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Digital Culture in Higher Education: A Theoretical Overview and an Analytical Research Framework

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Abstract

This study reviews theoretical approaches to digital culture in higher education and proposes an analytical framework to support future empirical research. Drawing on a comprehensive synthesis of both international and context-specific studies related to digital culture, digital competence, digital behavior, and digital transformation in higher education, the study adopts a systematic literature review approach guided by PRISMA principles. The literature selection process involves database searching, screening, eligibility assessment, and inclusion of relevant sources based on clearly defined criteria. Subsequently, content analysis and thematic synthesis systematize conceptual approaches, identify key theoretical foundations, and examine emerging research trends. The findings indicate that digital culture can be conceptualized as a multidimensional construct encompassing values, norms, practices, and digital interaction environments, while influenced by both individual and institutional factors within higher education contexts. Thereby, the study proposes an integrated analytical framework consisting of digital awareness, digital competence, digital behavior, digital ethics, and organizational and environmental factors. This study contributes to clarifying the theoretical foundation of digital culture in higher education and provides a structured basis for the development and empirical validation of research models in future studies.

1. INTRODUCTION

On accelerating global digital transformation, higher education is among the sectors most profoundly affected. The rapid advancement of digital technologies not only reshapes governance, teaching, and learning practices but also necessitates the reconfiguration of values, norms, and behaviors within educational environments. In this process, digital culture has emerged as a foundational factor influencing how stakeholders interact, adapt, and develop in digital contexts.

Recent studies emphasize that digital transformation in education should not be viewed merely as technological adoption, but rather as a process closely associated with cultural, social, and organizational change (Selwyn, 2016; Vial, 2023; Williamson & Hogan, 2020). Existing research has examined digital competence, digital citizenship, and technology-related behaviors among students and educators (Ferrari, 2012; Ilomäki et al., 2016; Ribble, 2015; Vuorikari et al., 2022). However, these approaches often remain fragmented and do not fully capture digital culture as an integrated system of cognition, values, norms, and practices within digital environments (Castells, 2010; Levin & Mamlok, 2021; Pangrazio & Sefton-Green, 2021).

The literature shows that digital culture has been approached from multiple theoretical perspectives, including sociological, organizational, and educational frameworks, as well as perspectives related to digital competence and digital citizenship (Castells, 2010; Ferrari, 2012; Ribble, 2015; Pangrazio & Sefton-Green, 2021; Schein, 2004). This diversity reflects the complexity of digital culture as a socio-educational phenomenon shaped by the interaction between technology, knowledge, and cultural practices (Bollmer, 2018; Levin & Mamlok, 2021). Nevertheless, the integration of these perspectives into a unified analytical framework for higher education remains limited (Selwyn, 2016; Williamson & Hogan, 2020).

In the context of universities accelerating digital transformation, the challenge extends beyond improving technological competence to fostering a sustainable digital culture (OECD, 2020; UNESCO, 2023). This requires systematic research to clarify the structure, components, and operational mechanisms of digital culture in higher education environments (Bond et al., 2020; Vuorikari et al., 2022).

Despite the growing body of research, significant gaps remain regarding the integration of theoretical perspectives and the development of analytical frameworks for digital culture in higher education. Existing studies have not sufficiently clarified the relationships among digital culture components or the roles of individual and contextual factors in shaping learners' digital culture (Levin & Mamlok, 2021; Pangrazio & Sefton-Green, 2021; Selwyn, 2016).

Addressing these gaps, this study aims to systematically review theoretical approaches to digital culture in higher education and to propose an integrated analytical framework for future empirical research. Specifically, the study addresses four research questions:

(1) How is digital culture conceptualized in higher education research?

(2) What are the major theoretical foundations of digital culture?

(3) What research gaps remain?

(4) What analytical framework is most appropriate for studying digital culture in higher education?

Higher education is selected as the focal context because universities represent highly autonomous and knowledge-intensive environments where digital transformation reshapes not only technological practices, but also academic values, learning cultures, and institutional governance.

2. LITERATURE REVIEW

The research history of digital culture in higher education is closely associated with the development of studies on educational technology and digital transformation in modern society. From an evolutionary academic perspective, this field can be understood through three main stages, reflecting a shift from technology-centered approaches to socio-cultural perspectives and integrated systemic perspectives.

2.1. The Technology-Oriented and Digitization Stage

In the initial stage, studies primarily approached digital transformation from a technological perspective, viewing it as a process of digitizing activities and applying technology to improve operational efficiency (Nadkarni & Prügl, 2020). Research during this period focused on issues such as technological infrastructure, learning management systems, digital learning resources, and online teaching.

In higher education, technology was initially conceptualized primarily as a tool to support teaching and learning, with limited attention paid to cultural and social dimensions (Bates, 2015; Selwyn, 2016). This perspective led to a simplified understanding in which digital transformation was often equated with the implementation of technological systems, such as learning management platforms and digital resources, rather than being understood as a broader process of institutional and cultural change (Vial, 2023). Consequently, digital culture was not yet recognized as an independent construct, but rather remained implicitly embedded within discussions of technology use and digital competence (Ilomäki et al., 2016; Pangrazio & Sefton-Green, 2021).

However, subsequent studies highlighted the limitations of this approach, particularly its inability to explain differences in learning behaviors and levels of technology adoption among educational stakeholders (Selwyn, 2020). These limitations laid the groundwork for a shift toward broader socio-cultural and systemic perspectives.

2.2. The Organizational and Digital Competence Stage

The key characteristics of this stage are summarized in Table 1.

Table 1. The Organizational and Digital Competence Stage

Aspect	Description	Key References
Time period	From around 2010 onwards, associated with the emergence of digital competence frameworks such as DIGCOMP	Ferrari (2012); Vuorikari et al. (2022)
Core focus	Digital transformation conceptualized as a process of organizational restructuring and individual capacity development	Verhoef et al. (2021)
Key components	Digital competence including information literacy, communication, creativity, and digital safety	Ferrari (2012); Vuorikari et al. (2022)
Empirical evidence in higher education	Studies highlight the relationship between digital competence and learning outcomes, self-directed learning, and career adaptability	Zhao et al. (2021); Song et al. (2025)
Organizational dimension	Emphasis on digital leadership, governance, and innovation in implementing digital transformation	Verhoef et al. (2021)
Limitations	Digital culture is often reduced to digital competence, neglecting values, norms, and social contexts	Ilomäki et al. (2016)
Theoretical implication	Recognition that digital competence is only one component within a broader digital culture system, contributing to the shift toward socio-cultural approaches	Ilomäki et al. (2016)

2.3. The Socio-Cultural and Integrated Systems Stage

Recent studies demonstrate a clear shift from technology-centered perspectives toward socio-cultural approaches, in which digital culture is understood as a system of values, norms, and practices formed within digital environments (Bollmer, 2018; Pangrazio & Sefton-Green, 2021). In this view, technology is considered part of a broader socio-cultural ecosystem rather than being treated as the central focus.

Theoretical perspectives such as network society theory (Castells, 2010), digital knowledge ecosystems (Williamson & Hogan, 2020), and connected learning theory (Jenkins et al., 2009) have expanded the understanding of digital culture in higher education by emphasizing the interactions among individuals, organizations, and digital environments. Consequently, digital culture is increasingly conceptualized as a multidimensional construct involving awareness, competence, behavior, communication, and ethics, and is commonly approached from integrated and multi-level perspectives (OECD, 2023; Pelletier et al., 2024).

In Vietnam, research on digital transformation and digital culture in education has grown rapidly in line with national digital transformation policies (Government, 2020). Existing studies have highlighted the integration of technology, governance, and culture, while also identifying challenges related to infrastructure and digital competence (Bui, 2022; Ho et al., 2020). However, the existing literature remains fragmented and lacks integrated learner-centered models.

2.4. Research Gaps

A synthesis of the literature reveals three major trends in digital culture research: a shift from technology-centered approaches to socio-cultural perspectives, the development of multidimensional and multi-level models, and the growing integration of individual, organizational, and systemic levels.

Despite these advances, important gaps remain, including the lack of integrated models, limited context-specific studies, and insufficient empirical validation in educational settings. These gaps highlight the need for more comprehensive analytical frameworks applicable to higher education research and practice.

Table 2. Evolution of Research on Digital Culture in Higher Education

Stage	Key Characteristics	Theoretical Foundations	Limitations
Technology-oriented stage	Focus on digitization, infrastructure, LMS, online learning	Digital transformation theory (early stage)	Overemphasis on technology, limited socio-cultural perspective
Organizational & competence stage	Focus on digital competence, governance, institutional restructuring	DIGCOMP, digital competence frameworks	Reduces digital culture to skills and competence
Socio-cultural & integrated stage	Digital culture as values, norms, practices, and multi-level systems	Network society theory, connected learning, digital ecosystems	Fragmented models and limited empirical validation

3. MATERIALS AND METHODS

3.1. Research Design

This study adopts a theoretical and critical review approach to systematize theoretical perspectives and identify research gaps related to digital culture in higher education. Rather than providing a merely descriptive summary, the study focuses on analyzing and integrating existing theories in order to develop an analytical framework for future empirical research.

3.2. Search Strategy and Literature Selection

Approximately 70 publications were selected, including peer-reviewed journal articles, academic books, and policy reports. Most of these studies were published between 2010 and 2026, reflecting the rapid development of digital transformation and digital culture research in higher education. The literature selection process followed PRISMA principles to ensure transparency and rigor.

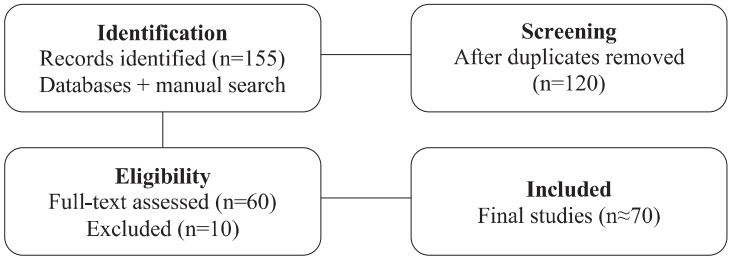

Figure 1. PRISMA-Informed Flow Diagram of the Literature Selection Process

3.3. Inclusion and Exclusion Criteria

Studies were included if they: (i) addressed digital culture, digital competence, digital behavior, or digital transformation in higher education; (ii) were published in academic journals, books, or high-quality reports; and (iii) provided theoretical or analytical contributions relevant to the study. Duplicate, irrelevant, or low-quality studies were excluded.

3.4. Data Analysis and Synthesis Methods

The selected literature was analyzed using content analysis, thematic synthesis, and comparative analysis. The studies were categorized into major themes, including conceptualizations of digital culture, theoretical foundations, research trends, and influencing factors. The findings were subsequently synthesized to identify patterns, limitations, and research gaps, thereby forming the basis for the proposed analytical framework.

3.5. Reliability and Limitations

To enhance reliability, the study employed a structured literature selection process with clearly defined inclusion and exclusion criteria. However, as a theoretical review, the study does not provide empirical validation of the proposed framework, and some relevant studies may have been excluded due to language and database limitations.

4. RESULTS

4.1. Digital Transformation and Digital Culture in Higher Education

Digital transformation is increasingly understood not only as technological digitization but also as a process of organizational and socio-cultural change (Verhoef et al., 2021; Vial, 2023). In higher education, this process reshapes curricula, learning environments, and academic interaction through the integration of digital technologies and data-driven systems (Castro Benavides et al., 2020; Timotheou et al., 2023).

Recent studies indicate a clear shift from technology-centered approaches toward socio-cultural perspectives, emphasizing that digital transformation is closely associated with values, norms, and practices in digital environments (Selwyn, 2020; Williamson & Hogan, 2020). In this context, digital culture is conceptualized as a multidimensional construct involving awareness, behavior, ethics, and communication practices rather than merely a form of technological competence (Pangrazio & Sefton-Green, 2021; Robles-Carrillo, 2024).

In higher education, students' digital culture is reflected in their learning practices, academic communication, and participation in digital environments. Existing studies also show that the development of digital culture is shaped not only by individual competence but also by organizational, institutional, and contextual factors (Bui, 2022; Duong et al., 2021).

From a theoretical perspective, three major approaches are commonly identified: network society theory, data culture and digital knowledge ecosystem perspectives, and connected learning theory. These approaches collectively emphasize the interactions among individuals, organizations, and digital environments in shaping digital culture.

Three major theoretical approaches can be identified:

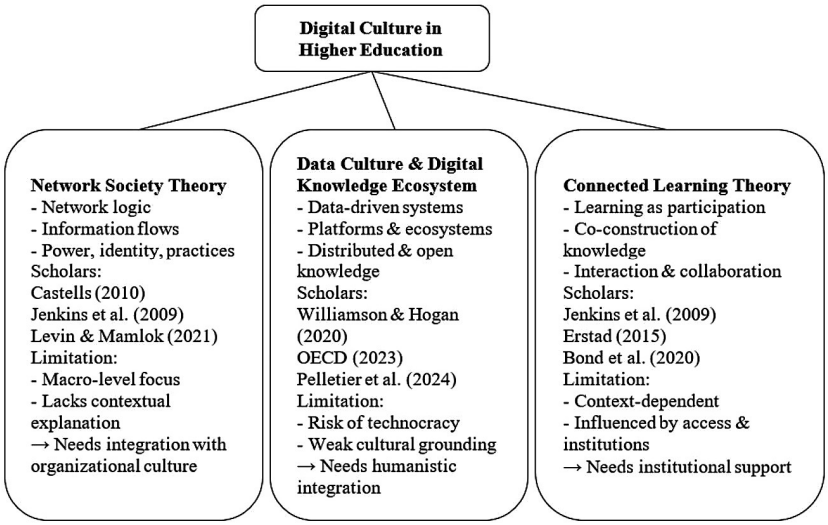

Figure 2. Three Major Theoretical Approaches to Digital Culture in Higher Education and their Key Characteristics and Limitations

Overall, recent research increasingly favors integrated approaches that combine sociological, educational, and cultural perspectives to explain digital culture as a dynamic system of values and practices within digital environments. From this perspective, digital culture in higher education is understood not merely as a product of technology or networks but as the result of interactions between technology and the deeper cultural layers of educational institutions (Dimmock, 2005; El Din, 2025; Schein, 2004). However, the literature continues to highlight the lack of integrated models suitable for specific higher education contexts, particularly in Vietnam and at the student level.

4.2. Components of Digital Culture in Higher Education

International and domestic studies consistently affirm that digital culture in higher education is a multidimensional construct reflecting the interaction among cognition, competence, behavior, social norms, and institutional contexts within digital environments (Bollmer, 2018; Pangrazio & Sefton-Green, 2021). Rather than being limited to technology use, digital culture is increasingly understood as a socio-cultural system in which technology serves as a medium for the formation of values, norms, and practices.

Current research approaches digital culture through several major dimensions, including values and norms (Bollmer, 2018; Hague & Payton, 2010), digital competence (Ferrari, 2012; Vuorikari et al., 2022), digital learning behavior (Bond et al., 2020; Erstad, 2015), and ecosystem or organizational

factors (OECD, 2023; Pelletier et al., 2024). By integrating these perspectives, recent studies suggest that digital culture in higher education consists of five core components: (i) digital awareness and attitudes, (ii) digital competence, (iii) digital learning behavior, (iv) digital communication culture, and (v) digital ethics and responsibility, which interact dynamically within digital environments (Gudmundsdottir & Hatlevik, 2018; Krumsvik, 2014; Robles-Carrillo, 2024).

Research also highlights the role of contextual and institutional factors such as infrastructure, organizational culture, and educational policies in shaping students' digital culture (OECD, 2023; Pelletier et al., 2024). In Vietnam, digital culture development is further influenced by technological conditions, regional disparities, and digital governance policies (Nguyen et al., 2025; Vu, 2025). Nevertheless, empirical and integrated learner-centered models remain limited.

Overall, the literature confirms that digital culture in higher education is a multidimensional system. However, important gaps remain regarding integrated models, context-specific studies, and empirical validation in educational settings. These gaps highlight the need for more comprehensive analytical frameworks to explain the formation and operation of digital culture in higher education. The major research gaps identified in the literature are summarized in Figure 3.

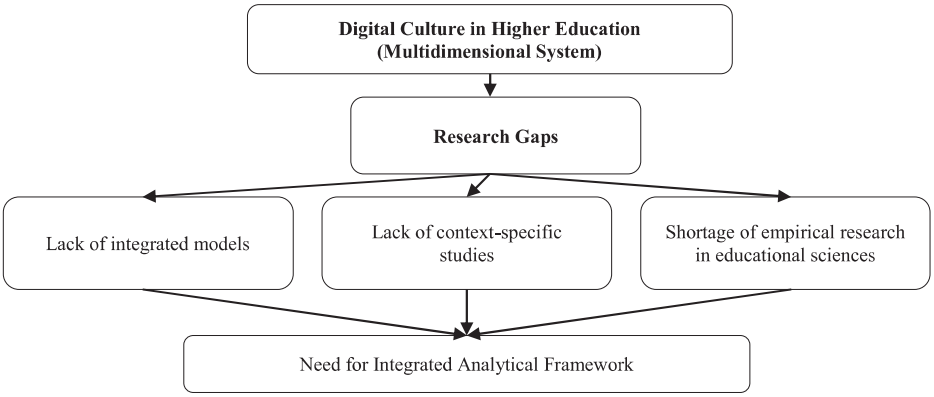

Figure 3. Research Gaps and the Need for an Integrated Analytical Framework for Digital Culture in Higher Education

4.3. Developing Digital Culture in Higher Education

4.3.1. A Policy and Global Orientation Perspective

In the context of digital transformation, the development of digital culture in higher education is increasingly associated with educational reform, digital citizenship, lifelong learning, and sustainable development (International Commission on the Futures of Education, 2021; OECD, 2020, 2023; UNESCO, 2023). Recent international approaches demonstrate a clear shift from technology-centered perspectives toward systemic and value-oriented frameworks.

Global frameworks emphasize that digital culture extends beyond technological competence to include ethics, responsibility, critical thinking, and participation in digital society (Recommendation of the European Parliament and of the Council, 2006; IEEE Standards Association, 2020; Miao et al., 2024). At the same time, studies and reports by JISC (2019, 2022) and EDUCAUSE highlight that digital culture development should be approached at multiple levels, including learners, organizations, policies, and technological infrastructure (Pelletier et al., 2024). Some scholars further argue that digital transformation is reshaping governance and cultural practices within digital environments (Millard, 2023; Valtysson, 2020, 2022).

In Vietnam, the development of digital culture in higher education is closely linked to national digital transformation policies such as Resolution No. 52-NQ/TW (Politburo, 2019), Decision No. 749/QĐ-TTg (Government, 2020), Decision No. 411/QĐ-TTg (Prime Minister, 2022a), and Decision No. 131/QĐ-TTg (Prime Minister, 2022b). Existing studies indicate that these policies have promoted digital learning environments and digital educational practices, although implementation remains uneven across institutions (Bui, 2022; Ho et al., 2020; Nguyen, 2024; Tran, 2023; Vu, 2025).

However, the literature also reveals several limitations, including the continued emphasis on infrastructure over cultural dimensions, the gap between policy and practice, and the lack of context-specific studies on students' digital culture (OECD, 2023; Pelletier et al., 2024; Timotheou et al., 2023). Therefore, current research increasingly emphasizes the need for integrated approaches linking policy, organizational environments, and learner practices.

4.3.2. Models for Developing Digital Culture in Education

The literature commonly approaches digital culture development in higher education from three interconnected levels: system, organization, and learner, indicating that digital culture cannot be developed through isolated technical solutions but instead requires coordination among policies, institutional practices, and learners' behaviors (OECD, 2023; Pelletier et al., 2024).

At the system level, studies emphasize digital education ecosystems in which policy, governance, infrastructure, competence, and learning environments interact in shaping digital culture (Hemerling et al., 2018; Millard, 2023; OECD, 2023). International organizations further associate digital culture with digital citizenship, lifelong learning, and responsible participation in digital society (Pelletier et al., 2024; UNESCO, 2023), although these approaches remain largely policy-oriented.

At the organizational level, digital culture development is closely linked to university governance, organizational culture, leadership, and digital transformation strategies (Capogna et al., 2020). Research highlights the importance of governance innovation, staff development, and collaborative organizational environments in supporting digital transformation (Cardoso et al., 2021; Deep, 2023; El Din, 2025). In Vietnam, institutional culture and human-resource readiness are also identified as important factors influencing digital transformation outcomes (Nguyen, 2024; Truong & Tran, 2026).

At the learner level, models mainly focus on digital competence and learning practices, showing that students' digital culture is shaped by curriculum integration, authentic learning experiences, and digital learning environments (Gudmundsdottir & Hatlevik, 2018; Instefjord & Munthe, 2016; Ottestad et al., 2014). However, these approaches still pay insufficient attention to values, ethics, and social norms within digital environments (Pangrazio & Sefton-Green, 2021).

Current studies therefore suggest that digital culture development should be implemented through integrated approaches linking curriculum and competence development, university governance, and digital learning ecosystems (Bond et al., 2020; Castro Benavides et al., 2020; Haleem et al., 2022; JISC, 2019, 2022; Vuorikari et al., 2022). Nevertheless, comprehensive and context-specific models explaining the relationships among these levels remain limited, particularly within the Vietnamese higher education context.

4.4. Analytical Framework for Research on Digital Culture in Higher Education

Based on the synthesis of theoretical approaches and identified research trends, the findings suggest that digital culture in higher education can be approached as a multidimensional construct reflecting the interaction among individual, organizational, and technological-environmental factors. Drawing on the synthesized evidence, this study proposes an analytical framework consisting of three components: (i) the constituent components of digital culture; (ii) influencing factors; and (iii) the mechanisms through which digital culture operates within digital educational environments.

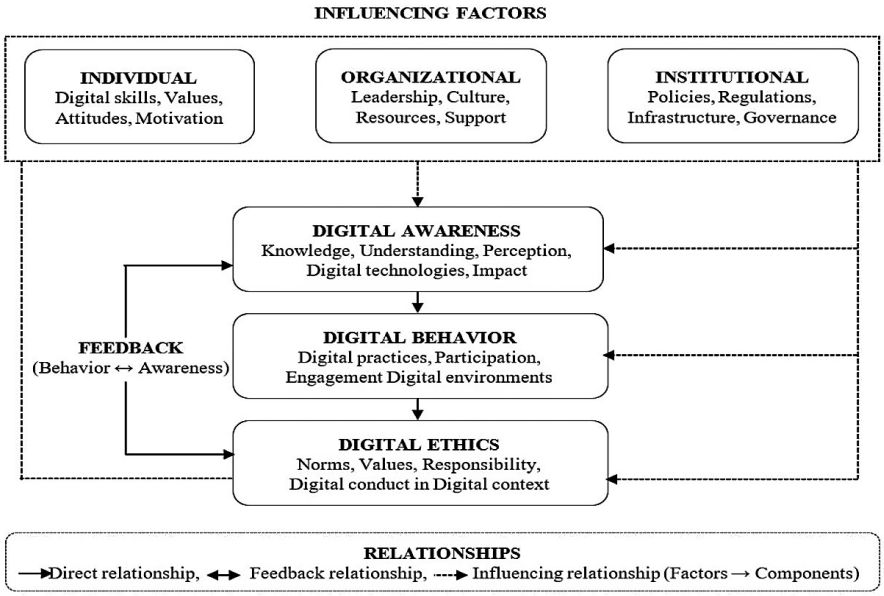

Figure 4. Analytical Framework of Digital Culture in Higher Education

The analytical framework proposed in this study is illustrated in Figure 4. It conceptualizes digital culture in higher education as a dynamic system consisting of three core components: digital awareness, digital behavior, and digital ethics. These components are interconnected, where digital awareness guides behavior, while behavioral practices continuously reshape awareness through feedback mechanisms.

In addition, the framework incorporates three groups of influencing factors - individual, organizational, and institutional - which interact with and shape the development of digital culture. This integrated structure allows for a comprehensive understanding of both internal processes and external conditions affecting digital culture in higher education.

4.4.1. Constituent Components of Digital Culture

The synthesis results indicate that digital culture in higher education consists of three closely related components: digital awareness, digital behavior, and digital ethics. Digital awareness reflects learners' understanding of technology and digital environments (Ferrari, 2012; Ribble, 2015), while digital behavior is expressed through learning, communication, and participation practices in digital spaces (Ilomäki et al., 2016; Pangrazio & Sefton-Green, 2021). Digital ethics relates to responsibility, privacy, and appropriate conduct in online environments (Ribble, 2015).

4.4.2. Factors Influencing Digital Culture

The literature shows that digital culture is shaped by multiple factors at individual, organizational, and institutional levels. Individual factors include digital competence, attitudes, and digital experiences (Ilomäki et al., 2016; Pangrazio & Sefton-Green, 2021). Organizational factors such as school culture, leadership, infrastructure, and learning environments significantly influence digital practices (Knox, 2019; Selwyn, 2016; Williamson & Hogan, 2020). Institutional and policy conditions also affect digital culture development, particularly in developing countries (Government, 2020; Politburo, 2019).

4.4.3. The Operational Mechanism of Digital Culture in Higher Education

The findings indicate that digital culture operates as a dynamic system in which awareness, behavior, ethics, and contextual factors continuously interact. Digital awareness shapes behavior, while digital practices simultaneously reinforce or transform learners' values and norms. This interaction reflects the dynamic relationship among individuals, organizations, and digital environments within higher education ecosystems.

4.5. Limitations of the Analytical Framework

Although the proposed framework provides an integrated approach to understanding digital culture in higher education, several limitations should be acknowledged. First, the framework remains primarily conceptual, while digital environments continuously evolve due to rapid technological changes, especially the emergence of generative artificial intelligence. Second, the framework may not fully capture differences across institutional and socio-cultural contexts. Therefore, further empirical studies are needed to validate and refine the framework in specific educational settings.

5. DISCUSSION

The findings address the research questions by synthesizing existing literature and proposing an integrated analytical framework for digital culture in higher education. Existing studies often examine digital competence, digital citizenship, or socio-cultural dimensions separately. Compared with competence-oriented frameworks (Ferrari, 2012; Vuorikari et al., 2022), the proposed framework expands digital culture beyond technical skills to include values, norms, and ethical dimensions, consistent with Ilomäki et al. (2016) and Pangrazio and Sefton-Green (2021).

In addition, unlike studies focusing mainly on technology or governance (Knox, 2019; Selwyn, 2016; Williamson & Hogan, 2020), this framework integrates individual, organizational, and institutional factors into a unified analytical structure. The study therefore contributes by conceptualizing digital culture as a multidimensional and dynamic system characterized by continuous interaction among awareness, behavior, ethics, and contextual factors.

From a practical perspective, the findings suggest that developing digital culture in higher education requires holistic approaches linking curriculum, governance, leadership, and digital learning environments. However, the framework remains conceptual and should be further validated through empirical studies in specific educational contexts.

6. CONCLUSION

This paper conducted a systematic review of theoretical approaches to digital culture in higher education, thereby clarifying the development of the concept, its theoretical foundations, and the major research trends in this field. The findings show that digital culture is a multidimensional construct reflecting the interaction among technology, individuals, and organizational contexts and cannot be fully explained when approached solely from the perspective of individual competence or simple technological application.

On that basis, the study proposes an integrated analytical framework for digital culture in higher education, including constituent components (awareness, behavior, and ethics), influencing factors (individual, organizational, and institutional), and operational mechanisms within digital environments. This analytical framework contributes to systematizing previous theoretical approaches while also providing a foundation for the development of future empirical research models.

In addition to its theoretical contribution, the study also emphasizes that the development of digital culture in higher education should be approached comprehensively, in connection with the digital transformation process and the specific context of each educational system. This implies that policies and solutions for developing digital culture must go beyond improving technological competence and should instead aim to build value systems and learning environments appropriate to digitalized contexts.

However, due to the limitations inherent in a review study, this paper does not provide empirical validation of the proposed analytical framework. Therefore, future studies should focus on developing and testing models based on this framework, particularly through quantitative methods such as SEM or PLS-SEM. At the same time, research should be expanded to specific contexts, especially in higher education institutions in developing regions, in order to clarify the role of contextual factors in the formation and development of digital culture.

DECLARATIONS

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Transparency: The authors confirm that this manuscript presents an accurate and transparent account of the research. All relevant aspects of the study have been reported, and no important information has been omitted.

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: The author was responsible for the conceptualization of the study, literature review, theoretical analysis, development of the analytical framework, and manuscript preparation. The author has read and approved the final version of the manuscript.

Disclosure of AI Use: AI tools were used to support language refinement and structuring of the manuscript. The author has carefully reviewed and verified all AI-assisted content and takes full responsibility for the accuracy and integrity of the work.

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