

Innovative Paths for Improving University Teachers' Digital Literacy in Liaoning Province Against the Backdrop of Digital-Intelligent Transformation

Aoran Di^a

Liaoning Communication University, Shenyang, Liaoning 110100, China

^a23502745@qq.com

Abstract

Digital technology drives the intelligent digital transformation of higher education, and digital education has become a key national strategy. To meet the needs of Northeast China revitalization and industrial upgrading, Liaoning Province urgently needs to strengthen the cultivation of university teachers' digital literacy. At present, local universities are faced with unbalanced regional development, prominent disparities in teachers' capabilities, backward training systems and insufficient integration between education and industry. Based on the actual situation of Liaoning, this paper defines the connotation of teachers' digital literacy, analyzes existing problems, and constructs a five-in-one improvement mechanism, so as to provide practical references for the digital transformation of local universities and regional industrial development.

Keywords

Digital-intelligent transformation, Universities in Liaoning Province, teachers' digital literacy.

1. Introduction

The 20th National Congress of the Communist Party of China and the Fourth Plenary Session of the 20th Central Committee have successively deployed the strategy of digital education, clearly proposing to promote the in-depth integration of artificial intelligence and education and strengthen the cultivation of teachers' digital literacy. The report of the 20th National Congress of the Communist Party of China pointed out that it is necessary to "advance digital education and build a learning society and a learning country featuring lifelong learning for all"[1]. Relevant requirements state that we should "fully implement the Party's educational policy, fulfill the fundamental task of fostering virtue through education, and further carry out the national strategy for digital education"[2]. It is also emphasized that we shall fully advance the digital education strategy, "promote the spirit of educators and cultivate high-caliber teaching teams"[3], which sets the direction for the construction of teaching staff and the development of digital education in the new era.

As a pacesetter for the revitalization of Northeast China and a time-honored industrial base, Liaoning Province is implementing the Three-Year Action Plan for New Breakthroughs in Comprehensive Revitalization. It accelerates the digital and intelligent upgrading of the manufacturing industry and further integrates the digital economy with the real economy[4]. A total of six initiatives have been launched, including improving teachers' digital literacy, boosting teaching reform through digital means, transforming teachers' development models, supplying digital resources for teacher development, optimizing digital governance for teacher development and promoting international cooperation in digital education, aiming to address the challenges of teacher development in the digital era[5].

Teachers are the core practitioners of digital education, and their digital literacy directly determines the quality of talent cultivation. Against the backdrop of nationwide advancement of digital education, improving university teachers' digital capabilities has become a priority for the transformation of local higher education. Enhancing university teachers' digital literacy is not only an inevitable choice to adapt to the digital transformation of education, but also an important measure to innovate teaching modes and improve teaching effectiveness[6].

Currently, the digital capabilities of university teachers in Liaoning present obvious differentiation. Senior teachers are incompetent in applying digital technologies, while young teachers are proficient in digital tools but fail to integrate technologies with teaching effectively. Digital resources are unevenly distributed among universities in different regions and of different types. Coupled with rigid traditional training modes, training content disconnected from industrial demands and inadequate incentive mechanisms, the existing system can no longer keep pace with the intelligent digital transformation and the revitalization of Liaoning. Restricted by geographical conditions and economic development, universities in Northeast China have more prominent deficiencies in teachers' digital literacy cultivation compared with those in eastern China. Therefore, innovating and establishing a systematic mechanism to improve teachers' digital literacy is of important theoretical and practical significance.

2. Core Connotation of University Teachers' Digital Literacy Under Intelligent Digital Transformation

In the era of intelligent digitalization, teachers' digital literacy is a comprehensive capability system covering digital awareness, technology application, teaching innovation, data thinking, digital ethics and industry-education adaptation. Many domestic scholars have researched the framework of university teachers' digital literacy in the new era. It is widely acknowledged that digital literacy goes beyond the simple use of tools, and serves as a multi-dimensional comprehensive competency involving teaching, scientific research, ethics and social services.

The booming digital technology injects new impetus into education and teaching. University teachers are required to possess basic digital literacy, mainly including theoretical cognitive literacy, technical application literacy, data integration literacy and ethical security literacy[7]. In line with the school-running orientation of Liaoning universities that serve equipment manufacturing, modern agriculture and modern service industries, the core connotations are summarized into six aspects. First, establish awareness of intelligent digital teaching and actively embrace new teaching modes. Second, proficiently apply various digital tools such as smart teaching platforms, AI lesson preparation systems and virtual simulation software. Third, develop digital curriculum resources tailored to local industrial characteristics. Fourth, conduct learning situation analysis based on big data and realize data-driven teaching evaluation. Fifth, abide by digital ethics, and strictly safeguard data security and academic integrity. Sixth, strengthen collaborative capabilities between universities, local authorities and enterprises, and link digital teaching with the development of regional industries.

3. Current Situation and Predicaments of University Teachers' Digital Literacy in Liaoning Province

3.1. Distinct Regional and Personnel Stratification and Imbalanced Overall Development

Digital construction of universities in Liaoning varies greatly across regions. Universities in economically advantaged areas are equipped with complete hardware facilities and sufficient resources, where teachers generally have a higher level of digital literacy. By contrast, universities in less developed regions suffer from fund shortages, resulting in backward digital

hardware and network environments. Teachers there lack regular scenarios for digital teaching. The regional economic gap leads to uneven distribution of digital construction resources among universities, a common problem across Northeast China.

In addition, teachers' capabilities differ significantly by age. Senior teachers are reluctant to learn new digital technologies due to psychological resistance, while young teachers focus more on tool operation rather than in-depth teaching integration. This creates a pattern of "polarization and middle-tier gap", which is also a common challenge for university teachers' digital capability development nationwide.

3.2. Rigid Training Modes and Content Detached from Regional Industrial Demands

Current training activities mainly adopt unified online courses and short-term lectures with monotonous forms, without hierarchical and categorized training based on disciplines and age groups. Training content focuses on general digital technology explanation, lacking localized cases related to Liaoning's intelligent manufacturing, modern agriculture and cultural tourism industries, which disconnects theories from practice. Moreover, training lays excessive emphasis on theories rather than practical operations, with few hands-on exercises and project training sessions, leading to poor training effectiveness. The one-size-fits-all training mode cannot meet the personalized development needs of teachers from different majors and with different capability levels.

3.3. Fragmented Teaching and Research Collaboration and Insufficient Industry-Education Integration

Digital teaching and research in local universities mostly rely on individual exploration. Cross-disciplinary communication within universities and cross-regional cooperation between universities are inadequate, and many virtual teaching and research offices operate in name only, making it difficult to share high-quality resources and experience. Cooperation between universities and local digital and manufacturing enterprises remains superficial. Teachers have few opportunities to work in industrial frontlines, so they cannot integrate cutting-edge digital achievements of industries into classroom teaching. Superficial industry-education integration and inadequate digital teaching and research collaboration have become key bottlenecks restricting the digital teaching reform of local universities.

4. Innovation Path of University Teachers' Digital Literacy Improvement Mechanism Under Intelligent Digital Transformation

Combined with the national strategy for digital education and the requirements for comprehensive revitalization of Liaoning, this paper constructs a long-term five-in-one improvement mechanism featuring targeted training, platform empowerment, collaborative teaching and research, evaluation and incentives, as well as regional linkage.

4.1. Innovate Hierarchical and Categorized Training Mechanism and Build Localized Training System

Training is implemented hierarchically according to teachers' age and capabilities. Basic digital skill courses are offered for senior teachers; advanced courses covering AI teaching and virtual simulation curriculum design are provided for young and middle-aged teachers; and frontier research on digitalization is organized for academic leaders. Localized training content is developed centering on Liaoning's characteristic industries such as equipment manufacturing, new energy and red cultural tourism, incorporating typical cases of local industrial digital and intelligent transformation. A combined mode of online learning and offline practical training is adopted to distribute high-quality resources to disadvantaged regions and narrow the regional

gap. Hierarchical training combined with industry-specific content is an effective way to improve the quality of digital literacy training.

4.2. Optimize Intelligent Digital Platform Support Mechanism and Improve Software and Hardware Facilities

Increase provincial financial investment to upgrade hardware facilities including smart classrooms and virtual simulation laboratories in disadvantaged universities, and build a provincial shared digital teaching resource library. Further deepen university-enterprise cooperation to establish practical training bases for teachers, arrange on-the-job training in enterprises and invite enterprise experts to deliver guidance on campus. Rely on virtual teaching and research offices to build cross-regional and cross-disciplinary communities, break inter-university barriers and realize experience sharing. The overall arrangement of digital platforms and resource libraries at the provincial level can effectively balance resource allocation among universities.

4.3. Establish Collaborative Teaching and Research Mechanism and Deepen Industry-Education Integration

Carry out regular digital teaching and research activities by discipline, and explore the integration mode of "digital technology + curriculum + industry" based on professional characteristics. Set up special tracks for digital teaching in provincial teaching innovation competitions to promote teaching improvement and summarize and promote excellent teaching models. Establish an alliance for digital literacy improvement together with universities across Northeast China and organize joint regional training to boost the overall development of digital education in the region. Teaching and research collaboration driven by competitions and alliances accelerates the implementation and promotion of digital teaching achievements.

5. Conclusion

Intelligent digital transformation is a vital opportunity for Liaoning's higher education to achieve high-quality development and serve the comprehensive revitalization of the region. Currently, the construction of university teachers' digital literacy in Liaoning is restricted by multiple factors including mechanisms, resources and collaboration. Only by adhering to national strategies and local development demands and fully implementing the five-in-one improvement mechanism can relevant bottlenecks be resolved. Comprehensively enhancing university teachers' digital literacy, promoting the in-depth integration of digital technology with teaching and industries, and cultivating high-caliber talents matching Liaoning's modern industrial system will provide solid talent support and intellectual guarantee for the comprehensive revitalization of Northeast China.

Acknowledgments

Research on the Training Path of Short Drama Talents under the 15th Five-Year Plan Digital Culture Strategy (LMJX2026110).

Research on the Improvement Mechanism of Digital Literacy for Teachers in Private Colleges and Universities (LMJX2026117).

References

- [1] Xi, J. P. (2022). Hold high the great banner of socialism with Chinese characteristics and strive in unity to build a modern socialist country in all respects - Report to the 20th National Congress of the Communist Party of China. People's Press.

- [2] Ministry of Education of the People's Republic of China, Ministry of Industry and Information Technology of the People's Republic of China, Ministry of Finance of the People's Republic of China, Ministry of Science and Technology of the People's Republic of China, & China Association for Science and Technology. (2025). Action Plan for "Artificial Intelligence + Education".
- [3] CPC Central Committee. (2025). Communiqué of the Fourth Plenary Session of the 20th Central Committee of the Communist Party of China. Central Compilation & Translation Press, Foreign Languages Press.
- [4] People's Government of Liaoning Province. (2023). Three-Year Action Plan for New Breakthroughs in Comprehensive Revitalization of Liaoning (2023-2025).
- [5] General Office of the Ministry of Education of the People's Republic of China. (2025). Notice on Organizing and Implementing the Initiative of Empowering Teacher Development through Digitalization.
- [6] Zhao, W. N. (2025). Cultivation strategies of university teachers' digital literacy under the background of educational digital transformation. *Innovation and Entrepreneurship Theory Research and Practice*, 8(24), 125–127.
- [7] Zhou, L. F., & Zhang, M. X. (2022). Connotation, current situation and cultivation path of university teachers' digital literacy in the digital era. *Journal of Gansu Open University*, 32(4), 1–6.