Research on Performance Appraisal and Expansion Path of Digital Transformation in Higher Education

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ABSTRACT

The digital transformation of higher education is imperative, which has significant implications for improving education quality, enhancing competitiveness, and achieving educational modernization. Management science factors play a key role in this process, covering strategic planning, organizational coordination, and cultural shaping. This article starts from the perspective of management science and conducts research around core categories such as leadership strategy guidance, resource integration, innovation drive, and performance appraisal, in order to extract key information for constructing performance appraisal indicators and explore the performance appraisal system and performance improvement path of digital transformation in colleges and universities.

Keywords: *Higher education, Digital transformation, Performance appraisal.*

1. INTRODUCTION

In the current wave of the information age, the digital transformation of higher education has become one of the core tasks driving educational development. As a key place for knowledge creation and talent cultivation, the effectiveness of digital transformation in colleges and universities is directly related to the improvement of educational quality, the realization of educational equity, and the process of educational modernization. However, the path of digital transformation in higher education often faces various difficulties, which restrict its speed and ultimate effectiveness.

Given the many challenges faced by the digital transformation of higher education, it is extremely necessary to explore the application of grounded theory from the perspective of management science. Grounded theory constructs theories through in-depth research and empirical data induction. In the context of university transformation, it can collect multiple types of data at various levels and deeply explore the inherent connections between leadership strategic planning, resource integration, innovation drive, and transformation effectiveness. At the same time, it is necessary to combine leadership theory to design effective improvement strategies, promote the transformation of education in universities under the digital background, and cultivate high-quality talents that meet the needs of the times.

2. LITERATURE REVIEW

2.1 Management Science of Digital Construction in Higher Education Institutions

In the digital construction of colleges and universities, leadership plays a crucial strategic leading role. The various goals of the digital education strategy action, such as resource integration and teaching innovation, require leadership planning. Jiang Zhihui (2024) proposed that teachers are the key to transformation, and leaders should allocate teacher resources and plan their development paths accordingly to assist teaching.[1] Wang Ruyi and Lan Weihong (2024) emphasized that leaders should have a strategic perspective when building an evaluation system, selecting indicators, setting weights, and adjusting mechanisms to measure effectiveness.[2] The research by Li Wenbin and Han Xiaocui (2024) shows that leaders need to develop strategies in

budget performance management, including planning data analysis investment, coordinating platform construction, and ensuring data security, laying the foundation and leading the direction for digital construction.[3]

2.2 Digital Education and Teaching

Big data and AI algorithms are driving profound changes in education, teaching, and campus services through digital technology. Zhang Jun (2024) pointed out that green education in the AI era promotes the transformation of teaching ecology, bringing about changes in resources, methods, and experiences, and posing challenges to various aspects of traditional teaching.[4] Yu Shengquan and Liu Enrui (2022) found that in the era of intelligence, there is a paradigm shift in learning, where informal and formal learning are integrated. This provides a basis for teaching innovation and triggers discussions on hot issues such as the construction of learning environments.[5] Yu Shengquan (2023) believed that teachers should achieve deep integration of information technology and teaching, enhance their literacy and abilities to carry out precise and personalized teaching.[6] In terms of campus services, there is a must to build a one-stop platform to integrate business systems, use big data analysis to achieve information sharing, process integration, and personalized service customization, and improve campus operational efficiency and user satisfaction. The regulations of the Ministry of Education (2021) provided guidance for the digital transformation of universities,[7] and many universities explore and practice based on them. Enfu Wang (2024) constructed a student management model,[8] Wu Di (2023) created a platform and planning strategy,[9] and Zhu Zhiting and Hu Jiao (2024) proposed the strategic significance and talent cultivation requirements of educational digitization, demonstrating the value and development trend of digital technology applications.[10]

2.3 Digital Transformation Strategies

Various countries attach great importance to the digital transformation of education, but face difficulties in practice. Lu Xing and Huang Ronghuai (2023) proposed response strategies, including accepting transformation deviations, clarifying governance elements and building an intelligent technology governance system, and conducting risk prevention experiments.[11] Zhang Zhengang and Cheng Linyuan (2023) summarized the experience of Nanyang Technological University in promoting transformation from multiple dimensions, such as innovative ideas and model reforms.[12] Qingcai, Zhao Yue, and Chen Bowen (2023) studied the digital strategy of higher education in Germany, which has the characteristics of perfect policies, innovative teaching scenarios, rigorous management, and diverse cooperation.[13] The evaluation index system has attracted much attention. Fu Xianglong and Xi Meihong (2023) constructed a system that covers multiple key indicators and clarifies standards and weights, providing reference for the transformation of universities.[14] Huang Ronghuai (2024) proposed suggestions for constructing an innovative evaluation system, emphasizing the evaluation of students' diverse abilities, teachers' multi-faceted qualities, and the comprehensive influence of schools, in order to accurately position and promote the transformation process.[15]

2.4 Research Review

Previous researchers have a certain research foundation on the digital construction of universities, but from the perspective of management science, there is a lack of research on the performance evaluation and improvement path of digital transformation in universities, which needs to be further explored. The feedback mechanism between teachers, students, and leaders in digital transformation is unclear, which affects the understanding of the intrinsic relationship between diverse subjects and performance. In terms of research depth, there is a lack of research on the impact of digitization on core performance such as teaching quality and talent cultivation. There is a lack of systematic strategies to address issues such as data security and resource allocation fairness, and a lack of in-depth analysis of the relationship between management science perspectives and performance, which hinders the digital transformation and development of colleges and universities.

3. RESEARCH DESIGN

3.1 Research Goals

Starting from the perspective of management science, using grounded theory, this study explores the performance evaluation index system of digital transformation in higher education, and proposes practical and feasible improvement paths to guide

leadership decision-making and practical operations in the process of digital transformation, and improve the quality and efficiency of education. Multiple types and levels of colleges and universities were selected as research objects in the study, including university leaders, teachers, administrative staff, students, and other personnel at all levels.

3.2 Data Sources

This study focuses on the digital transformation of higher education, collecting data from multiple sources to explore its status and patterns in depth.

3.2.1 Semi-structured Visits

Targeting university leaders, teachers, administrative staff, and student groups, the visits were conducted by following the principle of confidentiality. The first is to select 9 on-site interview texts and integrate them with another 26 interview texts. The samples are sourced from successful cases related to digital transformation and management science in universities, which can reflect key characteristics and patterns at the leadership level and provide first-hand information for grounded theory research. [16]

3.2.2 On-site Observation and Document Collection

The researchers have conducted in-depth observation and recording of digital transformation scenarios in colleges and universities, extensive collection of various document materials, accurate extraction of effective information from them, and enrichment of research data foundation from multiple perspectives.

3.3 Research Methods

The study used the grounded theory method and Nvivo14 software to analyze 30 text data and construct a theoretical model.

3.3.1 Encoding Process

The researchers perform open, axial, and selective encoding on the filtered text (W1-W73) in sequence. Open coding extracts initial concepts, main axis coding integrates to form categories, and selective coding combines expert opinions to extract core categories.

3.3.2 Theoretical Model Construction

Based on the core categories and logical connections, the study has constructed a theoretical model from bottom to top, sorted out the key factors, relationships, and mechanisms of transformation, and provided support for research and practice.[17]

Through rigorous data collection methods and scientific grounded theory analysis, the quality of research data and the reliability of research results are ensured, providing a solid foundation and valuable reference for in-depth research on the digital transformation of higher education.

3.4 Research Process

3.4.1 Open Encoding

It is necessary to analyze the collected raw data and extract meaningful concepts and categories from it. At the same time, corresponding concepts and categories are also excavated from the information contained in the digitalization related documents of universities, laying the foundation for subsequent coding and theoretical construction. As shown in “Table 1”.

Table 1. Open encoding sample table

Initial category	Raw data fragment (example)
Management of digital education	The leadership has set goals for optimizing management processes, requiring administrative departments to optimize digital management processes and reduce the use of paper documents.
Valuing digital work	A dedicated Digital Transformation Office has been established to coordinate digital work among various departments.
Paying attention to capital investment	The school invests in digital resources, equipment procurement, etc. The principal emphasizes increasing investment in digital teaching platforms and purchasing advanced software and hardware.
Emphasizing learning and management	When formulating strategies, leaders will refer to and draw on external experience. When formulating digital transformation strategies, meetings will be held to discuss and solicit opinions from teachers, and experts will be invited to demonstrate.
Paying attention to teacher development	The schools should encourage teachers to participate in digital teaching training, enhance their ability to use new technologies, and assess their digital abilities.
Encouraging teachers to innovate	Colleges and universities encourage teaching innovation, affirm new teaching methods, create an atmosphere, encourage teachers to improve teaching quality, and promote educational development.
Leaders will use incentive mechanisms	The schools should set up special rewards in the education digitalization budget to commend teachers who have outstanding digital teaching performance.
Timeliness performance of problem-solving	Promptly address the issue of lag in the digital learning platform reported by students, reflecting its response efficiency.
Strategies for performance evaluation	The schools should formulate performance evaluation rules for the digital transformation of the leadership team, and will score their performance in promoting the integration of teaching resources based on this at the end of the semester.
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3.4.2 Axial Coding

The axial coding is to associate and integrate the concepts and categories obtained from open coding, and establish the relationship between the main category and subcategories. These main categories summarize the core areas of research phenomena, demonstrating the relationship between subcategories and main categories, and providing a basis for subsequent theoretical construction. (As shown in “Table 2”)

Table 2. Axial coding analysis

Main category	Subcategory	Subcategory connotation
Strategic planning	Goal setting	The school has set a goal of achieving 80% digitalization of teaching resources within three years and has set clear goals for digital transformation.
	Implementing the plan	The path of starting digital teaching pilot projects from some advantageous disciplines and gradually promoting them is planned and designed for the implementation of transformation.
Resource coordination	Resource allocation	Allocate most of the digital transformation funds to the development of new online courses and platform construction, and the leadership has made arrangements for the allocation of financial resources.
	Organizational coordination	Ensure efficient implementation of digital transformation projects, promote communication and collaboration between different teams, and promptly resolve potential conflicts and issues.
Leading the innovation	Innovation in teaching model	Under the leadership's advocacy, teachers attempted new digital teaching models such as flipped classrooms, and the leadership promoted new teaching practices.
	Innovation of evaluation system	Leaders actively promote the construction of a new digital teaching evaluation system, incorporating indicators such as students' online learning duration, to ensure that the system meets the needs of digital transformation.
	Work ideas innovation	Some teachers are resistant to digital teaching, and leaders resolve this through communication meetings and training. When faced with obstacles in transformation, they will adopt strategies to cope.
Performance appraisal	Improving teaching effectiveness	Students' grades in practical courses have improved by an average of 30%.
	Rapid technological response	The leadership has a 100% response rate to technical issues and will quickly organize repairs.
	Improving management efficiency	The performance of digital transformation in management efficiency is significant, with digital management systems reducing the processing time of administrative departments by 60%.Teaching effectiveness enhance

3.4.3 Selective Coding

In the process of digital transformation of higher education, leadership decision-making plays a crucial core role. It has a close and intricate causal relationship and interaction with resource allocation, innovation driven, organizational coordination, and other categories, profoundly influencing the ultimate effectiveness of the transformation. By using axial coding, researchers can deeply analyze data correlations and clarify the internal logical context between core categories and other categories. (As shown in “Table 3”)

Table 3. Examples of exemplary relationships for performance evaluation of digital transformation in universities

Typical relationship structure	The connotation of relational structure
Strategic leadership → The commanding role of digital transformation in colleges and universities	The impact of management science on the digital transformation of universities
Resource integration → The Importance of Resource Coordination	The best coordination of funds, manpower, and material resources is achieved through leadership coordination
Innovation as the driving force → Leadership initiatives in leadership innovation → Digital transformation of universities	Leaders play an important role in promoting the successful digital transformation of college and universities
Management science factors → Performance achievement → Promoting positive effects of digital transformation in college and universities	Management science has a significant positive impact on the digital transformation of universities and significantly improves performance

3.5 Saturation Test

The researchers need to verify the new data code with the reserved 5 documents to see if it can be classified into core and sub categories such as strategic leadership, resource integration, innovation as the driving force, and transformational performance achievement. After evaluating the fit between the new data and existing theories, it is confirmed that the new data is suitable within the framework and there are no unclassifiable concepts or new relationships. It is determined that the data has reached saturation.

4. KEY FACTORS AND INTERNAL LOGIC EXPLANATION FOR THE SUCCESS OF DIGITAL CONSTRUCTION IN COLLEGES AND UNIVERSITIES

4.1 Key Factors

4.1.1 Leadership Level

4.1.1.1 Strategic Planning and Execution

When integrating digitalization in colleges and universities, it is important to diversify funding and allocate funds reasonably, break down barriers and build teams in terms of manpower, and keep up with the forefront of technology and promoting integration. There are many variables in construction, and leaders rely on insight and decision-making power to adjust strategies, resource allocation, and implementation methods in a timely manner based on changes in internal and external environments, external policy and technological breakthroughs, internal factors such as poor acceptance by teachers and students, and project effectiveness, to ensure the correct direction of construction.

4.1.1.2 Innovation as the Driving Force and Cultural Creation

In university management, it is necessary to create a campus culture that encourages innovation, promote digital innovation cases, commend and reward outstanding individuals to form an incentive mechanism, and build an open and inclusive communication platform to stimulate creativity. In terms of innovation in the evaluation system, it is also necessary to promote the construction of a diversified and comprehensive indicator system that covers all dimensions of students' online learning, and achieve automated and intelligent evaluation through digital tools.[18]

When innovating organizational management, leaders should break through the limitations of traditional university management, establish a flexible project management mechanism to adapt and promote projects, actively promote the digitization of administrative processes, achieve standardization, transparency, and automation, and improve administrative efficiency.

4.1.2 Performance Level

4.1.2.1 Improving Teaching Quality

In the digital transformation of colleges and universities, the quality of teaching has been improved due to digitization. It provides abundant resources, supports virtual practice, and intelligent systems to assist teachers in teaching according to their aptitude. The effectiveness can be seen from grades and competition awards, providing a basis and direction for performance evaluation and leadership strategies, and demonstrating leadership role.

4.1.2.2 Advanced Management Efficiency

Leadership decision-making is crucial for the digital transformation of colleges and universities. It is necessary to build a platform to achieve information sharing and process optimization, accurately allocate resources, improve management efficiency, and promote transformation. Scientific leadership is related to performance evaluation strategies, and reasonable indicators can help leaders optimize strategies, improve performance, highlight core leadership values, and assist in the digital development of universities.

4.1.2.3 Empowering the Development of Teachers and Students

From the perspective of management science, the performance evaluation and strategies are key to digital transformation in colleges and universities. In terms of teacher-student development, digitalization helps teachers grow and students improve their literacy, which are key performance indicators. Leaders formulate strategies based on this, promote deepening transformation and performance improvement, and demonstrate key roles.

4.1.2.4 Expanding Social Influence

The digital transformation of colleges and universities enhances their social influence, attracts high-quality students, promotes industry university research cooperation and achievement transformation, and can also lead industry development and increase visibility. This highlights its value in leadership decision-making and performance evaluation, and leaders should attach importance to relevant strategies to enhance effectiveness.[19]

4.2 Logical Relationship

The successful digital construction of colleges and universities relies on systematic operation, and the key factors are logically close. Leadership strategy guidance is the core starting point, and the formulation of strategic guidance direction; Resource integration is the fundamental guarantee, and the rational allocation of funds, manpower, and technical resources promotes the implementation of strategies; Leadership innovation drive is the driving force, empowering and evaluating effectiveness through innovative measures to enhance efficiency; The achievement of transformation performance is the ultimate goal, and the results of teaching quality reflect and test the effectiveness of construction. It is promoted by the synergy of strategy, resources, and innovation, and the improvement of teaching quality can attract students. The performance results in turn affect strategic adjustments and social influence enhancement, forming a virtuous cycle and promoting the continuous optimization and upgrading of colleges and universities.

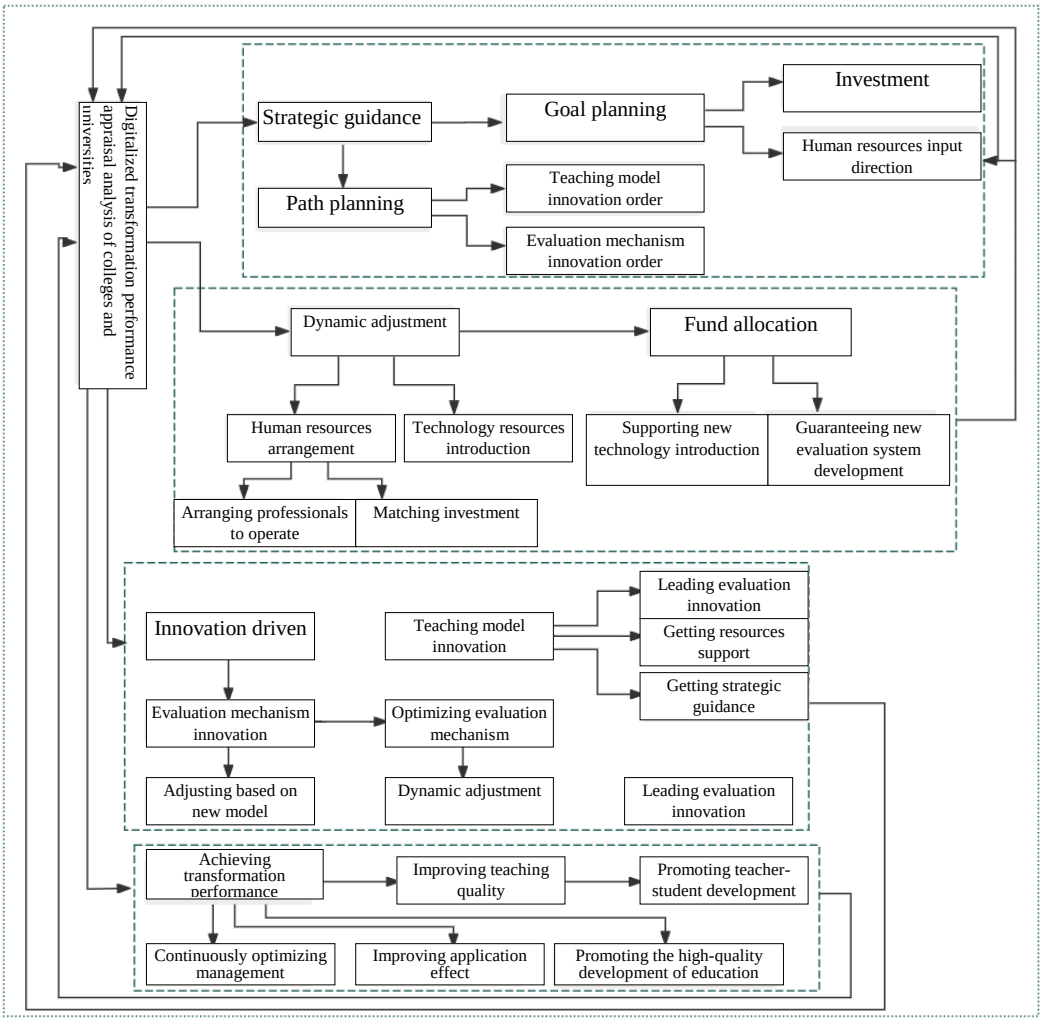

Figure 1 Impact model of digital transformation in higher education based on grounded theory.

5. CONCLUSION

5.1 Research Conclusions

This study uses grounded theory to explore the digital transformation of colleges and universities in depth. Leadership strategy guidance provides direction for transformation by accurately grasping trends and school conditions, clarifying target paths, and integrating resources; Resource integration is supported by diversified fundraising, team building, and technical screening to provide solid support; Innovation as the driving force can create a culture that promotes teaching, evaluation, and management innovation, and stimulates internal vitality.

These three key elements are closely connected and complementary, working together to achieve significant improvements in teaching quality, leapfrog progress in management efficiency, comprehensive development of teachers and students' comprehensive literacy, and effective enhancement of the school's social influence in the practice of digital transformation in colleges and universities. It is necessary to build complete and organic collaborative system, effectively promoting the continuous progress and development of colleges and universities in the digital wave, and providing important empirical basis and theoretical support for the deepening of the theory and practice of digital transformation in colleges and universities.

5.2 Theoretical Contributions

This study introduces leadership theory into the digital transformation of higher education, deeply analyzes the role of leadership and the relationships

between various links, provides a basis for understanding the transformation mechanism, and expands the digital application boundaries of educational management theory. At the same time, by using grounded theory to analyze the details and internal connections of leadership behavior, there is a must to deepen leadership theory, enhance its explanatory and guiding power for practice, elaborate on the relationship between leadership and transformational performance, and broaden the theoretical connotation and application scope.

5.3 Practical Insights

The practical implications of the performance improvement path of digital transformation in colleges and universities from the perspective of management science are as follows:

5.3.1 Putting Leadership Philosophy Innovation First

University administrators need to update their concepts, recognize that digital transformation is a comprehensive change, actively learn new knowledge, establish scientific concepts, plan digital blueprints, and lead the whole school to participate.

5.3.2 Taking Precise Performance Evaluation as the Guide

There is a must to build a comprehensive performance evaluation system, set indicators from multiple dimensions for evaluation, identify strengths and weaknesses based on data, help optimize resources and adjust strategies, and ensure the correct direction of university transformation.

5.3.3 Integrating Collaborative Resources as the Driving Force

Leaders should exert coordination power, integrate internal and external resources, break boundaries to promote cooperation internally, expand cooperation networks externally, add momentum to digital transformation, and advance key tasks.

5.3.4 Taking Continuous Innovation Driven as the Source

It is necessary to create an innovative ecosystem, stimulate the innovation ability of teachers and students, encourage exploration and experimentation in various aspects, cultivate and transform achievements, maintain vitality and competitiveness through innovation, and create a new situation in education.

5.4 Outlook

Future research needs to further expand perspectives, optimize data collection methods, and increase sample sizes to enhance the reliability and universality of conclusions. It is a must to comprehensively analyze the role of various factors in the digital transformation of universities, improve the dynamic model of the external environment, deeply explore its internal relationships, and strengthen the leadership influence of management science to promote the efficient development of digital transformation in colleges and universities and enhance their competitiveness and innovation in the digital age.

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