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Digital technologies in teaching: insights from Vietnamese teacher educators through a European perspective

Summary

In the context of the knowledge society, the rapid development and pervasive integration of digital technologies have positioned digital competence as a key priority in higher education. In addition to their roles in teaching and curriculum development, teacher educators play a crucial role in preparing future teachers to effectively integrate technology into the classroom. Strengthening their digital competence is essential for fostering innovative pedagogical practices and supporting the broader digital transformation of education. In Vietnam, educational digital transformation has been a national priority since 2019; however, significant challenges remain in equipping teacher educators with the necessary digital skills and pedagogical strategies. Existing research has primarily focused on school teachers and students, leaving a gap in understanding the digital competence of teacher educators in higher education. The aim of this pilot study is to identify and examine the key challenges that teacher educators in Vietnam face in developing digital competence across five domains, and to interpret these challenges through the European HeDiCom framework. This study explores the challenges in developing digital competence among teacher educators at three major universities of education in Ha Noi, Ho Chi Minh City, and

Da Nang. A questionnaire survey involving 59 participants was designed and interpreted using the HeDiCom (Higher Education Digital Competence) framework, focusing on barriers related to infrastructure, pedagogical integration, organisational support, workload, and international collaboration. The findings reveal moderate levels of competence and motivation, alongside persistent structural barriers. Interpreted through the European HeDiCom framework, the results highlight common challenges and provide insights for developing inclusive and sustainable strategies to enhance digital competence in Vietnamese higher education institutions (HEIs).

Keywords: digital competence, higher education, teacher education, digital transformation, teacher educator

Introduction

In the information and knowledge society, the rapid advancement and deep integration of technology into our lives have made the development of digital competence one of the most prominent concerns in education (Zhao et al., 2021). Following the outbreak of COVID-19 and its impact on the education sector, concerns about digital competence have intensified across all levels of education, reaching new heights, including in higher education.

Teacher educators, in addition to their responsibilities for teaching, curriculum development, and monitoring learning through various digital platforms, play a key role in educating and preparing future teachers to integrate digital technologies into their classrooms (Tondeur et al., 2019; Uerz et al., 2018). Developing digital competence is therefore essential for teacher educators, as it enables them to design and implement innovative pedagogical approaches that are vital in the era of digital transformation – a comprehensive process that leverages digital technologies to enhance teaching practices and provide enriched learning experiences (Alenezi, 2021).

Recognising the benefits of digital transformation, the Vietnamese Government began investigating and implementing digital transformation within the education sector in 2019, marking the onset of the Digital Transformation Era in Vietnam. The integration of digital technologies into higher education presents significant challenges, particularly in preparing future teachers to navigate a digital society (Thái et al., 2021). Despite the growing importance of digital technologies in education, research on digitalisation in Vietnam has primarily focused on school education and students (Hoang et al., 2022; O'Connor et al., 2023), with minimal attention given to the digital competencies of teacher educators, especially in the context of preparing future teachers. There is still limited understanding of how teacher educators in Vietnamese universities are incorporating these technologies into their teaching practices.

This study explores the challenges of digital integration encountered by teacher educators within the context of ongoing educational reforms and digital transformation in Vietnamese higher education. Moreover, the impact of institutional and systemic factors – such as technology access, support programs, and educational policies – on the development of digital competencies of future teachers remains underexplored. While teacher educators are expected to develop their own digital competencies, the mechanisms and barriers to achieving this remain insufficiently studied, particularly across different regions and institutional contexts in Vietnam. By situating the analysis within a European theoretical perspective, this study also positions Vietnamese findings within broader international debates on digital competence development.

To address these gaps, this study explores the challenges faced by teacher educators in developing their own digital competence across three major Vietnamese cities: Ha Noi, Ho Chi Minh City, and Da Nang. These cities represent diverse educational and technological contexts, enabling a comparative understanding of regional conditions. Data were collected through a pilot study with a questionnaire survey involving 59 teacher educators from Ha Noi National University of Education, Ho Chi Minh City University of Education, and the University of Da Nang – University of Science and Education.

The article is structured as follows: first, a review of the relevant literature on digital competence and teacher education is presented; next, the research methodology, including participants, instruments, and data collection procedures, is described; this is followed by a presentation of the study's findings and an in-depth discussion; finally, the article concludes with implications for policy and practice, as well as recommendations for future research.

Recent educational developments in Vietnamese higher education

In a study on Vietnamese educational development, Vallely (2005) highlighted ongoing efforts to address structural and contextual challenges in advancing educational progress. Three key lessons emerged from his analysis of policies concerning teacher workforce development, educational management, and strategies for mobilising social resources to promote educational advancement. First, the Vietnamese government has consistently regarded education and training, together with science and technology, as top national priorities. Second, the education system must undergo comprehensive reform to promote democratisation, socialisation, diversification, standardisation, and modernisation. Third, educational

management reform should begin with new conceptual and strategic approaches to educational development.

The past decade has witnessed remarkable progress in Vietnamese higher education as a result of Resolution No. 29-NQ/TW. The reform has significantly transformed the system, marking "a pivotal phase in the sector's development trajectory" and reflecting comprehensive efforts to improve both quality and efficiency. Key achievements include: (1) the expansion of higher education infrastructure, with the number of universities increasing from 214 to 242, alongside strong growth in master's and doctoral programs; (2) significant improvements in educational and research quality, through curricular reform, new pedagogical practices, and a stronger emphasis on scientific research; (3) the advancement of internationalisation, with Vietnamese universities building partnerships with international counterparts to exchange knowledge and enhance global standing; and (4) a strong digital transformation, where information technology has been applied to educational management, teaching, and learning to optimise operations and enrich the student experience. Overall, these developments underscore the dynamic evolution of Vietnam's higher education system and its vital role in socio-economic development and global integration (Nguyen, 2024).

Digital transformation in education has become a global priority, and Vietnam has actively pursued this agenda by incorporating technology into teaching and learning. The Vietnamese Ministry of Information and Communications (MIC) issued Circular No. 03/2014/TT-BTTTT, establishing Information and Communication Technologies (ICT) skills standards for the education sector. More recently, the Prime Minister's Decision No. 2222/QĐ-TTg (December 30, 2021) approved the National Digital Transformation Programme for vocational education through 2025, with orientations toward 2030. These initiatives have laid a solid foundation for a profound shift toward digital transformation, particularly in higher education. Moreover, the forthcoming Higher Education Strategy 2021–2030 in Vietnam, as outlined by the Ministry of Education and Training (MOET), highlights governance modernisation, quality assurance, and faculty development as strategic priorities for reform (Parajuli et al., 2020, p. 21). These priorities align closely with the need to strengthen teacher educators' digital competence as part of Vietnam's broader digital transformation agenda.

According to Le Thi Thanh Thu (2024), the implementation of the national digitalisation agenda prioritises the development of platforms that support distance teaching and learning, ensuring the comprehensive integration of digital technologies in management, pedagogy, and assessment. All higher education institutions are required to offer distance learning opportunities, with pilot initia-

tives mandating that at least 20% of course content be delivered online. The policy further emphasises three key priorities: the digitalisation of learning materials, the establishment of a centralised data warehouse for sharing both online and face-to-face teaching resources, and the enhancement of educational technologies to support personalised instruction and learning. Collectively, these priorities reflect Vietnam's strong commitment to building a digitally empowered higher education system.

Digital competence in higher education

Digital competence has become a fundamental requirement in higher education worldwide as universities adapt to the increasing digitalisation of teaching, learning, and research. While early definitions often focused on the ability to operate digital tools and online technologies, modern perspectives view digital competence as a multifaceted concept. The OECD (2013) describes competence as the ability to meet complex demands by mobilising psychosocial resources such as skills, knowledge, and attitudes. Likewise, the Llywodraeth Cymru Welsh Government (Welsh Government, 2018) defines digital competence as a broad range of knowledge, skills, and dispositions that enable individuals to use digital technologies confidently, creatively, and responsibly. Across global academic discourse, related terms – such as ICT skills, digital literacy, and digital skills – are often used interchangeably (Zhao et al., 2021), reflecting the evolving understanding of digital competence in higher education.

In Europe, digital competence in higher education has been shaped by a series of influential frameworks that integrate both pedagogical and technological dimensions. The European Framework for the Digital Competence of Educators (DigCompEdu) provides one of the most comprehensive policy-guided models, outlining 22 competencies across six domains to support high-quality and inclusive digital education (Caena & Redecker, 2019). Complementing this policy focus, the pedagogical model TPACK (Technological Pedagogical Content Knowledge) has gained significant recognition for explaining how educators integrate technology into teaching through the interplay of technological, pedagogical, and content knowledge (Koehler, 2013). Together, these frameworks illustrate Europe's systemic approach, which views digital competence as a multi-dimensional construct embedded at individual, institutional, and policy levels. This conceptual foundation has informed the development of newer, higher education–specific models, such as the HeDiCom framework (Tondeur et al., 2023), which further extends the European understanding of digital competence into the university context.

Digital competence in higher education is increasingly recognised as a multidimensional construct that goes beyond just technical skills. Modern research shows that university educators need a wide range of technological, pedagogical, and professional skills to teach effectively in digitally enhanced environments. Studies emphasise that teacher educators are often called "second-order teachers" (Uerz et al., 2018) must not only use digital tools in their own teaching but also demonstrate, justify, and assess digital pedagogical practices for the teachers they train. This positions them uniquely within the academic system, requiring a more complex set of digital skills than those usually expected at the school level.

A growing body of European and international literature conceptualises digital competence as functioning across multiple levels. At the individual level, teacher educators require technological knowledge, pedagogical judgment, and confidence in navigating digital environments (Krumsvik, 2014; Zhao et al., 2021). At the institutional level, digital competence is influenced by infrastructure, organisational processes, and access to technical or professional development support (Amhag et al., 2019). At the systemic or policy level, national priorities, quality assurance mechanisms, and broader digitalisation strategies affect how universities structure and promote digital teaching (European Commission, 2020). This multilevel perspective aligns with global views recognising that digital transformation cannot rely solely on individual skill development; it must be underpinned by institutional readiness and policy coherence.

The multidimensional and multilevel conceptualisation provides a strong theoretical foundation for understanding the various challenges faced by teacher educators. Existing research consistently identifies several areas that affect teacher educators' digital competence: the availability and reliability of infrastructure, the capacity to integrate digital technologies pedagogically, the level of organisational support, workload and competing demands, and opportunities for international collaboration or networking (Wagner et al., 2024; Lindfors et al., 2021). These areas are closely interconnected and collectively influence teacher educators' ability to incorporate digital technologies sustainably and meaningfully in higher education.

Applying a European perspective to the Vietnamese higher education context is valuable because both regions identify digital transformation as a strategic priority. Using this multilevel approach, the present study examines five domains influencing teacher educators' digital competence – infrastructure, pedagogical integration, organisational support, workload, and international collaboration – to explore how Vietnam's digitalisation efforts intersect with everyday teaching practice.

Challenges facing teacher educators amid the digital transformation of Vietnamese higher education

Teacher educators play a crucial role in preparing future teachers by imparting subject knowledge, developing teaching skills, and supporting professional development (Loughran, 2014). To fulfil these responsibilities effectively, they must possess strong digital competence, enabling them to manage disciplinary knowledge and integrate digital tools into both teaching and research practices (Ramírez-Montoya et al., 2017). These competencies are essential for developing practical pedagogical knowledge, enhancing student learning, and equipping students for life and work in a digital society. Additionally, these abilities help teacher educators develop and uphold the fundamental competencies required for their profession (Štemberger & Konrad, 2021). Consequently, their digital competence significantly influences their professional and educational careers. This demands ongoing self-improvement and active engagement in professional development throughout their careers (Van der Klink et al., 2017). However, advancing digital competence remains challenging at both individual and institutional levels. Teacher educators often struggle to use digital tools effectively and to translate their pedagogical potential into meaningful classroom practices. At the institutional level, excessive workload and overlapping responsibilities often limit opportunities for participation in continuing professional development, hindering sustained growth in digital competence. Similar concerns about numerous time-consuming tasks and insufficient time for professional learning have also been identified in other empirical studies with teacher educators (Wagner et al., 2024).

According to O'Connor et al. (2023), following the COVID-19 pandemic, teacher educators in Vietnam face challenges similar to those encountered globally, encompassing technological, pedagogical, institutional, and systemic dimensions. A continuing challenge is ensuring that lessons learned from the pandemic are effectively applied to enhance teaching and learning in engaging, sustainable ways. Another persistent concern is how to integrate the strengths of face-to-face pedagogy into blended approaches that meet the professional and social needs of both educators and learners. Hoang et al (2022) found that teacher educators in Vietnamese universities of education generally possess intermediate levels of digital competence, with younger educators demonstrating higher ICT proficiency and minimal gender differences. Significant challenges include limited practical skills in digital content creation and problem-solving, insufficient hands-on training, and infrastructural constraints such as unstable internet access and inadequate institutional support. These findings underline how both individual and systemic factors restrict the sustainable development of teacher educators' digital competence in Vietnam.

To address this gap, the present study investigates the challenges faced by teacher educators in Vietnamese higher education as they develop and apply digital competence amid the ongoing digital transformation. The study examines how individual, institutional, and systemic factors interact to shape their professional experiences. This study seeks to provide an evidence-based understanding of the barriers that hinder teacher educators' effective integration of digital technologies into teaching and learning across the regions of Vietnam: Ha Noi, Da Nang, and Ho Chi Minh City. Guided by this aim, the pilot study focused on two research questions: (RQ1) What are teacher educators' perceived challenges across key domains, including infrastructure, digital competence, pedagogical integration, workload and stress, and international perspectives? (RQ2) Do these challenges differ across the three cities?

Methodology

Data collection tools and strategy

To answer the main two research questions, a questionnaire was designed based on insights from international research on educators' digital competence and digitalisation in higher education, which emphasises that competence extends beyond technical skills to include pedagogical and professional dimensions shaped by institutional and systemic factors (O'Connor et al., 2023; Tondeur et al., 2019; Wagner et al., 2024). The survey therefore, addressed five interrelated areas – infrastructure and access, digital competence and professional development, pedagogical integration, workload and stress, and international perspectives – reflecting the multifaceted nature of digital transformation in higher education

The structure and content of the questionnaire were conceptually informed by existing international research on educators' digital competence and digitalisation in higher education. Data were collected through an online survey using Google Forms. The survey was distributed to all teacher educators at three major universities (frame $n = 90$) and received 59 voluntary responses (response rate: 66%).

The questionnaire included 41 questions, written in English by the international research team and then translated into Vietnamese, organised into 7 sections. Section A collected demographic and professional background information, including gender, age, work experience in higher education, teaching subject, institution, and prior experience integrating digital tools into teaching. Sections B to F explored specific areas of challenge: B – Infrastructure and Access, C – Digital Competence and Professional Development, D – Pedagogical Integration, E – Workload, Stress, and Professional Motivation, and F – Comparative and Regional Perspectives.

Sections B–F included items measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree, plus an additional N/A = Not applicable/No experience). The final section (G) contained open-ended questions inviting participants to elaborate on their experiences, reflections, and suggestions. Respondents were encouraged to describe the main challenges encountered when integrating digital technologies into teaching, systemic and institutional supports, international collaboration, and recommendations for enhancing digital teaching and learning in Vietnamese higher education.

To assess aspects of technology use and challenges, we primarily employed multiple-choice questions organised in a matrix table, with criteria in rows and levels (Likert scale) in columns. The other format used was open questions, which enabled respondents to input relevant information freely. We posed open questions to cross-verify responses and gain deeper insights into the outputs of multiple-choice and tag questions. All data were translated from Vietnamese into English for analysis and report writing.

Data analysis

Quantitative data were analysed by computing respondent-level domain scores (means on 1–5 scales) using pairwise-missing handling; N/A responses were treated as missing for the corresponding domain. Where applicable, items were reverse-coded prior to aggregation. Internal consistency was assessed with Cronbach's α ($\alpha \geq .70$ deemed acceptable for a pilot). Group differences were examined using one-way ANOVA; Levene's test guided post-hoc selection (Tukey when variances were equal; Games–Howell when unequal). Effect sizes were reported as η^2. Analyses were conducted in SPSS.

Participants

The pilot study was conducted using a convenience sample of 59 teacher educators from three major universities of education: Ha Noi National University of Education (HNUE), Ho Chi Minh City University of Education (HCMUE), and The University of Da Nang – University of Science and Education (UED). These institutions were selected because they represent the three most significant urban centres in Vietnam (Ha Noi, Ho Chi Minh City, and Da Nang) with diverse educational and technological infrastructures. Participants varied in academic discipline, years of teaching experience, and exposure to digital teaching practices, ensuring a heterogeneous dataset. Participation was voluntary and anonymous. Informed consent was obtained prior to survey participation.

Results

Sample characteristics

The pilot study included 59 teacher educators from three leading universities of education: Ha Noi National University of Education ($n = 14$, 23.7%), Ho Chi Minh City University of Education ($n = 22$, 37.3%), and the University of Da Nang – University of Science and Education ($n = 23$, 39.0%). The majority of participants were female (66.1%), with males accounting for 33.9%. In terms of teaching experience, the largest group had 11–20 years of experience (40.7%), followed by those with more than 20 years (33.9%); a smaller proportion reported fewer than 10 years.

Participants came from a wide range of academic disciplines, with the largest share in Primary and Early Childhood Education (32.2%) and History (13.6%), as well as smaller numbers from fields such as English, Chemistry, Educational Sciences, and Political Science. Regarding digital teaching experience, nearly half reported a moderate level of experience (49.2%), while 42.4% indicated substantial experience, and only a small fraction had limited or no exposure.

In terms of learning management systems (LMS), the most widely used platform was Microsoft Teams (66.1%), followed by Moodle (11.9%) and internal institutional LMS (6.8%). Other platforms, such as Google Classroom, Blackboard, and Zoom, were mentioned but are far less common.

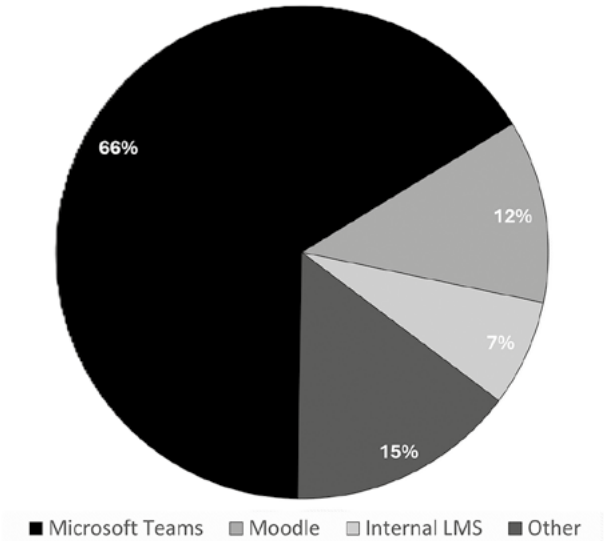


Figure 1. LMS Usage among teacher educators.

Source: Authors' own work.

Descriptive statistics

Descriptive statistics are presented in Table 1. Overall, teacher educators' perceived challenges were moderate, suggesting that while digital transformation in higher education is progressing, substantial barriers remain. Infrastructure and Access (M = 2.37, SD = 0.84) and Digital Competence and Professional Development (M = 2.52, SD = 0.85) were rated relatively low, highlighting critical barriers. Pedagogical Integration challenges were somewhat higher (M = 3.06, SD = 0.78). Workload and Stress also scored moderately (M = 2.52, SD = 0.75). International Perspectives were viewed more positively (M = 3.21, SD = 0.78), although this

Table 1. Descriptive statistics by domain

Domain	Items (k)	Mean	SD	Min	Max
B. Infrastructure & Access	5	2.37	0.84	1.00	4.40
C. Digital Competence & Professional Development	6	2.52	0.85	1.00	4.67
D. Pedagogical Integration	5	3.06	0.78	1.40	4.60
E. Workload & Stress	4	2.52	0.75	1.00	4.25
F. International Perspectives	7	3.21	0.78	1.43	4.71

Items reflected agreement with challenge statements (1 = strongly disagree to 5 = strongly agree); higher scores indicate greater perceived challenge.

Source: Authors' own work.

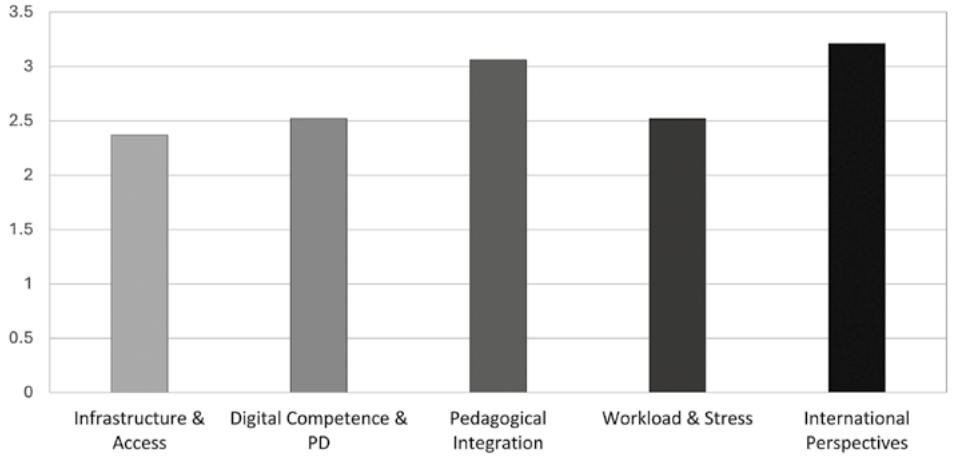


Figure 2. Perceived challenges by domain (mean scores, 1–5).

Source: Authors' own work.

section had higher rates of missing responses due to limited international exposure. Collectively, these findings reveal a nuanced picture of teacher educators' experiences – where infrastructural and professional constraints persist, yet attitudes toward global digital integration remain relatively optimistic.

Reliability

Cronbach's alpha analysis indicated satisfactory internal consistency for most domains: Infrastructure and Access (α = .73), Digital Competence and Professional Development (α = .85), Pedagogical Integration (α = .72), and International Perspectives (α = .84). The Workload and Stress domain produced a lower coefficient

Table 2. Reliability of the domains

Domain	Cronbach's α	N (listwise)	Note
B. Infrastructure & Access	.73	59	Acceptable
C. Digital Competence & Professional Development	.85	59	Strong
D. Pedagogical Integration	.72	59	Acceptable
E. Workload & Stress	.62	59	Low reliability
F. International Perspectives	.84	40	One weak item (F5)

Note. α ≥ .70 generally acceptable for pilot studies; Section E listwise N = 40 due to "Not applicable/No experience" responses.

Source: Authors' own work.

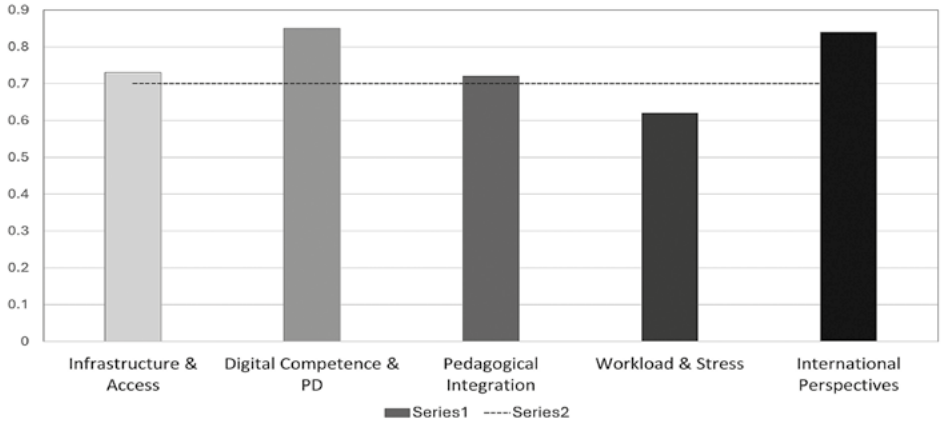


Figure 3. Reliablity of domains (Cronbach's α).

Source: Authors' own work.

(α = .62), which reflects the inherently diverse ways in which teacher educators experience the pressures of digital transformation – such as increased workload, stress, and reduced flexibility. This suggests that the challenges in this area are multifaceted and not easily captured by a single scale. Although one item in the International Perspectives domain demonstrated weaker consistency, the domain as a whole remained robust, underscoring the relevance of international collaboration as both an opportunity and a challenge for Vietnamese teacher educators.

Group comparisons (Ha Noi, Da Nang, Ho Chi Minh City)

One-way ANOVA tests were conducted to examine whether teacher educators' perceived challenges differed significantly across the three cities: Ha Noi, Ho Chi Minh City, and Da Nang. As shown in Table 3, Levene's test results confirmed the assumption of homogeneity of variances for all domains except Pedagogical Integration ($p = .037$), for which the Games–Howell correction was applied. Across all five domains, no statistically significant differences were observed: Infrastructure and Access ($p = .915$), Digital Competence and Professional Development ($p = .336$), Pedagogical Integration ($p = .449$), Workload and Stress ($p = .248$), and International Perspectives ($p = .589$). Effect sizes ($\eta^2 = .003–.049$) were consistently small, indicating minimal variation between cities in participants' responses.

The findings indicate that teacher educators across Vietnam's major cities experience similar challenges in digital transformation, suggesting that these difficulties are not region-specific. This consistency highlights the dominant influence of national and institutional factors over regional contexts and calls for coordinated, system-wide strategies to enhance digital competence and equity in higher education.

Table 3. One-way ANOVA results by city

Domain	Levene p	F(df)	p	η^2	Post hoc
B. Infrastructure & access	.609	F(2,56)=.089	.915	.003	ns
C. Digital competence & Professional development	.716	F(2,56)=1.111	.336	.038	ns
D. Pedagogical integration	.037	F(2,56)=.811	.449	.028	Games–Howell ns
E. Workload & stress	.152	F(2,56)=1.432	.248	.049	ns
F. International perspectives	.972	F(2,56)=.534	.589	.019	ns

Source: Authors' own work.

Discussion and conclusion

This pilot study explored the challenges faced by teacher educators in Vietnam's higher education system during the ongoing digital transformation. The findings demonstrate that teacher educators perceive moderate levels of challenge across five domains, with the most silent difficulties reported in infrastructure, access, digital competence, and pedagogical integration. Despite generally positive attitudes towards digitalisation and international collaboration, the results highlight ongoing structural and professional barriers that constrain teacher educators' ability to effectively incorporate digital technologies into their teaching practice.

The analysis of reliability confirmed that the newly developed questionnaire is a feasible and coherent instrument for investigating these issues, with four of the five domains achieving acceptable internal consistency ($\alpha > .70$). The comparatively lower reliability of the workload and stress scale ($\alpha = .62$) indicates that this dimension may capture heterogeneous and context-dependent experiences of digital transformation. This finding suggests the need for further refinement of the scale in future studies, while also pointing to the complex and multidimensional nature of workload-related digital pressures in higher education. The absence of statistically significant differences between Ha Noi, Ho Chi Minh City, and Da Nang indicates that these challenges are not primarily shaped by regional location, but rather reflect shared institutional and systemic conditions across Vietnam's higher education sector. This pattern supports the interpretation of digital transformation as a multilevel phenomenon, shaped by the interaction of macro-level policy frameworks, meso-level institutional arrangements, and micro-level teaching practices

Interpreted through the HeDiCom framework (Tondeur et al., 2023), the moderate levels of perceived challenge reported across the five domains do not necessarily indicate a lack of digital competence among teacher educators. Instead, they point to a structural tension between expanding professional expectations and the institutional conditions under which these expectations must be enacted. In line with HeDiCom's multidimensional conceptualisation of digital competence, these findings indicate that digital competence should not be understood solely in terms of technical proficiency, but rather as an integrated professional capacity that encompasses pedagogical judgment, organisational embeddedness, and ongoing professional learning. From this perspective, digital competence emerges as an integrated professional capacity encompassing pedagogical judgment, organisational embeddedness, and continuous professional learning.

From a professional agency perspective, the findings on workload and stress provide important insights into teacher educators' digital competence development. Within the HeDiCom framework, digital competence presupposes not only

individual willingness but also temporal and organisational conditions that enable experimentation and pedagogical innovation. The moderate challenge scores suggest a form of structurally bounded professional agency, in which teacher educators' capacity for digital innovation is constrained by intensified workloads and competing institutional demands. Digital transformation is thus frequently experienced as an additional layer of responsibility rather than as an integral component of reconfigured academic work.

The absence of statistically significant differences across Ha Noi, Ho Chi Minh City, and Da Nang provides further insight into the nature of the challenges identified. Interpreted through the HeDiCom framework, this pattern suggests that difficulties in developing digital competence are shaped less by regional contexts than by shared institutional and systemic conditions within Vietnamese higher education. This finding highlights the importance of meso-level influences, including organisational culture, institutional leadership, and the implementation of national digital transformation policies at the institutional level.

Qualitative responses from the open-ended questions further contextualise the quantitative findings by illustrating how teacher educators experience these challenges in everyday practice. Participants frequently referred to limited institutional support for pedagogical innovation, heavy workloads constraining professional learning, and uneven access to international collaboration. Although exploratory in nature, these qualitative insights complement the survey results by shedding light on the lived realities underlying the reported challenge levels.

The interrelation between these areas indicates that the development of digital competence among teacher educators relies not only on access to tools or training but also on institutional leadership, organisational climate, and supportive professional cultures. Universities play a vital role in fostering such environments by integrating digital transformation into strategic planning, providing reliable technological infrastructure, and embedding digital competence into career development frameworks. Nationally, cohesive policies are necessary to ensure fair digital access and standardised expectations for digital pedagogy across higher education institutions, thereby reducing disparities between regions and institutions.

From a practical perspective, the findings highlight several priorities for both institutional leaders and policymakers. First, there is a pressing need for ongoing and context-aware professional development programmes that address both the pedagogical and technological aspects of digital competence. As Wagner et al. (2024) observed, informal and peer-based learning – such as mentoring and collaborative problem-solving – often has a stronger impact on competence development than traditional one-off training courses. Universities should therefore foster professional learning communities and incentivise ongoing engagement with digital

innovation. Second, investment in technological infrastructure remains essential. The low mean scores for infrastructure and access in this study reveal persistent inequalities in connectivity and resource distribution. Institutions need to ensure reliable digital platforms, adequate devices, and accessible technical support to enable teacher educators to integrate technology efficiently into their teaching. Finally, the findings reinforce O'Connor et al. (2023) call to embed digital transformation into institutional strategies that align with national policy frameworks, ensuring that teacher educators are not only reactive users of technology but also active contributors to pedagogical innovation.

In conclusion, this pilot study provides valuable initial evidence on the challenges teacher educators face during Vietnam's transition toward a digitally enhanced higher education system. The findings reveal that infrastructural limitations, workload pressures, and fragmented professional development opportunities remain significant obstacles. However, the generally positive orientation toward digitalisation and international collaboration demonstrates both the readiness and the potential of Vietnamese teacher educators to engage meaningfully with digital transformation. Strengthening digital competence in this context will require a systemic, coordinated approach – linking national policy, institutional capacity, and individual agency – to ensure that teacher educators are fully equipped to prepare future teachers for an increasingly digital and interconnected world. This multilevel approach not only reflects global research but also aligns Vietnam with broader European perspectives on digital competence development, offering an important foundation for future comparative and cross-regional studies.

Limitations and future research

This study has several limitations that should be acknowledged. As a pilot study based on a convenience sample, the findings are not intended to be generalised beyond the participating institutions. The reliance on self-reported data may also have influenced the results, as participants' perceptions can be shaped by individual experiences and institutional contexts. In addition, while the inclusion of open-ended questions provided valuable contextual insights, the qualitative data were analysed at an exploratory level. Future research would benefit from larger samples, more diverse institutional contexts, and in-depth qualitative approaches, such as interviews or focus groups, to further examine how digital competence is developed and enacted by teacher educators across different levels of the higher education system.

Author statement

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