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A Study on the Cultivation Pathways and Evaluation Feedback Mechanisms for Enhancing Digital Literacy Empowered by AIGC

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Abstract: *Against the backdrop of the digital intelligence era, the rapid development of Artificial Intelligence Generated Content (AIGC) has reshaped the core connotation and extension of digital literacy. Aiming at the targeted improvement of digital literacy, this study constructs a four-dimensional cultivation framework: standard guidance and education foundation, scenario application and precise adaptation, AI-driven technological empowerment, and demand-oriented collaborative governance. Meanwhile, it proposes an evaluation and feedback mechanism featuring AIGC-driven intelligence, three-dimensional support, and closed-loop operation, so as to achieve accurate diagnosis and dynamic optimization in the promotion of digital literacy.*

Keywords: *Generative Artificial Intelligence (AIGC), Digital Literacy, Cultivation Pathways, Evaluation and Feedback Mechanism*

1. Systematic Reconstruction of the Connotation and Extension of Digital Literacy Empowered by AIGC

Driven by AIGC technologies, digital literacy has evolved beyond its early focus on information access and tool operation, developing into a comprehensive concept that integrates multiple dimensions and adapts to the new paradigm of human–machine collaboration.[1] Its connotation and extension are thus undergoing systematic reconstruction.

1.1 Deepening and Upgrading of the Core Connotation of Digital Literacy

Through core functions such as natural language generation, multimodal content creation, and intelligent interaction, AIGC promotes the upgrading of digital literacy into a four-dimensional structure: cognition–skills–thinking–ethics.

1.1.1 Cognitive Dimension

It incorporates AIGC-related technological cognition and application awareness, including basic understanding of the operating principles of generative models, judgment of applicable scenarios, and proactive awareness of using AIGC to improve learning and work efficiency.

1.1.2 Skill Dimension

It expands to human–machine collaborative operation capabilities, including proficient use of AIGC tools (e.g., prompt engineering, multimodal content generation), screening and integration of generated content, and rapid adaptation to technological iterations, thereby breaking through the limitations of traditional digital skills.

1.1.3 Thinking Dimension

It strengthens critical thinking and innovative thinking, requiring individuals to verify the authenticity and logic of AIGC-generated content and develop a human–machine co-creative mindset for knowledge reconstruction and creative expression supported by AIGC.

1.1.4 Ethical Dimension

It extends to digital responsibility and technological ethical literacy, including the compliant use of copyrighted AIGC-generated content, protection of personal data privacy, identification and avoidance

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of algorithmic bias, and self-discipline to prevent technology abuse and cognitive dependence.

1.2 Expansion of the Extension of Digital Literacy

1.2.1 Group Extension

It expands from students and employees to citizens of all age groups, especially the elderly, rural residents, and other digitally vulnerable groups, forming a pattern of universal coverage and hierarchical cultivation.

1.2.2 Scenario Extension

It extends from education and workplace scenarios to diversified scenarios such as daily services, public governance, and creative production. For example, AIGC applications in health consultation, government affairs processing, and cultural creation require deep integration of digital literacy into specific scenarios.

1.2.3 Spatiotemporal Extension

Supported by AIGC's lifelong learning support functions, a ubiquitous and personalized cultivation pattern of digital literacy has been formed, breaking through the spatiotemporal constraints of traditional education and achieving competency improvement across the entire life cycle.

2. Cultivation Pathways for AIGC-Enabled Digital Literacy Improvement

By systematically leveraging the advantages of new-generation artificial intelligence technologies represented by DeepSeek, this study constructs a four-in-one cultivation pathway: "standard guidance, scenario implementation, intelligent empowerment, and collaborative construction". This pathway promotes the transformation of digital literacy cultivation from extensive coverage to precision and efficiency, realizing the systematic improvement of national digital literacy, As shown in Figure 1.

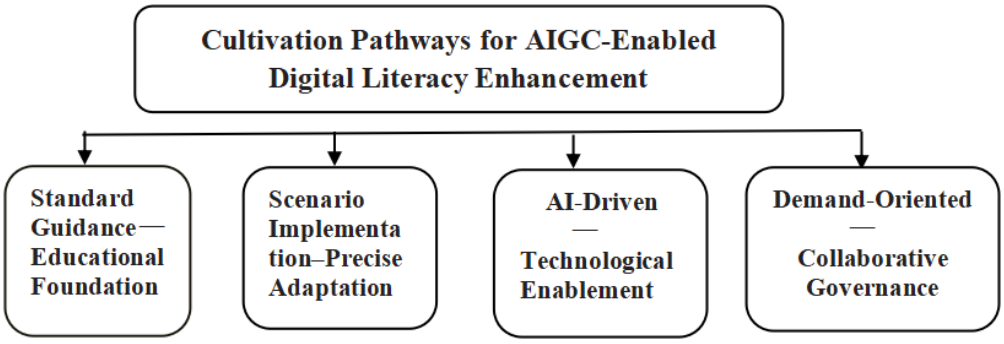

Figure 1 Cultivation Pathways for AIGC-Enabled Digital Literacy Improvement

2.1 Standard Guidance – Education Foundation: Building a Whole-Stage Digital Literacy System

Taking standardization as the core starting point, this study promotes the in-depth integration of digital literacy cultivation and the digital transformation of education, addressing the prominent problems of disconnection between standards and practice and misalignment between cultivation and social demand.[2]

2.1.1 Three-Level Digital Literacy Cultivation Standards

In accordance with industry standards and the requirements of educational digital transformation, a three-level digital literacy cultivation system (basic level – advanced level – professional level) will be jointly formulated with the Educational Informatization Technology Standards Committee of the Ministry of Education, university research institutions, and AI enterprises such as DeepSeek.

- The basic level focuses on AIGC cognition, basic tool operation, and ethical bottom lines, meeting the needs of universal popularization.

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• The advanced level strengthens human–machine collaboration skills and scenario application capabilities, supporting workplace and educational digitalization.

• The professional level emphasizes innovative thinking, technological R&D, and complex problem-solving, serving the cultivation of digital industry talents.

Meanwhile, the Implementation Guidelines for AIGC-Enabled Digital Literacy Cultivation Standards will be compiled to clarify objectives, modules, and assessment requirements for all stages and groups, ensuring implementable and evaluable standards.

2.1.2 Reconstructing the Whole-Stage Curriculum System

• Primary and secondary education: Digital literacy is integrated into special curricula for educational digital transformation, with a compulsory module "AI and Digital Life" that includes scenario-based applications of DeepSeek and ethical education such as data security and copyright protection.

• Higher education: A core elective course "Intelligent Technology and Digital Innovation" is offered, aligned with disciplinary training programs:

Teacher education: AI + teaching research;

Engineering: AI + engineering practice;

Liberal arts: AI + content creation.

• Lifelong education: Customized courses are developed for teachers, the elderly, and rural residents. Teacher training emphasizes the application of DeepSeek in instructional design and learning analytics. Aging-friendly courses focus on voice-interactive AIGC tools for daily digital life.

2.2 Scenario Implementation – Precise Adaptation: Creating Practical Application Scenarios

Focusing on actual needs in education, work, and daily life, digital literacy cultivation is transformed from theoretical teaching to scenario-based practice, realizing the integration of learning and application and improvement through practice.[3]

2.2.1 In-Depth Integration into Educational Teaching Scenarios

Based on DeepSeek, an intelligent teaching and research environment is built to support teachers in improving human–machine collaborative teaching capabilities through multimodal resource generation and intelligent learning analytics. "AI + Project-Based Learning" and "AI + Inquiry-Based Learning" are promoted, enabling students to complete research, data visualization, and creative tasks via DeepSeek.

2.2.2 Precise Adaptation to Workplace Scenarios

Customized AIGC training is provided for different industries, such as intelligent customer service in e-commerce and data analysis in manufacturing, to enhance employees' digital competence. Enterprises are encouraged to establish internal digital literacy mechanisms and include AIGC skills in job assessment.

A workplace digital literacy improvement platform supported by DeepSeek provides a full-cycle service: skill assessment – personalized learning plan – practical training – assessment and certification, solving the mismatch between digital skills and occupational demands.

2.2.3 Extension to Life and Public Service Scenarios

AIGC application training is developed for high-frequency daily scenarios such as medical care, finance, and government services, helping citizens improve digital skills in practice. With the voice interaction and visual operation functions of DeepSeek, citizens can master intelligent government services, electronic medical insurance, and online consultation, accompanied by education in fraud prevention and privacy protection.

Aging-adapted AIGC tools (e.g., voice-based DeepSeek, large-font assistants) are introduced to solve the difficulties of the elderly in using digital tools.

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2.3 AI-Driven Technological Empowerment: Constructing an Intelligent Training Ecosystem

With new-generation AI technologies such as DeepSeek as core support, an intelligent, efficient, and diversified digital literacy ecosystem is constructed to overcome low efficiency, fragmented resources, and insufficient personalization.[4]

2.3.1 AIGC Adaptive Learning Platform

Based on big data and cognitive diagnosis models, the platform identifies learners' weaknesses, generates personalized learning plans and evaluation reports, and supports AIGC tool training and scenario simulation. Intelligent algorithms provide real-time feedback and optimization suggestions.

2.3.2 Inclusive AIGC Tool Development

Enterprises are supported to develop aging-adapted, user-friendly AIGC tools to lower barriers for digitally vulnerable groups. The government expands coverage through service procurement and subsidies to ensure equal access to technological resources.

2.3.3 Digital Literacy Resource Library

High-quality resources from universities, enterprises, and research institutes are integrated into a resource library covering courses, cases, templates, and question banks, open to the public via the National Smart Education Service Platform. AIGC enables dynamic updates and multilingual adaptation, while user behavior data supports precise resource recommendation for teachers.[5] A review, evaluation, and incentive mechanism ensures resource quality.

2.4 Demand-Oriented Collaborative Governance: Multi-Stakeholder Participation

Adhering to the demand-oriented principle, a collaborative governance pattern of "government – enterprise – school – society – family" is established, forming a closed-loop system: demand research – resource integration – scenario implementation – evaluation feedback.

2.4.1 Precise Demand Matching Mechanism

The government leads a digital literacy demand platform to collect needs via big data and AI, identifying pain points and preferences. A White Paper on Digital Literacy Cultivation Needs is regularly published to avoid blind cultivation and supply–demand mismatch.

2.4.2 Government-Enterprise-School-Society-Family Collaboration

- Government–enterprise collaboration: The government issues financial and tax incentives to encourage DeepSeek and other AI enterprises to develop inclusive tools, platforms, and courses.
- School–family–society collaboration: Universities provide theoretical and academic support; communities carry out offline training and grassroots services; families participate in digital practice, forming a collaborative ecosystem.

3. Evaluation and Feedback Mechanism for AIGC-Enabled Digital Literacy Improvement

With the core goal of targeted improvement of digital literacy, an evaluation and feedback mechanism featuring AIGC-driven, three-dimensional support, and closed-loop operation is constructed, promoting the shift from phased improvement to sustained development.

3.1 Digital Portrait-Driven Precise Evaluation

Leveraging AIGC's multimodal data processing and intelligent analysis, a comprehensive and dynamic digital literacy portrait is built to address fragmented data and vague diagnosis in traditional evaluation. Real-time data updates portraits and visually shows strengths, weaknesses, and trends, such as an "AI + Teaching" portrait for teachers.

Furthermore, precise diagnosis and demand matching are achieved through intelligent comparison between digital portraits and the three-level cultivation standards:

- Basic-level groups: AIGC awareness and basic operation;
- Advanced-level groups: human–machine efficiency and scenario adaptability;

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• Professional-level groups: innovation, problem-solving, and ethical leadership.

Diagnosis results directly optimize cultivation pathways, realizing the closed loop of "portrait – diagnosis – cultivation".

3.2 Micro-Competence Certification: Hierarchical Evaluation System

A task-driven, real-time evaluation micro-competence certification system is built. Digital literacy is decomposed into quantifiable, certifiable micro-units.

• Basic-level certification: Lightweight tasks (e.g., basic information retrieval via DeepSeek), automatically scored by AIGC, focusing on basic application ability.

• Advanced-level certification: Complex tasks (e.g., AI-supported instructional design), graded by "AI preliminary evaluation + expert review", focusing on proficient and flexible application.

• Professional-level certification: Innovative tasks (e.g., industry digital solutions), evaluated by outcome transformation and industry recognition, focusing on creation and leadership.

An electronic micro-competence archive is established and updated in real time, realizing dynamic linkage between competence improvement and certification upgrading.

3.3 Large Model Empowerment: Intelligent Feedback and Optimization

With large models such as DeepSeek as the core engine, an intelligent feedback system of "real-time feedback – precise recommendation – dynamic optimization" is constructed to overcome lag, homogenization, and weak operability in traditional feedback[6], strengthening the backwash effect of evaluation.

Large models generate data-driven, visualized, personalized feedback reports, showing scores, rankings, and gaps from target levels. They provide targeted improvement suggestions and push personalized learning resources. Portraits and reports are updated quarterly to track progress and adjust support strategies.

3.4 Closed-Loop Operation: Evaluation–Feedback–Improvement Mechanism

AIGC connects the full cycle of "evaluation – feedback – cultivation – re-evaluation", forming a multi-stakeholder, multi-scenario closed-loop mechanism.

Four-Stage Closed-Loop Process (Figure2):

Precise Evaluation: Comprehensive diagnosis based on digital portraits and micro-competence certification;

Intelligent Feedback: Personalized suggestions and resource lists delivered to users, institutions, and managers;

Targeted Cultivation: Customized training based on feedback;

Iterative Evaluation: Re-assessment and effect analysis for continuous optimization.

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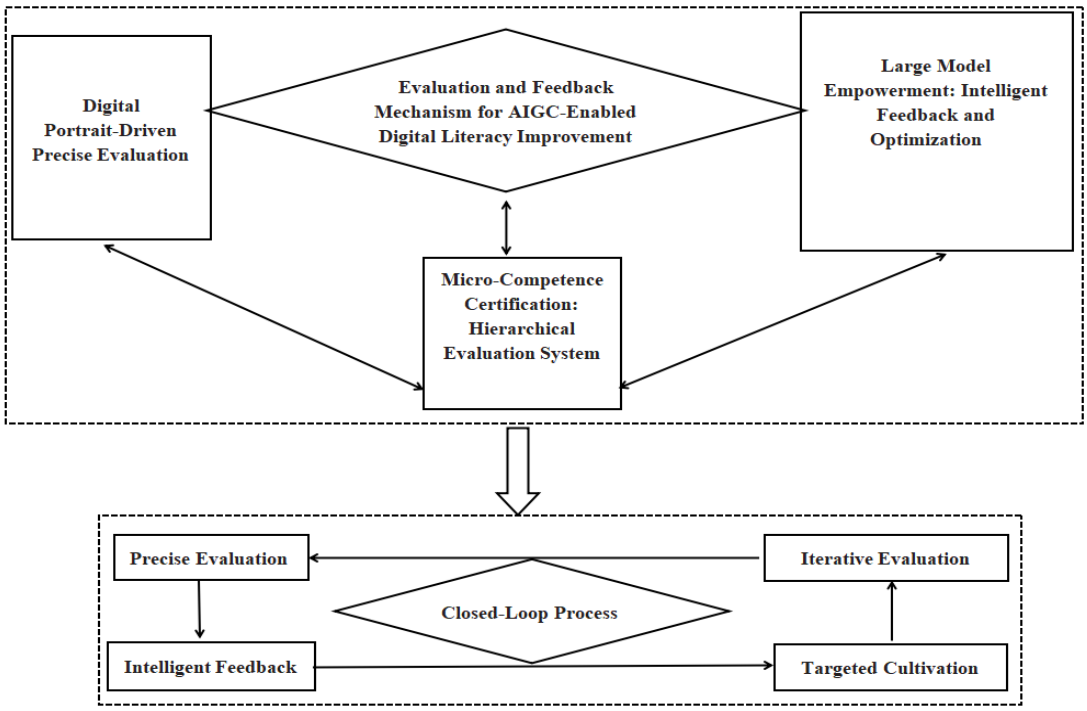

Figure 2 Evaluation and Feedback Mechanism for AIGC-Enabled Digital Literacy Improvement

4. Conclusion

The development of AIGC brings new opportunities and challenges for digital literacy enhancement. Through digital-portrait-based precise diagnosis, hierarchical micro-competence certification, large-model-driven intelligent feedback, and closed-loop operation, the integrated linkage of "assessment – evaluation – cultivation" is achieved. This provides an intelligent solution for the sustained improvement of national digital literacy and strongly supports the deep advancement of educational digital transformation and the Digital China initiative.

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