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Conceptual Definition and Framework Construction of Farmers' Digital Literacy in the Context of Digital Rural Construction: Postprint

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Abstract

[目的/ 意义]The conceptual definition and framework construction of farmers' digital literacy constitute an important foundation for assessing farmers' digital literacy levels, and hold significant implications for conducting education and training on farmers' digital literacy, promoting high-quality development among farmers, and facilitating rural talent revitalization.[方法/ 过程]This study employs content analysis to define the concept of farmers' digital literacy from a "competence+quality" perspective, and constructs a farmers' digital literacy framework from a "dimension-level" perspective through comparative analysis of typical and representative digital literacy frameworks both domestically and internationally.[结果/ 结论]The framework encompasses eight core dimensions: farmers' digital awareness, digital operation, digital information, digital socialization, digital innovation, digital security, digital application, and occupation-related skills, containing three levels of digital literacy—basic, intermediate, and advanced. The construction of this farmers' digital literacy framework in the context of digital rural construction can provide guidance for formulating relevant policies and assessment scales, updating high-quality farmer cultivation systems, and enhancing farmers' own digital literacy.

Full Text

Preamble

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Farmers' Digital Literacy in the Context of Digital Village Construction: Conceptual Definition and Framework Construction

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Abstract:
[**Purpose/Significance**] The conceptual definition and framework construction of farmers' digital literacy constitute an important foundation for assessing farmers' digital literacy levels, which is significant for conducting digital literacy education and training, promoting high-quality farmer development, and facilitating rural talent revitalization. [**Method/Process**] This study employs content analysis to define the concept of farmers' digital literacy from an "ability + quality" perspective, and through comparative analysis, reviews typical and representative digital literacy frameworks both domestically and internationally. From a "dimension-level" perspective, it constructs a farmers' digital literacy framework. [**Results/Conclusions**] The framework includes eight core dimensions: farmers' digital awareness, digital operation, digital information, digital social interaction, digital innovation, digital security, digital application, and occupation-related skills, encompassing three levels of digital literacy: basic, intermediate, and advanced. The construction of a farmers' digital literacy framework in the context of digital village construction can provide guidance for formulating relevant policies and assessment scales, updating high-quality farmer cultivation systems, and improving farmers' own digital literacy.

Keywords: digital village; farmers; digital literacy; framework construction; digital literacy education
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0 Introduction

The *Outline for Enhancing National Digital Literacy and Skills* proposes that by 2025, the digital literacy and skills of the entire population will reach the level of developed countries, and by 2035, the digital divide will be significantly narrowed and farmers' digital literacy will be substantially improved [1]. The 2024 Central No. 1 Document, *Opinions on Learning and Applying the Experience of the "Thousand Villages Demonstration, Ten Thousand Villages Renovation" Project to Effectively and Forcefully Promote Comprehensive Rural Revitalization*, identifies enhancing farmers' digital literacy and skills as a major task

and key project. This includes narrowing the urban-rural digital divide, which is essential for adapting to digital village construction requirements. As digital village construction progresses, optimizing digital infrastructure alone is insufficient; the digital literacy gap between urban and rural residents remains substantial. According to a survey report by the Chinese Academy of Social Sciences' Informatization Research Center, farmers scored the lowest in digital literacy among all surveyed groups, with only 18.6 points—57% lower than the average of 43.6 points for all respondents, and a gap of 37.5% compared to urban residents [4].

As digital village construction advances, the gap is shifting from digital infrastructure to digital literacy. Farmers, as the "last mile" of digital village construction, face an urgent need to improve their digital literacy, which has attracted significant academic attention. Current research focuses on two aspects: First, conceptual definitions of digital literacy. Scholars have approached "farmers' digital literacy" from various perspectives, but most existing research focuses on civil servants, students, and other groups, with limited studies on farmers specifically. This has resulted in a lack of clear definition for farmers' digital literacy, complicated by the historically ambiguous concept of "farmer" itself [9]. Second, framework construction for digital literacy. Most existing frameworks for farmers' digital literacy are derived from EU frameworks or UNESCO's digital literacy frameworks. While these citizen-oriented frameworks are comprehensive, farmers' unique occupational attributes and rural contexts require a more targeted framework that distinguishes farmers' digital literacy from general citizen digital literacy.

The concept of digital literacy originated with an Israeli scholar who proposed a five-element conceptual framework, later refined by American scholars who defined it as the ability to understand the true meaning of digital resources and information [10]. UNESCO and the EU have since developed influential frameworks, with UNESCO creating a global digital literacy framework based on the EU's DigComp2.0, offering universal applicability for national assessments [12]. Chinese scholars have constructed frameworks for teachers, civil servants, and other specific groups [5-7], providing valuable references. However, definitions of farmers' digital literacy lack two crucial elements: adaptation to rural-specific contexts and recognition of farmers' professional orientation. As farmers transform into new-type professional and high-quality farmers, their occupational attributes become increasingly prominent. Therefore, this study defines farmers' digital literacy as: In the context of digital village construction, the qualities and abilities of farmers to learn, engage in agricultural production, use intelligent equipment and digital technology to obtain, produce, use, evaluate, interact, share, and innovate digital information with security guarantees and ethical considerations, and apply these to rural life and production practices to achieve digital income growth.

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1 The Proposal and Conceptual Definition of Farmers' Digital Literacy

1.1 Digital Literacy

The concept of digital literacy has evolved from a narrow focus on digital skills and operations to a broader perspective emphasizing psychological qualities, cognitive skills, and metacognition when facing complex digital environments [12]. This broader conception includes not only technical capabilities but also values, attitudes, and emotions. Early definitions in the mid-to-late 1990s primarily emphasized narrow understandings focused on skill operation and application. Representative concepts, such as that of an American scholar, defined digital literacy as the mastery ability to use digital resources for creation [10]. These narrow definitions are clear, goal-oriented, and highly operable, facilitating adoption by other institutions.

As digital technology has permeated all aspects of society and the digital economy has accelerated, digital literacy concepts have broadened to encompass value orientations. In digital market contexts, consumers need to regularly update their digital literacy to actively, safely, and decisively participate. UNESCO's definition emphasizes competency elements to help countries at different development levels clarify digital literacy status and formulate future-oriented policies. The concept has become multi-faceted and comprehensive, incorporating knowledge and experience. Ukrainian scholars argue that digital literacy involves not only skills but also cognition, values, and attitudes [11]. China's Cyberspace Administration defines digital literacy as a comprehensive ability. This broader conception has been widely adopted internationally, though definitions remain dynamic, continuously evolving with technological development.

1.2 Farmers' Digital Literacy

Building on this evolution, this study adopts a broad perspective to define farmers' digital literacy. The definition must account for: (1) adaptation to rural-specific scenarios, and (2) farmers' professional orientation. In the context of digital village construction, farmers' digital literacy refers to the qualities and capabilities required for farmers to learn, engage in agricultural production, use intelligent equipment and digital technology to obtain, produce, use, evaluate, interact, share, and innovate digital information with security and ethical considerations, and apply these to rural life and production practices to achieve digital income growth. This definition emphasizes both ability and quality, incorporating cognitive, attitudinal, and emotional dimensions while highlighting the unique characteristics of the rural context and farmers' professional attributes.

2 Construction of the Farmers' Digital Literacy Framework

The core task of assessing farmers' digital literacy is framework construction. Digital literacy frameworks must align with life contexts and characteristic fields [17]. The EU Commission has conducted over 20 years of research, evolving from DigComp1.0 (2013) through DigComp2.0, DigComp2.1, to the more scientific DigComp2.2 version. UNESCO developed the Global Digital Literacy Framework based on DigComp2.0, providing universal applicability. Chinese scholars have constructed frameworks for teachers, civil servants, and other groups [5-7], offering valuable references.

This study constructs a farmers' digital literacy framework using a "dimension-level" approach, innovatively introducing occupation-related skills as a first-level dimension. The framework comprises eight core dimensions with 21 secondary dimensions and specific elements.

2.1 Core Dimensions of the Farmers' Digital Literacy Framework

The eight core dimensions are: (1) Farmers' Digital Awareness, (2) Digital Operation Skills, (3) Digital Information Quality, (4) Digital Social Skills, (5) Digital Innovation Skills, (6) Digital Security Quality, (7) Digital Application Skills, and (8) Occupation-Related Skills .

2.1.1 Farmers' Digital Awareness Awareness is a necessary condition for purposeful personal action. In digital transformation, farmers must recognize digital technology's important role in agricultural production and employment, understand its significance and value, and maintain positive attitudes. This includes understanding digital technology's role in rural modernization, recognizing opportunities and challenges, having willingness to learn and use digital resources, and possessing the confidence to overcome difficulties in digital practice. Three secondary dimensions comprise this core dimension: digital cognition, digital willingness, and digital willpower .

2.1.2 Farmers' Digital Operation Skills These are fundamental skills for using various digital technologies in rural daily life and production, including both physical operation (using digital devices and agricultural technology) and software operation (selecting and using appropriate software). Two secondary dimensions are identified: digital physical operation and digital software operation .

2.1.3 Farmers' Digital Information Quality This refers to the reflective discovery of information, understanding how to search for needed information, evaluating information, and using it innovatively. Farmers must be able to identify misinformation, understand information's true meaning, and transform data resources into value for scientific decision-making. Three secondary dimensions are included: digital information basics, digital information evaluation, and digital information management .

2.1.4 Farmers' Digital Social Skills Based on Maslow's hierarchy of needs, social skills are essential. These skills involve daily communication through digital devices, cooperation, and collaborative work. With rural internet penetration reaching 58.8% by June 2022 [3], digital technology has integrated into all aspects of rural life, requiring farmers to enhance digital communication, sharing, and cooperation capabilities. Three secondary dimensions are: digital communication, digital sharing, and digital cooperation .

2.1.5 Farmers' Digital Innovation Skills The Cyberspace Administration identifies innovation skills as essential for citizens. For farmers, this includes both basic digital content creation (editing text, creating tables) and more advanced digital technology innovation in agricultural equipment. As users of smart agricultural equipment, farmers are also key innovators in agricultural technology. Two secondary dimensions are: digital creation and digital innovation .

2.1.6 Farmers' Digital Security Quality Digital security is crucial for building a cyber-power nation and the foundation of digital economy security. Farmers face risks such as privacy theft and online fraud. They need awareness and protection capabilities to safeguard personal information and privacy, distinguish illegal behaviors, and use the internet healthily. Two secondary dimensions are: digital legal and ethical norms, and digital security protection .

2.1.7 Farmers' Digital Application Skills These are capabilities needed to solve problems in agricultural production and daily life under digital village contexts. Farmers face multiple scenarios requiring digital solutions, including digital finance, governance, and health services. Four secondary dimensions are: digital agriculture skills, digital finance skills, digital governance skills, and digital health skills .

2.1.8 Farmers' Occupation-Related Skills As farmers transform into high-quality professional farmers, their occupational attributes become prominent. These skills involve using digital technology and tools for specialized agricultural production and improving management capabilities. Two secondary dimensions are: production technology skills and industrial development skills .

2.2 Hierarchical Construction of the Farmers' Digital Literacy Framework

Bloom's cognitive hierarchy theory, developed in the 1950s, categorizes cognition into six levels: Remember, Understand, Apply, Analyze, Evaluate, and Create. This theory emphasizes learning as an evolutionary process, which provides important reference for constructing a hierarchical framework for farmers' digital literacy.

This study divides farmers' digital literacy into three levels—basic, intermediate, and advanced—forming a continuous progression:

- **Basic Level**: Primarily "awareness and understanding" with simple operations of digital technology, tools, and equipment.
- **Intermediate Level**: Focuses on being "able to use," varying according to individual goals, needs, and professional characteristics.
- **Advanced Level**: Involves "active participation in practice," enabling innovation and practical application in specific domains.

Farmers can self-assess against these levels to identify gaps and pathways for continuous improvement. The hierarchical framework is illustrated in [Figure 2: see original paper].

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3 Application of the Farmers' Digital Literacy Framework

Enhancing farmers' digital literacy in the digital village context requires systematic efforts from multiple stakeholders. The framework must have practical applications to demonstrate its value.

3.1 For Policymakers: Informing Policy Development and Assessment Scales

The framework can guide the formulation and improvement of relevant policies and assessment scales. First, it helps clarify the connotation and extension of farmers' digital literacy, combining China's digital village construction realities to identify gaps and needs. Second, it provides concrete input for policy formulation by analyzing current status and determining improvement priorities. Third, it offers reference for improving professional farmer certification systems by incorporating digital literacy into evaluation processes.

3.2 For Training Institutions: Updating High-Quality Farmer Cultivation Systems

Farmer training is essential for building high-quality farmer teams and accelerating agricultural modernization. The framework can optimize training resources and content. Before training, institutions can conduct needs assessments and select appropriate trainees based on the framework. During training, they can adjust content according to farmers' current levels and needs across various dimensions. The framework supports segmented training, integration of online and offline learning, and alignment between teaching and practice, providing standards for curriculum development and resource selection.

3.3 For Farmers: Self-Assessment and Self-Improvement

Farmers' agency is crucial for improving their own digital literacy. Farmers can use the framework for self-assessment to understand their current level, identify gaps, and target improvements. This helps them recognize the importance of digital technology, enhance learning motivation, and build lifelong digital learning systems. By referring to the framework, farmers can proactively develop digital literacy to meet the demands of rural revitalization and modern agricultural development.

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4 Conclusion

In the digital era and digital village construction context, digital literacy is essential for farmers to contribute to rural revitalization and promote rural workforce transformation. This study defines farmers' digital literacy from a broad perspective and constructs a framework comprising eight core dimensions and three hierarchical levels, innovatively incorporating occupation-related skills. The framework provides theoretical reference for developing quantifiable assessment tools and cultivating high-quality farmer teams adapted to digital village construction requirements.

As an exploratory theoretical study, the farmers' digital literacy framework still requires substantial further research. Empirical questions remain: What is the current status of farmers' digital literacy? What factors hinder its improvement? How can it be effectively cultivated? Future research should develop assessment scales and questionnaires based on this framework, conduct expert evaluations, and verify its scientific validity and applicability from the perspective of farmer subjects.

References

[1] China Cyberspace Administration. Outline for Enhancing National Digital Literacy and Skills[EB/OL]. (2021-11-05)[2024-05-01]. https://www.cac.gov.cn/2021-11/05/c_{1637708867754305}.htm.

[2] CPC Central Committee and State Council. Opinions on Learning and Applying the Experience of the "Thousand Villages Demonstration, Ten Thousand Villages Renovation" Project to Effectively and Forcefully Promote Comprehensive Rural Revitalization[EB/OL]. (2024-01-01)[2024-05-01]. https://www.moa.gov.cn/ztzl/2024yhwj/2024nzyyhwj/202402/t20240204_{6447020}.htm.

[3] Ministry of Agriculture and Rural Affairs Information Center. China Digital Rural Development Report (2022)[R/OL]. (2023-03-05)[2024-05-01]. https://www.gov.cn/xinwen/2023-03/01/content_{5743969}.htm.

[4] Chinese Academy of Social Sciences Informatization Research Center. Analysis Report on China's Rural Digital Literacy Survey Under the Background of Rural Revitalization Strategy[R/OL]. (2021-03-01)[2024-05-01]. http://iqte.cssn.cn/yjjg/fstyjzx/xxhyjzx/xsdt/202103/P020210311318247184884.pdf.

[5] XIA M, SHI X W, SUN L X. Research on structural model of elderly education teachers' digital literacy from the perspective of "actor-structure" interconstruction in the new era[J]. Adult Education, 2024, 44(4): 32-39.

[6] ZHANG H C, YANG H. Digital literacy framework of civil servants under the background of digital government: A conceptual model[J]. E-Government, 2023(1): 110-124.

[7] YAN M. A conceptual framework of digital literacy for foreign language majors in China[J]. Foreign Language Research, 2024(2): 67-74.

[8] SU L L, PENG Y L. Farmers' digital literacy, elite identity and participation in rural digital governance[J]. Journal of Agrotechnical Economics, 2022(1): 34-50.

[9] DU Y C, ZHAO D Y, LIANG H. Logic of constructing concept of farmers—A dynamic analysis based on framework of "structure-process-attribute"[J]. Agricultural Economics and Management, 2022(4): 22-32.

[10] LANHAM R A. Digital literacy[J]. Scientific American, 1995, 273(3): 253-255.

[11] HAVRILOVA L H, TOPOLNIK Y V. Digital culture, digital literacy, digital competence as the modern educational phenomena[J]. Information Technologies and Learning Tools, 2017, 61(5): 1-14.

[12] JIANG M J, ZHAI Y. Citizen's digital literacy under the background of digital transformation: Framework, challenges and countermeasures[J]. E-Government, 2022(1): 54-65.

[13] Ministry of Education. Teachers' Digital Literacy[EB/OL]. (2022-11-30)[2024-05-01]. http://www.moe.gov.cn/srcsite/A16/s3342/202302/W020230214594527529113.pdf.

[14] MA S, CHEN Z Z, GAO L L. Digital literacy scale for rural residents in China: Development and verification[J]. Library Tribune, 2023, 43(8): 43-50.

[15] HUANG R H, SHI L Y, WU Y Q, et al. Constructing content framework for artificial intelligence literacy instruction in China from a global perspective[J]. Documentation, Information & Knowledge, 2024, 41(3): 27-37.

[16] ZHAO C, LIN C, ZHOU J L, et al. Laborers' digital literacy in the new forms of employment: Concept, connotation and cultivation path[J]. Documentation, Information & Knowledge, 2023, 40(3): 52-61.

[17] HE Y T, LIU W G. Farmers' digital literacy from the perspective of situational cognition: Realistic restriction and relief path[J]. Huxiang Forum, 2024, 37(2): 70-80.

[18] China Cyberspace Administration. Digital Village Construction Guide 1.0[EB/OL]. (2021-09-03)[2024-05-01]. https://www.cac.gov.cn/2021-09/03/c_{1632256398120331}.htm.

[19] China Cyberspace Administration. Digital Village Construction Guide 2.0[EB/OL]. (2024-05-16)[2024-05-20]. https://www.cac.gov.cn/2024-05/15/c_{1717449042791246}.htm.

[20] General Office of the State Council. Opinions on Accelerating Rural Talent Revitalization[EB/OL]. (2021-02-23)[2024-05-01]. https://www.gov.cn/zhengce/2021-02/23/content_{5588496}.htm.

[21] Ministry of Agriculture and Rural Affairs Market and Informatization Department. Key Points for Digital Rural Development Work in 2023[EB/OL]. (2023-04-13)[2024-05-01]. http://www.scs.moa.gov.cn/zcjd/202304/P020230414324704065323.pdf.

[22] General Office of the Ministry of Agriculture and Rural Affairs. Notice on High-Quality Farmer Cultivation Work in 2023[EB/OL]. (2023-05-12)[2024-05-01]. https://www.gov.cn/zhengce/zhengceku/202305/content_{6857767}.htm.

[23] ZHAO M C, WU Z X, WENG K R, et al. Add to favorite digital literacy of civil servants: The conceptual feature, structure measurement and advancement path[J]. Journal of Zhejiang Sci-Tech University (Social Sciences), 2024(2): 206-214.

[24] YE L. Practice progress of the digital literacy in Europe and America and its enlightenment[J]. Library Development, 2014(7): 17-22.

[25] SU L L, ZHANG H Y, PENG Y L. Study on the mechanism of farmers' digital literacy driving the development of digital countryside[J]. E-Government, 2021(10): 42-56.

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