediated information environments.

Keywords: Media literacy, information culture, AI literacy, pre-service teachers, competency-based approach, Bloom's taxonomy, didactic conditions, ethical reflection, deepfake, algorithmic awareness.

INTRODUCTION

The rapid proliferation of generative AI tools — including ChatGPT, Claude, Gemini, and image-generation systems — has produced a fundamental transformation of the contemporary media ecosystem. Algorithmic content curation, AI-generated text and visual content, recommender systems, and automated information dissemination have become structural features of the digital information environment that pre-service teachers will navigate throughout their professional careers. This transformation has rendered traditional media and information literacy frameworks insufficient: future

teachers must develop integrated competencies that combine traditional media analysis with the capacity to critically engage with AI-mediated content.

Media and information literacy (MIL) education has long emphasized critical analysis of mediated information, evaluation of source credibility, and responsible engagement with media texts. The emergence of generative AI introduces new dimensions to this work: deepfake detection, algorithmic transparency awareness, prompt-engineering literacy, and ethical reasoning about AI-generated content. International policy frameworks — including UNESCO's Media and Information Literacy curricula and the AI Competency Framework for Teachers (2024) — have explicitly recognized the need for integrated MIL-AI literacy approaches in teacher education. However, systematic pedagogical-methodological frameworks for such integration remain underdeveloped, particularly in non-Western educational contexts.

This study addresses this gap by substantiating the pedagogical-methodological foundations of integrating AI literacy into media and information literacy education for pre-service teachers in Uzbekistan, identifying the didactic conditions for systematic integration, and proposing a Bloom taxonomy-based methodology. The research questions are: (1) What didactic conditions are essential for developing AI literacy within the disciplinary framework of media and information literacy? (2) How can Bloom's taxonomy structure the systematic development of AI literacy in this context?

THEORETICAL BACKGROUND

1. Media and information literacy foundations

Media and information literacy as a research field has been developed in the works of D.Buckingham (2003), R.Hobbs (2010), P.Mihailidis (2018), and others. Buckingham conceptualized media education as developing critical understanding of mediated communication, while Hobbs articulated a comprehensive framework integrating digital and media literacy competencies. Mihailidis extended these traditions to civic media literacy, emphasizing engagement and civic intentionality. UNESCO's Media and Information Literacy curricula provide internationally recognized frameworks for systematic MIL education at all levels.

In the Uzbek pedagogical tradition, Yo‘ldasheva characterizes media literacy development as a process aimed at developing critical analysis, evaluation, and conscious use of information, directly connected to digital and AI technologies. Xo‘jayev defines information culture as the personal capacity for orientation in information environments, analyzing information, and using it with social responsibility. Kayumova and Normatov position media and information literacy as a fundamental competency that develops students' analytical, critical, and creative thinking. These conceptualizations align with international scholarship while reflecting the specific cultural and institutional context of Central Asian pedagogical education.

2. AI literacy frameworks

AI literacy as a distinct field of scholarship emerged with Long and Magerko's (2020) seminal conceptualization defining AI literacy as a set of competencies enabling individuals to critically evaluate AI technologies, communicate and collaborate with AI, and use AI as a tool. Ng et al. (2021) propose four interconnected dimensions: knowing and understanding AI, using and applying AI, evaluating and creating AI, and AI ethics. The AI4K12 Initiative (Touretzky et al., 2019) articulates Five Big Ideas in AI — perception, representation and reasoning, learning, natural interaction, and societal impact. UNESCO's AI Competency Framework for Teachers (2024) identifies five core competency areas specifically for educators.

3. Competency-based approach and Bloom's taxonomy

The competency-based approach has been theorized by Muslimov in the Uzbek pedagogical tradition as oriented toward developing students' capacity to apply knowledge and skills in real life and professional contexts. Anderson and Krathwohl's (2001) revision of Bloom's taxonomy distinguishes six cognitive levels — remembering, understanding, applying, analyzing, evaluating, and creating — that provide a universal didactic model for organizing learning experiences. Integrating Bloom's taxonomy with AI literacy development within media literacy education offers a methodologically rigorous framework for scaffolding the systematic development of these competencies in pre-service teacher education.

METHODS

This study employs a multi-method conceptual design integrating theoretical analysis with expert evaluation. The theoretical phase involved comprehensive analysis of media and information literacy literature, AI literacy frameworks, and pedagogical modeling theory, drawing on publications indexed in Scopus and Web of Science from 2018 to 2024 (n = 142 publications screened, n = 67 included in qualitative synthesis). Comparative analysis examined international policy documents including UNESCO MIL curricula, UNESCO AI CFT (2024), UNESCO Generative AI Guidance (2023), and EU Digital Education Action Plan.

The expert evaluation phase involved 14 experts (12 PhD holders and 2 doctoral candidates in pedagogical sciences) from Gulistan State Pedagogical Institute, Andijan State Pedagogical Institute, and Fergana State University. Experts evaluated the proposed didactic conditions and Bloom taxonomy-based methodology on four dimensions: scientific validity, didactic feasibility, content coherence, and prognostic potential. Inter-rater agreement was assessed using Kendall's coefficient of concordance ($W = 0.81$, $p < 0.001$), indicating strong agreement. Content validity was confirmed through Lawshe's content validity ratio (CVR = 0.79, above the established threshold of 0.51 for 14 experts).

RESULTS

1. Five didactic conditions for integrated AI–media literacy

The study substantiates five interconnected didactic conditions for AI literacy development within media and information literacy education. The first condition — integrated content — represents the systematic combination of traditional media literacy elements (textual analysis, source verification, ideological critique) with AI literacy elements (algorithmic reasoning, prompt engineering, AI-generated content evaluation). This integration produces a unified curricular content that develops students' capacity to critically engage with both human-produced and AI-generated media artifacts.

The second condition — interactive methods — encompasses problem-based learning, case-study analysis, project-based learning, debate, and simulation activities that position pre-service teachers as active participants rather than passive recipients of information. In the AI-media literacy context, these methods include AI-assisted media content analysis, fake news detection exercises, and algorithmic recommendation evaluation tasks. The third condition — reflective analysis — addresses pre-service teachers' metacognitive engagement with their own AI-mediated learning processes. Through reflection journals, peer dialogue, and structured self-evaluation, students develop awareness of their own engagement with AI tools and the limitations of those tools.

The fourth condition — ethical deliberation — engages pre-service teachers with the ethical dimensions of AI-mediated information environments. Topics include algorithmic bias, manipulation, deepfake creation and detection, authorship attribution, data privacy, and the social implications of AI-curated information. The fifth condition — authentic media practice — grounds AI literacy development in real media artifacts (news articles, social media posts, blogs) that pre-service teachers analyze using AI tools, verify through fact-checking platforms, and evaluate through pedagogical frameworks. This authentic practice connects theoretical knowledge to professional competence.

2. Bloom taxonomy-based methodology

Table 1. Bloom taxonomy-based methodology for AI literacy development in media literacy education

Cognitive level	Student activity and expected outcome
Remembering	Recalling key media and AI concepts; identifying basic principles of AI systems and recommender algorithms
Understanding	Explaining how media algorithms operate; interpreting AI-generated media products in their disciplinary context
Applying	Using AI tools for media content analysis; applying prompt engineering and AI-assisted fact-checking

Cognitive level	Student activity and expected outcome
Analyzing	Comparing media messages from different sources; deconstructing AI-content for evidence and argument structure
Evaluating	Assessing the social impact of AI-mediated information; evaluating ethical-pedagogical implications of AI tools
Creating	Producing innovative AI-mediated media products; designing original AI-supported pedagogical content

The Bloom taxonomy-based methodology distributes AI literacy development across the six cognitive levels in a systematic and scaffolded manner. Each level builds upon previous levels while preparing pre-service teachers for higher-order cognitive engagement with AI-mediated information. The progression from remembering to creating mirrors the trajectory from passive information consumption to active media production with AI tools — a trajectory aligned with contemporary teacher education competency standards.

3. Four developmental levels of AI literacy

Building on Utkirov's (2023) framework, the study identifies four developmental levels of AI literacy within media literacy education. The initial level encompasses basic recognition of media and AI concepts. The intermediate level develops the capacity to analyze media content with AI assistance. The advanced level enables pedagogical evaluation of media impact through AI-augmented analysis. The innovative level represents the capacity to create original media products using AI tools, reflecting expert-level integration of media and AI competencies. The systematic integration of the five didactic conditions and the Bloom taxonomy-based methodology produces the didactic schema illustrated in Figure 1.

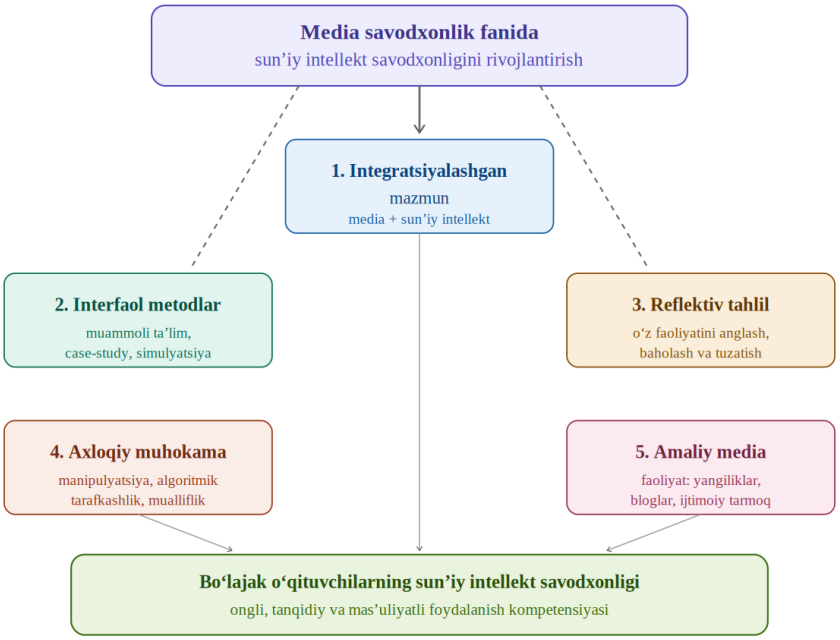

Figure 1. Didactic schema for AI literacy development in media and information literacy education

DISCUSSION

The proposed pedagogical-methodological framework advances the international scholarly conversation on integrating AI literacy with media and information literacy in several significant ways. First, by substantiating five interconnected didactic conditions, the framework moves beyond fragmented approaches that treat AI literacy and media literacy as separate competency areas. The framework demonstrates that these competencies are inherently complementary and most effectively developed through integrated pedagogical strategies. Second, the Bloom taxonomy-based methodology provides a systematic developmental trajectory that addresses both technical AI competencies and higher-order critical and creative capacities required for professional teaching practice in AI-mediated educational environments.

Third, the framework contributes to broader debates about media literacy education in the AI era. Traditional MIL frameworks developed for static media (text, images, video) require systematic adaptation for AI-mediated information environments characterized by hallucinations, algorithmic personalization, and conversational interfaces. The five-condition framework offers one pathway for such adaptation while preserving the critical thinking emphasis central to MIL education. The expert evaluation findings (Kendall's W = 0.81; CVR = 0.79) provide strong support for the framework's scientific validity and didactic feasibility.

Several limitations should be acknowledged. The framework is grounded primarily in theoretical analysis and expert evaluation; empirical validation through controlled pedagogical experimentation is needed. The expert panel, while representing four leading institutions, was limited to a single national context (Uzbekistan); cross-cultural validation remains an important direction for future research. Finally, the framework focuses on pre-service teacher education; adaptations for in-service teacher professional development and K-12 student learning contexts require additional investigation.

CONCLUSIONS

This study has substantiated the pedagogical-methodological foundations of integrating AI literacy development into media and information literacy education for pre-service teachers. Five interconnected didactic conditions — integrated content, interactive methods, reflective analysis, ethical deliberation, and authentic media practice — provide a coherent pedagogical framework for systematic integration. A Bloom taxonomy-based methodology distributes AI literacy development across six cognitive levels (remembering to creating) and four developmental stages (initial to innovative), enabling scaffolded progression from basic concept recognition to expert-level AI-mediated media production.

The framework has significant implications for pre-service teacher education curriculum reform in the AI era. National and institutional curricula should integrate AI literacy systematically into existing media and information literacy courses rather than treating these competencies as separate additions to teacher education programs. The Bloom taxonomy-based methodology provides actionable guidance for organizing learning experiences across the curriculum, while the five didactic conditions offer practical principles for instructional design. Future research directions include empirical validation through controlled pedagogical experiments, cross-cultural adaptation studies, and longitudinal investigations of AI-media literacy development among practicing teachers in AI-mediated educational environments.

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