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Change Practices and Large-Scale Technology-Driven Educational Innovation of School Leaders in A Selected University in Shenyang, China

Pan Jing

Doctor of Philosophy in Educational Management, Major in Educational Leadership, Emilio Aguinaldo College, Manila, Philippines

ABSTRACT: This study investigates the relationship between school leaders' change practices and the implementation of large-scale technology-driven educational innovation in a selected university in Shenyang, China. Using a descriptive-correlational design, data were collected from 306 full-time teachers to assess eight dimensions of change practices (systems thinking, visionary leadership, collaborative processes, technological innovation strategies, teacher readiness and support, cultural responsiveness and equity, professional development and reflection, strategic and adaptive management) and seven pillars of technological innovation (adaptive learning, data-driven systems, interdisciplinary integration, sustainable development, stakeholder collaboration, equity and accessibility, ethical considerations). Results indicate that all change practices were perceived as "practiced" (overall mean=3.24) and all innovations as "implemented" (overall mean=3.24). Cultural responsiveness (mean=3.36) and stakeholder collaboration (mean=3.34) emerged as strengths, while professional development (mean=3.16) and interdisciplinary integration (mean=3.17) required improvement. Significant correlations were found between visionary leadership and stakeholder collaboration (r=0.402, p=0.000) and between cultural responsiveness and equity in technology use (r=0.160, p=0.005). The findings highlight the critical role of inclusive, visionary leadership in sustaining technology-driven innovation and provide actionable recommendations for enhancement.

KEYWORDS: change leadership; technology-driven education; higher education innovation; educational management

1. INTRODUCTION

1.1 Context and Significance

The global education landscape is undergoing rapid transformation due to technological advancements, with large-scale technology-driven innovation becoming a cornerstone of educational reform (Strielkowski et al., 2024). In China, initiatives such as the *Education Modernization 2035 Plan* prioritize the integration of artificial intelligence (AI), big data, and digital platforms to enhance teaching quality, improve accessibility, and cultivate innovative talent. However, the success of such initiatives hinges on effective leadership—leaders must navigate complex systemic challenges, foster collaboration, and address resistance to change to ensure sustainable innovation (Goshtasbpour et al., 2023).

Shenyang, a key industrial and educational hub in Northeast China, is home to universities at the forefront of technological integration. This study focuses on a selected university in Shenyang with strengths in AI, intelligent manufacturing, and digital media—fields where technology-driven innovation is particularly prominent. By examining teacher perceptions of leadership practices and innovation implementation, this research addresses a critical gap: while existing literature explores educational leadership or technology integration in isolation, few studies investigate their interplay in large-scale reform within Chinese higher education (Tian, 2024).

1.2 Research Questions

How do teachers perceive school leaders' change practices across eight key dimensions?
To what extent is large-scale technology-driven educational innovation implemented, as perceived by teachers?
Are there significant differences in these perceptions based on teacher demographics (age, years of service, position)?
What is the correlation between change practices and the implementation of technology-driven innovation?

2. LITERATURE REVIEW

2.1 Change Leadership in Higher Education

Change leadership in education is a multidimensional construct that involves guiding transformative processes through strategic, inclusive, and adaptive practices (Litz & Blaik-Hourani, 2018). Key dimensions include:

Viewing the institution as an interconnected ecosystem, where decisions consider interdependencies between departments, policies, and stakeholders (Després, 2007). Communicating a clear, future-oriented vision that aligns with emerging educational trends and inspires stakeholder commitment (Aziz et al., 2018). Decentralizing authority to engage teachers, students, and external partners in decision-making, fostering collective ownership of reform (Amels et al., 2020).Prioritizing equity and inclusivity, ensuring that change initiatives address diverse needs and reduce disparities (Shields, 2012).Supporting teacher growth through targeted training, mentoring, and reflective practices to enhance adaptability to innovation (Wheeley et al., 2022).

2.2 Large-Scale Technology-Driven Innovation

Large-scale technology-driven educational innovation refers to the systemic integration of advanced technologies to transform teaching, learning, and administration. Core pillars include:

Using AI and big data to tailor content, pacing, and feedback to individual student needs (An, 2023).Leveraging analytics to inform institutional strategies, improve performance, and streamline operations (Gertsik & Omelchenko, 2024).Breaking curriculum silos through technology to foster cross-disciplinary problem-solving, critical for 21st-century skill development (Carević & Todorov, 2024).Engaging internal (faculty, students) and external (industry, community) partners to co-design and implement innovations (Hopster-den Otter et al., 2024).Addressing data privacy, algorithmic bias, and transparency to ensure responsible technology use (Ray & Ray, 2024).

2.3 Theoretical Framework

This study is grounded in two complementary frameworks: (Després, 2007), which explains how leaders coordinate institutional elements (people, resources, policies) to address complex challenges in technology integration.(Bass, 1985), which focuses on how leaders inspire vision, foster collaboration, and prioritize equity to drive sustainable innovation.

Together, these frameworks provide a holistic lens to explore how leadership practices influence technology-driven reform.

3. METHODOLOGY

3.1 Research Design

A quantitative descriptive-correlational design was used to: (1) describe teacher perceptions of change practices and innovation; (2) compare perceptions across demographic groups; (3) explore relationships between variables.

3.2 Setting and Sample

The study was conducted at Shenyang City University, a private institution with over 15,000 students and 1,500 faculty members. The university is recognized for its focus on applied education and technological innovation, offering programs in AI, digital media, and smart manufacturing.

Participants included 306 full-time teachers selected via random sampling, ensuring representation across disciplines and ranks. Demographic characteristics were:

Age: 25–35 years (30.1%), 36–45 years (20.6%), 45–55 years (26.5%), 55+ years (22.5%).

Years of service: 1–5 years (43.5%), 6–10 years (27.1%), 11–15 years (13.7%), 16+ years (15.7%).

Position: Assistant Lecturer (31.7%), Associate Lecturer (44.4%), Senior Lecturer (23.9%).

3.3 Instrumentation

A researcher-developed questionnaire was used, consisting of three parts: Age, years of service, position.48 items measuring 8 dimensions (e.g., “Leaders consider the long-term effects of decisions on all stakeholders” for systems thinking).42 items measuring 7 pillars (e.g., “Students have access to platforms that adapt content to their learning pace” for adaptive learning).

Responses used a 4-point Likert scale (1=Strongly Disagree, 4=Strongly Agree). The instrument was validated through expert review (content validity index=0.92) and pilot testing (n=30), with Cronbach’s α coefficients ranging from 0.72 to 0.91 for all constructs, indicating good reliability.

3.4 Data Collection and Analysis

Data were collected via online (Google Forms) and paper surveys, with a 92% response rate.

Analysis was conducted using SPSS 26.0:

Descriptive statistics (means, standard deviations) summarized perceptions. ANOVA tested differences in perceptions by demographics.

Pearson correlations explored relationships between change practices and innovation.

4. RESULTS

4.1 Perceptions of Change Practices

All eight dimensions of change practices were rated as “practiced” (mean range=3.16–3.36; overall mean=3.24):Cultural

responsiveness and equity (mean=3.36, SD=0.29), with strong agreement on items such as "Policies promote equity and inclusion across all programs" (mean=3.56).Professional development and reflection (mean=3.16, SD=0.38), with the lowest score for "Leaders encourage reflective practices to improve teaching methods" (mean=3.05).

Table 1: Summary of Change Practices

Dimension	Mean ± SD	Rank	Verbal Interpretation
Cultural Responsiveness and Equity	3.36 ± 0.29	1	Practiced
Collaborative Change Processes	3.27 ± 0.37	2	Practiced
Technological Innovation Strategies	3.26 ± 0.37	3	Practiced
Teacher Readiness and Support	3.24 ± 0.32	4	Practiced
Visionary Change Practices	3.23 ± 0.33	5	Practiced
Strategic and Adaptive Management	3.19 ± 0.34	6	Practiced
Systems Thinking and Complexity	3.17 ± 0.40	7	Practiced
Professional Development	3.16 ± 0.38	8	Practiced

4.2 Perceptions of Technology-Driven Innovation

All seven pillars were rated as "implemented" (mean range=3.17–3.34; overall mean=3.24):Stakeholder collaboration and engagement (mean=3.34, SD=0.30), with "Collaboration with external partners enhances institutional innovation" scoring highest (mean=3.56).Interdisciplinary integration (mean=3.17, SD=0.35), with "Students are prepared for careers requiring interdisciplinary expertise" scoring lowest (mean=2.99).

Table 2: Summary of Technological Innovation

Pillar	Mean ± SD	Rank	Verbal Interpretation
Stakeholder Collaboration	3.34 ± 0.30	1	Implemented
Adaptive and Personalized Learning	3.27 ± 0.38	2	Implemented
Sustainable Development	3.24 ± 0.36	3	Implemented
Data-Driven Decision-Making	3.23 ± 0.35	4	Implemented
Equity and Accessibility	3.22 ± 0.37	5.5	Implemented
Ethical Considerations	3.22 ± 0.40	5.5	Implemented
Interdisciplinary Integration	3.17 ± 0.35	7	Implemented

4.3 Differences by Demographics

Younger teachers (25–35 years) rated cultural responsiveness higher (mean=3.43) than the 36–45 age group (mean=3.27,

p=0.005) and professional development higher (mean=3.28) than the 55+ group (mean=3.06, p=0.001).
Teachers with 16+ years scored systems thinking higher (mean=3.34) than those with 1–5 years (mean=3.11, p=0.008) and ethical considerations higher (mean=3.37) than 1–5 years (mean=3.17, p=0.004).
Senior Lecturers rated teacher readiness and support higher (mean=3.30) than Assistant Lecturers (mean=3.17, p=0.017), and Assistant Lecturers scored data-driven decision-making higher (mean=3.30) than Associate Lecturers (mean=3.18, p=0.027).

4.4 Correlations Between Variables Significant positive correlations included:

Visionary change practices and stakeholder collaboration (r=0.402, p=0.000). Cultural responsiveness and stakeholder collaboration (r=0.424, p=0.000).
Professional development and adaptive learning (r=0.167, p=0.003). Professional development and interdisciplinary integration (r=0.163, p=0.004).

Table 3: Key Correlations Between Change Practices and Innovation

Change Practice	Innovation Pillar	r	p
Visionary Change Practices	Stakeholder Collaboration	0.402	0.000
Cultural Responsiveness	Stakeholder Collaboration	0.424	0.000
Professional Development	Adaptive Learning	0.167	0.003

5. DISCUSSION

5.1 Strengths in Change Practices and Innovation

The high ratings for cultural responsiveness and stakeholder collaboration align with global trends emphasizing equity and inclusive innovation (UNESCO, 2023). This suggests the university's leaders effectively prioritize diversity and engage external partners—key for sustaining technology-driven reform (Shields, 2012; Hopster-den Otter et al., 2024).

Visionary leadership's strong correlation with stakeholder collaboration (r=0.402) supports transformative leadership theory: clear vision fosters cross-stakeholder engagement, critical for scaling
innovation (Litz & Blaik-Hourani, 2018). Similarly, cultural responsiveness' correlation with collaboration (r=0.424) highlights that equity-focused leadership creates environments where diverse stakeholders contribute meaningfully (Santamaría & Santamaría, 2011).

5.2 Areas for Improvement

The low ratings for professional development and interdisciplinary integration reveal critical gaps: Teachers need more support for reflective practice and skill-building to effectively use adaptive technologies (Wheeley et al., 2022). This aligns with the moderate correlation between professional development and adaptive learning (r=0.167), indicating that enhanced training could strengthen technology implementation.Weak scores reflect challenges in breaking curriculum silos, despite the growing demand for cross-disciplinary skills (Carević & Todorov, 2024). Technology tools (e.g.,
collaborative platforms) are underutilized to bridge disciplines.

5.3 Demographic Differences

Younger teachers' higher ratings for cultural responsiveness and professional development suggest they value contemporary equity and growth initiatives, while senior staff's focus on systems thinking and ethics reflects deeper institutional knowledge (Kondakçı et al., 2017). These differences highlight the need for tailored leadership strategies—e.g., digital training for younger faculty and inclusion of senior staff in long-term planning.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study confirms that effective change leadership—particularly visionary, equitable, and collaborative practices—significantly influences the implementation of large-scale technology-driven innovation. While the university demonstrates strengths in stakeholder engagement and cultural responsiveness, gaps in professional development and interdisciplinary integration hinder full innovation potential. Demographic differences in perceptions underscore the need for targeted leadership approaches.

6.2 Recommendations

Enhance professional development: Design targeted programs for 25–35-year-old faculty (e.g., workshops on AI ethics and interdisciplinary teaching).

Establish mentorship programs pairing senior and junior teachers to facilitate reflective practice.

Strengthen interdisciplinary integration: Create cross-departmental committees to develop technology-enabled interdisciplinary courses (e.g., AI + social sciences).

Incentivize faculty participation through recognition in promotion criteria.

Deepen stakeholder collaboration: Expand internal engagement by involving students and support staff in technology planning. Formalize partnerships with industry to co-develop applied technology projects.

Address demographic needs: Use digital platforms to communicate with younger faculty and in-person forums for senior staff.

Ensure Assistant Lecturers have access to data analytics training, while involving Senior Lecturers in ethical policy design.

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