

Research on the Hierarchical Enhancement Model of Information Literacy for University Teachers in the Context of Education Informatization 2.0

Yang Wang*, Hongzhang Xu, Huanhuan Peng, Shuo Li

Huanghuai University, Zhumadian, 463000, China

*Corresponding author: wangyang@huanghuai.edu.cn

Abstract: With the deep advancement of Education Informatization 2.0, the professional capacity building of university teachers in an information-based environment faces new challenges and development opportunities. Information literacy, as the core competence supporting teaching design, classroom interaction, and efficient research activities, encompasses information cognition, information acquisition, information processing, and information innovation, and demonstrates phased developmental characteristics. Based on the background of Education Informatization 2.0, this paper constructs a hierarchical evaluation system of information literacy for university teachers, clarifies the three levels of basic competence, applied competence, and innovative competence, and proposes a multidimensional indicator system and quantitative methods to achieve scientific diagnosis of teachers' information literacy. At the same time, it designs hierarchical goal-oriented competence enhancement strategies, a collaborative model driven by teaching and research, and a mechanism for continuous development and adaptive capacity enhancement, so as to provide systematic pathways and theoretical support for the professional development of teachers in dynamic and multimodal educational environments, and to promote the deep application and sustainable optimization of information literacy.

Keywords: Education Informatization 2.0; university teachers; information literacy; hierarchical enhancement; competence development

Introduction

In the context of Education Informatization 2.0, the widespread application of digital resources, intelligent tools, and multimodal information has made university teachers' information literacy a core element of their professional capacity development. Information literacy not only affects teachers' abilities in teaching design, classroom interaction, and research, but also directly relates to the integration of educational resources and the efficiency of knowledge generation. However, the overall level of teachers' information literacy still shows discrepancies, and there is a lack of refined alignment between competence structures and professional demands, which makes it urgent to construct systematic and hierarchical development pathways. Taking university teachers as the research subjects, this paper starts from the core components of information cognition, information acquisition, information processing, and information innovation, analyzes their developmental stages and characteristics, establishes a hierarchical evaluation system, and proposes a design for hierarchical enhancement models. Through systematic strategy research, this study aims to provide theoretical support and methodological guidance for improving teachers' professional competence, to promote their progressive development from basic skills to innovative capacities in the environment of Education Informatization 2.0, and to enhance the effectiveness and innovativeness of education, teaching, and research.

1. Connotation and Characteristics of University Teachers' Information Literacy in the Context of Education Informatization 2.0

1.1 Core Components of University Teachers' Information Literacy

University teachers' information literacy is an important component of teachers' professional

competence and a key capability for enhancing teaching and research effectiveness in an education informatization environment. Its core components cover four aspects: information cognition, information acquisition, information processing, and information innovation. Information cognition ability not only includes the understanding of information types, information value, and information structures, but also involves adaptive analysis of the information environment and precise identification of information needs, which provides fundamental support for teachers in handling information in complex educational contexts. Information acquisition ability emphasizes systematic retrieval, classification, integration, and accurate selection of multi-source information resources, while also requiring teachers to possess the ability to efficiently collect information through databases, knowledge graphs, and intelligent retrieval tools so as to support teaching design and research decision-making. Information processing ability represents the central link of teachers' information literacy and is reflected in the capacity to organize, analyze, integrate, and generate knowledge from information, enabling teachers to transform scattered information into operational knowledge in educational practice.

Information innovation ability, as a higher-level dimension, highlights teachers' capacity for interdisciplinary integration, teaching scheme optimization, and research innovation based on existing information, which not only promotes the multidimensional presentation of educational content but also fosters the diversification of teachers' professional development models. The four components present a systematic interactive relationship, with information cognition as the foundation, information acquisition and processing as the core, and information innovation as the advanced manifestation of capability extension and application, jointly supporting teachers' continuous professional growth in the context of Education Informatization 2.0^[1].

1.2 The Reshaping of Teachers' Information Behavior under Education Informatization 2.0

The environment of Education Informatization 2.0 emphasizes the deep application of intelligent tools, multimodal resources, and data-driven decision-making, and it poses entirely new requirements for university teachers' information behavior. In course design, teachers need to integrate multi-source resources such as text, images, audio, video, and virtual simulation based on education informatization platforms, so as to achieve the visualization, interactivity, and personalization of teaching content and to enhance students' immersive experience and engagement. In research activities, teachers should use intelligent retrieval, data analysis, and knowledge graph technologies to process academic information efficiently, extract its value, and present it in a structured way, making research decisions more precise and cutting-edge. In the process of academic exchange and collaboration, the application of informatization tools not only improves the efficiency of information transmission but also raises higher requirements for teachers' digital collaboration capabilities, including cross-regional academic cooperation, knowledge sharing, and online collaborative abilities. Teachers' information behavior under Education Informatization 2.0 demonstrates the characteristics of active selection, deep processing, and innovative application.

Information is no longer a passively received resource but a strategic tool for teachers in educational design, academic research, and professional development. Teachers improve their capacity for information integration through multidimensional information operations and simultaneously achieve the coordinated development of information innovation ability and educational innovation ability. The reshaping of information behavior in this environment not only expands the breadth and depth of teachers' professional competence but also provides a realistic foundation for the hierarchical enhancement of university teachers' information literacy, enabling teachers to continuously optimize their competence structures in dynamic and diverse educational contexts.

1.3 Development Stages and Characteristics of University Teachers' Information Literacy

The development of university teachers' information literacy demonstrates distinct stage characteristics and can be divided into the basic skills stage, the applied competence stage, and the innovation-leading stage. The basic skills stage focuses on mastering information tools and building the abilities of information acquisition and processing, providing essential support for teachers' daily teaching and research activities, and emphasizing the standardization of information operations and technical proficiency. The applied competence stage reflects teachers' capacity to integrate information resources with disciplinary knowledge in specific educational contexts, thereby forming efficient teaching design, research data analysis, and academic communication abilities, and highlighting the practicality and systematicity of information literacy in educational practice. The innovation-leading

stage embodies teachers' capacity to integrate information technology with disciplinary frontiers, enabling them to conduct interdisciplinary research, optimize course content, and promote educational innovation activities, thus realizing the extension of information literacy into higher-level competencies [2].

Information literacy at different stages presents progressive characteristics in terms of knowledge structure, skill operation, and innovation ability, while also displaying clear capacity accumulation and structural interconnections across levels. These stage characteristics provide a theoretical foundation for constructing a hierarchical enhancement model of university teachers' information literacy, ensuring that competence enhancement can accurately match teachers' professional development needs. The cognitive logic of hierarchical development emphasizes the consolidation of basic abilities, the deepening of applied abilities, and the expansion of innovative abilities, thereby offering a scientific pathway for teachers' continuous professional development in the context of Education Informatization 2.0, as well as providing an operable theoretical basis for the systematic design of information literacy enhancement models.

2. Construction of a Hierarchical Evaluation System for University Teachers' Information Literacy

2.1 Division of Competence Levels and Evaluation Dimensions of Information Literacy

2.1.1 Basic Competence Level

The basic competence level is the starting point of university teachers' information literacy and mainly covers information acquisition, basic information processing, and digital tool operation abilities. At this level, teachers demonstrate the capacity to efficiently use educational information resource platforms, accurately retrieve, filter, and preliminarily integrate the information needed for teaching or research. In the context of Education Informatization 2.0, the basic competence level also includes an understanding of information ethics and data security, so as to ensure standardization and security in information processing and resource utilization.

2.1.2 Applied Competence Level

The applied competence level emphasizes teachers' abilities to integrate and apply information in specific educational contexts, including teaching design optimization, research data processing, and academic communication skills. At this level, teachers are able to deeply integrate information resources with disciplinary knowledge, generate structured knowledge outputs, and enhance the visualization and interactivity of course content through digital tools. The applied competence level also reflects teachers' capacity for systematic planning of teaching and research activities in an education informatization environment, thereby promoting the effective transformation of information in educational processes [3].

2.1.3 Innovative Competence Level

The innovative competence level represents the advanced development of teachers' information literacy and focuses on information integration, interdisciplinary application, and educational innovation abilities. At this level, teachers are able to conduct innovative teaching design based on multi-source information resources, optimize educational methods and research programs, and put forward new research ideas and knowledge integration models in academic exchanges. The innovative competence level is not only an extension of teachers' information operation abilities but also a core indicator of teachers' professional growth in the context of Education Informatization 2.0, providing a theoretical basis for the design of hierarchical enhancement models.

2.2 Construction of a Multidimensional Indicator System and Quantitative Methods

2.2.1 Indicators of Information Acquisition Ability

The indicators of information acquisition ability are used to measure the efficiency and accuracy of teachers in retrieving, filtering, and integrating information in a multi-source information environment. The specific indicators include the frequency of information resource access, the success rate of retrieval, the precision of information selection, and the understanding of the diversity of information sources. By quantifying these indicators, it is possible to clearly identify teachers' competence levels in the stages of information collection and preliminary processing, thus providing a data basis for

hierarchical enhancement.

2.2.2 Indicators of Information Processing Ability

The indicators of information processing ability focus on teachers' capacity to transform information resources into usable knowledge, including the depth of information analysis, methods of information integration, and the quality of information presentation. This ability is crucial in teaching design and research activities, as it ensures the effective transformation of information and the generation of knowledge in educational contexts. Quantification of these indicators can be achieved by analyzing teachers' performance in course resource development, research data analysis, and literature review, thereby enabling a quantitative assessment of competence levels ^[4].

2.2.3 Indicators of Information Innovation Ability

The indicators of information innovation ability measure teachers' capacity for innovative integration, interdisciplinary application, and educational innovation based on existing information resources. Specific indicators include the number of innovative course contents, interdisciplinary research outcomes, and the breadth and depth of new method applications. Quantitative assessment of innovation ability can reflect teachers' potential in advanced information operations and educational innovation, providing core reference for the design of hierarchical enhancement models.

2.3 Applicability Analysis of Hierarchical Evaluation in Teachers' Professional Development

2.3.1 Competence Diagnosis and Level Identification

Hierarchical evaluation can scientifically identify teachers' performance across different levels of information literacy, providing precise competence diagnosis for professional development. Evaluation at the basic level helps clarify teachers' current status in information acquisition and tool operation; evaluation at the applied level reveals teachers' proficiency in teaching design and research information integration; evaluation at the innovative level quantifies teachers' abilities in interdisciplinary integration and educational innovation. Competence diagnosis provides a scientific basis for tailoring hierarchical development pathways for teachers.

2.3.2 Support for Hierarchical Development Strategies

The results of hierarchical evaluation can provide data support for teachers' professional development strategies, making competence enhancement systematic and targeted. Based on the evaluation outcomes, teachers can select appropriate training and development pathways according to their competence levels, achieving progressive improvement from basic skills to applied competence and then to innovative competence. The construction of hierarchical development strategies ensures that teachers' competence development aligns with the demands of teaching and research in an education informatization environment, thereby improving the efficiency of professional growth.

2.3.3 Data-Driven Continuous Optimization

Hierarchical evaluation serves not only for competence diagnosis but also as an important tool for the continuous optimization of teachers' information literacy. Through long-term tracking and analysis of evaluation data across different teacher levels, it is possible to identify competence development trends, potential weaknesses, and directions for improvement. A data-driven hierarchical evaluation mechanism helps establish a dynamically adjustable teacher development system, ensuring that the information literacy enhancement model is scientific, systematic, and sustainable, and enabling teachers' long-term professional development in the context of Education Informatization 2.0.

3. Design of a Hierarchical Enhancement Model for University Teachers' Information Literacy

3.1 Goal-Oriented Competence Enhancement Strategies

3.1.1 Strategies for Enhancing Basic-Level Competence

Strategies for enhancing basic-level competence focus on developing teachers' abilities in information acquisition, information processing, and digital tool operation. By constructing systematic information skills training modules, teachers can master efficient methods for retrieving and filtering multi-source information resources, thereby improving the accuracy and standardization of information processing. In the context of Education Informatization 2.0, consolidating basic competence not only

provides operational support for teachers' teaching and research activities but also lays the foundation for the expansion of higher-level competencies^[5].

3.1.2 Strategies for Enhancing Applied-Level Competence

Strategies for enhancing applied-level competence focus on teachers' ability to integrate information resources with disciplinary knowledge in specific educational contexts. Through cross-platform information integration, data analysis, and course design optimization, teachers achieve multidimensional presentation of teaching content and in-depth processing of research data. This strategy emphasizes systematic competence development, enabling teachers to effectively transform collected resources into educational and research outcomes in an informatized environment, thereby improving the overall efficiency and professional depth of information application.

3.1.3 Strategies for Enhancing Innovative-Level Competence

Strategies for enhancing innovative-level competence focus on expanding teachers' abilities in interdisciplinary integration, educational content innovation, and research methodology innovation. Through comprehensive analysis and innovative application of multi-source information resources, teachers can design innovative courses, optimize research methods, and propose new models of knowledge generation. This strategy emphasizes the advanced expansion of competence, enabling teachers to achieve a leap from information operation to educational innovation in the context of Education Informatization 2.0, and promoting the multidimensional optimization of educational activities.

3.2 Information Literacy Enhancement Model Driven by Teaching and Research Collaboration

3.2.1 Teaching-Driven Model

The teaching-driven model centers on course design and classroom informatization, aiming to effectively enhance information literacy through the close integration of digital teaching resources with educational objectives. In teaching design, teachers integrate multimodal information resources, such as text, images, video, and virtual experiments, to enhance classroom interactivity and the layered presentation of knowledge. This model emphasizes the application and optimization of information competence in teaching contexts, enabling teachers to continuously accumulate information processing and application abilities through practice^[6].

3.2.2 Research-Driven Model

The research-driven model centers on academic research and data analysis, enhancing teachers' abilities in information acquisition, processing, and innovative application through intelligent data platforms, knowledge graphs, and academic resource integration tools. Teachers can perform structured processing, in-depth analysis, and value extraction of research data and academic literature, achieving efficient transformation of information resources into research outcomes. This model emphasizes the interaction between information literacy and research competence, promoting the continuous improvement of teachers' data analysis skills, research methodology innovation, and interdisciplinary integration abilities in research projects, thereby providing a scientific pathway and practical foundation for professional growth.

3.2.3 Collaborative Integration Model

The collaborative integration model emphasizes the linkage between teaching and research activities, constructing a systematic model for enhancing teachers' information literacy through the organic combination of teaching informatization design and research data analysis. Teachers simultaneously apply information acquisition, processing, and innovation abilities in course development and research exploration, achieving bidirectional competence development. This model not only reflects the dynamic and systematic nature of information literacy enhancement but also strengthens teachers' multidimensional professional competence development in the context of Education Informatization 2.0, enabling continuous optimization and capability expansion in both teaching and research activities.

3.3 Mechanisms for Strengthening Continuous Development and Adaptive Competence

3.3.1 Strengthening Individual Adaptive Competence

The mechanism for strengthening continuous development and adaptive competence emphasizes

teachers' autonomous learning and self-regulation abilities in an informatized environment. By establishing personal learning portfolios and competence tracking systems, teachers can adjust learning content and methods in a targeted manner according to their information literacy development stage, achieving progressive enhancement from basic skills to innovative competence. Strengthening adaptive competence ensures that teachers can maintain continuous updating of professional abilities in an ever-changing information environment.

3.3.2 Organizational Support and Collaborative Optimization

This mechanism establishes professional collaboration networks among teachers and information resource-sharing platforms, forming a collaborative system for collective learning and competence enhancement. Teachers engage in information exchange, resource sharing, and experience transfer during collaboration, strengthening the interactivity and extensibility of information literacy. The collaborative optimization mechanism not only enhances individual information literacy but also promotes the dynamic development of the overall competence level of the teacher group.

3.3.3 Dynamic Feedback and Competence Iteration

The dynamic feedback and competence iteration mechanism provides timely adjustment guidance for teachers' competence enhancement through continuous monitoring of evaluation data, learning outcomes, and teaching and research effectiveness. Teachers can optimize their information operation strategies and innovative application methods based on feedback, achieving cyclical iteration and gradual improvement of competence. This mechanism emphasizes the dynamic and sustainable nature of the information literacy enhancement model, ensuring that teachers' professional development in the context of Education Informatization 2.0 remains long-term and adaptive.

Conclusion

This study constructed a hierarchical evaluation system for university teachers' information literacy, clarifying three development levels: basic competence, applied competence, and innovative competence, and proposed goal-oriented competence enhancement strategies, a teaching and research collaborative driving model, and mechanisms for strengthening continuous development and adaptive competence, thereby providing a systematic pathway for teachers' professional development in the context of Education Informatization 2.0. The study demonstrates that the hierarchical enhancement model can accurately match teachers' competence needs at different development stages, promote the in-depth application of information literacy in teaching design, research analysis, and educational innovation, and establish a sustainable mechanism for competence development. Future research can further explore personalized hierarchical enhancement programs supported by artificial intelligence, as well as dynamic monitoring methods of teachers' information literacy based on big data analysis, to achieve intelligent diagnosis, dynamic optimization, and long-term development of teachers' competence.

Fund Projects

Huanghuai University Educational Teaching Reform Research Projects, Project Nos.: 2024XJGLX01, 2024XJGLX48, 2024XJGZLX02

References

- [1] Zhu, L. "Research on the Enhancement of Information Literacy of Secondary Vocational English Teachers under the Background of Education Informatization 2.0." *Pinwei·Jingdian* 02 (2024): 111-113.
- [2] He, B. "An Analysis of Strategies to Improve University Teachers' Information Literacy under the Background of Education Informatization." *Zhishi Wenku* 11 (2023): 156-159.
- [3] Guo, J. "Research on Enhancing University Teachers' Information Literacy in the Context of Education Informatization 2.0." *Henan Library Science Journal* 42.12 (2022): 50-52.
- [4] Jiang, H., et al. "Current Status and Enhancement Strategies of University Teachers' Information Literacy under the Background of Education Informatization 2.0: A Case Study of Shenyang Agricultural University." *China Educational Technology Equipment* 16 (2022): 28-31+38.
- [5] Shi, Y. "Research on Improving Teachers' Teaching Literacy through Information Technology under

the Background of Education Informatization 2.0." New Curriculum 43 (2022): 142-143.

[6] Li, L., and Meng, Q. "Research on Strategies for Improving Information Technology Literacy of Private University Teachers under the Background of Education Informatization 2.0." *Keji Feng 09 (2022): 43-45.*