

Developing Digital Competence for Pre-Service Teachers in Vietnam: Enhancing the Quality of Educational Human Resources in the Context of Digital Transformation

Le Van Hai

Faculty of Education, Thu Dau Mot University, Vietnam

ABSTRACT: Digital transformation is reshaping education systems worldwide, placing new demands on the development of high-quality educational human resources. In this context, digital competence has emerged as a core competency for pre-service teachers. This study aims to analyze the role, current status, and challenges in developing digital competence among pre-service teachers in Vietnam, and to propose relevant solutions in the context of educational digital transformation.

Using a qualitative research approach, the study synthesizes theoretical frameworks such as DigComp 2.1 and UNESCO guidelines, and examines practical implementation through a case study at Thu Dau Mot University. The findings indicate that digital competence extends beyond technical skills to include information processing, communication, content creation, and ethical awareness in digital environments. Empirical evidence shows that while digital infrastructure and learning environments have been significantly improved, the development of higher-order digital pedagogical competencies remains limited.

The study identifies a critical gap between technology access and meaningful pedagogical integration, and proposes solutions including curriculum redesign, faculty development, and the enhancement of digital learning ecosystems. These findings contribute to improving teacher education and strengthening the quality of educational human resources in Vietnam's digital transformation era.

KEYWORDS: Digital competence; Pre-service teachers; Educational digital transformation; Teacher education; Vietnam.

I. INTRODUCTION

Digital transformation has become an inevitable trend, profoundly affecting all sectors of society, particularly education. In the context of the Fourth Industrial Revolution, the rapid development of digital technologies is not only reshaping teaching and learning methods but also redefining the requirements for educational human resources.

Among the essential competencies required in this context, digital competence has been widely recognized as a fundamental capability that enables individuals to effectively participate in knowledge-based societies and engage in lifelong learning (Mai, A. T., 2023). For pre-service teachers, digital competence is not merely a personal skill but a professional requirement, as they are expected to integrate technology into teaching practices and support learners in digital environments.

International frameworks such as DigComp 2.1 define digital competence as a combination of knowledge, skills, and attitudes related to information processing, communication, content creation, safety, and problem-solving in digital contexts (European Commission, 2017). Similarly, UNESCO emphasizes digital competence as a key enabler for lifelong learning and sustainable development (UNESCO, 2021).

In Vietnam, digital transformation in education has been strongly promoted through national policies. The National Digital Transformation Program highlights the critical role of education in developing digital human resources (Prime Minister, 2020), while Resolution No. 57-NQ/TW further emphasizes the strategic importance of digital transformation in socio-economic development (Politburo, 2024). In addition, Circular No. 02/2025/TT-BGDĐT provides a national framework for digital competence, serving as a foundation for integrating digital skills into educational programs.

Despite these efforts, the development of digital competence among pre-service teachers in Vietnam remains limited. Existing studies indicate that while students are generally capable of using basic digital tools, they lack higher-order competencies such as digital pedagogical design and meaningful technology integration (Ha, T. K. L., Dam, T. K. T., Nguyen, T. T. H., & Duong, T. N., 2025). Furthermore, there is a noticeable gap between policy directions and actual implementation in teacher education institutions.

Developing Digital Competence for Pre-Service Teachers in Vietnam: Enhancing the Quality of Educational Human Resources in the Context Of Digital Transformation

Therefore, this study aims to: (1) examine the theoretical foundations of digital competence in teacher education; (2) analyze the current situation of digital competence development among pre-service teachers in Vietnam; and (3) propose solutions to enhance digital competence in alignment with educational digital transformation.

This study contributes by highlighting the gap between technological access and pedagogical integration, providing a contextualized understanding of digital competence development in teacher education in Vietnam.

II. METHODOLOGY

This study employs a qualitative research approach to analyze the development of digital competence among pre-service teachers in Vietnam. The research is based on document analysis and a case study. Document analysis is used to review international frameworks such as DigComp 2.1 (European Commission, 2017) and UNESCO guidelines (UNESCO, 2021), as well as national policies related to digital transformation in education in Vietnam. In addition, a case study is conducted at Thu Dau Mot University to examine the practical implementation of digital transformation in teacher education. Data are collected from institutional reports and relevant academic studies, and analyzed using content analysis to identify key patterns in digital competence development.

III. RESULTS AND DISCUSSION

3.1. Theoretical perspectives on digital competence in teacher education

Digital competence has been widely recognized as a multidimensional construct that goes beyond basic technical skills. According to DigComp 2.1, digital competence includes five key areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving (European Commission, 2017). Similarly, UNESCO emphasizes the integration of digital competence with lifelong learning and sustainable development goals (UNESCO, 2021).

In the context of teacher education, digital competence is closely associated with pedagogical practices. It requires not only the ability to use digital tools but also the capacity to design, implement, and evaluate teaching activities in digital environments. Recent studies indicate that digital competence for pre-service teachers should be understood as the integration of technological, pedagogical, and social competencies in digital contexts (An, B. T., Nguyen, T. L. N., & Trinh, T. P. T, 2024).

This perspective highlights that digital competence is not merely an individual skill set but a professional competence that directly influences teaching quality. Therefore, developing digital competence for pre-service teachers requires a systematic approach that integrates theory, practice, and policy.

3.2. Current practices in developing digital competence: Evidence from Vietnam

In practice, many teacher education institutions in Vietnam have actively implemented digital transformation initiatives, particularly in teaching, learning, and academic management. The use of Learning Management Systems (LMS), online learning platforms, and blended learning models has become increasingly common, creating opportunities for students to engage in digital learning environments.

A case study at Thu Dau Mot University provides empirical evidence of this transformation. According to institutional reports, 100% of core educational activities are managed through the Edusoft system, ensuring a fully digitalized training process (Thu Dau Mot University, 2024) (Thu Dau Mot University, 2025). This indicates that digital transformation has been integrated into the institutional infrastructure rather than being limited to experimental practices.

In addition, digital technologies have been widely applied in assessment activities. The TDMU Exam system has been implemented on a large scale, with 119 exam sessions, 923 exam rooms, and more than 100,000 student participations. These figures demonstrate the extensive use of digital systems in evaluation processes, contributing to transparency, efficiency, and scalability.

Furthermore, the university has developed a rich digital learning environment, including over 26,000 digital learning materials and nearly 24,000 electronic resources, which support students' independent learning and information processing skills. Such a digital ecosystem plays a crucial role in fostering self-directed learning and lifelong learning competencies.

However, despite the strong digital infrastructure, the level of pedagogical integration remains limited. Approximately 20% of course content is delivered through online or blended formats, indicating that digital technologies are not yet fully embedded in teaching practices. This suggests that while digital access has improved significantly, the transformation of pedagogical practices is still in progress.

These findings are consistent with previous research, which indicates that pre-service teachers are generally proficient in basic digital skills but lack higher-order competencies such as designing digital learning activities and applying technology in pedagogically meaningful ways (Ha, T. K. L., Dam, T. K. T., Nguyen, T. T. H., & Duong, T. N., 2025).

Developing Digital Competence for Pre-Service Teachers in Vietnam: Enhancing the Quality of Educational Human Resources in the Context Of Digital Transformation

3.3. Key challenges in developing digital competence

Despite the progress in digital transformation, several challenges remain in developing digital competence for pre-service teachers.

First, there is a significant gap between technological access and pedagogical integration. While digital infrastructure and tools are widely available, their effective use in teaching and learning remains limited. Many educational practices still focus on content delivery rather than interactive and student-centered digital learning.

Second, the digital competence of teacher educators is uneven. The successful integration of technology in education depends heavily on the capacity of lecturers to design and implement digital learning activities. However, not all educators possess sufficient digital pedagogical skills, which affects the quality of training.

Third, curriculum design has not fully incorporated digital competence as a core learning outcome. In many cases, digital skills are treated as supplementary rather than essential components of teacher education programs. This leads to fragmented and inconsistent development of digital competence among students.

Finally, there is a mismatch between policy orientation and practical implementation. Although national policies strongly emphasize digital transformation, the translation of these policies into concrete teaching practices remains a challenge at the institutional level.

3.4. A Case Study of Digital Competence Development at Thu Dau Mot University

Thu Dau Mot University (TDMU) provides a representative example of digital transformation in Vietnamese higher education, particularly in teacher education. The university has identified digital transformation as a strategic direction to improve educational quality and institutional management in alignment with national digital transformation policies.

At the institutional level, TDMU has developed a relatively comprehensive digital infrastructure. According to institutional reports, 100% of core educational activities are managed through the Edusoft system, enabling the university to digitalize major processes such as course registration, academic monitoring, and graduation management (Thu Dau Mot University, 2024) (Thu Dau Mot University, 2025). This demonstrates that digital transformation has moved beyond isolated technological adoption toward system-wide integration.

Elearning interface Thu Dau Mot University

Digital transformation is also evident in assessment practices. The TDMU Exam system has been implemented on a large scale, with 119 examination sessions, 923 examination rooms, and 100,985 student participations. These figures indicate that digital technologies have been effectively embedded in assessment management, contributing to transparency, efficiency, and institutional scalability.



(Picture 1. Main screen of the online course registration website for students of Thu Dau Mot University)

Developing Digital Competence for Pre-Service Teachers in Vietnam: Enhancing the Quality of Educational Human Resources in the Context Of Digital Transformation

In addition, TDMU has invested in digital learning resources. The university currently maintains more than 26,700 digital documents and approximately 23,900 electronic learning materials, providing students with broad access to academic resources and strengthening their capacity for self-directed learning. Such an environment is particularly significant for pre-service teachers, who are expected not only to use digital resources but also to guide future learners in digital contexts.

However, the case of TDMU also reveals important limitations. Although digital infrastructure is relatively strong, pedagogical integration remains uneven. Approximately 20% of course content is delivered through online platforms or blended formats (Prime Minister of Vietnam, 2020); (Trinh, H. C., 2024), suggesting that digital technologies are still not fully embedded in teaching practices across the curriculum. This indicates that institutional digital transformation does not automatically lead to the full development of digital pedagogical competence among students.

Overall, the case of TDMU illustrates both the opportunities and constraints of digital competence development in teacher education. It shows that infrastructure expansion and system digitalization can create favorable conditions for competence development, but meaningful pedagogical transformation requires stronger curricular integration and educator readiness.

3.5. Implications for Enhancing the Quality of Educational Human Resources

Based on the findings above, several implications can be drawn for improving the quality of educational human resources through the development of digital competence among pre-service teachers in Vietnam.

First, digital competence should be integrated systematically into teacher education curricula. Rather than being treated as an additional or optional component, it needs to be embedded in learning outcomes, course design, teaching activities, and assessment practices. Such integration would help ensure that digital competence is developed progressively and coherently throughout teacher education programs.

Second, strengthening the digital pedagogical competence of teacher educators is essential. Since teacher educators play a decisive role in shaping students' professional practices, their ability to integrate technology meaningfully into teaching must be enhanced through continuous professional development and institutional support.

Third, digital infrastructure should be linked more closely with pedagogical innovation. The case of TDMU shows that strong digital systems and learning resources can support competence development, but infrastructure alone is insufficient. Institutions need to create teaching and learning environments that encourage interaction, creativity, critical thinking, and authentic digital practice.

Fourth, more experiential learning opportunities should be provided for pre-service teachers. Activities such as digital lesson design, online teaching practice, and participation in technology-enhanced educational projects can help students move beyond basic digital literacy toward professional digital competence.

Finally, the alignment between national policy and institutional implementation should be strengthened. Although Vietnam has made significant progress in establishing policy frameworks for digital transformation, the translation of these policies into concrete educational practices remains inconsistent. Closer coordination among policymakers, institutions, and educators is therefore necessary to ensure sustainable and effective digital competence development.

These implications suggest that improving educational human resources in the digital era requires not only technological access but also a comprehensive strategy that connects policy, pedagogy, curriculum, and institutional practice.

IV. CONCLUSION

This study examined the development of digital competence among pre-service teachers in Vietnam in the context of educational digital transformation. The findings confirm that digital competence is not only a core professional requirement for future teachers but also a critical factor in improving the quality of educational human resources.

The results indicate that although digital competence has been emphasized in policy frameworks and has been partially implemented in practice, its development remains fragmented and insufficiently coordinated. Key challenges include the lack of systematic integration into teacher education curricula, limitations in the digital pedagogical competence of teacher educators, inadequate infrastructure in some contexts, and a gap between policy orientations and practical implementation.

The case of Thu Dau Mot University provides empirical evidence that digital transformation can effectively support the development of digital competence through investment in digital infrastructure, the establishment of digital learning ecosystems, and the implementation of technology-enhanced training activities. However, the effectiveness of these initiatives depends largely on institutional coordination and the capacity of educators to integrate digital technologies into pedagogical practices.

This study contributes both theoretically and practically by clarifying the concept and development of digital competence in teacher education in Vietnam, and by offering implications for curriculum innovation, faculty development, and digital transformation strategies in higher education.

Developing Digital Competence for Pre-Service Teachers in Vietnam: Enhancing the Quality of Educational Human Resources in the Context Of Digital Transformation

Nevertheless, this study has certain limitations, as it is based on a qualitative approach and secondary data sources. Future research could employ quantitative methods or comparative studies across different teacher education institutions to enhance the generalizability and reliability of the findings.

REFERENCES

- 1) An, B. T., Nguyen, T. L. N., & Trinh, T. P. T. (2024). Developing a digital competence framework for pre-service teachers in Vietnam. *Vietnam Journal of Education*, 1-6.
- 2) Chang & Huynh. (2016). *ASEAN in transformation: The future of jobs at risk of automation*. International Labour Organization.
- 3) European Commission. (2017). *DigComp 2.1: The digital competence framework for citizens*. Publications Office of the European Union.
- 4) Ha, T. K. L., Dam, T. K. T., Nguyen, T. T. H., & Duong, T. N. (2025). Developing digital competence for pre-service teachers: A contextual approach from the digital higher education environment. *TNU Journal of Science and Technology*, 111-118.
- 5) Henriette, E.; Feki, M.; Boughzala, I. (2015). The shape of digital transformation: A systematic literature review . *Mediterranean Conference on Information Systems*.
- 6) Mai, A. T. (2023). *Developing digital competence for university students (Doctoral dissertation)*. Ho Chi Minh City University of Technology and Education.
- 7) Politburo of Vietnam. (2024). *Resolution No. 57-NQ/TW on breakthroughs in science, technology, innovation, and national digital transformation*.
- 8) Prime Minister of Vietnam. (2020). *Decision No. 749/QĐ-TTg approving the National Digital Transformation Program to 2025, with orientations to 2030*.
- 9) Redecker, C. (2017). *European framework for the digital competence of educators (DigCompEdu)*. Publications Office of the European Union.
- 10) Thu Dau Mot University. (2024). *Annual report for the academic year 2023–2024 and strategic directions for 2024–2025*.
- 11) Thu Dau Mot University. (2025). *Annual report for the academic year 2024–2025 and strategic directions for 2025–2026*.
- 12) Trinh, H. C. (2024). Digital Transformation in Education at Thu Dau Mot University. *International Journal of Social Science Humanity & Management Research*, 1071-1078.
- 13) UNESCO. (2021). *Digital literacy and digital competence frameworks*. UNESCO Publishing.