

Leadership Strategies for Digital Transformation in Higher Education: A Qualitative Study of Heilongjiang Universities

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ABSTRACT

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This qualitative study explores how educational leadership practices facilitate the integration of technology in higher education, using universities in Heilongjiang province, China as a contextual example. Through a case study approach, this study conducted semi-structured interviews with 15 participants, including university deans, department heads, and faculty from three different Heilongjiang universities undergoing digital initiatives. The study aimed to uncover leadership strategies, challenges, and contextual factors that influence the success of educational technology integration. Thematic analysis of interview data revealed four major themes: 1) Vision and Strategic Planning: effective leaders set clear, shared goals for digital transformation and align technology use with institutional mission; 2) Professional Development and Support: leaders invest in continuous training, mentorship, and communities of practice to build faculty capacity for using technology; 3) Cultivating a Collaborative Culture: leaders foster an environment of trust and innovation, encouraging faculty experimentation with technology without fear of failure; 4) Resource Allocation and Incentives: leaders actively secure funding, infrastructure, and provide incentives to motivate faculty adoption of technology. Participants highlighted that leadership in this context also involves navigating national policies and local constraints. The findings illustrate a culturally nuanced picture of digital academic leadership, confirming that leadership approaches must address both human and technical aspects of change. This study contributes practical insights for university leaders and policymakers

on guiding effective technology integration, and suggests a framework of leadership best practices tailored to higher education's digital transformation in China.

Contribution/Originality: This study contributes to the existing literature by offering context-rich evidence of digital academic leadership in Chinese higher education. It documents how leaders align vision, capacity building, culture, and resource incentives to drive technology integration, and proposes a practice-oriented framework useful to university leaders and policymakers undertaking digital transformation.

1. Introduction

The landscape of higher education is being reshaped by digital technologies, from online learning platforms to data-driven administrative systems. Achieving meaningful integration of these technologies into universities requires more than just hardware and software; it demands visionary and adaptive educational leadership. Leadership in the digital age entails guiding institutions through change, inspiring stakeholders, and addressing challenges that come with new technology (Benchea & Ilie, 2023; Jing et al., 2025). This study focuses on how higher education leaders in China, specifically in Heilongjiang province, are navigating and driving digital transformation in their institutions.

Heilongjiang's universities are in a period of transformation, aligning with national strategies like the Education Informatization 2.0 Action Plan and the 2035 educational modernization goals. These policies call for deep integration of information technology in teaching, research, and management (Yan & Yang, 2021). As a result, universities in the province have launched initiatives such as smart classrooms, campus digital infrastructure upgrades, and faculty training in educational technology. However, the success of these initiatives varies, and a key differentiating factor often cited is the effectiveness of leadership at the institution and department levels (Jing et al., 2025). Provincial education authorities have explicitly emphasized the role of school and university leaders as leaders in education informatization, indicating that leadership is recognized as pivotal in achieving technology integration objectives.

Despite this acknowledged importance, there is a lack of in-depth understanding of how educational leaders in higher education implement and guide technology integration in practice. Much of the existing literature on educational leadership and technology comes from quantitative surveys or Western contexts, or it focuses on K-12 principals (Banoğlu et al., 2023). There is a need for rich, context-specific insights into leadership processes in universities, particularly within China's unique cultural and institutional environment (Jing et al., 2025). Qualitative research can provide nuanced details about leadership behaviors, decision-making, and the interplay with institutional culture that surveys might miss. By examining Heilongjiang universities as the case setting, the researchers can uncover lessons and strategies that may be relevant to similar higher education contexts embarking on digital transformation.

1.1. Objectives

This study aims to explore the following questions qualitatively: (1) What leadership strategies and practices are university leaders employing to promote and support the integration of educational technology in their institutions? (2) What challenges do these

leaders face in the process of digital transformation, and how do they overcome them? (3) How do contextual factors influence leadership approaches to technology integration? By addressing these questions, the study seeks to fill a research gap regarding the practical, on-the-ground aspects of technology leadership in higher education (Jing et al., 2025) and to propose a set of effective practices or a framework that could guide current and future educational leaders.

1.2. Significance

Understanding leadership in digital transformation is significant for several reasons. Firstly, it contributes to theory by providing empirical evidence of digital academic leadership (DAL) in action, complementing conceptual discussions of DAL in literature (Cheng & Zhu, 2021; Zhu & Caliskan, 2021; Ruan et al., 2024). Secondly, it offers practical guidance. As universities worldwide strive to become smart or digital campuses, the experiences from Chinese universities can provide valuable insights into managing change, especially in resource-constrained or hierarchical environments. Thirdly, focusing on Heilongjiang adds diversity to the scholarly narrative. Much research on technology leadership highlights elite universities or Western systems, whereas this study shines a light on a different context, potentially revealing novel challenges or innovative solutions. In the following sections, this study reviews related literature to situate the study, describe the qualitative methodology used, present the findings through key themes, and discuss the implications for leadership practice and research.

2. Literature Review

2.1. Leadership in Educational Technology Integration

Prior research establishes that leadership is a critical success factor for integrating technology in education. Leaders set the tone and provide direction, and they can either accelerate innovation or inadvertently hinder it. Hallinger (2011) pointed out that in any educational change, including technology adoption, leadership acts as a catalyst that mobilizes resources and motivates people towards a common goal. In technology integration, this often translates to leaders articulating a vision for how technology will improve learning, allocating Resources to support that vision, and creating incentives for faculty to participate in the change (Zhang, 2022). In K-12 contexts, effective principals have been documented implementing strategies like mentoring teachers in tech use, modeling technology usage themselves, and recognizing teachers who innovate (Zhang & Chen, 2025).

In higher education, the leadership structure is more complex. There are institutional leaders, mid-level leaders, and even informal leaders or champions among faculty. Research suggests that distributed leadership is often needed for tech integration in universities, meaning leadership responsibilities are shared among various stakeholders (Garrison & Vaughan, 2013). However, formal leaders still play a crucial role in setting priorities and securing buy-in. A study by Sife et al. (2007) in African universities found that one barrier to e-learning adoption was the lack of strong leadership commitment and strategy at the top levels. Similarly, Keengwe et al. (2014) noted that university leadership must establish clear policies and expectations for technology use, or else implementations remain patchy and voluntary.

Recent scholarship has introduced the concept of Digital Academic Leadership (DAL) in universities (Dima et al., 2021; Chwen-Li et al., 2022; Cegielski, 2023; Ghamrawi & Tamim, 2023; Karakose et al., 2023). DAL encompasses the capabilities and actions of academic leaders to integrate digital technologies into all facets of university operations. It overlaps with traditional leadership but requires additional skills such as technological fluency, change management, and the ability to navigate the intersection of technology with pedagogy and culture (Eberl & Drews, 2021; Weritz, 2021; Kawiana, 2023; Cheng et al., 2024). Jing et al. (2025) conducted a mixed-method study on DAL in Chinese universities and identified that leaders perceive digital leadership along dimensions of foresight, culture building, and resource coordination. However, the detailed practices – how those perceptions translate into daily leadership actions – were not fully explored. The study builds on such work by delving into those daily actions and strategies via interviews.

2.2. Key Leadership Strategies Identified in Past Research

From the literature, it can be outlined several leadership strategies that are often cited as conducive to technology integration. In terms of developing a clear vision, Successful leaders craft and communicate a compelling vision for technology's role in advancing the institution's mission (Priyowidodo, 2021). This vision provides a rationale and shared goal that faculty and staff can rally around. For instance, a vision might be to become a leading smart campus that uses digital tools to personalize student learning and improve research collaboration. A clear vision helps in aligning initiatives and evaluating progress. Secondly, leaders who personally use and champion technology can inspire others. When a dean teaches a class using an online tool or a president uses data analytics in decision-making, it sends a message that technology is valued and viable. This strategy, sometimes called modeling, builds credibility and reduces resistance (Bossu et al., 2018).

In the field of professional development and capacity building, nearly all studies emphasize that continuous training and support for faculty are essential (Ertmer et al., 2012). Effective leaders either organize formal workshops, engage peer learning groups, or even implement mentoring where tech-savvy faculty assist others. The role of leadership here is to ensure PD is not one-off but ongoing and responsive to faculty needs. In addition, leaders must ensure the necessary infrastructure and technical support are in place. Lack of Resources is a common barrier (Al-Adwan et al., 2024). Good leaders actively lobby for funding, partner with external organizations, or reallocate budgets to prioritize tech integration. In some cases, this includes creating new roles or units.

Furthermore, setting policies that encourage technology use can be a strategy, for instance, by integrating technology expectations into teaching evaluation criteria or curriculum standards. Additionally, incentivizing innovation has been cited as a way leaders can spur faculty to try new approaches (Albion et al., 2015). Lastly, fostering an Innovative Culture: Perhaps more intangible, but leaders contribute to creating a culture where experimentation is encouraged and failures are treated as learning opportunities (Schmitz et al., 2023). This strategy involves building trust, reducing fear of technology or job insecurity, and celebrating successes publicly. It overlaps with transformational leadership qualities, inspiring and empowering faculty to take initiative.

These strategies are well-supported in the literature; however, how they manifest can differ by context. For instance, in a Chinese university, hierarchical decision-making might mean the vision is set at the top and cascaded down, whereas in a Western university, there might be more bottom-up input in forming the vision. The qualitative approach allows examination of these nuances in Heilongjiang universities.

2.3. Challenges in Leading Technology Integration

Understanding strategies is incomplete without acknowledging the challenges leaders face. Past research highlights several common challenges. Firstly, in terms of resistance to change, faculty or staff may be skeptical of new technologies, either fearing added workload, irrelevance to their discipline, or replacement by tech (Rosenberg, 2023). Leaders often encounter resistance or apathy, which they must manage through persuasion or policy. Sometimes, leaders themselves are not tech experts. A principal or dean might lack a deep understanding of new technologies, making it hard to lead confidently. This points to the need for leaders' professional development, which is an area seldom discussed (Sterrett & Richardson, 2020).

For resource constraints, particularly in developing regions or smaller institutions, leaders struggle with insufficient funds to acquire technology or hire tech support personnel. They must be creative or prioritize within tight budgets. In highly centralized systems like China's education system, leaders must align with government mandates and navigate bureaucratic procedures for approvals and funding (Green, 2023). This can slow down innovation or force a one-size-fits-all approach that may not suit local conditions. Additionally, universities have entrenched traditions and quality standards. Leaders may find it challenging to push digital methods while maintaining academic rigor and meeting conventional metrics of success (Jing et al., 2025). There can be tension between old pedagogical methods and new ones, and leaders mediate that.

Lastly, it is not always clear how to measure the success of technology integration. Leaders may struggle to demonstrate the ROI or educational impact of tech initiatives to stakeholders (Dexter & Richardson, 2020). These challenges set the stage for the investigation. They likely influence the approaches leaders take. For instance, if resistance is high, a leader might adopt a more participatory strategy to involve faculty in decision-making. Or if Resources are limited, a leader might prioritize one or two key projects that give visible benefits to build momentum.

In summary, the literature provides a blueprint of possible leadership strategies and obstacles. However, there's a dearth of research zooming in on specific case contexts to see this blueprint in action. This study addresses this by focusing on a set of universities in one Chinese province, giving life to how leaders there interpret and execute their role in digital transformation.

3. Research Methods

3.1. Research Approach and Design

This study employs a qualitative case study approach. The case study method is suitable for an in-depth exploration of contemporary phenomena within real-life contexts, especially when the boundaries between phenomenon and context are not evident (Yin, 2018). Here, the phenomenon is educational leadership in technology integration, and

the context is Chinese higher education (Heilongjiang province). This study chose a multiple-case design involving three universities in Heilongjiang. Each university served as a sub-case, allowing us to compare and contrast leadership experiences across different institutional environments while still focusing within a single provincial context.

The approach is interpretivist, aiming to understand the participants' perspectives and the meanings they ascribe to their experiences. The researchers used semi-structured interviews as the primary data collection tool, supplemented by document analysis of strategic plans or policy documents for context. An interview-based qualitative approach was deemed ideal to capture the rich, detailed narratives of university leaders and faculty regarding technology integration – something that cannot be fully captured through surveys or purely quantitative means.

3.2. Case Selection and Institutional Profiles

The three universities selected were:

- i. University A: a large comprehensive university in the provincial capital (Harbin), with a strong research focus and part of the national “Double First-Class” initiative. It has significant government funding and has launched a high-profile “Smart Campus” project.
- ii. University B: a medium-sized university in a secondary city, focusing on teacher education and humanities. It has moderate Resources and is in the process of upgrading its campus IT and encouraging online teaching methods.
- iii. University C: a smaller vocational-oriented college in a different city, catering to applied sciences and engineering. It has more limited funding but has recently received a provincial grant for digital learning infrastructure.

These were chosen to reflect a diversity of institutional types in Heilongjiang (elite vs. teaching-focused vs. vocational). Access was negotiated through personal contacts and official permission from each university's administration.

3.3. Participants

The study interviewed a total of 15 individuals across the three universities. This included:

- i. Senior Administrators: 3 participants – one vice-president in charge of academic affairs from University A, the dean of academic technology from University B, and the president of University C. These provided high-level insights into institutional strategy and policy.
- ii. Mid-Level Academic Leaders: 6 participants – this group comprised deans of faculties or colleges (4 individuals from various disciplines) and heads of departments (2 individuals). They are directly involved in implementing tech initiatives in their units and working with faculty.

Faculty Members with informal leadership roles: 6 participants – the researchers chose faculty who were known as technology champions or who had roles like leading a teaching innovation committee. They provided perspective on how leadership efforts are received and what support looks like on the ground.

Participants were selected using purposive and snowball sampling (Valerio et al., 2016). The researchers initially identified key people who then helped recommend other

participants. The aim was to include those actively engaged in or affected by technology integration efforts. All participants were assured confidentiality; thus, pseudonyms or generic titles are used. Interviews were conducted in Chinese, as all participants were fluent, which allowed them to express themselves freely. Translations were later done for analysis and reporting, with care to preserve meaning.

3.4 Data Collection

Semi-structured interviews were the core of data collection. An interview guide was prepared with open-ended questions covering topics such as:

- a. Personal experience with technology integration projects.
- b. Strategies or actions taken to encourage or support tech use.
- c. Perceived successes and what contributed to them.
- d. Challenges or resistance encountered and how they responded.
- e. Views on institutional culture and policy about technology.
- f. For faculty, questions about how they perceive leadership support or what leadership actions impacted their tech usage.

Each interview lasted between 60 to 90 minutes, often with follow-up clarification via email or phone if needed. They were audio-recorded with consent and later transcribed verbatim. The researchers also collected relevant documents to triangulate and contextualize the interview data.

Data collection occurred over approximately 3 months, with interviews either in-person for participants in Harbin or via video call for those in other cities or during COVID-related restrictions. Field notes were taken to capture observational context, like if an interviewee showed us a smart classroom during the conversation, etc.

3.5. Data Analysis

The study employed a thematic analysis approach ([Braun & Clarke, 2006](#)) to derive patterns and themes from the qualitative data. The analysis process was as follows:

- a. Transcription and Familiarization: After transcription, the researchers read through all transcripts multiple times to become thoroughly familiar with the content. Initial impressions were noted.
- b. Coding: Using NVivo software, the researchers coded the transcripts. An open coding strategy was used initially – segments of text were labeled with codes that summarized the idea or action described. The researchers had a mix of deductive codes and inductive codes.
- c. Generating Themes: The researchers then examined how codes could be grouped or related to form broader themes. For instance, codes like “mentoring faculty”, “training workshops”, and “teaching competitions” are all related to a theme of Professional Development and Support. The researchers ended up with candidate themes, and the researchers reviewed the data again to ensure each theme was strongly grounded in the interviews and to refine its definition.
- d. Review and Refinement: The researchers cross-checked themes against each other to avoid redundancy and ensure they were distinct. The researchers also sought disconfirming evidence or exceptions within each theme to ensure a nuanced understanding.

- e. Triangulation: The documents collected were reviewed to see if they supported or contrasted with participants' narratives. For instance, if a leader said they created a strategic plan, the researchers looked at that plan to see its content. Generally, the documents corroborated the presence of top-down strategies and provided details on official goals.

The major themes that emerged encapsulated the leadership strategies and factors in the cases. These are detailed in the Results section. Reliability was enhanced by involving two researchers in coding: one primary coder and one independent coder who reviewed a subset of transcripts and the coding scheme. Differences were discussed and resolved, ensuring consistency in how data was interpreted.

3.6. Trustworthiness

To ensure the credibility and trustworthiness of the qualitative findings, the study employed several strategies:

- a. Member Checking: After initial analysis, the researchers provided a summary of key themes to a few participants (one from each role category) to verify whether the interpretations resonated with their experiences. Feedback was positive, and minor clarifications were incorporated.
- b. Peer Debriefing: The researchers discussed the findings with two other researchers knowledgeable in educational leadership to challenge the analysis and help avoid bias. This feedback helped refine theme definitions and consider alternative explanations.
- c. Thick Description: In reporting results, the researchers include direct quotes and detailed descriptions to allow readers to see the basis of the interpretations and assess transferability to other contexts.
- d. Reflexivity: The researchers kept reflexive journals, noting the assumptions and reactions (one of the researchers is himself a faculty member in a Chinese university, which provided an insider perspective but also required bracketing of personal bias).

By following these methodological rigor steps, the study aimed to produce findings that are credible, insightful, and useful for understanding leadership in the context of higher education technology integration.

4. Results

The qualitative analysis yielded the overarching themes that describe how educational leaders in the studied Heilongjiang universities approach digital transformation and technology integration. These themes are: (1) Vision and Strategic Planning, (2) Professional Development and Support, (3) Cultivating a Collaborative Culture, and (4) Resource Allocation and Incentives. Each theme is discussed below with illustrative quotes and examples from participants, as well as a note on challenges faced in that area.

4.1. Theme 1: Vision and Strategic Planning – “Charting the Digital Future”

A clear finding was that effective leaders invest considerable effort in defining and communicating a strategic vision for technology in their institutions. Nearly all leadership participants stressed the importance of having a “big picture plan”. For instance, the vice-president of University A explained:

“When I took charge of academic affairs, one of my first tasks was drafting the Smart Campus 2025 plan. We set specific goals – like 30% of courses to incorporate online elements, a fully paperless administration system – and I shared this vision in every meeting. I told colleagues: This is not just IT for its sake, it’s how we remain relevant and improve teaching quality.”

This quote illustrates how the leader tied technology integration to the university’s broader mission, making the vision meaningful. Similarly, at University B, the dean of academic technology described creating a digital roadmap in consultation with faculty committees, thereby giving stakeholders a sense of ownership. Faculty interviewees acknowledged the presence of these visions; one professor said, *“The dean constantly reminds us of the goal to become a ‘first-class digital university in the region’. It’s become a shared slogan that guides the projects.”*

However, having a vision is one thing – executing it is another. Leaders used strategic planning to turn vision into action. This included setting phased targets, like incremental increases in online content each year, or piloting tech integration in certain departments first. Leaders also ensured the vision was documented in official plans, which helped legitimize initiatives and allocate funds accordingly. Document analysis of University A’s strategic plan showed detailed timelines and responsibilities for various tech initiatives, reflecting careful planning.

A challenge mentioned was avoiding the “all talk, no action” pitfall. One department head noted some leaders in other places make grand statements, but “nothing changes in classrooms”. In these cases, leaders tackled this by aligning the vision with policy and accountability. For example, at University C, the president issued an official directive linking the digital plan to departmental evaluations – departments had to report progress on tech integration annually. This created pressure to act on the vision.

To summarize, Theme 1 highlights that successful leadership for tech integration starts with a clear, well-communicated vision and a concrete strategic plan. It rallies the university community around common goals and provides a roadmap for the journey. The leaders in the study recognized that without this guiding star, efforts would be fragmented. They also found that repeating the vision often and embedding it in policy helped maintain momentum. As one leader succinctly put it, *“If you do not know where you’re going, you can’t lead others there.”* In the context of digital transformation, knowing where to go and how to get there is foundational.

4.2. Theme 2: Professional Development and Support – “Empowering the Frontline Educators”

The second theme centers on the myriad ways leaders support faculty to develop the skills and confidence needed for technology integration. All participants echoed that training and ongoing support are vital. A department chair from University B stated:

“I realized early that many teachers were hesitant because they just didn’t feel competent with the new platforms. So, I organized hands-on workshops, and I paired up tech-savvy teachers with those less

experienced. We created small mentoring groups. As a leader, I see my role as enabling my colleagues, removing the fear factor."

This reflects a proactive strategy of capacity building. Leaders took initiative in organizing workshops, seminars, and peer learning opportunities. University A had a formal program where each semester, a series of "Digital Teaching Brown Bags" was held, often kicked off by a dean or invited expert, and faculty could share tips or tools they tried. Faculty participants appreciated these: one mentioned how a workshop on using a flipped classroom app, supported by the teaching affairs office, got her to experiment with it, something she "would never have done alone".

Another support mechanism was establishing communities of practice or task forces. For instance, University C's president formed a "Digital Transformation Taskforce" including enthusiastic young faculty, IT staff, and a couple of students. This group met monthly to troubleshoot issues and exchange ideas, effectively serving as a support network. A faculty member from University C said, *"It helps to know there's a team and the president attend some meetings, which shows he cares and will get us the help we need."*

Leaders also provided support by being accessible and responsive. Several faculty members noted that their deans or administrators were approachable when they faced technical difficulties or needed approvals for trying something new. A quote from a faculty member at University B: *"When I wanted to use a new simulation software for my class, I was not sure if it would be okay. But my dean said, 'Go ahead, try it, if you need funds for a license, let me know.' That moral support was huge."* This indicates the leader's role in encouraging risk-taking and providing backup.

Professional development was not limited to initial training; follow-ups and continuous learning were emphasized. Leaders encouraged sharing success stories – e.g., one dean would invite faculty who tried a new tech-based approach to present their experience in a faculty meeting, both to recognize them and to inspire peers. This created a sense of collective learning.

A challenge under this theme was time and workload. Faculty are busy and persuading them to spend time in workshops or learning new tools was not always easy. Leaders addressed this by sometimes integrating training into regular meetings or by providing certificates that could count towards their professional development requirements. In one case, University A offered a modest stipend for faculty who completed a certain number of tech training hours – a tangible incentive showing leadership's commitment to faculty development.

Overall, Theme 2 underscores that leaders act as enablers and coaches. They do not just mandate technology use; they empower faculty with the knowledge and skills to do so effectively. This human-centric approach – focusing on people's growth – was a cornerstone of effective digital leadership in these cases. It echoes global findings that without adequate training and support, technology integration falters, no matter how advanced the tools. The study shows leaders in Heilongjiang are actively applying this knowledge, tailoring support to their context.

4.3. Theme 3: Cultivating a Collaborative and Innovative Culture – “Creating a Safe Space for Experimentation”

The third theme delves into the cultural aspect of leadership. Participants frequently mentioned the importance of organizational culture – essentially the shared norms, values, and atmosphere within the university – in enabling or hindering technology integration. Effective leaders deliberately cultivate a culture that encourages collaboration and innovation. As the dean of the Faculty of Engineering at University A put it:

“I always tell my faculty, ‘We are in this together.’ I encourage them to collaborate – for example, team-teach an interdisciplinary course using online tools – and I make sure that if something doesn’t work out, there are no negative repercussions. We treat it as a learning process. I think people have become more open to trying new things because they know it’s OK to not be perfect the first time.”

This quote highlights two sub-components: collaboration and tolerance for failure. Leaders promoted collaboration by breaking down silos. They facilitated cross-departmental projects related to technology, like jointly developing e-learning content. One faculty member described how their leader set up a cross-disciplinary working group to create online general education courses, which built a sense of camaraderie and shared purpose in using tech.

To foster innovation, leaders worked on the psychological climate. Fear of failure or skepticism can stifle experimentation. In the interviews, the notion of “no blame for failure” came up. University C’s president explicitly communicated to his staff that failed attempts at using new technology would not be punished in evaluations; instead, he wanted to hear what they learned from it. This was significant in a culture where educators often worry about maintaining face and meeting targets. It liberated many to try pilot projects.

Recognition and morale boosting were also tools under this theme. Leaders celebrated even small wins. University B’s technology dean mentioned, *“When we hit the 100 online courses milestone, I threw a small celebration and invited all those who contributed. We even gave out certificates of appreciation. It created buzz – others saw that, and some told me they’d like to be part of the next wave.”* Recognizing efforts reinforced the innovative culture by showing that risk and effort were valued.

Another aspect was open communication. A collaborative culture requires trust and open channels. Leaders used town hall meetings, suggestion boxes, or informal lunches to listen to concerns and ideas about tech integration. Faculty felt heard when, for example, they complained about a cumbersome platform and the leadership took that feedback to the IT department or chose a different solution the next semester.

One challenge here was changing mindsets, especially among veteran faculty. A department head noted, *“Some senior professors were really set in their ways. Getting them to even come to discussions about online teaching was hard.”* The approach that worked in some cases was peer influence – having respected figures who did embrace tech talk to their peers, rather than top-down orders. Leadership facilitated such peer influence by identifying early adopters and giving them a platform to share. Over time,

as more colleagues participated without negative outcomes, the resistant ones gradually warmed up or at least did not actively oppose.

Theme 3 shows that beyond formal initiatives, leaders influence the soft infrastructure of integration – the culture. This aligns with literature emphasizing that transformational leadership can shift organizational culture towards innovation and collaboration. In the Chinese context, building a collaborative culture might involve leveraging collectivist values while also carefully introducing more open, less hierarchical communication. The leaders in the cases seemed adept at straddling these, maintaining respect and authority but encouraging more horizontal interactions when it came to learning about technology.

4.4. Theme 4: Resource Allocation and Incentives – “Backing Goals with Resources and Rewards”

The final theme revolves around how leaders marshal Resources and use incentives to drive technology integration. In Heilongjiang, where resources are not as abundant as in China’s top-tier cities, this theme was particularly salient. Effective leaders were described as resourceful, finding ways to fund and support tech initiatives despite budget constraints. For instance, the president of University C mentioned:

“We do not have a big budget for fancy tech. But I made it a priority in the annual budget planning to allocate funds specifically for teaching technology, even small upgrades like buying graphic tablets for teachers or subscriptions to online libraries. I also reached out to the Education Bureau and got a special grant for digital classrooms by presenting a solid proposal. As a leader, you have to fight for these Resources.”

This indicates leaders are actively seeking external funding and reprioritizing internal budgets. Similarly, University A’s vice-president used the prestige of their institution to form industry partnerships, getting some tech companies to sponsor or pilot their tools on campus. A document the researchers saw listed partnerships with a tech firm to provide free training software licenses for a year, secured through leadership’s networking.

Beyond money, resource allocation included human resources like hiring or assigning staff to support tech integration. University B created two new positions for “digital learning coordinators” in each college, an idea the dean advocated for and succeeded in implementing. These coordinators acted as liaisons and support persons for tech initiatives, effectively multiplying the leadership’s reach.

Incentives were another key aspect. Leaders instituted both intrinsic and extrinsic incentives to motivate faculty. On the extrinsic side, the researchers heard about things like:

- a. Small grants or stipends for faculty who develop online courses or use new tech in class.
- b. Awards at annual ceremonies for “Innovative Teaching with Technology,” which came with a certificate and sometimes a monetary prize.
- c. Inclusion of tech integration efforts as a positive factor in promotion or annual performance reviews.

Intrinsic incentives often overlapped with Theme 3's recognition, making people feel proud and part of something progressive. One faculty member noted that simply having the university's leadership publicly praise their work was motivating: *"When the President highlighted my online course as an example in his newsletter, it was better than any monetary reward. It made me and my department proud, and more people got interested in doing it."*

However, a caution was raised about equity and sustainability. A department head worried that focusing incentives on early adopters could cause some to feel left out or that once they got the award, interest might fade. Leaders seemed aware of this; one strategy to mitigate it was rotating opportunities (ensuring over a couple of years many different people got some grant or recognition) and gradually embedding the expectation so that it becomes normalized (i.e., you start by incentivizing until a critical mass is on board, then it becomes part of regular practice).

Another challenge was that Resources are finite. Leaders had to make tough choices – for example, upgrading internet bandwidth vs. buying new smart boards vs. funding training sessions. In these decisions, aligning with the vision (Theme 1) helped – they chose what supported the strategic goals most. Communication about resource decisions was also important to maintain trust; a leader explained to faculty why certain investments were prioritized to show it was not arbitrary.

Theme 4 underscores that effective leadership for technology integration is not just inspirational but also pragmatic. Leaders back up their words with concrete support, providing the tools and rewards that make technology use feasible and attractive. This echoes the concept of the path-goal theory in leadership, where leaders' clear obstacles and provide what followers need to achieve goals. In these cases, leaders indeed acted to clear the path (through funding, support staff) and to reward the reaching of milestones. Especially in the Chinese university context, where administrative allocation of Resources is significant, having leadership that champions and channels Resources to tech initiatives can make the difference between superficial adoption and substantial integration.

5. Discussion

The themes identified in this study paint a comprehensive picture of what effective digital leadership looks like in the context of Chinese higher education, particularly within Heilongjiang's provincial setting. They also highlight how this context shapes leadership actions. In this section, the researchers discuss the implications of the findings, relate them to broader literature, and delve into what makes the Heilongjiang case distinctive.

A key observation is that leadership in these cases was multi-dimensional and adaptive. Leaders did not rely on a single approach; they employed a blend of visionary, instructional, and distributed leadership styles. For instance, Theme 1 aligns with a transformational leadership approach – inspiring and setting direction (Schmitz et al., 2023). Theme 2 reflects an instructional or servant leadership perspective, focusing on nurturing the people who implement the change. Theme 3 again ties to transformational ideas and collaborative or distributed leadership, as leaders created environments for others to lead and innovate at their levels. Theme 4 shows a transactional side – using contingent rewards and practical support, but in service of transformational goals. This

mix supports the idea from literature that e-leadership or digital leadership in education is not entirely new but rather a contextual application of many fundamental leadership principles (Avolio et al., 2000; Jameson et al., 2022). What is notable is how leaders in the study consciously integrated these principles to fit their technological mission. Another discussion point is the importance of context. The Chinese cultural and administrative context influenced leadership strategies in several ways:

Hierarchy and Policy Alignment: Chinese universities often have a top-down management style and respond to government policies. The researchers saw leaders leveraging this positively by using national or provincial policy as a mandate to push changes (Zhang, 2022). The creation of formal strategic plans, task forces, and directives (Themes 1 and 4) shows leaders working within the hierarchical system to drive innovation. Unlike some Western contexts where too much top-down can cause pushback, here it provided legitimacy. However, leaders balanced it with bottom-up elements to ensure buy-in.

Collectivist Orientation: The emphasis on team efforts, peer mentoring, and collective celebrations (Themes 2 and 3) resonates with collectivist cultural values. Leaders often framed technology projects as contributing to the university's honor or collective success, which can be a strong motivator in Chinese culture (Zhang & Chen, 2025). One dean explicitly said he framed the digital initiative as "The shared responsibility to the students and the university's reputation", invoking collective duty.

Face and Harmony: Recognizing that confrontation or direct criticism can be counterproductive, leaders handled resistance tactfully. Instead of directly penalizing non-adopters, they used gentle pressure and positive examples to coax change (Theme 3). Maintaining harmony was implicitly a priority, so leaders sought win-win solutions like letting a resistant professor team-teach with a tech-keen colleague rather than forcing them solo online (Ghamrawi & Tamim, 2023).

Resource Constraints: Heilongjiang is not Beijing or Shanghai; funding is limited. This made leadership's role in resource acquisition (Theme 4) even more crucial. It also meant a focus on frugal innovation – doing more with less (Karakose et al., 2021). Leaders often had to demonstrate results to get continued support, which may be why they were diligent in planning and showing quick wins.

Comparing the findings with prior research, there's strong convergence on many points. For instance, Zhang and Chen (2025), a study the researchers cited, found that leadership strategies like clear goals, professional development, and collaborative culture were critical in Chinese colleges. The qualitative data humanizes those findings, showing exactly how leaders implement such strategies and how faculty perceive them (Ruan et al., 2024). It was heartening that the results reinforce those emerging from other Chinese contexts, indicating a consistent understanding of what works in technology leadership in China's higher education. On the other hand, the study adds depth by exploring challenges and nuances.

One interesting insight is the interconnectedness of the themes. They are analytically separate but in practice interwoven. For instance, a compelling vision (Theme 1) helps justify resource allocation (Theme 4) and inspires a culture of innovation (Theme 3). Support and training (Theme 2) build confidence, which feeds into a willingness to collaborate and innovate (Theme 3). When leaders provided Resources or incentives

(Theme 4), it reinforced that their vision was not just rhetoric, thereby strengthening trust in leadership and culture. This interplay suggests that successful leadership is about creating an aligned system – vision, people development, culture, and Resources all reinforcing each other towards the goal of tech integration (Weritz, 2021). If any component lags, the effort may stall. For instance, one could imagine if Resources weren't provided, the best vision would ring hollow; or if culture is not addressed, training might not be utilized due to lingering fear or apathy.

The challenges identified also offer lessons (Zhang & Chen, 2025). The fact that leaders faced resistance, resource limits, etc., providing practical guidance for others: 1) Building allies and champions can mitigate resistance; 2) Persistent communication of vision eventually permeates even the skeptics; 3) Small wins and visible benefits convert doubters over time; 4) Leaders should not underestimate the time and patience needed; cultural change is gradual. The participants often spoke of multi-year timelines for seeing significant shifts in attitudes.

An additional point to discuss is the role of mid-level vs. top-level leaders. The researchers interviewed both, and it appears that mid-level leaders were the hands-on change agents working closely with faculty, whereas top leaders provided enabling conditions (Zhu & Caliskan, 2021). This multi-tier leadership is essential: top leaders signal priority and allocate Resources, mid-levels translate strategy to execution and manage day-to-day change. In these cases, alignment between these levels was evident – for example, a president's vision was embraced and implemented creatively by deans. Misalignment could derail progress, but the researchers did not see much of that in the data. It suggests that an institution needs both strategic commitment at the top and operational champions in the middle (Jing et al., 2025).

This study has implications for practice and theory (Cheng et al., 2024). For university leaders in similar contexts, the findings highlight a repertoire of strategies that could be employed: 1) Start with a clear plan and communicate it relentlessly; 2) Invest in people, not just technology, through training and moral support; 3) Lead the cultural shift by encouraging collaboration, being patient with mistakes, and building trust; 4) Back the plans with Resources; even if small, targeted resource support signals seriousness; 5) Use incentives smartly to jumpstart engagement but work towards intrinsic motivation and normalization of tech use; 6) Engage in continuous dialogue with faculty – feedback loops will help adjust strategies; 7) Embrace a learning mindset as a leader, too; some of the participants indicated they learned and adjusted their leadership style through this process, which is an important model to show.

The study adds to the conceptualization of digital academic leadership. It provides evidence that effective DAL is both strategic and empathetic, blending hard and soft leadership elements (Jing et al., 2025). It underscores that leadership frameworks in digital transformation need to incorporate cultural context as a core component. A model emerging from the data might center around Vision to Capacity Building to Culture to Support Structures, all looped by feedback. This aligns with path-goal theory in practice – leaders clearing paths and setting goals (House & Mitchell, 1975; Zhao & Zhao, 2016), but also highlights transformational aspects like culture shaping (Jing et al., 2025).

In terms of limitations and future research, while the findings are rich, they are based on three cases in one province. Caution should be taken in generalizing directly to all

universities in China or beyond. Heilongjiang might have specific features. Other regions, say highly affluent universities, might show different dynamics. Comparative studies across regions in China, or between countries, would be valuable to see which leadership strategies are universal and which are context-dependent (Cheng et al., 2024).

The data primarily reflects the views of those somewhat inclined towards supporting tech integration. The voices of staunch resisters or those disengaged are less represented. Future research could specifically target such individuals to understand their perspective and what leadership could do to engage them (Schmitz et al., 2023). Longitudinal research following an institution's digital transformation journey over several years could yield insights into how leadership challenges and strategies evolve (Cheng et al., 2024). And as technology itself evolves, exploring how leaders adapt to integrate these new waves will be important.

6. Conclusion

This qualitative case study sheds light on how educational leaders in Heilongjiang's higher education institutions are spearheading the integration of technology and driving digital transformation. Through interviews and thematic analysis, the study identified a suite of leadership strategies that proved effective: articulating a clear vision and plan, empowering faculty through development and support, nurturing a collaborative and innovative culture, and ensuring Resources and incentives align with digital goals. These strategies collectively create an ecosystem in which technology integration can thrive.

The findings affirm that leadership is the linchpin of educational innovation. Leaders translate ambitious digital visions into reality by working closely with people, managing Resources wisely, and shaping a supportive culture. In the context of Chinese higher education, where national directives and local constraints interplay, leaders act as both architects and catalysts of change. They blend the strengths of hierarchical direction with participatory approaches. For practitioners, this study offers a practical framework of leadership best practices: Lead with vision, support with action. A leader should be a visionary, a coach, a facilitator, and a steward of Resources. For policymakers and stakeholders, the message is to invest in developing such well-rounded leaders if the aim is to achieve deep and lasting technology integration in education.

In conclusion, as universities worldwide continue to navigate the ever-changing digital landscape, the human element – enlightened and proactive leadership – remains crucial. Technology may provide the tools, but it is leadership that builds the bridge between those tools and the educational advancement the researchers seek. The experiences from Heilongjiang's universities illustrate that with committed, thoughtful leadership, even institutions outside the usual spotlights can leap forward into the digital age, benefiting faculty and students alike. The journey of digital transformation is complex, but with strong leadership at the helm, it becomes not only manageable but an inspiring collective endeavor towards improved teaching and learning.

Ethics Approval and Consent to Participate

Institutional research approval from universities was obtained before data collection. All participants provided informed consent before participating in the study. The research complied with ethical guidelines for educational research involving human subjects.

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Conflict of Interest

The authors declare there are no conflicts of interest.

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