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Managing Assessment in Vocational Education through Digital Transformation: Evidence from Secondary Vocational Schools in Hanoi, Vietnam

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Abstract: The global push towards digital transformation has profoundly impacted vocational education and training (VET), necessitating a paradigm shift in how student competencies are assessed

and managed. This study investigates the management of assessment in secondary vocational schools in Hanoi, Vietnam, amidst this transition. Employing a mixed-methods research design, the study gathered data through surveys administered to 357 participants – comprising managers, teachers, and students – across eight secondary vocational schools, supplemented by in-depth semi-structured interviews with 15 educational leaders and instructors. The findings reveal a significant gap between stakeholders' awareness of the importance of digital assessment and its actual, systematic implementation. Specifically, while 82.3% of managers and 74.7% of teachers agreed that digital technologies are necessary for improving assessment quality, the mean implementation scores across all assessment dimensions remained low (ranging from M = 1.97 for secure online examinations to M = 3.21 for learning management system-based quizzes). School-enterprise collaboration emerged as the most critically underdeveloped area (M = 1.68–1.76). Key challenges include inadequate technological infrastructure, insufficient digital competencies among educators and managers, and the absence of a coherent institutional framework for e-assessment. Based on this empirical evidence, the study proposes six integrated management measures: fostering a digital culture, developing a comprehensive e-assessment framework, improving assessment methods and tools, ensuring enabling conditions, establishing a monitoring and adjustment mechanism, and strengthening school-enterprise linkages. This research provides a practical, evidence-based roadmap for VET school leaders and policymakers in Vietnam to navigate the complexities and challenges of digital transformation, ultimately improving assessment quality and aligning vocational training with the demands of the digital economy.

Keywords: assessment management, digital transformation, e-assessment, quality assurance, Vietnam, vocational education and training.

Introduction

Research Problem

Socio-technical systems have been undergoing a digitisation process, catalysed by the Fourth Industrial Revolution, which has led to profound changes in all aspects of society and has transformed traditional labour markets into redefined ones that require offering a new skilled workforce (Schwab, 2017; Li et al., 2026). In this context, VET systems around the world have long been challenged to be more innovative and responsive. The Vietnamese government has acknowledged the urgent and pressing nature of this challenge, making education a top priority for digital transformation under its national strategy. The project has been approved in Decision No. 131/QĐ-TTg, which states that it is necessary to establish a digital connection between teaching and learning activities, educational

management with other fields of socio-economic life, as well as to emphasise the impact of information technology (IT) applications on improving human resources quality (Prime Minister of Vietnam, 2022).

In this transformative context, assessment plays a pivotal role as a quality assurance lever within VET. Good assessment practice is critical not only for issuing credentials but also for identifying areas for further development and evaluating whether training within accredited facilities is responsive. In a time when VET is moving toward both digital and blended teaching, traditional assessment methods often fail to meet new demands. Moving to e-assessment – the use of digital technology in the assessment cycle – offers avenues for increased efficiency, scalability, and data-driven insights. Nevertheless, it poses considerable management challenges that require intentional institutional stewardship (Fuller et al., 2022).

Research Focus

This study addresses a critical gap: while the need for digital transformation in VET is well-recognised, there is limited understanding of how to effectively manage the transition of assessment practices within institutional settings. Secondary vocational schools in Hanoi, the political and economic heart of Vietnam, serve as a critical case for this investigation. These institutions face numerous obstacles, including inconsistent technological infrastructure, varying levels of digital competency among staff, and the absence of a coherent, systematic framework for implementing and managing digital assessment. Understanding how these schools manage the transition to digital assessment is essential for informing policy and practice not only in Hanoi but across Vietnam's VET system. This situation risks undermining the quality of training and the readiness of graduates for a digital-first workforce.

Research Aim and Research Questions

This research aims to investigate the management of assessment in secondary vocational schools in Hanoi within the context of digital transformation, and to propose evidence-based management measures to enhance the effectiveness and quality of digital assessment practices. Specifically, this study seeks to address the following research questions:

1. What are the theoretical foundations and practical realities of assessment management in VET within the context of digital transformation? This question guides the literature review and conceptual framework development, examining established evaluation models (CIPP, Kirkpatrick) and their application to investigations of the gap between stakeholders' awareness of the importance of digital transformation and the actual implementation of digital assessment practices, and in digital assessment contexts.

2. What is the current state of digital assessment awareness and implementation in secondary vocational schools in Hanoi, and what factors influence its management? This question directs the empirical investigation by examining the gap between stakeholders' awareness of the importance of digital transformation and the actual implementation of digital assessment practices, and by identifying the key institutional, technological, and human factors that facilitate or impede this transition.

3. What integrated, evidence-based management measures can enhance the quality and effectiveness of assessment practices in this evolving educational landscape? This question motivates the development of practical, actionable recommendations grounded in both theoretical frameworks and empirical findings, designed to guide school leaders and policymakers in navigating digital transformation.

This study contributes to the field by providing a comprehensive framework for managing the digital transformation of assessment in VET, a topic of growing importance that remains under-researched, particularly in the Vietnamese context. For practitioners, it offers an actionable roadmap for school leaders and policymakers to navigate the complexities of this transition, improve institutional capacity, and ultimately enhance the quality and relevance of vocational training in the digital age.

Literature Review

Digital Transformation in Vocational Education and Training

VET digital transformation is a complex transition consisting of the adoption and integration of digital technologies in all functions related to vocational education, from curriculum design (and delivery), assessment, organisation, and management (Herrero et al., 2025; Siliņa-Jasjukeviča et al., 2025). These transformations go beyond acquiring new tools and encompass a deeper integration of digital competencies into teaching, learning, and systems culture to ready learners for success in the digital economy (Kholifah et al., 2025). For example, research shows that effective VET digital transformation refers to a mix of top-down policy measures and bottom-up innovation by practitioners in education. The national strategy on digital transformation in Vietnam has set a clear direction, aiming for 100% of VET institutions to apply digital technology in their management and teaching activities (Prime Minister of Vietnam, 2022).

As per international literature, the integration of technologies such as Artificial Intelligence (AI), virtual reality (VR), and augmented reality (AR) in VET holds significant promise for crafting engaging and tailor-made learning experiences; this approach has been a key field of investigation with potential benefits to VET practitioners/technologies that is potentially widely used including VR systems or AR simulation providing various scale environments under human operator control designed to create

highly personalized learning opportunities (Leong, 2025). These technologies can replicate real-world working conditions in safe environments, thereby giving students access to complex tasks. Nevertheless, effective integration of these technologies relies heavily on investing in infrastructure and developing digital competencies for both teachers and learners (Waluyo et al., 2025). Evidence from the Vietnamese context supports these findings, indicating that new didactic approaches and the adoption of productive digital literacy are crucial to fully benefit from the transition into a digital era at VET (Zhu, Zuo & Chen, 2024; Nguyen et al., 2025).

Assessment Management in VET

Assessment management is all about the planning, implementation and review (PIR) of assessment processes within VET to ensure that assessments are valid, reliable and aligned with learning outcomes and industry standards. In VET, there has been a move towards competency-based education and, consequently, a greater focus on authentic assessment methods to assess students' ability to transfer knowledge and skills in real-world settings (Yusop et al., 2023). These include formative (which provide feedback for learning) and summative (certifying whether competences were achieved) assessments (Solis Trujillo et al., 2025).

VET programs are to be evaluated using several models. Lim and Lee (2025) highlight that the CIPP (Context, Input, Process, Product) model offers a holistic framework for evaluating the context, input, process, and product aspects of an educational program and is thus particularly relevant for quality assessment management (Vasilev, 2024). These include the widely recognised Kirkpatrick model, which provides a framework for evaluating VET effects (at four levels: reaction, learning, behaviour, and results) (Wuryanto et al., 2026). We have to adapt these models for digital implementation to account for features of e-learning and e-assessment, especially those related to data collection and use for continuous quality improvement.

E-Assessment: Tools, Methods, and Challenges

E-assessment is when you use information technology for any of these assessment-related activities, e.g. writing, delivering, analysing and reporting on assessments. E-assessment tools can vary widely, from a basic LMS that only allows online quizzes and assignment submissions to more comprehensive e-assessment platforms that combine digital portfolios, simulations, and even online proctoring systems (Hamdan et al., 2025). These tools provide many advantages, including greater efficiency, real-time feedback, and the ability to collect and analyse vast volumes of data to inform teaching and learning (Fuller et al., 2022).

Despite its potential, the implementation of e-assessment is fraught with challenges. One of the biggest fears is that online classes could lead to academic dishonesty and make cheating easier. Other notable dilemmas include the digital divide, which disadvantages students without access to devices or reliable internet; the need for robust technical support for both students and faculty; and the need to establish authentic e-assessments that effectively test practical hands-on skills (Song, 2025). Addressing these issues necessitates a strategic, effectively managed process for the adoption of e-assessment technology and methods, delivered through strong institutional leadership.

Digital Competency for VET Leaders and Teachers

Digital competencies of leaders and educators are the key to success in digital transformation in VET. The time and effort of school principals/managers are imperative to shaping the vision for digital transformation, securing resources, and fostering a culture that promotes change (Sutopo, 2024). Leadership research on digitalisation emphasises the role of principals who are not only technologically competent but also able to lead pedagogical innovation and manage organisational changes associated with digitalisation (Mizova et al., 2026).

Digital literacy goes beyond ICT technology requirements for teachers, as it encompasses the ability to create and promote digital learning experiences, to undertake assessment using digital tools, and, more importantly, to remain engaged in educational life within a digital environment (Wu et al., 2025). For example, the European Framework for the Digital Competence of Educators (DigCompEdu) offers a holistic approach to identifying and learning about these competencies. Research consistently indicates that focused professional development is crucial for developing teacher confidence and ability in technology integration (Deschênes et al., 2024; Pratiwi et al., 2025).

Research Gap

Although there is an increasing body of literature on different facets of digital transformation in education, there is a research gap at the nexus of assessment management, digital transformation and the development context (in particular VET), such as in Vietnam. There is extensive research on e-assessment tools; however, little research investigates the managerial and organisational strategies that have been implemented to facilitate and embed this shift. The existing literature does not feature descriptive studies in this region that analyse the challenges and present context-based management solutions for VET institutions in Vietnam. Filling this gap, this study presents an evidence-based examination of assessment management in Hanoi's secondary vocational schools and proposes a comprehensive framework towards their digital transformation journey.

Materials and Methods

Research Design

This study employed a mixed-methods research design, integrating both quantitative and qualitative approaches (Creswell & Plano Clark, 2018). The quantitative component, a structured survey, was used to gather broad data on the current state of digital assessment practices and perceptions across a larger sample. The qualitative component, consisting of semi-structured interviews, was utilised to gain deeper insights into the experiences, challenges, and perspectives of educational managers and teachers. This approach enables data triangulation, enhancing the validity and reliability of the findings.

Population and Sampling

The target population comprised managers, teachers, and students from secondary vocational schools in Hanoi. Eight schools were purposefully selected to represent a range of institutional characteristics. The final survey sample consisted of 357 participants: 35 managers (9.8%), 182 teachers (51.0%), and 140 students (39.2%). For the qualitative component, 15 participants were selected through purposive sampling for in-depth interviews: 8 school principals or vice-principals and 7 experienced teachers directly involved in assessment processes.

The survey sample size of 357 was determined based on the total accessible population of managers, teachers, and students across the eight selected schools (approximately 420 individuals). With a target response rate of 85%, this yielded a final sample of 357 participants.

Data Collection Instruments

Two primary instruments were developed. First, a structured questionnaire collected quantitative data on three domains: (1) awareness of digital transformation in assessment, (2) the reality of implementing digital assessment, and (3) the factors influencing digital assessment management. Content validity was established through a review by five experts in educational management and VET, followed by a pilot test with 30 participants. Second, a semi-structured interview protocol guided in-depth conversations with managers and teachers, exploring their perceptions of digital transformation, specific challenges in managing assessment, and suggestions for improvement.

Data Analysis

Survey data were analysed using SPSS version 22.0, employing descriptive statistics (frequencies, percentages, means, and standard deviations) to characterise the sample and describe the state of

digital assessment practices. Interview transcripts were analysed using thematic analysis, following the six-phase process described by Braun and Clarke (2006): familiarisation, coding, theme generation, theme review, theme definition, and report production. This process enabled the identification of recurring patterns and themes that provided rich, contextualised insights complementing the quantitative findings.

Ethical Considerations

This study was conducted in accordance with established ethical research standards and received approval from the Institutional Review Board (IRB) of Hanoi Metropolitan University (IRB approval number: HMU-2024-0847). All participants provided informed consent prior to participation in the study. Survey respondents were provided with a detailed information sheet explaining the study's purpose, the voluntary nature of their participation, their right to withdraw at any time without consequences, and assurances regarding data confidentiality. For the qualitative interviews, participants received comprehensive information about the study objectives, the interview procedures, and the use of audio recording, and all participants signed formal consent forms before the interviews commenced.

Data confidentiality and anonymity were maintained throughout the research process. Survey responses were collected anonymously using a secure online platform (Qualtrics), with no personally identifiable information linked to individual responses. All respondents were assigned unique identification codes rather than names. Interview participants were assigned pseudonyms (e.g., Principal A, Teacher B), and all identifying information—including school names, specific job titles, and other details that could reveal participant identity—was removed from the interview transcripts during the coding and analysis phase. Interview audio recordings were stored securely on an encrypted external hard drive with password protection. They will be permanently deleted upon completion of the research project (within 12 months of data collection).

All data were handled in compliance with institutional data protection policies and Vietnamese data privacy regulations. The research team members who had access to identifiable data (raw interview recordings and consent forms) were limited to the three principal investigators. These individuals signed confidentiality agreements prior to accessing any data. All electronic data files were encrypted, and paper-based documents (consent forms) were stored in a locked filing cabinet accessible only to authorised research personnel. No data were shared with third parties, and no participant names or identifying information appear in any research outputs, publications, or presentations. The study posed minimal risk to participants, as it involved standard educational

research methods (surveys and interviews) with no experimental interventions or sensitive personal questions beyond the scope of educational assessment practices.

Results

Participant Demographics

The survey sample of 357 participants comprised three key stakeholder groups: 35 educational managers (9.8%), 182 teachers (51.0%), and 140 students (39.2%). Among the managers, 22 were school principals, and 13 were vice-principals. The majority of teachers (68.1%) had more than 5 years of experience in VET, while 31.9% had between 1 and 5 years. This distribution ensured a multi-faceted view of the assessment process, incorporating perspectives from strategic leadership, pedagogical implementation, and the student experience. Table 1 summarises the demographic profile of the survey respondents.

Table 1

Demographic Profile of Survey Respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Role	Managers	35	9.8
	Teachers	182	51.0
	Students	140	39.2
Teaching Experience (Teachers)	1–5 years	58	31.9
	6–10 years	74	40.7
	> 10 years	50	27.4
School Type	Public	6	75.0
	Private	2	25.0

Awareness of Digital Transformation in Assessment

The findings indicate a generally high level of awareness among managers and teachers regarding the importance of digital transformation in assessment. A large majority of respondents (82.3% of managers and 74.7% of teachers) agreed or strongly agreed that integrating digital technologies is necessary to improve the efficiency and quality of training assessment. However, the qualitative data revealed that this awareness is often superficial. While stakeholders understood the concept in broad terms, they frequently lacked a deep, nuanced understanding of the pedagogical

shifts, strategic planning, and specific competencies required to manage a digital assessment ecosystem effectively. As one interviewed school principal observed: "We all agree that going digital is the future, but a clear roadmap of how to get there, especially for assessment, is what we are missing." This finding aligns with previous research suggesting that awareness of digital transformation does not automatically translate into effective implementation (Pfeffer & Sutton, 2008).

Implementation of Digital Assessment Practices

The study assessed the real-world implementation of digital assessment across the whole assessment cycle: input, process and output. The findings show that implementation is haphazard and institution-wide, with none of it systematic (Table 2). None of the features screened for in terms of digital assessment has been developed at a high level (i.e., above M > 4.0), and some key measurements - particularly concerning secure digital assessments and input assessment methods - are not even at the initial adoption stage. However, as yet, no institutions in this sample appear to have a coherent end-to-end digital assessment strategy, with only individual teachers experimenting with digital tools at the process stage.

To provide an additional perspective on the implementation gap, we display the mean implementation scores over the three assessment points in time (Figure 1). There is a stark difference in the levels at which each of these areas was assessed – while process assessment (M = 3.01) still had the highest mean score, input and output assessments were much lower overall (M = 2.14 and M = 2.24, respectively). Most notably, however, none of the assessment stages has achieved a high level of implementation (M > 4.0), suggesting that digital assessment itself remains in its infancy across all dimensions of the assessment cycle.

Figure 1

Mean Implementation Scores by Assessment Stage

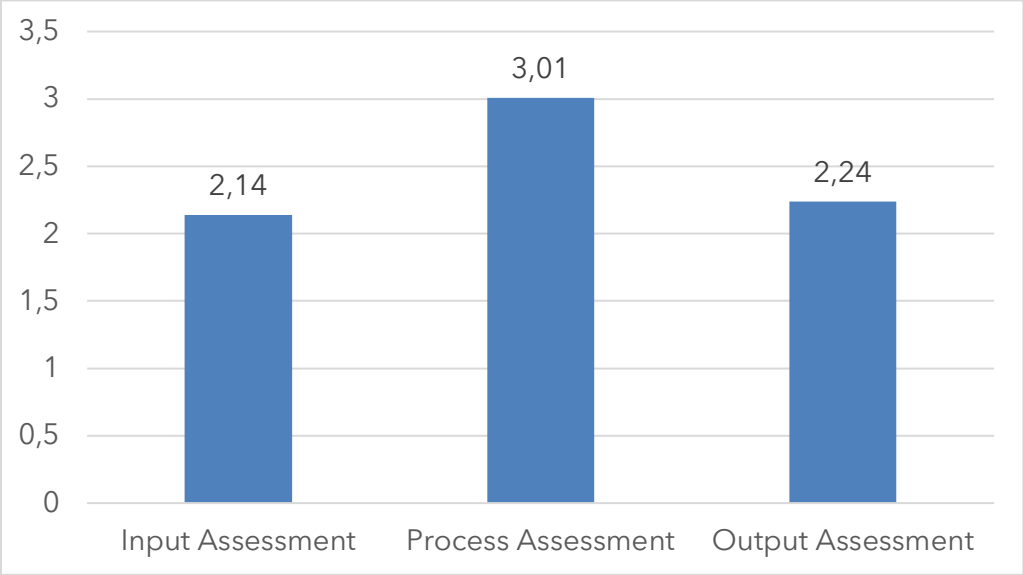


Table 2.

Mean Scores for Implementation of Digital Assessment Practices (Scale: 1 = Very Low, 5 = Very High)

Assessment Stage	Aspect	Mean (M)	SD
Input Assessment	Use of digital tools for initial placement	2.14	0.87
Process Assessment	Use of LMS for formative quizzes	3.21	0.92
	Use of digital platforms for assignments	3.05	0.88
	Frequency of digital feedback to students	2.78	0.95
Output Assessment	Digital question bank development	2.31	0.84
	Secure online examination software	1.97	0.79
	Digital competency-based assessment	2.45	0.91

The use of digital tools for input assessment was minimal (M = 2.14), with most schools still relying on traditional paper-based records and examinations for admissions and initial student placement. Process assessment indicated the most digital activity, particularly through LMS-based quizzes (M = 3.21) and digital assignment submissions (M = 3.05). However, this usage is often ad hoc, depending on individual teacher initiative rather than a unified institutional strategy. Output assessment remains predominantly traditional, with the development of secure digital examination systems at a very early

stage (M = 1.97). Key challenges cited by both managers and teachers included the lack of standardised, secure examination software, concerns about academic integrity in online environments, and the difficulty of designing digital assessments for practical, hands-on skills. The qualitative data further revealed that many teachers who do use digital tools for assessment do so based on personal familiarity with a specific platform rather than as part of a deliberate, pedagogically-informed strategy. As one experienced teacher noted, "I use Google Forms for quick quizzes because I know how to use it, not because the school has a policy. There is no guidance on which tools to use or how to use them for formal assessment." This underscores the critical need for institutional-level guidance and standardisation.

Factors Affecting Digital Assessment Management

Four categories of key factors particularly influential in the management of digital assessment were identified through thematic analysis of interview data, supported by survey responses. Our findings are consistent with the literature on the adoption of educational technology, highlighting leadership, infrastructure, competence, and collaboration as prominent factors influencing successful implementation (Herrero et al., 2025; Sutopo, 2024). The key factors and their rating (in terms of impact) by survey respondents are summarised in Table 3.

Helping to Persona: Analysis of ADigital Assessment Management Factors. In Figure 2, the radar chart shows the pattern of domain-wise strengths and weaknesses. Although policy and leadership (M = 2.82), infrastructure (M = 2.33), and digital competitiveness (M = 2.46) seem to have a moderate impact, school-enterprise collaboration appears to be the most critically underdeveloped aspect in the education system during transformations (M = 1.72). This depiction illustrates the critical need for additional influences, especially to strengthen the links between educational institutions and market partners.

Figure 2

Perceived Impact of Factors on Digital Assessment Management

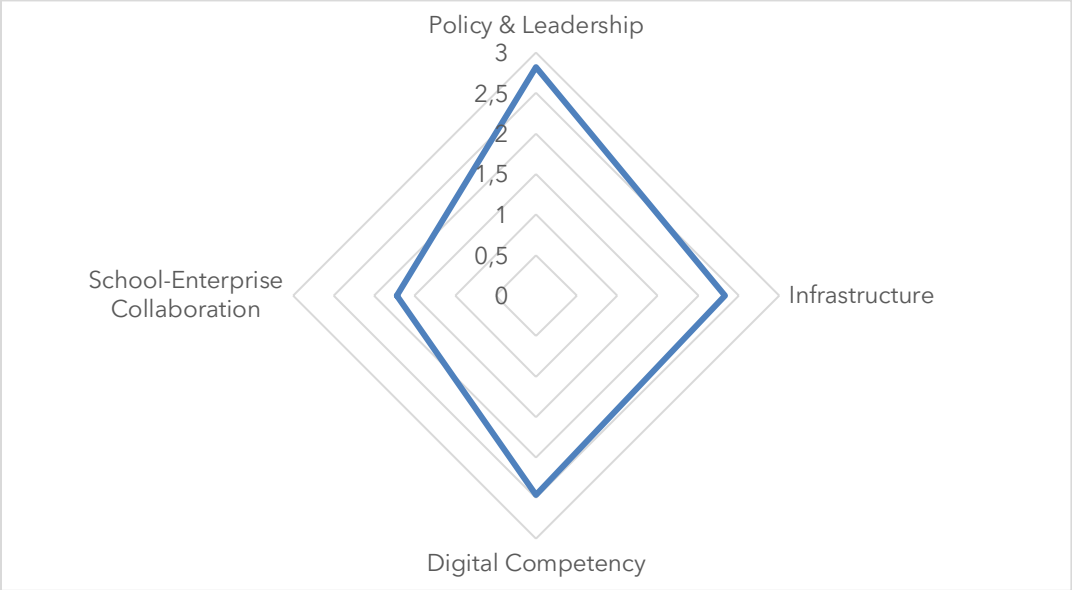


Table 3.

Factors Influencing Digital Assessment Management (Scale: 1 = No Impact, 5 = Very High Impact)

Factor Category	Specific Factor	Mean (M)	SD
Policy & Leadership	Clarity of institutional digital assessment policy	2.18	0.91
	Principal's active leadership in digital transformation	3.45	0.88
Infrastructure	Reliability of internet connectivity	2.67	1.02
	Availability of hardware (computers, tablets)	2.43	0.97
	Access to specialized assessment software	1.89	0.85
Digital Competency	Teachers' ability to design digital assessments	2.55	0.93
	Teachers' confidence in using assessment platforms	2.71	0.89
	Availability of professional development programs	2.12	0.87
School-Enterprise	Involvement of enterprises in assessment design	1.76	0.78
Collaboration	Use of industry-standard platforms for assessment	1.68	0.74

The primary (and most important) element was institutional policy and strategic leadership (M = 2.18 for policy clarity; M = 3.45 for principal leadership). One of the main barriers is the lack of actionable and institutional policies and guidelines. National policies may create an overarching framework; however, it has been a gradual process for schools to convert these into specific strategic digital assessment roadmaps. Resulting in a reactionary, not proactive approach to technology implementation, whereby one individual teacher makes the change without an overarching strategy driving towards a unified goal.

The second is the technological infrastructure and resources (M between 1.89 and 2.67 for sub-factors). Data from both surveys and interviews pointed consistently to inadequate and uneven technological infrastructure. Problems include an unreliable internet connection, an inadequate ratio of computers to students, and a lack of investment in specialised software for secure assessments. Financial restrictions were often listed as the primary barrier to upgrading hardware and software.

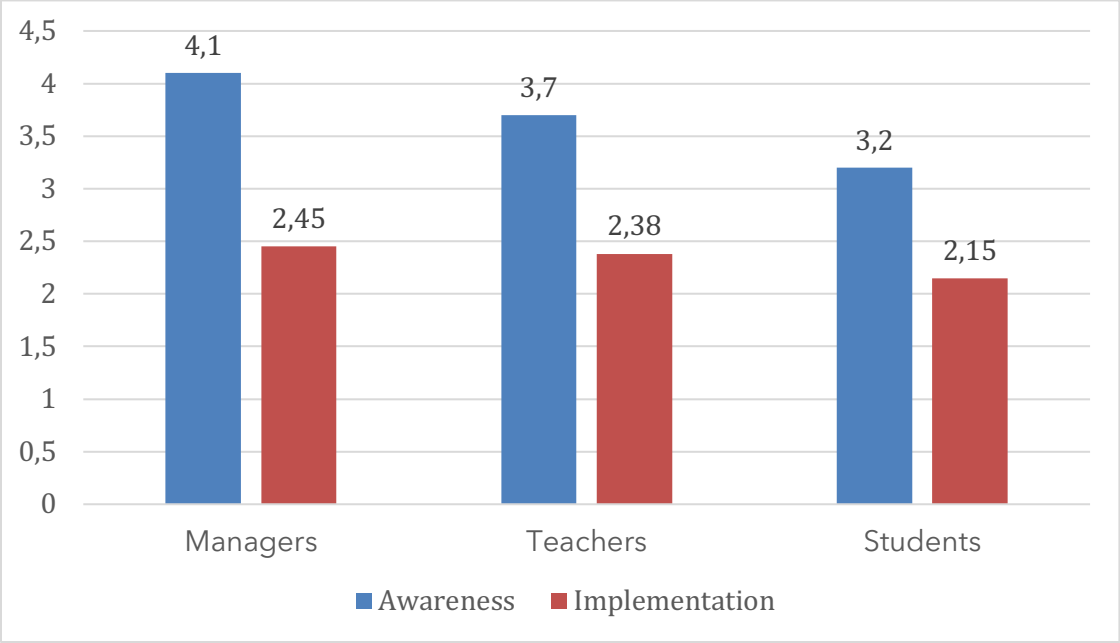
The third is the digital competencies of staff and students (M from 2.12 to 2.71). A significant portion of teachers (61.5%) indicated feeling unprepared to design, implement, and evaluate digital assessments [5]. They have often been trained to develop basic ICT competence, rather than advanced digital pedagogy for assessment. Likewise, although students are largely digital natives, they have significant gaps in the digital literacy skills needed to read and analyse information in online test-taking environments.

The fourth factor was school-enterprise collaboration (M = 1.76 and 1.68 for the two sub-factors, as a whole, the lowest-rated category). There was also a weak link between the schools and their partners regarding similarity and common ground about what this assessment entailed. At the same time, there are near nonexistent ways to engage enterprises in creating digital assessment products or using industry-standard platforms to assess student competencies, which can cause a gap between education and the workplace.

Data reveal an astonishing "knowing-doing gap" across all stakeholder groups (see Figure 3). Though managers, teachers, and students have a strong awareness of the need for digital transformation in assessment (mean scores between 3.20 and 4.10), the actual provision of digital practices remains distinctly modest (mean scores between 2.15 and 2.45). This gap is most acute among managers (a difference of 1.65 points), indicating that even those charged with managing institutional strategy have difficulty translating awareness into action. Such a conclusion is consistent with the account in the organisational change literature, which suggests that knowing what needs to be done and what actually gets done is divided into two areas (Pfeffer & Sutton, 2008).

Figure 3

The Knowing-Doing Gap: Awareness versus Implementation



Proposed Management Measures

Based on the comprehensive analysis of the theoretical framework and the empirical findings, this study proposes six integrated management measures. These measures are designed to address the identified weaknesses and leverage existing strengths and opportunities to build a robust, effective digital assessment management system. The necessity and feasibility of these measures were validated through expert consultation.

Measure 1: Fostering a Digital Culture for Assessment

Successful digital transformation is built on a common understanding and an enabling institutional culture. This deeper understanding moves past surface-level awareness to foster a genuine, community-wide commitment to digital assessment. The school principal needs to have a sound, dynamic communication strategy and to plan the implementation of this new approach with all relevant stakeholders. These include holding workshops and seminars to communicate the school's digital transformation strategy, articulate the objectives and pedagogical advantages of e-assessment, and share best practices adopted by reputable institutions. The principal's task is therefore not administrative, but transformational; leading by example and prompting a behavioural shift in

perception so that digital assessment becomes viewed as a mechanism for enhancing the quality of learning delivery, rather than an administrative headache.

Specifically, this includes the principal creating a special Digital Assessment Task Force of passionate teachers, IT staff and department heads. We can make that Cultural Shift from the inside by appointing a task force to identify and promote Digital Champions within each department and to help create a Community of Practice where teachers can share their experiences, issues, suggestions, etc. The last dimension of fostering a positive digital culture is formal and informal recognition and rewards for innovation in the use of digital assessment. Studies show that a positive working environment is so important for the successful implementation of technology within schools that a supportive organisational culture can be considered necessary and a prerequisite (Mizova et al., 2026; Sutopo, 2024).

Measure 2: Developing a Comprehensive Digital Assessment Framework

To shift from ad hoc implementation to a systematic approach, school leaders must define an institutional framework for managing digital assessment. This framework should be co-created with input from stakeholders, including academic departments, IT staff, and teachers. It should include: (1) clear policies related to selection and use of digital assessment platforms; (2) common practices for the development, administration, evaluation and revision of digital assessments (Liu et al., 2025); (3) distinct academic integrity policies as well as data privacy and security considerations; and(4) an outline detailing roles, responsibilities at-all stages in the process among those involved. This framework will be the key governance document for ensuring consistency, quality, and fairness across all digital assessment practices.

It should be based on established quality assurance models, such as the CIPP model, so that all dimensions of the assessment – context, input, process, and product – are systematically considered (Lim & Lee, 2025). It should also clearly align assessment activity with the competency standards required in the national VET curriculum and with industry expectations. An important component is constructing a school-wide digital assessment calendar that paces all departments so students are neither swamped nor deprived of timely, relevant feedback. The frameworks should be re-evaluated annually to align with emerging technologies, pedagogy and industry needs.

Measure 3: Improving and Diversifying Assessment Methods and Tools

This dimension then focuses on the actual selection, development, and implementation of a diverse set of assessment tools and methods for use in a competency-based VET. This involves moving away from excessive reliance on simplistic, multiple-choice questions to more authentic assessment

styles. Some key areas to focus on are building strong digital question banks linked to intended learning outcomes and competency frameworks, looking into simulation-based assessments for practical skills (common in medicine), creating digital portfolios that allow students to track their progress and showcase cumulative work over a period of time, as well as integrating peer- and self-assessment tools. Ideally, this should result in a balanced portfolio of assessment methods that can validly and reliably capture the full range of students' knowledge and skills.

Measure 4: Ensuring Enabling Conditions for Digital Assessment

Effective digital assessment is impossible without the necessary supporting conditions. This measure addresses the critical need to invest in and manage the required infrastructure, human resources, and financial support. On the infrastructure front, this means ensuring reliable, high-speed internet access across the campus and providing sufficient hardware for students and teachers. For human resources, this involves implementing a continuous professional development program focused on building advanced digital assessment competencies among teachers and technical skills among IT support staff. Financially, school leaders must strategically allocate budget resources to procure secure assessment software, maintain infrastructure, and provide ongoing personnel training.

Measure 5: Establishing a Monitoring and Adjustment Mechanism

A strong monitoring and evaluation system will provide a solid basis for ensuring the quality and improvement of the digital assessment system over time. This establishes a systematic process for collecting, analysing, and acting on data in relation to assessment activities. This will involve routinely soliciting feedback from teachers and students on the usability of assessment tools, analysing student performance data to identify areas for curriculum enhancement, and conducting periodic reviews to ensure compliance with the established framework. This feedback should inform data-driven improvements to assessment strategies, tools, and training programs to support ongoing quality improvement.

Measure 6: Strengthening School-Enterprise Linkages for Assessment

To ensure the relevance of vocational training, assessment must be closely aligned with industry needs. This measure focuses on building and strengthening partnerships with enterprises to integrate their expertise and resources into the digital assessment process. This can be achieved by involving industry experts in the design and review of digital assessment content and criteria, utilizing industry-standard software and digital platforms for student assessments where appropriate, creating opportunities for work-based assessments co-evaluated by teachers and industry supervisors using

digital tools, and establishing a formal feedback loop where enterprises can provide input on the skills and competencies of graduates to inform the continuous improvement of the assessment system.

Discussion

Interpretation of Findings

The study's key finding – a disparity between widespread recognition of the importance of digital transformation on one hand and limited, piecemeal adoption of any mechanism for digitally assessing this on the other – is consistent with patterns identified in the broader literature regarding educational technology adoption. Despite strong national policies in Vietnam that offer impetus for change (Prime Minister of Vietnam, 2022), the lived experience at many vocational schools in Hanoi illustrates a traditional "knowing-doing gap" (Pfeffer & Sutton, 2008). This key barrier to policy–practice translation is the absence of a systematic, managed approach. This underscores previous studies showing that when technology is implemented in schools without an overarching leadership and implementation plan, technology initiatives flounder, and staff sustain them only if teachers drive them (Mizova et al., 2026). Some of the mean scores are especially revealing, notably for clarity of institutional policy (M = 2.18) and availability of professional development programs (M = 2.12): this suggests that, in contrast to what is typically assumed, system management is the real bottleneck rather than individual teacher capacity.

Such identified limitations of underdeveloped infrastructure and a lack of digital competency are not specific to Vietnam but have been described as significant barriers to digital transformation in education systems worldwide (Wu et al., 2025; Waluyo et al., 2025; Zhu et al., 2026). For the VET sector in Hanoi, this research fills an evidence gap in that it is specific and contextualised in terms of how these factors may manifest. The fact that even formative assessment, which can be much more simply adapted for use with basic digital tools, is carried out ad hoc in many cases really brings home the scale of the problem. It implies that there is a more deep-seated problem than just a resource shortage, a need for an underlying pedagogical and management framework to properly embed technology into their day-to-day operations. This discovery is consistent with that of Herrero et al. (2025). This chapter provides a more general conceptual outline for approaching the digital transformation of VET, one that goes beyond technology and pedagogy towards a conjunction of technology, pedagogy and governance at every stage.

In addition, the weakest connection between schools and enterprises in the assessment process (last-rated factor category; means 1.76 and 1.68) hinges on a systemic issue in Vietnamese VET that becomes even more prominent/magnified/distracting in a digital environment. Digital transformation will improve existing processes, but to create real value, it must enhance the convergence between

training and industry requirements. If organisations do not participate in the design and execution of digital assessment, we will be left with a system that seemingly employs digital tools but is utterly disconnected from the world of work. This finding is consistent with Kholifah et al. (2025), who point out that, in addition to digital employability skills, industry needs to be involved to prepare graduates as truly workforce-ready.

Last but not least, the study's results about the school principal's role as a key driver of digital transformation are very interesting. Clarity of institutional policy ranked very low (M = 2.18), while the principal's active leadership ranked much higher (M = 3.45), suggesting that where digital progress is made, it's largely because individual principals take the initiative to implement rather than because systemic policy supports implementation. This underscores both the importance of strong leadership and the fragility of a system that relies on individual champions instead of institutionalised practices. Driving sustainable change requires embedding such best practices into the organisational structure and culture (Zeng & Cheah, 2025), not miracles of leadership or other inspirational stories.

Implications for Practice

The six proposed management measures offer a practical, integrated roadmap for educational leaders and policymakers. For school principals and managers, the primary implication is the need to shift from a passive to an active leadership role in managing digital transformation. This involves moving beyond simple technology provision to championing a new digital culture, developing a comprehensive strategic framework, and making targeted investments in infrastructure and professional development. For policymakers at the city and national levels, this study highlights the need for policies that go beyond setting broad goals to provide more specific guidelines and support mechanisms to help schools build their management capacity. For teacher training institutions, the findings underscore the urgent need to reform pre-service and in-service training programs to equip VET teachers not only with the skills to use digital tools but also with the pedagogical knowledge to design, implement, and evaluate high-quality digital assessments.

Limitations and Future Research

This study has several limitations. Its geographical coverage is limited to secondary vocational schools in Hanoi, and the findings may not be applicable or generalizable to all VET institutions across Vietnam, particularly those in rural or less well-developed regions. Moreover, the study offers a cross-sectional view of the system; tracking implementation over time in a longitudinal study would be needed to assess the progress of digital assessment and the long-term effects on clinical management measures, as proposed by these authors. Future studies may extend this study by comparing across

regions in Vietnam, comparing Vietnam with other ASEAN countries, and/or assessing the effectiveness of specific digital assessment tools and methods for specific vocational domains.

Conclusions

This study has systematically examined the management of assessment in secondary vocational schools in Hanoi, set against the backdrop of Vietnam's national push for digital transformation. The research has revealed a landscape ripe with potential but encumbered by significant managerial, technical, and pedagogical challenges. The findings confirm that while there is a strong consensus on the necessity of digital assessment, its practical implementation is inconsistent and lacks a strategic, institution-wide approach. The core of the problem lies not in a lack of will, but in the absence of a comprehensive management framework to guide the transition.

In response to this evidence, the study has proposed a holistic, integrated framework of six management measures, providing a clear, actionable roadmap for VET leaders. These measures move from fostering a digital culture and developing a robust assessment framework to ensuring the necessary enabling conditions and building strong industry partnerships. The framework's strength lies in its systematic and multi-faceted approach, recognising that successful digital transformation is not a piecemeal effort but a comprehensive organisational change.

Ultimately, the strategic management of digital assessment is indispensable for enhancing the quality and relevance of vocational education in the 21st century. For Vietnam, a nation with ambitions of building a high-skilled, competitive workforce, the stakes are particularly high. Effectively navigating this digital transition in VET is not merely an educational upgrade; it is an economic imperative. This research provides the foundational insights and managerial tools necessary to guide that journey, helping to ensure that the next generation of Vietnam's workforce is not only trained but also assessed to the standards of a global digital economy.

Suggestions for Future Research

Future research should investigate the long-term impact of the proposed management measures through longitudinal studies. Comparative studies between Vietnamese VET institutions and those in other ASEAN countries would provide valuable cross-cultural insights. Additionally, research on the development and validation of context-specific digital assessment tools across vocational fields – such as manufacturing, hospitality, and healthcare – would significantly advance the practical application of e-assessment in VET.

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Conflict of Interest

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