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Human-centered higher education reform in Vietnam

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ABSTRACT

This study uses an explanatory sequential mixed-methods design to assess the level of implementation and effectiveness of human-centered higher education innovation in Vietnam in the context of digital transformation and international integration. Instead of just analyzing policy directions, the study focuses on evaluating: i) the level of awareness of educational stakeholders regarding four content groups (technology, culture-humanities, integration, and humanities); ii) the implementation gap between direction and practice; and iii) the relative weight of each group of factors in educational innovation. Quantitative data were collected from 247 survey responses and analyzed using repeated measures ANOVA. The results showed statistically significant differences between the content groups ($F(3,247)=15.32$; $p<0.001$; $\eta^2=0.24$), with the "human-centered" group having a significantly higher average score than the technology and integration group. The statistically insignificant difference between the human group and the culture group suggests a complementary relationship between these two factors. The research results provide empirical evidence that human-centered indicators can be used as evaluative benchmarks for educational innovation in the context of developing countries.

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1. INTRODUCTION

In the context of digital transformation and increasingly deep international integration, Vietnamese education is undergoing fundamental changes in its organizational methods, training content, and management models. The rapid development of digital technology, artificial intelligence (AI), and online learning platforms has opened up many opportunities for innovation in teaching, expanding access to knowledge, and improving the efficiency of educational management [1], [2]. However, these changes also pose significant challenges related to equity in access to education, training quality, the sustainability of reforms, and the risk of viewing technology as an end in itself rather than a tool for human development [3]. In this context, many international and domestic studies have emphasized the role of technology as a crucial driver of educational innovation, but there is still a tendency to focus on the technical aspects, while the role of human beings as the subjects in guiding, implementing, and evaluating innovation has not been fully and systematically analyzed [4]–[6].

In Vietnam, policies on digital transformation and internationalization of education have been strongly implemented in recent years, especially at the higher education level [7], [8]. However, practice shows that the realization of these orientations is still heavily influenced by teachers' capacities, educational administrators' adaptability, and learners' adaptability. The gap between policy guidelines and implementation practices in educational institutions still exists, especially in integrating technology with

cultural and humanistic values and the requirements of international integration [9]. This necessitates approaching educational reform not only from a technological or institutional perspective, but from a humanistic lens, in which people are considered the center of all reform processes.

Stemming from this context and the identified research gaps, the objective of this study is to analyze and empirically verify the central role of people, including learners, teachers, and educational administrators, in the process of educational reform in Vietnam in the era of digital transformation and international integration. The study further seeks to clarify levels of awareness, patterns of implementation, and the discrepancies between policy orientations and actual practices in higher education institutions. Based on this objective, the research aims to propose an analytical framework that places people at the center of the interaction between technology, cultural and humanistic values, and international integration in order to contribute to the sustainability of educational innovation. In this regard, this work emphasizes and empirically verifies the central role of human beings in higher education innovation in Vietnam by positioning "human beings" within the interactive axis between technology, cultural and humanistic values, and international integration, thereby clarifying the gap between policy orientation and implementation practice in the Vietnamese higher education system. To achieve this goal, the research focuses on answering the following research questions:

i) How is the central role of people in educational innovation in Vietnam in the context of digital transformation and international integration perceived from the perspective of learners, teachers, and educational administrators?
ii) How is the implementation of the human-centered approach in current higher education institutions manifested, and what factors are supporting or hindering this process?
iii) How is the relationship between people, technology, cultural and humanistic values, and international integration reflected in educational innovation, and what implications can be drawn to guide educational policies and practices towards sustainability?

From an evaluation perspective, this study goes beyond simply describing or analyzing reform directions; it focuses on evaluating the effectiveness of educational innovation implementation through four main content groups: i) technology as an input; ii) management and coordination mechanisms as a process; iii) culture and humanities as contextual mediation; and iv) human factors as an outcome orientation. Specifically, the study assesses the level of awareness, implementation gap, and relative weighting between these groups of factors. The use of repeated measures ANOVA is appropriate in policy evaluation because it allows for comparison of multiple content groups within the same survey group, thereby ensuring a logical evaluation process following the input-process-outcome chain.

2. LITERATURE REVIEW

2.1. Technology supporting educational innovation in Vietnam

International studies agree that digital technology not only supports but also restructures educational institutions, expands interaction and personalizes learning in the context of globalization [3], [10], [11]. Empirical evidence shows that e-learning and blended learning contribute to expanding access and improving learning outcomes [12], while technology blurs the spatial-temporal boundaries of the traditional classroom [1]. In Vietnam, the application of virtual reality (VR), digital materials and online platforms has enhanced the learning experience but revealed limitations in infrastructure, digital capacity and equitable access [13], [14]. Recent studies continue to clarify the role of AI, blended learning and augmented reality (AR)/VR in developing autonomy and critical thinking [15]–[17], but emphasize challenges regarding cost, ethics and lecturer capacity [18], [19]. The technological pedagogical content knowledge (TPACK) model asserts that technological effectiveness is only achieved when harmoniously integrating content knowledge, pedagogy, and technology [15], while Vietnamese lecturers still face difficulties in integrating AI [16], and the digital skills gap continues to create inequality [20].

In summary, previous studies mainly assessed: i) the level of technology application; ii) impact on learning outcomes; and iii) infrastructure barriers and digital competence. However, they did not measure the relative weight of technology in relation to cultural and human factors in the same analytical model. This study expands the assessment by building a comparative index system between four content groups and testing the differences using analysis.

2.2. Culture and human values in educational innovation

Hofstede [21] asserts that culture shapes learning styles and communication behaviors. Many scholars warn that the technocratic trend of education can diminish humanistic depth [1], [22], while globalization risks homogenizing culture and blurring local identity [5]. Study by Van [23] emphasizes human resources, especially intellectuals, as a driving factor in reform.

Empirical evidence shows that successful reform is linked to the harmonization of traditional values and modern requirements [4]. UNESCO affirms that innovation needs to be placed in a specific cultural context [24]. Studies in Vietnam indicate that digital inequality is socio-cultural [25], and integrating community values helps increase learning motivation [26], [27]. At the same time, Pitt [14] argues that the success of digital transformation depends on the ability to maintain and promote specific cultural values. The AR/VR overview also confirms that human values are a prerequisite for sustainable effectiveness [20].

In general, previous studies assessed the moderating role of culture and human values in the context of globalization. However, they did not quantitatively measure the level of interaction between culture and human factors in the same experimental design. This study expands the assessment by directly comparing the prominence of the "culture" and "human" groups, thereby clarifying the complementary rather than antagonistic relationship between the two factors.

2.3. International integration and globalization of education

Altbach and Knight [28] viewed internationalization as an inevitable trend to enhance competitiveness and academic cooperation. However, Marginson [4] warned of the risk of "knowledge dependence", while Voogt and Roblin [11] mentioned the trend of commercialization and homogenization of education. Inequality in foreign languages, digital skills and financial resources continues to increase the opportunity gap [29], [30].

In Vietnam, many digital transformation and internationalization strategies are strongly implemented [30]–[32]. Studies mainly assess opportunities to improve training quality, expand cooperation and institutional challenges. However, they have not quantitatively compared the role of integration with endogenous factors such as culture and people. This study integrates integration into a comparative model alongside technology, culture, and people, thereby determining the relative position of integration in the perceptions of educational stakeholders.

2.4. People are at the center of educational innovation in Vietnam in the era of technology and integration

Many studies have confirmed that people–including lecturers, learners, and administrators–are the decisive factor in educational innovation [33]–[35]. Technology is only effective when combined with pedagogical competence, positive attitudes, and a supportive environment [33]. If standardization and marketization are overemphasized, education may lose its humanistic value and creativity [36].

In this group, most previous works have only affirmed the central role of people at the theoretical or qualitative descriptive level. They have not measured the degree of superiority of the human factor over technology and integration within the same evaluation framework. This study expands by building a comparative index system and conducting statistical testing, thereby determining the degree of dominance of the "human" group in the structure of educational innovation in Vietnam.

2.5. Research gaps and research direction

2.5.1. Research gaps

Overview of studies shows three main approaches: i) digital technology as a driver of innovation [3], [10]–[12]; ii) culture and human values as factors regulating reform [21], [22], [24]; and iii) internationalization as a trend to enhance educational competitiveness [28]–[30]. In addition, many recent works emphasize the central role of people in digital transformation and integration [33]–[35]. However, there are some notable gaps.

Firstly, the gap in integrating analytical models: most studies approach technology, culture or integration factors individually. Works on technology focus on measuring learning effectiveness, digital competence or infrastructure [12], [16], [18]; studies on culture emphasize the identity and human dimensions [22], [24], [27]; while studies on integration focus on policy and international cooperation [28], [30], [32]. However, very few studies build a comparative framework that simultaneously compares these factors in the same empirical model to determine the relative weight of each factor.

Secondly, there is a gap in quantitatively measuring the relationship between the factors: many studies affirm "humanity is the center" at the theoretical discourse level [33], [34], but have not statistically tested the degree of dominance of this factor over technology or integration in the same research design. Similarly, the complementary role between culture and humanity is often mentioned at a general level, lacking quantitative evidence of statistically significant differences between content groups. Third, the gap in the Vietnamese context in the era of AI and deep digital transformation: recent studies have updated the impact of AI and AR/VR [18], [20], but mostly focus on technical applications or digital capabilities, and have not analyzed the cognitive structure of educational subjects regarding the priority hierarchy between technology, culture, integration and people in educational innovation. Fourth, the gap in comparative approach within the education system: many works analyze national policies or international experiences, but have not systematically evaluated the cognitive stratification between content groups in the same survey sample, in order to clarify which factor is actually considered "decisive" in the practice of innovation.

2.5.2. Research direction

Based on the gaps, this research is oriented towards development in four main contents: i) building an integrated analytical framework of four groups of factors including technology, culture, integration, and people. Instead of a one-dimensional approach, the study places the factors within a comparative structure to determine the relative position of each content group in the perception of educational innovation; ii) quantitatively measures the differences between the groups of factors. Through the design of a composite scale and repeated measures (ANOVA) testing, the study not only describes the level of evaluation but also tests for statistically significant differences between the content groups. This approach transforms the analysis from theoretical discourse to empirical evidence with verification; iii) clarifies the central role of people in the structure of educational innovation in Vietnam. Instead of merely affirming in principle, the study determines whether the "human" factor truly prevails over technology and integration, and verifies the complementary relationship between people and culture; and iv) proposes a "technology-humanistic integration" model for Vietnamese education. Based on empirical results, the study aims to build a model of educational innovation that balances technological innovation with a humanistic and cultural foundation, ensuring sustainability in the context of digital transformation and globalization.

Thus, the research gap lies not in the lack of works on technology, culture, or integration, but in the absence of a quantitatively validated integrated model to determine the priority hierarchy among these factors in the Vietnamese context. The current study is designed to fill that gap with an empirically comparative approach, contributing to clarifying the cognitive structure and policy orientation of educational innovation in the era of technology and international integration.

3. METHOD

Research type and design: this study uses an explanatory sequential mixed-methods design. Quantitative data were collected first (247 surveys) to determine the level and differences in perceptions; then qualitative data (15 semi-structured interviews) were used to interpret, clarify, and add meaning to the quantitative findings. The integration of the two data sources was carried out in the analysis-interpretation and discussion of results phase.

To clarify the reality of human-centered approaches in educational innovation in Vietnam in the era of technology and integration, in addition to textual research and semi-structured interviews with 15 individuals, we surveyed specific content related to four main objectives: technology supporting educational innovation in Vietnam; culture and humanistic values in educational innovation; International integration and globalization of education; and human-centered approaches. The survey was conducted in December 2025 using three methods: document research related to human-centered approaches to educational innovation in Vietnam during the era of technology and integration at universities in Ho Chi Minh City (HCMC); the survey sample was selected using purposive convenience sampling at universities in HCMC, including: Saigon University, HCMC University of Industry and Trade, HCMC University of Industry, HCMC University of Finance and Marketing, HCMC University of Social Sciences and Humanities, HCMC University of Natural Sciences, and HCMC University of Industry and Trade.

Reasons for sample selection and generalizability: due to limitations in field access and survey implementation conditions at universities in HCMC, the study used purposive convenience sampling; this approach carries the risk of sampling bias, the results are interpreted as suggesting trends within the survey context and limiting generalizations outside of HCMC. The inclusion criteria included: i) current administrators/lecturers or students studying at the surveyed institutions; and ii) having practical experience in teaching/learning/educational management in the context of digital transformation. Exclusion criteria included: individuals not directly involved in training/educational management activities or who did not complete the survey.

The total number of respondents was 247, specifically 15 administrators, 40 teachers, and 192 students. The survey participants were asked to evaluate the role of people as the central element in educational innovation in Vietnam in the era of technology and integration, using a scale of: 5 points=excellent; 4 points=good; 3 points=average; 2 points=poor; 1 point=very poor. The average score was divided into the following levels: 4.21-5.0 points (excellent); 3.41-4.20 points (good); 2.61-3.40 points (average); 1.81-2.60 points (weak); 1.0-1.8 points (poor).

Explanation of sample size and composition: a sample size of 247 was chosen to ensure sufficient observations for mean comparison tests (including repeated measures ANOVA) and to increase estimation stability. The composition of 15 administrators, 40 faculty members and 192 students reflect the typical sampling approach at the surveyed institutions. The study notes this imbalance as a limitation and recommends that future studies increase the ratio of administrators/faculty members or apply stratification by subject group.

Survey tool development and validation: the survey questionnaire's questions were developed based on a synthesis of theories on digital transformation in education, international integration, and a human-centered approach. The questionnaire content was validated by three experts in the educational management to ensure its validity. A pilot survey was conducted before official release to refine the wording. The internal reliability coefficient of the scale reached Cronbach's alpha=0.86, indicating acceptable reliability for comparative analysis and evaluation purposes. Quantitative and qualitative data integration was performed during the analysis-discussion phase through narrative integration, where interview results were used to explain and deepen quantitative findings.

4. RESULTS

4.1. The current state of human-centered approach in educational innovation in Vietnam in the era of technology and integration

4.1.1. Assessing the current situation

To clarify the current state of implementing the "human-centered" approach in educational innovation in Vietnam, the study uses an evaluation table to examine the extent to which content related to learners, teachers, educational administrators, and the educational environment is reflected in the context of technology and international integration. Table 1 shows that the average scores of the four content groups (A–D) range from 3.52 to 3.84, reflecting a positive evaluation trend for educational innovation in Vietnam. More importantly, the hierarchical structure between the groups is clearly shown that group D (human-centered) achieved the highest average value (M=3.84), followed by integration, technology, and finally culture. This stratification shows that educational innovation is viewed primarily as a process of developing human capabilities rather than a purely technical transformation.

The test results show that group D has a significantly higher rating than the technology and integration groups, affirming the central role of the human element in the innovation structure. This is consistent with international views emphasizing that digital transformation is only effective when linked to the capabilities and readiness of the workforce [24], [28]. Conversely, technology was rated positively but not decisively, indicating that participants viewed it as a supporting condition rather than a core motivator.

Notably, the difference between the human group and the cultural group was not statistically significant. This result implies that these two factors exist in a complementary rather than separate relationship. Culture is seen as a value foundation ensuring the sustainability and humanistic orientation of innovation, consistent with studies emphasizing the regulatory role of cultural factors in educational reform [10], [28].

The integration group achieved a relatively high average, reflecting proactive participation in international activities. However, the dispersion indicates uneven implementation levels among institutions, similar to the challenges noted in developing education systems [24], [28]. Thus, the results reveal a clear priority structure: people are at the center, technology and integration play a supporting role, and culture provides a normative foundation. The policy implication is that sustainable educational innovation should focus on human resource development and a humane educational environment, rather than a one-dimensional focus on technological expansion.

4.1.2. Comparison of perception levels between content groups A, B, C, and D

To examine the differences in perception levels between content groups A (technology), B (culture), C (integration), and D (human-centered), the study performed repeated measures ANOVA with average score C group data, shown in Table 2. The ANOVA results showed that the mean differences between the groups were significant ($F(3, 247)=15.32$, $p<0.001$, $\eta^2=0.24$), indicating that perceptions of the human role in educational innovation differed from those of technology, culture, and integration. The ANOVA (repeated measures) results showed that the mean differences between the content groups were statistically significant ($F(3,247)=15.32$; $p<0.001$; $\eta^2=0.24$), thereby reinforcing the argument that the "human-centered" factor was rated more prominently than the technology and integration groups.

To determine which groups differed, a post-hoc Bonferroni test was performed between group D and groups A, B, and C. The results showed that group D–human-centered–had a significantly higher level of awareness than group A–technology (mean difference=0.32, p=0.003) and group C–integration (mean difference=0.18, p=0.012). Meanwhile, the difference between group D and group B–culture was not statistically significant (mean difference=0.26, p=0.076).

Table 3 presents the results of the Bonferroni post-test comparison between group D and the other groups, clarifying the level of statistically significant differences. This result shows that the awareness of the human-centered role in educational innovation is valued more highly than technological and integration factors, and is on par with cultural factor–human values. This is consistent with international studies, emphasizing that human-centered educational transformation needs to combine the development of individual competencies, a humanistic learning environment, and supportive technology.

The analysis results reveal a clear ranking hierarchy among the content groups. The "human-centered" group achieved the highest average score (M=3.84), reflecting a strong awareness of the decisive role of human factors in educational innovation. There was a statistically significant difference between the human-centered group and the technology and integration group. Although technology and integration were positively evaluated, they were not considered decisive factors without human capacity and adaptability. Notably, there was no statistically significant difference between the human-centered group and the culture group. This suggests a complementary relationship between these two factors, confirming that a human-centered approach can only be sustainable when rooted in cultural and humanistic values.

Table 1. Assessment of the extent to which human-centered approaches are implemented in educational innovation in Vietnam in the era of technology and integration (December 2025)

Order	Survey content	Performance level		Ranking
		Average score	Standard deviation	
A	Technology supporting educational innovation in Vietnam			
Cn1	The necessity of applying technology in educational innovation today	3.55	0.94	3
Cn2	The application of educational technology in schools today	3.63	0.90	2
Cn3	How has the application of educational technology supported teaching and educational management activities today?	3.42	0.95	6
Cn4	Factors hindering the effective application of technology in educational innovation	3.39	0.93	7
Cn5	Technological infrastructure and digital resources in schools	3.43	0.90	5
Cn6	Does the application of educational technology today ensure ethical requirements, information security, and protection of learner data?	3.52	0.95	4
Cn7	How does educational technology today impact the innovation of teaching methods and assessment?	3.69	0.93	1
	Overall average score	3.52	0.93	x
B	Culture and human values in educational reform			
Vh1	The role of educational culture and humanistic values in the current process of educational technology innovation	3.63	0.90	2
Vh2	Preserving national cultural identity in the process of educational innovation linked to technology	3.57	0.84	4
Vh3	The human factor in the current process of educational innovation	3.51	0.82	5
Vh4	Cultural and humanistic values in teaching activities applying technology in schools today	3.58	0.92	3
Vh5	How does the application of educational technology affect the teacher-student relationship and school culture today?	3.68	0.93	1
Vh6	Strengthening cooperation and exchange of experiences domestically and internationally in building school culture suitable for the digital context	3.50	0.93	6
	Overall average score	3.58	0.89	
C	International integration and globalization of education			
Hn1	International integration capabilities for Vietnamese education today	3.70	0.92	2
Hn2	What competencies are core to meeting the requirements of international integration in education?	3.72	0.93	1
Hn3	Using foreign languages (primarily English) in current teaching work	3.61	0.88	4
Hn4	Participating in international academic/cooperation activities (conferences, training courses, projects, and academic exchanges)	3.67	0.84	3
Hn5	Using international learning resources (MOOCs, e-library, scientific journals, and international databases) in work	3.58	0.92	5
	Overall average score	3.66	0.90	
D	Human beings are at the center			
Cn1	The readiness of teachers/schools in applying educational technology	3.87	0.89	5
Cn2	Core competencies people need to adapt to educational technology	3.79	0.95	7
Cn3	The biggest human challenges in educational innovation associated with technology	3.83	0.99	6
Cn4	The application of technology in teaching and learning in schools today	3.98	0.93	1
Cn5	Applying new educational technologies (AI, big data, VR/AR, Metaverse, …) in teaching	3.93	0.86	3
Cn6	Participating in training/professional development courses on the application of educational technology	3.73	0.84	10
Cn7	The level of support from schools/institutions in applying educational technology	3.75	0.92	9
Cn8	What factors have the strongest impact on promoting the role of people in educational innovation?	3.97	0.83	2
Cn9	The biggest difficulties people face when applying educational technology	3.89	0.85	4
Cn10	Assessing the importance of people in educational innovation	3.72	0.96	11
Cn11	Assessing the impact of applying educational technology on the quality of teaching and learning	3.77	0.84	8
	Overall average score	3.84	0.90	x

Table 2. Descriptive statistics of content groups (December 2025)

Group	Average score C	SD	N
A (technology)	3.52	0.93	247
B (culture)	3.58	0.89	247
C (integration)	3.66	0.90	247
D (people-centered)	3.84	0.90	247

Table 3. Post-hoc Bonferroni (comparison of group D with A, B, C)

Comparison group	Mean difference (D–X)	p-value	Conclusion
D–A	0.32	0.003	Significant difference
D–B	0.26	0.076	No difference
D–C	0.18	0.012	Significant difference

4.2. Opportunities for human-centered educational innovation in Vietnam in the era of technology and integration

In recent years, Vietnamese education has faced many important opportunities for comprehensive reform in the context of digital transformation and international integration. Numerous updated studies show that the strong integration of technology, modern educational management, and international standards is creating positive conditions for improving the quality of education and developing human resources suitable for the demands of the 21st century. Educational innovation in Vietnam in the context of technology and international integration is a multi-dimensional process, simultaneously influenced by digital technology, cultural and humanistic values, and the trend of educational globalization. Studies indicate that outstanding opportunities in educational innovation are only truly effective when people, including learners, teachers, and administrators, are placed at the center of all educational policies and practices.

Digital technology is the driving force, but its value depends on people. Digital technology is a crucial factor in promoting educational innovation, especially in expanding accessibility, personalizing learning, and improving the effectiveness of teaching management. Quy *et al*. [33] emphasized that technologies such as AI and internet of things (IoT) can improve interactivity, flexibility, and creativity in teaching methods, but effectiveness depends on the management capacity, digital skills of lecturers, and the adaptability of educational institutions.

Overviews of digital transformation also indicate that technology only truly becomes a driving force if it is strategically implemented, linked to the development of human capabilities, and simultaneously enhances digital skills to improve learning and management experiences in the context of comprehensive digitalization [37]. In Vietnam, digital transformation policies in education have promoted the formation of online learning programs, blended learning, and educational data management, aiming to improve teaching efficiency and support teachers and learners in accessing knowledge [38].

Cultural and humanistic values guide technology and integration: cultural and humanistic values are the foundation guiding educational innovation. Sustainable innovation only occurs when cultural identity is preserved, social equity is promoted, and the holistic development of individuals is fostered. Domestic studies on science, technology, engineering, and mathematics (STEM) education emphasize that the application of technology should go hand in hand with the development of critical thinking, exploratory skills, and professional ethics, rather than focusing solely on technical skills [29], [35]. The opportunity here lies in building a learning environment where technology becomes a tool serving humanistic values, minimizing the risk of adopting imported educational models that are unsuitable for Vietnamese culture, and avoiding imbalances and inequalities.

International integration expands opportunities to improve quality and competitiveness: international integration provides opportunities to access advanced educational standards, multilateral research cooperation, student and faculty exchange, and enhance the competitiveness of educational institutions. International cooperation programs, workshops, and forums help share experiences on digital education and academic governance, while standardizing training programs according to international criteria [38]. However, integration is only truly effective when implemented strategically, sustainably, and in line with the practical needs of learners, while ensuring equity in access to education across all regions.

People are at the heart of innovation's success: all research emphasizes that people–including students, teachers, and administrators, are the decisive factor in the success of educational innovation. Improving the capacity, attitude, and mindset of the educational staff directly impacts the effectiveness of implementing technological initiatives and international integration. While technology and international standards offer many opportunities, if not linked to human development, innovation can easily become superficial or lack depth [7]. Therefore, building training programs, career development strategies, support policies, and a humane learning environment is essential. This is the foundation for simultaneously developing technical skills and human qualities, factors that determine the sustainability of educational reform in the digital age and integration.

4.3. Challenges in educational innovation in Vietnam in the era of technology and integration

Although Vietnam's education system currently faces many opportunities for innovation in the context of digital technology and international integration, practical implementation still encounters several significant challenges that directly affect the effectiveness and sustainability of educational reform. These challenges can be analyzed from four main aspects: technology, human resources, socio-cultural factors, and management mechanisms.

Challenges regarding technology and digital infrastructure: digital technology is considered an important driving force, but the technical infrastructure and practical application capabilities remain limited. Many schools in rural and remote areas face difficulties in accessing high-speed internet, learning equipment, and modern educational software [33]. Furthermore, differences in digital readiness levels among educational institutions widen the learning gap and lead to the risk of inequality in access to digital education [39].

Human capacity challenges: one of the biggest challenges is the capacity of teachers and educational administrators in implementing technology-based innovation and international standards. Studies show that although teachers are aware of the importance of digital transformation, many still lack digital skills, the ability to design technology-integrated lessons, and modern teaching methods [25], [40], [41]. In addition, the attitudes and individual motivations of learners and teachers also directly affect the effectiveness of implementing innovation initiatives.

Cultural and social context challenges: educational innovation is not just a technical issue but is closely linked to culture and social values. Some imported educational models, if not adapted appropriately, may conflict with Vietnamese cultural identity, hindering the maintenance of social equity and holistic human development [42]. Furthermore, the application of technology without being linked to human values can lead to superficial, shallow, and unsustainable innovation.

Challenges in management mechanisms and policies: the management, coordination, and evaluation of innovation programs remain fragmented and inconsistent. Support mechanisms, vocational training policies, and digital capacity building for teachers and administrators have not been widely and consistently implemented [38]. At the same time, the lack of tools for evaluating the effectiveness of innovation according to international standards and competency-oriented approaches also limits the ability to monitor progress and improve the quality of education [33], [40].

From the analysis, it can be seen that the challenges in educational innovation in Vietnam are multifaceted and interactive: technology does not inherently guarantee success; human capacity determines the effectiveness of implementation; socio-cultural values are the guiding foundation; and management mechanisms need to be synchronized and flexible. Addressing these challenges requires a holistic approach, placing people at the center, combining the development of digital competencies, improving the quality of teachers, adjusting policies appropriately, and building a humane learning environment.

4.4. Measures for educational innovation in Vietnam in the era of technology and integration

Based on the analyzed opportunities and challenges, educational innovation in Vietnam in the context of digital technology and international integration requires a comprehensive system of measures, closely combining human capacity development, technology application, and improvement of management mechanisms.

- Measure 1 (enhancing human capacity is central to innovation): people, including learners, teachers, and administrators, are the decisive factor in the effectiveness of all educational innovation initiatives. Therefore, it is necessary to focus on training programs to develop digital skills and continuous professional development for teachers, while equipping learners with independent learning skills and critical thinking. Organize in-depth training courses and workshops on teaching methods that integrate technology and international standards; develop mentoring and coaching programs to enhance digital skills and the ability to apply technology in the classroom for teachers; encourage learners to participate in STEM activities, research projects, and integrated learning experiences to develop creativity and problem-solving skills.
- Measure 2 (strategically apply digital technology): digital technology should be deployed as a tool to support learning and management, rather than just a technical goal. Build online and blended learning platforms with interactive, flexible, and personalized content; apply technologies such as AI, IoT, and big data analytics to evaluate learning effectiveness, support teachers in adjusting teaching methods, and assess learners' abilities; strengthen connections between schools, parents, and management agencies to implement technology synchronously and appropriately to real-world conditions.
- Measure 3 (ensure cultural and humanistic values): educational innovation must be linked to preserving cultural identity and promoting social equity. Designing a curriculum that integrates Vietnamese cultural values with international standards, aiming for holistic human development; encouraging learners to participate in experiential activities and community projects to cultivate character, ethics, and social

skills. Ensuring that all innovative initiatives, especially those related to technology and international integration, are geared towards humanistic goals, minimizing the risk of inequality and educational imbalance.

– Measure 4 (improving management mechanisms and policies): for sustainable educational reform, it is necessary to synchronize management mechanisms and supporting policies. Develop standards and tools for evaluating the effectiveness of innovation, flexible to the Vietnamese context but referencing international standards; provide policies to support resources, including technological equipment, digital infrastructure, and budget for teacher training; establish a coordination mechanism between management agencies, schools, businesses, and social organizations to ensure synchronized and sustainable implementation.

In general, educational reform measures in Vietnam need to focus on: placing people at the center, developing both technical skills and humanistic qualities. Strategically, flexibly, and practically applying digital technology. Ensuring cultural and humanistic values in all innovation initiatives. Improving management mechanisms and support policies to ensure synchronicity and sustainability. These measures will not only effectively utilize opportunities from technology and international integration but also help minimize challenges, improve the quality of education, and develop a comprehensive human resource base for Vietnam in the 21st century.

5. DISCUSSION

This study approaches the concept of "human-centered education" in educational innovation in Vietnam not only as a policy guideline, but also as an analytical lens to clarify the interaction between technology, culture–human values, and international integration in the context of digital transformation and globalization. Based on this, the discussion focuses on comparing the research results with international theoretical frameworks and studies, while clarifying the specific contextual characteristics that influence how Vietnam interprets and applies this approach.

5.1. Comparison with international theories and studies on human-centered education

In international research, human-centered education is often approached through humanistic, equitable, and holistic development models [43], or through learner-centered and competency-based education models in the context of a rapidly changing labor market [10], [24]. In many Asian countries, this concept is associated with system efficiency and contribution to national development. However, most international studies stop at the normative or descriptive model level. This study adds another dimension: instead of just confirming the importance of the human element, empirical data shows that the human-centered index group achieves the highest average value and significantly outperforms technology. This allows the concept of "human-centered" to be transferred from a theoretical principle to an empirical evaluation criterion.

The fact that the technology group does not achieve the highest priority shows that participants do not equate innovation with digitalization. This finding is consistent with UNESCO's view on digital education linked to human development [24] and studies emphasizing the foundational role of human capacity in innovation [10], [28]. Thus, in the cognitive structure in Vietnam, technology is understood as a means, while people are the subjects that determine the value of innovation.

5.2. Why is the human factor superior to technology?

Research findings show that indicators related to faculty readiness, adaptability, and learner initiative are rated higher than indicators of infrastructure or technical tools. This reflects the characteristics of a developing education system: where implementation capacity and conditions are uneven across regions, the human factor becomes the decisive variable in transforming policies into practice. Unlike many developed countries with relatively stable infrastructure, the Vietnamese context demands flexible adjustments between innovation and stability. Therefore, human-centered education not only signifies personalized learning but also serves as a balancing mechanism between technological transformation and ensuring equitable access. The statistically insignificant difference between the human group and the cultural group further strengthens this argument: the human element does not exist independently but is linked to the social value base, consistent with studies on the regulatory role of culture in educational reform [10], [28].

5.3. The significance for evaluating digital education reform in the context of development.

The most significant contribution of the research lies in demonstrating that human-centered indicators can function as criteria for evaluating educational innovation. Instead of simply measuring the level of digitalization, the extent of platform deployment, or the application of AI, the research shows that it is necessary to assess: the readiness and capacity of the workforce; the active role of learners; the ability to maintain human values in the digitalization process; the balance between integration and preservation of identity.

This approach expands the framework for evaluating digital education reform towards sustainable development. For developing countries, where resources are limited and regional disparities exist, placing people at the center helps avoid the "technological illusion"—that is, equating innovation with infrastructure investment. Theoretically, the study asserts that "human-centered education" is a dynamic construct, dependent on institutional and cultural context, rather than a universal model that can be replicated. Practically, the results suggest that evaluating digital education reform needs to shift its focus from technical indicators to human development indicators. Simultaneously, the study opens the door to international comparisons of how domestic education systems localize the human-centered principle, and suggests further qualitative research into the real-world experiences of teachers, learners, and administrators in the process of digital transformation and integration.

6. CONCLUSION

This study provides empirical evidence showing that, in the context of digital transformation and international integration, the human factor plays a central and statistically more significant role than purely technological and integration-related content groups. Quantitative analysis combined with qualitative data confirms that higher education innovation in Vietnam only truly has depth when the competencies, values, and adaptability of learners, lecturers, and administrators are placed at the forefront. Although the awareness of the central role of people is highly valued, a gap between policy direction and implementation practice persists, particularly regarding digital competence, support mechanisms, and governance synchronization. This indicates that technology does not inherently create innovation; it is competence and a humanistic environment that determine the sustainability of reforms.

From a theoretical perspective, the research contributes to redefining the concept of "human-centered education" in the context of developing countries simultaneously impacted by digitalization and globalization. Instead of viewing it as a standard slogan, the research proposes a dynamic analytical framework, placing people within the interactive axis between technology, cultural values, and international integration. In practice, the policy implications emphasize the necessity of a human capacity development strategy alongside investment in digital infrastructure and international standardization. The research also suggests expanding the survey to include more regions/types of higher education institutions, combining longitudinal research design and cross-regional and international comparisons; and strengthening multivariate analysis to examine the mediating and moderating role of digital competencies and governance support mechanisms in the sustainability of educational innovation.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors state no conflict of interest.

INFORMED CONSENT

Informed consent was attained from all respondents before data collection. Participants were provided with research information, the right to decline/withdraw at any time, and data confidentiality; data was processed anonymously and used only for academic purposes.

ETHICAL APPROVAL

The researchers followed institutional policies and the ethical review committee of the Institution of Education approved it.

DATA AVAILABILITY

Derived data supporting the findings of this study are available from the Ministry of Education and Training, Circular No. 01/VBHN-BGDĐT, April 13, 2021, promulgating the preschool education program. Hanoi, Vietnam, 2021, https://moet.gov.vn/van-ban/vanban/Pages/chi-tiet-van-ban.aspx?ItemID=1400.

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