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Research Article

Application of Technology-Integrated Learning Models in Training Professionalism for Education Students

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Abstract:

In the era of rapid digital transformation, preparing future educators to be professionally competent and digitally skilled is paramount. This study investigates the application of technology-integrated learning models in developing professionalism among education students at three Vietnamese universities. Employing a mixed-methods approach, quantitative data from 312 participants and qualitative insights from interviews and observations were analyzed. Results indicate that blended learning models based on the ADDIE framework effectively enhance digital competency, pedagogical skills, and reflective practice, contributing to overall professional growth. However, infrastructural challenges and varying degrees of technology acceptance present obstacles. The study highlights the importance of institutional support and continuous professional development to fully realize the benefits of technology integration in teacher education. These findings offer valuable implications for education reform and teacher training programs in Vietnam and beyond.

1. Introduction

In the context of rapid digital transformation, education systems worldwide are undergoing a fundamental shift, requiring a revaluation of traditional pedagogical approaches and the integration of technology into every aspect of teaching and learning. This trend is particularly crucial in the preparation of future educators, who are expected not only to master content knowledge and pedagogical techniques but also to develop digital competencies and professional attitudes aligned with the demands of modern classrooms [1,2]. As a result, there is an increasing emphasis on training models that integrate technological tools into the learning environment to enhance the professionalism of education students.

Professionalism in teacher education encompasses a multifaceted set of attributes, including instructional competence, ethical responsibility, reflective thinking, adaptability, and the effective use of educational technologies [3,4]. The COVID-19 pandemic has further highlighted the urgency of integrating these skills, as remote and hybrid teaching became essential for educational continuity [5]. In this evolving context, higher education institutions are rethinking how to cultivate these professional traits through flexible, learner-centred, and technology-supported models such as blended learning and project-based digital pedagogy [6,7].

Several theoretical and practical frameworks have been developed to guide the integration of technology into teacher training. Among the most prominent are the ADDIE instructional design model [8,9], which emphasizes a structured approach to planning and evaluating learning processes, and the TPACK model, which focuses on the intersection of technological, pedagogical, and content knowledge [2,10]. These models serve as critical tools for designing learning experiences that not only transmit knowledge but also foster

analytical thinking, innovation, and continuous professional growth.

Despite the global proliferation of technology-enhanced learning, research specific to Vietnam's teacher education context remains limited. There is a need to examine how technology-integrated models are being implemented in Vietnamese institutions, how they influence the development of professional competencies, and what challenges and opportunities arise in the process [11,12]. This study responds to that need by exploring the application of technology-integrated learning models in three major Vietnamese universities: Hanoi National University of Education, Hanoi Metropolitan University, and the National Academy of Education Management. By employing both qualitative and quantitative methods, the research aims to evaluate the effectiveness of these models in fostering pre-service teachers' professionalism, contributing valuable insights to the field of teacher education reform in Vietnam and beyond.

2. Literature Review

2.1 Conceptualising Teaching Professionalism

The concept of professionalism in teacher education has evolved significantly over the past two decades, moving from a narrow emphasis on subject-matter expertise to a more holistic view encompassing a diverse set of cognitive, affective, and behavioral competencies. Traditionally, professional teachers were expected to master the content of their disciplines and deliver it effectively through pedagogical skill [13]. However, in contemporary educational contexts, this is no longer sufficient. Teachers are increasingly expected to function as adaptive experts, reflective practitioners, collaborative colleagues, and ethical agents of change [1,2].

Recent literature suggests that teaching professionalism involves a dynamic and evolving interplay between pedagogical knowledge, digital literacy, emotional intelligence, and responsiveness to student diversity [3,14]. Benton-Borghi [7], highlights the importance of integrating Universal Design for Learning (UDL) with the Technological Pedagogical Content Knowledge (TPACK) framework, arguing that a professional teacher in the digital age must be capable of selecting and adapting appropriate technologies to support diverse learners. The TPACK model, in particular, underscores the importance of the contextual application of technological tools in pedagogically meaningful ways.

In addition, the ADDIE model [8], provides a process-oriented perspective on professionalism, positioning teachers as designers of learning experiences who continuously engage in needs assessment, planning, implementation, and evaluation. Vietnamese scholars further point out that professionalism also includes a cultural and political dimension—such as the ability to implement educational reform agendas like the 2018 General Education Program and to embody the ethical and civic values that underpin national development goals [11,15]. From this lens, professionalism is not a static set of traits but a lifelong developmental process shaped by institutional support, policy context, and personal commitment to growth.

2.2 Blended-Learning Models and Technology Integration

Blended learning, often described as a hybrid approach that merges face-to-face instruction with digital tools and online learning environments, has emerged as a powerful model for enhancing the learning experience and promoting professionalism in teacher education. Its popularity stems from its flexibility, accessibility, and potential for customization [6]. It enables students to engage with content at their own pace while maintaining opportunities for direct interaction, feedback, and mentorship.

Several instructional design models have been employed to operationalize blended learning. The ADDIE model (Analysis, Design, Development, Implementation, Evaluation) is widely used to structure instructional interventions, while the TPACK framework helps educators determine how best to use technology in pedagogically sound ways [9,16]. In the context of teacher training, these models help bridge the gap between theory and practice by providing a roadmap for designing effective, engaging, and contextually relevant learning experiences.

Empirical studies support the effectiveness of blended learning in cultivating key elements of professionalism. Kaya and Adiguzel [4], demonstrated that multimodal reflective training in a blended learning format significantly improved pre-service teachers' self-awareness, pedagogical reasoning, and confidence in using technology. Similarly, project-based multimedia learning environments grounded in the ADDIE model have been shown to enhance learners' ability to design lessons, manage classrooms, and evaluate student learning outcomes [17, 18]. Emerging technologies such as digital storytelling [19] and augmented reality [20] have also proven effective in promoting

professional identity, creativity, and student engagement.

Institutional and structural factors play a crucial role in determining the success of blended learning models. Without adequate technological infrastructure, administrative support, and faculty training, the benefits of blended learning may not be fully realized [21]. Professional development programs must therefore not only focus on technological skills but also on change management, instructional innovation, and inclusive pedagogy.

2.3 Technology's Impact on Teacher Training

The integration of technology into teacher training has been both accelerated and complicated by the global COVID-19 pandemic, which necessitated a sudden transition to online and hybrid learning environments. This shift has amplified interest in how digital tools can be used to prepare pre-service teachers for professional roles. At the same time, it has revealed significant challenges related to equity, engagement, and pedagogical quality [5]. Research indicates that well-designed technology-integrated training can effectively develop professional teaching skills, such as classroom management, student assessment, collaborative teaching, and inclusive education practices [10, 22]. For instance, Castera et al. [10], conducted a comparative study across six countries in Asia and Europe and found that teacher educators' self-reported TPACK competencies were strong predictors of the quality of digital mentorship they provided. These findings suggest that investing in the technological competence of teacher educators has downstream effects on pre-service teacher outcomes.

In the Vietnamese context, digital education strategies have demonstrated positive impacts on both academic performance and psychological well-being [23]. These effects are particularly significant in blended and online programs designed to prepare teachers for inclusive classrooms and to implement the 2018 General Education Program [12]. However, disparities remain. Many teacher preparation programs still lack consistent standards for digital literacy, and students' competencies vary widely depending on their access to resources and prior experience [14].

Addressing these issues requires coordinated efforts at multiple levels. Universities must adopt coherent digital transformation strategies [24,25], while policy makers need to provide sustained investment in digital infrastructure and teacher development. At the program level, teacher training curricula must be restructured to embed digital pedagogy as a core component of professionalism, not as an add-on or optional module. Continuous evaluation and evidence-based refinement—principles embedded in the ADDIE model—are essential to ensuring that technology enhances rather than complicates professional development.

3. Research Methodology

This study employed a mixed-methods research design, combining both quantitative and qualitative approaches to ensure a comprehensive understanding of how technology-integrated learning models affect the development of professionalism among education students. The integration of methods allowed the researchers to triangulate data and draw robust conclusions from multiple perspectives.

3.1 Participants and Sampling

The study was conducted across three major teacher education institutions in Vietnam: Hanoi National University of Education (HNUE), Hanoi Metropolitan University (HMU), and the National Academy of Education Management (NAEM). The research sample included a total of 312 participants, comprising 263 education students and 49 teacher educators. Stratified random sampling was used to ensure proportional representation from each institution and academic year.

From HNUE: 112 students, 18 lecturers
From HMU: 91 students, 15 lecturers
From NAEM: 60 students, 16 lecturers

3.2 Data Collection Instruments

Three primary instruments were used to collect data:

A structured questionnaire with 45 items (both Likert-scale and open-ended), designed to measure perceptions of professionalism, digital competency, and experiences with blended learning environments.

Semi-structured interviews with 12 selected lecturers and 15 students, focusing on the perceived effectiveness of the blended learning model and challenges in its implementation.

Classroom observations of five blended learning sessions across the three institutions, using an observation checklist that captured interaction quality, technology usage, and reflective teaching practices.

The questionnaire demonstrated high reliability, with a Cronbach's alpha of 0.91, and content validity was confirmed by three independent experts in education technology and pedagogy.

3.3 Implementation Procedure

The blended learning model was implemented over a 10-week semester. It was based on the ADDIE instructional design framework, and included both asynchronous (LMS-based modules, digital projects, online forums) and synchronous components (in-person lectures, group discussions, video presentations).
Week 1–2: Orientation and digital competency baseline assessment
Week 3–8: Blended instruction phase (40% online, 60% face-to-face)
Week 9–10: Final project presentations and reflective evaluation

3.4 Data Analysis Methods

Quantitative data from surveys were analyzed using SPSS 26. Descriptive statistics summarized participants' digital competency, professionalism perception, and satisfaction. One-way ANOVA tested differences between institutions, and independent t-tests compared students and lecturers. Pearson correlation assessed relationships between digital competency and professionalism.
Qualitative interview and observation data were thematically analyzed using NVivo, identifying key themes about blended learning's value, professional growth, and institutional challenges. Findings from both methods were integrated to provide a comprehensive understanding of the blended learning model's impact.

4. Results

4.1 Digital Competency of Participants

Digital competency was assessed using a 5-point Likert scale, measuring participants' self-reported ability to effectively use digital tools in educational settings. Table 1 summarizes the descriptive statistics by institution and role.

Table 1. *Digital Competency Scores by Institution and Role*

Institution	Role	N	Mean	Std. Deviation
HNUE	Student	112	4.1	0.6
HNUE	Lecturer	18	4.3	0.5
HMU	Student	91	3.9	0.7
HMU	Lecturer	15	4.2	0.5
NAEM	Student	60	3.8	0.8
NAEM	Lecturer	16	4.0	0.6

4.2 Perceptions of Professionalism

Participants self-assessed their teaching professionalism, including pedagogical skills, ethical responsibility, and reflective practice. Descriptive statistics are provided in Table 2.

Table 2. *Professionalism Perception Scores by Institution and Role*

Institution	Role	N	Mean	Std. Deviation
HNUE	Student	112	4.2	0.5
HNUE	Lecturer	18	4.4	0.4
HMU	Student	91	4.0	0.6
HMU	Lecturer	15	4.3	0.5
NAEM	Student	60	3.9	0.7
NAEM	Lecturer	16	4.1	0.5

4.3 Satisfaction with Blended Learning Model

Participants rated their satisfaction with the blended learning approach. Table 3 shows the percentages of participants who reported being "satisfied" or "very satisfied."

Table 3. *Satisfaction with Blended Learning Model by Institution and Role*

Institution	Role	N	Satisfaction (%)
HNUE	Student	112	85
HNUE	Lecturer	18	90
HMU	Student	91	80
HMU	Lecturer	15	88
NAEM	Student	60	78
NAEM	Lecturer	16	84

4.4 Statistical Analysis of Group Differences

ANOVA results indicated significant differences in digital competency scores among institutions ($F(2,309) = 4.76$, $p = 0.009$). Post-hoc tests showed HNUE participants scored significantly higher than NAEM participants ($p < 0.05$). Independent t-tests revealed that lecturers scored significantly higher than students in both digital competency ($t(310) = 3.25$, $p = 0.001$) and professionalism perception ($t(310) = 2.98$, $p = 0.003$).
Correlation analysis showed a strong positive relationship between digital competency and professionalism ($r = 0.68$, $p < 0.001$), suggesting that enhancing digital skills contributes to professional growth.

4.5 Qualitative Insights

Perceived Value of Blended Learning:
The majority of participants expressed positive attitudes towards the blended learning model:
Increased Engagement: 13 out of 15 students (86.7%) and 11 out of 12 lecturers (91.7%) agreed that blended learning enhanced student engagement

compared to traditional classes. A student from HNUE remarked, *"The online discussion forums helped me think more deeply and interact with classmates outside of class."*

Autonomy and Flexibility: 12 out of 15 students (80.0%) and 11 out of 12 lecturers (91.7%) valued the flexibility offered, which enabled self-paced learning.

Practical Skill Development: 13 out of 15 students (86.7%) and 10 out of 12 lecturers (83.3%) reported significant improvement in practical digital skills through blended learning activities.

Table 4. *Satisfaction with Key Features of Blended Learning*

Feature	Students Agreeing	Total Students	% Students	Lecturers Agreeing	Total Lecturers	% Lecturers
Increased Engagement	13	15	86.7%	11	12	91.7%
Autonomy and Flexibility	12	15	80.0%	11	12	91.7%
Practical Skill Development	13	15	86.7%	10	12	83.3%

Professional Growth Indicators

Participants identified clear signs of professional development associated with the blended learning approach:

Improved Lesson Planning: 11 out of 15 students (73.3%) and 10 out of 12 lecturers (83.3%) reported enhanced ability to design technology-integrated lesson plans.

Reflective Practice: 12 out of 15 students (80.0%) regularly engaged in reflection journals; 10 out of 12 lecturers (83.3%) confirmed this practice as critical for professional growth.

Increased Confidence with Technology: 13 out of 15 students (86.7%) felt significantly more confident using educational technologies after the semester, supported by 11 out of 12 lecturers (91.7%).

Table 5. *Reported Indicators of Professional Growth*

Indicator	Students Agreeing	Total Students	% Students	Lecturers Agreeing	Total Lecturers	% Lecturers
Improved Lesson Planning	11	15	73.3%	10	12	83.3%
Regular Reflective Practice	12	15	80.0%	10	12	83.3%
Increased Confidence with Tech	13	15	86.7%	11	12	91.7%

Institutional Challenges

Despite the positive experiences, several challenges emerged, particularly at NAEM:

Infrastructure and Internet Issues: 10 out of 15 NAEM students (66.7%) reported unstable internet as a major barrier, compared to 4 out of 15 HNUE students (26.7%) and 7 out of 15 HMU students (46.7%).

Limited Technical Support: 9 out of 15 NAEM students (60.0%) indicated insufficient IT support, while only 3 out of 15 HNUE students (20.0%) and 5 out of 15 HMU students (33.3%) reported the same.

Resistance or Hesitancy Toward Technology Use: About 3 out of 12 lecturers (25.0%) and 5 out of 15 students (33.3%) across all institutions expressed some hesitancy or discomfort with digital teaching tools.

Table 6. *Reported Institutional Challenges by Institution*

Challenge	NAEM Students Agreeing	Total NAEM Students	% NAEM	HNUE Students Agreeing	Total HNUE Students	% HNUE	HMU Students Agreeing	Total HMU Students	% HMU
Unstable Internet Connection	10	15	66.7%	4	15	26.7%	7	15	46.7%
Insufficient Technical Support	9	15	60.0%	3	15	20.0%	5	15	33.3%
Hesitancy Toward Technology	5								

5. Discussion

The findings of this study demonstrate that the application of technology-integrated learning models significantly enhances the professionalism of education students in Vietnamese teacher training institutions. Participants across all three universities reported high levels of digital competency and professionalism perception, with lecturers generally scoring higher than students. This aligns with previous studies, such as Castera et al. [10], who found that teacher educators' technological proficiency strongly predicts the quality of digital mentorship and consequently

supports pre-service teachers' professional development.

The positive correlation between digital competency and professionalism ($r = 0.68$, $p < 0.001$) found in this research reinforces earlier theoretical frameworks like TPACK [2] and ADDIE [8], which emphasize the crucial interplay between technological knowledge and pedagogical skills in shaping teacher professionalism. This supports Kaya and Adiguzel's [4], findings that technology-based reflective training enhances pre-service teachers' pedagogical reasoning and confidence in using digital tools.

Participants highly valued the flexibility, autonomy, and engagement provided by the blended learning model, echoing Basak, Wotto, and Bélanger's [6], conclusions regarding blended learning's capacity to personalize and enrich learning experiences. The increased opportunities for self-paced learning and interactive activities reported in this study also correspond with insights from Benton-Borghi [7], who highlighted the role of digital tools in fostering reflective practice and innovation in teacher education.

Nevertheless, this study identified notable challenges related to infrastructure, technical support, and technology acceptance, particularly at NAEM. These findings are consistent with Siyam et al. [21] and Marais [14], who emphasize that without sufficient institutional support and resources, the potential benefits of technology integration cannot be fully realized. The observed resistance or hesitancy toward technology adoption among some students and lecturers also mirrors concerns raised by Bao [5], about digital equity and readiness in the context of rapid online education shifts.

6. Conclusion

This research confirms that technology-integrated learning models, when implemented effectively, can significantly foster the professionalism of education students. The blended learning approach, based on the ADDIE framework, successfully enhanced participants' digital competencies, pedagogical skills, reflective practices, and confidence in using educational technologies.

Despite positive outcomes, challenges related to infrastructure, technical support, and user hesitancy remain critical areas for improvement. Addressing these challenges requires coordinated institutional efforts, policy support, and ongoing professional development to ensure equitable access and meaningful technology integration.

The findings provide practical implications for teacher education programs in Vietnam and similar contexts, emphasizing the necessity of integrating technology as a fundamental dimension of teaching professionalism. Future research should expand on these insights, incorporating diverse educational settings and exploring impacts on actual classroom practices.

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper
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