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REVIEW ARTICLE

A conceptual framework of digital transformation in Chinese private universities: Integrating digital leadership, teacher digital competence, and innovative work behavior

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ABSTRACT

Digital transformation has become a strategic imperative for higher education, yet how it is enacted in Chinese private universities and how it reshapes academic work at the teacher level remain insufficiently understood. Prior research often emphasises institutional strategies and technologies, with less attention to the micro-level mechanisms through which leadership and faculty capabilities convert digital investments into sustained innovation. This conceptual paper develops an integrative, multi-level framework explaining how digital leadership can support digital transformation in Chinese private universities by strengthening teachers' digital competence and, in turn, innovative work behavior. The framework positions digital leadership as an institutional driver that shapes strategic vision, infrastructure investment, and support for experimentation; teacher digital competence as a proximal capability enabling pedagogically meaningful digitalization of teaching practice; and innovative work behavior as the behavioral manifestation of transformation in everyday academic work. Professional identity tensions and contextual pressures are incorporated as boundary conditions that shape when competence is translated into discretionary innovation and when it is redirected toward compliance. By synthesising complementary and contradictory findings, including evidence on underperformance and rhetoric-practice decoupling, the paper offers a coherent perspective on digital transformation in private higher education and outlines priorities for future empirical research in the Chinese private university sector.

Keywords: digital transformation; digital leadership; digitalization; teacher digital competence; innovative work behavior

1. Introduction

Digital transformation has become a core agenda in higher education and is now understood as a deep reconfiguration of institutional logics, pedagogical models, and governance processes rather than a set of isolated technology projects[1-3]. Systematic reviews show that successful transformation depends on the alignment of digital technologies with strategy, culture, and academic work, yet many universities still struggle with fragmented initiatives and uneven staff capabilities[4,5].

In China, digital transformation is closely linked to national strategies for innovation and the digital

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economy, and universities are expected to contribute to talent development and regional development[6]. Private universities are central to expanding participation but often operate with resource constraints, market pressures, and questions about quality and sustainability. Recent work on Chinese private universities highlights opportunities in digital transformation but also challenges related to business models, resource allocation, and stakeholder readiness[7].

Within this context, digital academic leadership has been identified as a key condition for successful transformation, because leaders articulate digital visions, align strategies with technology adoption, and mediate tensions between traditional academic norms and new digital demands[8,9]. At the same time, research on teacher digital competence shows that many academics still feel underprepared to design, facilitate, and assess learning in digitally rich environments, and that training initiatives are often fragmented and insufficiently linked to institutional strategy[10,11].

A third strand of research examines teachers' innovative work behavior, defined as the generation, promotion, and implementation of new ideas in teaching and organizational practice, and shows that it is shaped by leadership, climate, and collaboration in higher education[12,13]. Despite these advances, evidence relevant to digital leadership, teacher digital competence, and teacher innovation/innovative work behavior remains dispersed across adjacent research streams, which often leaves the explanatory mechanisms connecting these constructs under-specified, especially in the context of Chinese private universities[14,15]. This fragmentation is theoretically consequential because studies that do not model intervening capability-building pathways can invite misattributed causal explanations, for example by treating leadership effects as predominantly "direct" or by implicitly assuming that competence initiatives are sufficient regardless of enabling conditions[16]. More broadly, digital transformation is increasingly theorized as multi-actor, mechanism-driven, and processual, suggesting that isolated bivariate explanations are vulnerable to incomplete mechanism specification and level-of-analysis blind spots[17,18]. In higher education, disruptive technological change may also trigger role transition and identity reconstruction, shaping whether teachers translate digital initiatives into sustained competence development and innovation engagement[19].

To address these theoretical failures, this paper proposes an integrative, multi-level framework that links digital leadership, teacher digital competence, and innovative work behavior as interdependent components of digital transformation in Chinese private universities. Specifically, it theories digital leadership as a meso-level driver shaping strategic direction and enabling conditions, positions teacher digital competence as a mediating capability through which leadership becomes actionable at the individual level, and conceptualizes innovative work behavior as the behavioral enactment through which digital transformation materializes in everyday academic work.

1.1. Key definitions and scope

To avoid conceptual ambiguity, this paper distinguishes among digitization, digitalization, and digital transformation. Digitization refers to the technical conversion of analogue or physical information into digital data. Digitalization refers to the use of digital technologies to redesign and improve processes, routines, and work practices. Digital transformation is a broader, strategic and socio-technical process through which digital technologies trigger substantial changes in organizational structures, capabilities, and value creation paths. Consistent with the staged view in the recent literature, digitization and digitalization can be understood as constituent processes or stages that enable wider digital transformation[20].

In terms of level of analysis, the proposed framework is explicitly multi-level: digital leadership is conceptualised primarily at the institutional level (strategic direction and enabling conditions), whereas teacher digital competence and innovative work behavior are enacted at the individual level[21]. The

framework therefore focuses on cross-level pathways through which institutional digital leadership becomes actionable in teachers' everyday work during digital transformation.

2. Literature review

2.1. Role tensions and teacher professional identity in digital transformation

Digital transformation in universities is not merely a technical upgrade; it reshapes academic work, expectations, and what it means to be a competent teacher. Research on teacher professional identity conceptualises identity as an ongoing process of negotiation and reconstruction under shifting institutional demands and socio technical change[22,23]. In digitally mediated universities, academics increasingly juggle multiple roles, such as subject expert, instructional designer, and data worker, and these role reconfigurations can intensify identity tensions rather than automatically enabling innovation[24,25].

Empirical studies further show that digitalization related tasks often expand faster than recognition, time, and support, producing role overload and ambiguity. Faculty are expected to sustain conventional teaching and research performance while mastering learning platforms, analytics, and AI supported tools, which can undermine perceived professional control and trigger defensive coping[26,27]. Importantly, policy practice research suggests that digitalization agendas are frequently framed as student centred and innovative at the policy level, while teaching practice may remain largely routine based, creating normative tension for teachers who are held accountable for reforms they did not co design[28]. Related evidence indicates that when digitalization is driven by external pressure rather than co construction with staff, emotional labour and resistance become more likely[29,30].

These findings imply a key mechanism for the present framework. Identity alignment shapes whether digital initiatives are interpreted as legitimate opportunities for professional growth or as threats to academic values and autonomy. When initiatives conflict with teachers' core beliefs, compliance may become minimal and innovation suppressed; when identity supportive conditions exist, experimentation and learning are more likely[23,31]. Thus, professional identity and role tensions are not peripheral context. They condition how digital leadership and digital competence development translate, or fail to translate, into innovative work behavior in Chinese private universities.

2.2. Digital leadership, teacher digital competence, and innovative work behavior

Digital leadership is commonly theorised as enabling digital transformation by shaping vision, priorities, and the organizational conditions for experimentation. Evidence across sectors links digital leadership to innovation outcomes through mechanisms such as empowerment, learning orientation, job crafting, and innovation capabilities[32-36]. In higher education, digital academic leadership is similarly discussed as central to strategy alignment, resource allocation, and risk taking norms that support institutional capacity for transformation[9,37].

However, a purely confirmatory reading is incomplete. Digital transformation initiatives frequently underperform or fail, not because technology is absent but because leadership driven transformation can become symbolic, fragmented, or decoupled from day to day operations. Digital transformation failure research highlights recurring pitfalls such as misalignment, shallow implementation, and limited attention to socio organizational dynamics[38]. More critically, recent theory development on digital transformation decoupling shows how organisations may separate transformation rhetoric from operational reality, weakening performance and undermining credibility[39]. For Chinese private universities, which face market pressures and constrained resources, this suggests that leadership effects are contingent. A digital vision does

not automatically generate innovation unless it is translated into credible structures, workload arrangements, and meaningful participation for faculty.

Teacher digital competence is widely treated as a proximal capability that enables pedagogically meaningful use of digital tools. Systematic reviews in higher education consistently report uneven competence profiles and persistent weaknesses in pedagogical design and data informed practice, indicating that competence remains a bottleneck for transformation[40,41]. Yet competence development is not uniformly efficacious. Reviews also show that training initiatives are often fragmented and weakly connected to institutional strategy, which limits transfer from skills acquisition to sustained pedagogical redesign[11,42]. At the individual level, competence demands can also heighten workload and role strain when expectations escalate faster than support, thereby dampening willingness to innovate despite higher technical capability[26,30].

Innovative work behavior (IWB) refers to the generation, promotion, and implementation of new ideas. It offers a behavioral lens for how digital transformation becomes visible in everyday academic work. Higher education research links IWB to leadership, collaborative climate, and organizational support, while also showing that contextual conditions, such as workload, age, and innovation climate, moderate whether resources translate into innovation[13,43]. Recent studies additionally point to the relevance of digital culture, AI literacy, and ethical or transformational leadership for sustaining innovation oriented behavior[12,36].

Taken together, the literature supports a selective but more theoretically credible synthesis. Digital leadership may enable digital transformation, but it can also produce symbolic implementation and decoupling. Digital competence is necessary but not sufficient, because its effects depend on institutional alignment and manageable role expectations. IWB emerges when teachers perceive digital change as legitimate, supported, and professionally meaningful.

3. Towards an integrative conceptual framework

3.1. A multi-level systems view of digital transformation in Chinese private universities

Building on the previous review of digital leadership, teacher digital competence and innovative work behavior, this section develops an integrative, multi-level view of digital transformation in Chinese private universities. Digital transformation is increasingly conceptualised as a strategic and socio-technical reconfiguration of organizations in response to digitally induced disruptions, involving changes in structures, capabilities, and value creation paths rather than technology adoption alone. It reshapes value creation logics, work processes and roles across multiple levels, so that technology, strategy and human capabilities must co evolve in a coherent way[20,44]. Within this perspective, leadership provides strategic direction and sensemaking, organizational structures and cultures provide enabling or constraining conditions, and individual professionals translate digital ambitions into concrete practices in their daily work.

For Chinese private universities, this multi level view is particularly relevant because these institutions often face market pressure, differentiation from public universities and resource constraints at the same time. Digital strategies are expected to support quality enhancement, brand positioning and efficiency, yet their success depends on how institutional leaders interpret national digital and innovation policies, how they allocate resources and redesign academic structures, and how academics themselves adopt new pedagogical and organizational practices[20].

In this paper, digital leadership is conceptualized as a meso level condition that connects macro policy and institutional strategy with micro level teaching and research practices. Digital leaders articulate visions for technology enhanced education, align incentives and structures with these visions, and orchestrate change

across departments and support units. Teacher digital competence represents a core capability at the individual level, encompassing educators' ability to select, adapt and integrate digital tools for pedagogy, assessment and professional collaboration[45,46].

Innovative work behavior is treated as the behavioral expression of digital transformation in everyday academic work. Following Janssen, it involves the intentional generation, promotion and implementation of new ideas that improve teaching, research or academic services[47]. In higher education, innovative work behavior has been linked to job resources such as autonomy, learning opportunities and supportive leadership, and is increasingly studied as a mechanism through which organizations convert digital investments into meaningful change[48-51].

3.2. Professional identity, role tensions and contextual influences

Research on teachers' professional identity emphasises that identities are multidimensional, dynamic and closely tied to how teachers interpret educational change[52]. Studies of beginning and early career teachers show that tensions between personal beliefs, institutional expectations and policy demands can create professional identity conflicts that shape teachers' willingness to adopt new practices[53]. These tensions are particularly salient when reforms are perceived as threatening core values or established images of "good teaching", which can lead to resistance, superficial compliance or withdrawal rather than deep engagement with change.

During digital transformation, particularly at the digitalization stage where digital tools reshape routines and teaching practices, professional identity work can interact with teachers' digital competence to influence how confidently and consistently they enact new digitally enabled roles. Reviews of professional digital competence point out that digital expectations are often layered onto existing roles, requiring teachers to re-negotiate what it means to be a competent professional in technology rich environments[54]. Empirical work links digital competence and innovative behavior to perceived organizational support, autonomy and trust, suggesting that teachers are more likely to engage in digital innovation when they can integrate new practices into a coherent professional self rather than experience them as externally imposed tasks[50]. For Chinese private universities, where market pressures, workload and status concerns are pronounced, these identity and contextual dynamics are likely to moderate how digital leadership and competence translate into innovative work behavior.

3.3. An integrative multi level framework

Building on the preceding discussion, this subsection further specifies the core relationships in the proposed multi-level framework of digital transformation in Chinese private universities[55]. The framework assumes that digital leadership, teacher digital competence, and teachers' innovative work behavior are systematically interconnected, and that these connections are jointly shaped by the dynamics of teacher professional identity and contextual conditions such as workload, market pressures, and resource allocation[56]. Prior research shows that teachers' professional identity is continuously reconstructed in the course of organizational change, and that identity tensions and contextual pressures significantly influence how teachers interpret and respond to reform goals[52]. On this basis, the framework conceptualizes digital leadership as a key institutional-level resource that can reduce uncertainty and professional identity tensions associated with technology-intensive change, and proposes that one important pathway through which it operates is the ongoing enhancement of teachers' digital competence, thereby providing the necessary capability foundation for innovative behavior.

First, digital leadership is expected to be positively related to teacher digital competence. Studies of digital leadership in higher education show that leaders who strategically steer digital transformation tend to

foster stronger staff competencies for working in technology-rich environments[57]. Large-scale empirical work on university staff indicates that teachers' digital competence is not only influenced by individual characteristics but is, to an even greater extent, shaped by institutional support, technological infrastructure, and leadership practices[58]. When institutional leaders consistently prioritize digital transformation in development planning, embed it in institutional strategies, and provide structured training and practice opportunities through systematic, tiered professional development programs, teachers clearly perceive digital competence as a dimension of academic work that is institutionally recognized and rewarded[59]. By allocating time for experimental teaching practices, providing project funding, and offering technical and pedagogical support teams, digital leaders can reduce teachers' subjective perceptions of failure risk and additional workload, thereby making investment in new skill acquisition and teaching innovation more legitimate and sustainable[48]. Related studies repeatedly show that leadership support, institutional facilitation, and clear policy signals are critical contextual factors predicting teachers' levels of digital competence and their willingness to engage in digitally mediated teaching and collaboration[41]. In the context of Chinese private universities, where resource constraints and performance pressures are particularly acute, this mechanism of integrating strategy, resources, and teacher development through digital leadership is especially important, because regional and institutional disparities in digital infrastructure and training opportunities remain pronounced[60].

Second, teacher digital competence is expected to be positively related to teachers' innovative work behavior. Survey research on teachers in different educational systems shows that higher levels of digital competence are associated with stronger self-leadership and higher levels of innovative work behavior in teaching[61]. Experimental and quasi-experimental studies in higher education indicate that lecturers with stronger digital skills are more likely to design interactive and personalized learning activities and to continuously experiment with new approaches in course design and student support, thereby demonstrating higher levels of innovative work behavior[26]. In higher education and vocational education contexts, the extent to which teachers master digital tools affects not only the frequency of technology use but also whether they can move from "substitutional use" to "transformational use," that is, using technology to re-think course structures, assessment formats, and patterns of teacher, student interaction; this process itself reflects the generation and implementation of innovative work behavior[46]. Higher levels of digital competence expand teachers' repertoire of possible actions, strengthen their self-efficacy in applying new technologies and methods to solve pedagogical problems, and provide the necessary conditions for translating abstract digital policy goals into concrete innovations in teaching and academic services[62]. These findings are highly consistent with evidence from organizational behavior research on the role of task-specific knowledge, learning-oriented climates, and perceived capability in promoting innovative work behavior, suggesting that the combination of capability and contextual resources is a key mechanism driving individuals to continuously generate, champion, and implement new ideas in their work[49].

Third, teacher digital competence is specified as a proximal capability that links digital leadership to teachers' innovative work behavior. Although capability based mediation has been widely discussed in related fields, its relevance in Chinese private universities lies in how leadership intentions are converted into teachers' practical capacity to redesign teaching, coordinate digitally mediated work, and manage technology related demands under constrained resources. Recent research on teachers' innovative work behavior suggests that perceived competence and related psychological resources help explain why some teachers translate contextual support into innovation whereas others do not[50]. Research on digital leadership similarly indicates that leadership effects on innovation are often strengthened through cognitive and affective mechanisms such as psychological ownership, engagement, and perceived competence[33]. In

digitalization contexts, teachers' capability to design, test, and institutionalize new practices is therefore a key condition for translating leadership vision into day to day change[54]. Empirical work also shows that digital competence predicts innovative work behavior and can operate as a proximal capability that connects organizational support to innovation related enactment[43,62]. In Chinese private universities, where visible innovation increasingly matters for institutional reputation while teachers simultaneously face heavy workloads and unequal access to professional development, this capability conversion pathway becomes especially salient[7].

The competence to innovation link is expected to vary with professional identity tensions and perceived contextual pressures. When teachers experience persistent tension between their professional values and role expectations, their openness to reform and innovation tends to decline and defensive responses become more likely[53]. In digitally mediated teaching, identity tensions arising from competing pedagogical beliefs, role demands, and technology expectations are closely connected to teachers' willingness to experiment with new practices[31]. Policy oriented analyses further suggest that when digitalization initiatives are interpreted as conflicting with core teaching beliefs or professional ethics, or as additional workload without adequate support and compensation, identity threats and role strain can weaken the positive translation of leadership and competence into innovative work behavior[63]. Conversely, when digital expectations are integrated into a coherent and positively valued professional identity, and when institutions provide sufficient support in terms of time, resources, and evaluation, teachers are more likely to use digital competence proactively and transform reform requirements into opportunities for development[64].

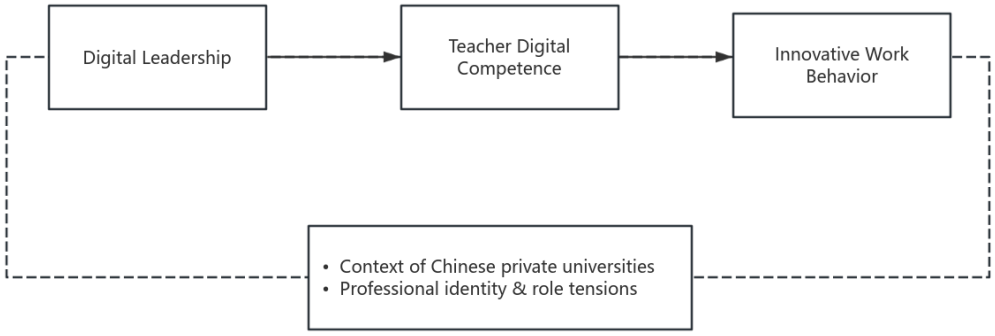

Figure 1. Multi-level conceptual framework.

In sum, **Figure 1** summarizes the proposed multi-level framework by situating digital leadership, teacher digital competence, and teachers' innovative work behavior within the specific context of Chinese private universities and highlighting professional identity and contextual factors as key boundary conditions shaping these relationships[65].

4. Implications and directions for future research

4.1. Theoretical implications

The proposed framework contributes to ongoing efforts to conceptualize digital transformation in higher education as a multi-level socio-technical reconfiguration rather than a linear technology adoption process. Recent work on digital transformation in universities emphasizes that institutional change emerges from the interaction of strategic direction, organizational structures, and everyday teaching practices, and calls for integrative frameworks that link these levels explicitly[56,66]. Within this debate, studies argue that digital transformation involves the reorganization of value logics, pedagogical models, and governance processes,

and that these reconfigurations need to be understood in relation to both national policies and institutional histories[67,68].

By positioning digital leadership, teacher digital competence, and innovative work behavior as analytically distinct yet interdependent components, the framework responds to calls for models that connect institutional leadership, professional capacities, and micro-level innovation in a single explanatory structure[66,68]. At the same time, research on teacher professional identity and digitalization shows that identity negotiations and perceived legitimacy are central to how educators interpret and respond to digital reform agendas, particularly when new expectations challenge established understandings of "good teaching"[69,70]. By explicitly treating professional identity tensions and contextual pressures as boundary conditions, the framework extends existing conceptual work and offers a more nuanced account of how digital transformation is likely to unfold in market-exposed private universities that face acute resource constraints and status concerns[71,72].

4.2. Research design and measurement implications

From a methodological perspective, the framework implies that empirical studies should pay careful attention to levels of analysis and nested structures in data on digital transformation. Classic methodological discussions point out that ignoring clustering, such as teachers nested within departments and institutions can bias parameter estimates and obscure cross-level effects, especially when leadership and organizational variables are involved[73,74]. Recent reviews of multilevel modeling in e-learning and educational technology similarly highlight that multi-level and longitudinal designs are well suited for examining how institutional policies and technology strategies shape changes in teacher' practices over time[75]. Building on these insights, the present framework supports empirical strategies that combine cross-sectional structural equation modeling with multilevel and, where feasible, longitudinal approaches to capture how digital leadership and contextual conditions influence teacher digital competence and innovative work behavior in Chinese private universities[66,67].

Figure 2 illustrates one possible empirical extension of the framework. At Level 2, institutional digital leadership is modeled through indicators such as strategic vision for digital transformation, investment in digital infrastructure, and support for experimentation, reflecting recent empirical work on digital strategy and governance in higher education[56,67]. At Level 1, teacher digital competence and innovative work behavior are treated as individual-level constructs, while professional identity tensions and perceived contextual pressures can be included as moderators or used to form latent profiles of teachers' sense-making about digital change[70,72]. The figure depicts direct paths from digital leadership to teacher digital competence and innovative work behavior, a mediated path via digital competence, and cross-level interactions in which leadership shapes the strength of the competence, innovation relationship. Such a specification can be operationalized using multilevel structural equation models and growth curves to examine both between-institution differences and within-teacher change over time[73,75].

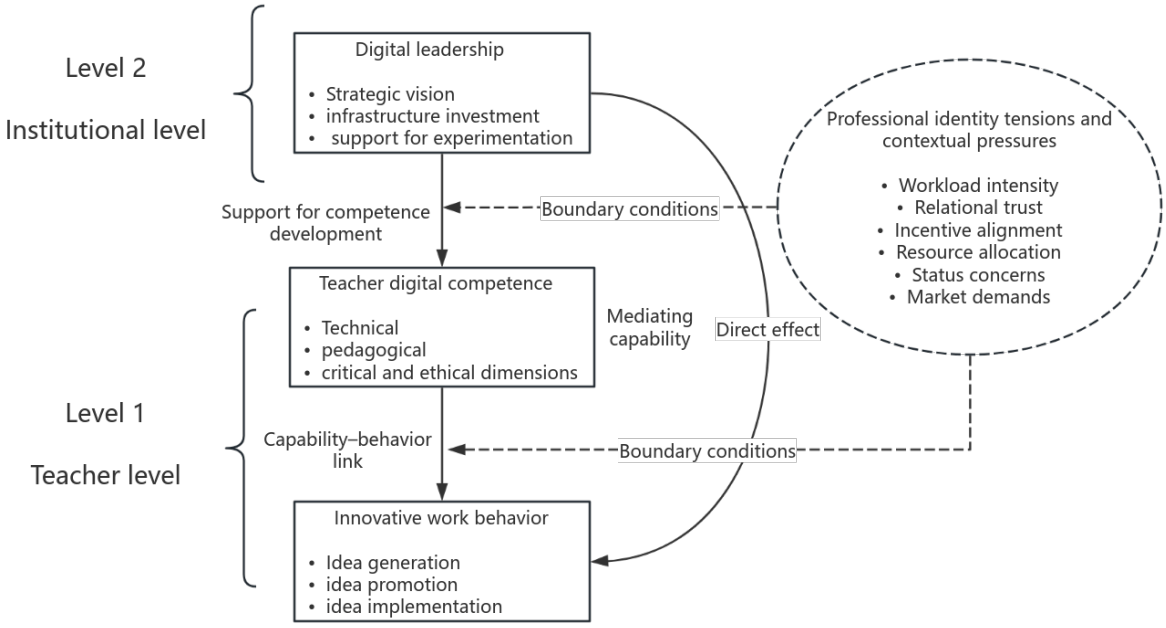

Figure 2. Digital transformation framework for Chinese private universities.

The framework also underscores the need for robust and context-sensitive measurement of core constructs. For teacher digital competence, recent scale development studies have constructed and validated multidimensional instruments that capture technical, pedagogical, and critical dimensions of digital practice and have demonstrated good psychometric properties across educational levels[76,77]. New work on digital competence instruments for teachers further emphasizes that context-specific validation is needed, since factor structures and item functioning can vary across higher education systems and institutional types[78,79]. In parallel, research on teachers' digital literacy and empowerment highlights the importance of including indicators related to data use, ethics, and agency, which are particularly relevant for digital transformation in resource-constrained environments[80,81].

For innovative work behavior, measurement work has progressed from unidimensional scales to multidimensional instruments that distinguish between opportunity exploration, idea generation, idea promotion, and idea implementation[82,83]. Subsequent validation studies confirm that these dimensions can be reliably measured and show that the structure of innovative work behavior is stable across different occupational groups and cultural settings, including public-sector and educational organizations[84,85]. These developments suggest that future research in Chinese private universities can draw on established multidimensional innovative work behavior scales and adapt them to teaching and academic service contexts, ideally combining self-ratings with peer or supervisor ratings to reduce common method bias[86].

Table 1 summarizes how the core constructs in the framework can be linked to candidate measurement strategies, including example instruments and preferred data sources, by drawing on recent work in digital competence and innovative work behavior measurement[76,77,82].

Table 1. Indicative measurement strategies for the core components of the framework.

Framework component	Measurement focus	Approaches	Main data sources
Digital leadership (institution)	Strategic vision, infrastructure investment, support for experimentation	Institutional surveys on digital strategy; items adapted from HE digital transformation and	Rectors, deans, heads

		governance studies[56,67]	
Teacher digital competence	Technical, pedagogical, critical and ethical dimensions of digital practice	Multidimensional digital competence scales validated for teachers[76-78]	University teachers (self-report, portfolios)
Innovative work behavior	Opportunity exploration, idea generation, promotion, implementation	Multidimensional innovative work behavior scales[82,83,85]	Teachers' self- and other-ratings
Professional identity and context	Identity tensions, perceived demands and support, transformation pressures	Questionnaires on professional identity in the digital era and digital transformation pressures[69,70,72]	Teachers, program leaders

Table 1. (*Continued*)

4.3. Contextual and comparative research agendas

Finally, the framework suggests a set of contextual and comparative research agendas that can deepen understanding of digital transformation in Chinese private universities and beyond. Recent empirical studies indicate that digital transformation trajectories differ substantially across institutions and sectors, and that readiness, infrastructure, and staff competences are unevenly distributed within and across higher education systems[67,66]. Conceptual and empirical work on digital transformation frameworks in higher education similarly highlights that private providers often operate under stronger market pressures and more fragile resource bases, which can intensify tensions between demands for innovation and concerns about workload, job security, and institutional sustainability[56,68].

At the same time, research on teacher professional identity in technology-rich environments shows that digital reforms can both threaten and enrich professional identity, depending on how change processes, participation opportunities, and professional development are designed[69,87]. Studies of teacher digital identity and transprofessional competences suggest that opportunities for meaningful collaboration, sustained professional learning, and involvement in pedagogical innovation are crucial for aligning digital expectations with teachers' sense of who they are as professionals[70,72]. Complementary work on teacher professional identity in digitally mediated teaching further documents that identity trajectories are closely linked to perceived recognition, autonomy, and access to supportive communities of practice[71,87].

In parallel, the literature on innovative work behavior in public and educational organizations emphasizes that personal characteristics, team dynamics, and organizational climates jointly shape employees' willingness and ability to propose and implement new ideas[84,86]. Recent studies of innovative work behavior across sectors underline that digital transformation processes, human resource practices, and leadership styles interact in complex ways, supporting the need for comparative and context-sensitive research designs[85]. Building on these insights, the present framework can be used to guide comparative studies that examine how digital leadership, teacher digital competence, and innovative work behavior interact across different categories of Chinese private universities, across regions with varying levels of digital infrastructure, and across disciplines with distinct digital cultures. Research that compares private and public universities or analyzes private institutions in other massified and market-exposed higher education systems can further test the portability of the framework and identify where contextual adaptations are required[56,67].

5. Conclusion

This conceptual paper has argued that digital transformation in Chinese private universities cannot be understood solely through technology adoption or infrastructure expansion, but must be framed as a multi-

level socio-technical reconfiguration that links institutional leadership, teacher capabilities, and everyday academic practices. By bringing together strands of research on digital leadership, teacher digital competence, innovative work behavior, and professional identity in digitally rich environments, the paper proposes an integrative framework in which digital leadership functions as an institutional resource, teacher digital competence operates as a mediating capability, and innovative work behavior represents the behavioral expression of digital transformation in academic work. In doing so, the framework moves beyond parallel literatures and offers a more connected account of how digital transformation agendas are enacted in resource-constrained and market-exposed private universities.

The framework also foregrounds professional identity tensions and contextual pressures as boundary conditions that shape whether digital leadership and teacher digital competence translate into sustained innovation. Evidence from studies of teacher identity and digital transformation suggests that reforms framed merely as technical or efficiency-driven initiatives are unlikely to generate deep engagement, whereas change processes that recognize teachers as professionals, support their agency, and align digital expectations with core pedagogical values are more likely to foster experimentation and learning. By embedding these identity and contextual dynamics into the relationships between digital leadership, digital competence, and innovative work behavior, the framework provides a more realistic basis for interpreting both the promises and the frictions of digital transformation in Chinese private universities and similar higher education systems.

Finally, the paper contributes to broader debates on the role of conceptual work in educational and organizational research. Conceptual articles are often judged by their ability to integrate dispersed literatures, clarify constructs and mechanisms, and open up new questions for empirical inquiry rather than by the presentation of new data. In line with this view, the present framework is not offered as a final model but as a heuristic that can guide future research designs, measurement strategies, and comparative studies of digital transformation in private higher education. By specifying levels of analysis, proposing mediating and moderating mechanisms, and situating digital transformation within the particular governance and market conditions of Chinese private universities, the paper aims to provide a theoretically grounded and context-sensitive lens that researchers and practitioners can adapt, test, and refine in subsequent empirical work.

Author contributions

Conceptualization, Mengjun Huang, Azlin Norhaini Mansor, and Fathiyah Mohd Kamaruzaman; Methodology, Mengjun Huang; Software, Mengjun Huang; Validation, Mengjun Huang, Azlin Norhaini Mansor, and Fathiyah Mohd Kamaruzaman; Formal Analysis, Mengjun Huang; Investigation, Mengjun Huang; Resources, Mengjun Huang; Data Curation, Mengjun Huang; Writing—Original Draft Preparation, Mengjun Huang; Writing—Review & Editing, Mengjun Huang; Visualization, Mengjun Huang; Supervision, Azlin Norhaini Mansor and Fathiyah Mohd Kamaruzaman; Project Administration, Azlin Norhaini Mansor and Fathiyah Mohd Kamaruzaman. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare no conflict of interest.

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