Journal of International Education and Development
2025, VOL. 9, NO. 9, 166-171
DOI: 10.47297/wspiedWSP2516-250037.20250909

Research on Strategies for Improving the Management Efficiency of Higher Vocational Education under the Background of Digital Transformation

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ABSTRACT
Digital transformation, driven by rapid technological advancement, has become pivotal in reshaping education management. This paper examines higher vocational education's digital transition, emphasizing its critical role in talent cultivation and industry service efficiency. It analyzes core challenges including weak digital awareness, infrastructure gaps, data silos, and talent shortages, while proposing targeted strategies across five dimensions: consciousness enhancement, facility modernization, data integration, talent development, and institutional optimization. These measures aim to elevate management efficiency and provide actionable guidance for vocational colleges' digital transformation.

KEYWORDS
Community elderly care services; Public management; Aging

1 Introduction

The Ministry of Education's "Digital Strategy Action Plan for Vocational Education (2023-2025)" mandates accelerating digital transformation of vocational education management through an efficient, collaborative digital system, aligning with its core mission of industry-education integration and school-enterprise cooperation to cultivate industrial talent. As higher vocational education prioritizes quality and value creation, traditional manual-based models face inefficiencies due to fragmented departmental systems causing data silos, redundant input, and empirical decision-making lacking insights into teaching quality, student development, and training resource utilization - obstructing precise alignment with industrial needs. This paper analyzes digital management challenges in higher vocational education and proposes strategies to build an intelligent, data-driven governance ecosystem supporting national digitalization goals.

2 The core significance of digital transformation in improving the efficiency of higher vocational education management

Digital transformation is not simply a combination of "technology+management", but rather a fundamental improvement in the precision, synergy, and intelligence of vocational education management through digital technology to reconstruct management processes, optimize resource allocation, and innovate decision-making models. The significance of improving the management efficiency of higher vocational education is mainly reflected in the following four aspects:

2.1 Optimize resource allocation and reduce management costs

Vocational education management involves diverse resources (equipment, faculty, etc.). Traditional manual allocation often leads to inefficiencies like idle equipment or supply-demand mismatches. Digital platforms enable real-time monitoring and dynamic allocation: IoT tracks equipment usage/faults to generate utilization reports, while integrating faculty data (expertise, experience) with teaching needs achieves precise resource matching. A vocational college achieved 65% equipment utilization (up from <30%), 40% faculty allocation efficiency improvement, and annual cost savings of 2 million yuan through such a platform.

2.2 Enhance the scientificity of decision-making and reduce reliance on experience

Higher vocational education management decisions must balance multiple goals like teaching quality, student development, and school-enterprise cooperation. Traditional models rely on experience, leading to subjective biases and delayed or one-sided decisions—e. g., professional adjustments based solely on past employment rates may overlook emerging industry demands, causing misalignment with market needs. Digital transformation integrates multidimensional data (regional industry trends, student employment outcomes, teaching evaluations, and school-enterprise feedback) via big data, enabling a "decision analysis model" that shifts from experience-driven to data-driven

decision-making. For instance, analyzing regional industrial chain upgrades (e.g., talent demand growth in new energy vehicles and AI) combined with a school's existing programs generates "professional adjustment recommendations"; assessing students' academic performance, training results, and career assessments identifies learning risks early for personalized support. This data-driven approach reduces subjective errors, responds swiftly to industry and student needs, and enhances decision accuracy and foresight.

2.3 Enhance service accuracy and improve management experience

The core service targets of vocational education management (students, teachers, enterprises) face inefficiencies under traditional models: fragmented processes, single feedback channels, and low satisfaction. Students applying for aid/loans must navigate multiple departments with week-long processing; enterprises collaborating with schools endure high communication costs due to cross-departmental coordination. Digital transformation enables a "one-stop service platform" that streamlines services: students complete transactions online (course selection, score inquiry, etc.) with processing time reduced from 7 days to 1-2 days; teachers access real-time teaching data (resource sharing, performance analysis) to adjust strategies; enterprises connect directly via modules for cooperation needs, internship docking, and internship evaluation, boosting communication efficiency by over 50%.

2.4 Promote collaborative management and break down departmental barriers

The interconnected aspects of vocational education management (e. g., teaching-practical training coordination, student-employment data sharing) face collaboration inefficiencies under traditional models due to departmental data silos and inconsistent standards. Digital transformation establishes a "unified data center" to integrate cross-departmental resources and standardize data formats (student info, course codes, etc.), enabling real-time sharing and parallel processes. For instance, academic departments access training equipment availability via the center to avoid resource conflicts; employment departments retrieve real-time student grades and skill certificates for precise job matching. This breaks down silos, shifting management from sequential to collaborative workflows and significantly boosting efficiency.

3 The main problems in the current digital transformation of vocational education management

Although most vocational colleges have initiated the digital construction of education management, there are still many problems constrained by factors such as awareness, funding, talent, and systems, which make it difficult for digital transformation to be implemented and effective, and the improvement of management efficiency is not significant. The specific issues are as follows:

3.1 Weak digital awareness and lack of top-level design

Some vocational colleges view digital transformation narrowly as "technology application" (e. g., website/system building), overlooking its potential to reshape management processes, organizational structures, and decision-making models. For instance, systems purchased to meet "smart campus" evaluation criteria often see <50% utilization due to misalignment with actual management needs. Meanwhile, most institutions lack top-level design: fragmented departmental initiatives (e.g., separate student systems by academic affairs and student engineering departments) cause redundant data entry; absence of dedicated digital agencies (data centers/transformation offices) hinders cross-departmental coordination, stalling progress on systemic issues.

3.2 Digital infrastructure lags behind and data standards are not unified

Digital infrastructure serves as the hardware foundation for digital transformation, encompassing servers, storage devices, network bandwidth, and IoT devices. However, many vocational colleges, particularly in remote areas, face significant infrastructure gaps: aging servers with insufficient storage capacity struggle to support big data analysis and high concurrent access, causing frequent system crashes; inadequate network bandwidth leads to slow speeds in training venues and dormitories, hindering online training and live teaching; and low IoT device coverage prevents real-time data collection and remote monitoring of equipment and classroom multimedia systems.

A critical bottleneck is the lack of unified data standards. Without national-level data standards for vocational education management, institutions adopt inconsistent formats, with even intra-school departments using differing data rules (e.g., 10-digit vs. 12-digit student ID codes). This fragmentation results in incompatible systems, prominent "data silos," and sub-30% data utilization rates, severely limiting data's role in decision-making support.

3.3 Shortage of digital talents and insufficient team capabilities

Vocational colleges face a severe shortage of digital talents with both education management and technical expertise. Most IT staff are limited to basic maintenance and network security, lacking skills for complex tasks like data center construction or AI applications. Simultaneously, management personnel often lack data analysis and system operation capabilities, with some teachers still relying on manual grade statistics instead of using digital tools.

Incentive mechanisms for digital talents are also inadequate: digital skills are not integrated into management assessment/training systems, reducing participation motivation; unclear salary structures and career paths hinder external recruitment and contribute to internal talent loss.

3.4 The management system is not compatible, and there are risks to data security

Vocational colleges' current management systems struggle to support digital transformation. First, digital performance metrics (system utilization, data contribution, efficiency gains) are absent from departmental/individual evaluations, reducing motivation for digital initiatives. Second, unclear data management rules (collection, storage, sharing permissions) create silos due to departments' data leakage or liability concerns.

Data security is another critical challenge. With sensitive management data (student info, teaching/research data) stored digitally, risks like leaks and cyberattacks have risen. However, many institutions lack: 1) data classification mechanisms (e.g., unencrypted storage of sensitive data like ID/card numbers); 2) emergency response plans for security incidents, risking severe consequences from delayed handling.

4 Specific strategies for improving the management efficiency of higher vocational education under the background of digital transformation

In response to the above issues, vocational colleges need to work together from the five dimensions of "awareness, facilities, data, talent, and system" to build a digital management system that "top-level design guidance, technical facility support, data-driven decision-making, talent guarantee implementation, and standardized system operation", effectively improving management efficiency.

4.1 Strengthen digital awareness and improve top-level design

4.1.1 Enhance the digital awareness of management

By organizing management to participate in "Vocational Education Digital Transformation Special Training" and visiting successful digital transformation colleges and universities (such as Shenzhen Vocational and Technical College and Wuxi Vocational and Technical College) for investigation and learning, we aim to make them aware of the core value of digital transformation in improving management efficiency, establish the concept of "digital reconstruction management", and incorporate digital transformation into the overall development plan of the school.

4.1.2 Develop a special plan for digital transformation

Based on the school's positioning and management needs, formulate the "Three Year Plan for Digital Transformation of Education Management", clarify the transformation goals (such as "achieving 80% online management business and 90% data sharing rate by 2025"), key tasks (such as data center construction and smart service platform development), responsible departments and time nodes, and avoid "blind construction".

4.1.3 Establish a specialized digital management organization

set up a "Digital Transformation Office" to coordinate the digital construction work of various departments, responsible for formulating data standards, promoting system integration, and solving cross departmental problems; Simultaneously establish a 'data center' equipped with professional technical personnel responsible for data collection, storage, analysis, and security management, providing organizational support for digital transformation.

4.2 Improve digital infrastructure and unify data standards

4.2.1 Upgrade digital infrastructure

On the one hand, strive for government financial support (such as vocational education special funds) and cooperation

with social capital (such as jointly building smart campuses with technology companies such as Huawei and Alibaba), invest funds to upgrade servers, expand storage capacity, and improve network bandwidth to ensure network coverage and speed in training venues, dormitories, and other areas; On the other hand, accelerate the deployment of IoT devices, integrate training equipment, classroom multimedia, logistics facilities, etc. into IoT systems, achieve real-time data collection and remote monitoring, and provide data sources for digital management.

4.2.2 Develop a unified data standard

Referring to national standards such as "Education Management Information Education Management Basic Code" (GB/T 2261.1-2003), combined with the characteristics of higher vocational education management, develop a unified data standard system for schools, clarify data coding rules (such as student ID, course code, enterprise code), data formats (such as text, values, dates), and data quality requirements (such as completeness, accuracy, timeliness). For example, it is stipulated that the student ID should be uniformly 12 digits, with the first 4 digits being the year of enrollment, the middle 2 digits being the college code, and the last 6 digits being the student serial number, to ensure that the data format of each department is consistent.

4.2.3 Building a unified data platform

Based on data standards, establish a unified data platform for the school, integrate data sources from academic affairs, student engineering, practical training, school enterprise cooperation, logistics and other departments, and achieve "one-time collection and multi-party sharing" of data. The data center needs to have functions such as data cleaning (removing duplicate and erroneous data), data integration (associating multi-source data), and data services (providing data interfaces for various systems) to provide data support for management decision-making and business collaboration.

4.3 Breaking down data silos and promoting data-driven decision-making

4.3.1 Promote system integration and business collaboration

With the data center as the core, integrate and transform the existing management system, connect the data interfaces of educational administration, student work, training and other systems, and achieve online collaboration of business processes. For example, in the "Student Leave" service, after a student submits a leave application through the smart service platform, the system automatically synchronizes the application to the homeroom teacher, academic department (adjusting course attendance), and logistics department (dormitory access control permissions), and each department approves it online without the need for students to run errands offline. The processing time for the service is shortened from 7 days to 1 day.

4.3.2 Conduct in-depth data analysis and application

Build data analysis models for different management scenarios to achieve data-driven decision-making. For example:

(1) Teaching quality analysis: Integrate student classroom attendance, homework submission, exam scores, teaching evaluation and other data, analyze course difficulty and teacher teaching effectiveness, and provide suggestions for curriculum reform and teacher training;

(2) Student development warning: Analyze students' academic performance, practical training performance, psychological assessment and other data, identify academic risks (such as failing two consecutive courses) and psychological problems, automatically push warning information to class teachers and counselors, and provide assistance in advance;

(3) Optimization of school enterprise cooperation: Integrate data on the duration of enterprise cooperation, the number of practical training positions, and student internship evaluations, analyze the value of enterprise cooperation, prioritize deepening cooperation with high-quality enterprises, and eliminate inefficient cooperative enterprises.

4.3.3 Build a visual decision-making platform

Present data analysis results in the form of charts (such as line charts, bar charts, heat maps) on the visual decision-making platform. Management can view key indicators such as teaching quality, resource utilization, and student development in real time and make decisions quickly. For example, checking the employment rate and salary level of each major through the platform, and adjusting the professional course settings in a timely manner.

4.4 Cultivate a team of digital talents and enhance their capabilities

4.4.1 Introduce professional digital talents

Develop a plan for introducing digital talents, recruit professional talents such as big data analysts, system architects, and data security engineers from the society, and enrich the strength of data centers and information technology departments; At the same time, through "school enterprise cooperation", digital experts from enterprises are introduced to serve as consultants for the school's digital transformation and guide the practice of digital construction.

4.4.2 Strengthen the digital training of existing personnel

build a "layered and classified" digital training system:

(1) Conduct "digital decision-making training" for management, focusing on explaining the application of data platforms and the use of visual decision-making platforms to enhance data-driven decision-making capabilities;

(2) Conduct "digital system operation training" for management personnel (such as academic administrators and student workers), focusing on explaining the operation processes of smart service platforms, data entry systems, etc., to improve business processing efficiency;

(3) Conduct "Big Data and Artificial Intelligence Training" for technical personnel, focusing on explaining data mining algorithms, AI model construction, and other content to enhance technical support capabilities.

4.4.3 Establish a digital capability incentive mechanism

Incorporate digital capabilities into the personnel performance evaluation system, and commend and reward departments and individuals with outstanding digital application results (such as high system utilization and significant data analysis results); At the same time, linking digital training experience and assessment results with professional title evaluation and job promotion can stimulate the enthusiasm of personnel to participate in digital transformation.

4.5 Establish a sound digital management system to ensure data security

4.5.1 Improve the digital management assessment system

formulate the "Digital Management Assessment Method", clarify the assessment indicators (such as system utilization rate, data sharing rate, management efficiency improvement ratio), assessment cycle (such as quarterly assessment, annual assessment), and assessment methods (such as data statistics, departmental mutual evaluation); Provide financial support to departments that perform well in the assessment, and order departments that fail the assessment to rectify to ensure the effectiveness of digital transformation.

4.5.2 Establish a data management and sharing system

Develop the "Data Management Measures" to clarify the data collection responsibilities of each department (such as the academic affairs department responsible for collecting course and grade data, and the student affairs department responsible for collecting student basic information), data storage standards (such as encrypted storage of sensitive data), and data sharing permissions (such as authorizing only class teachers and academic affairs departments to view student grade data); At the same time, establish a "data sharing approval process", and applications for data sharing between departments must be approved by the Digital Transformation Office to ensure that data sharing is legal and compliant.

4.5.3 Strengthen the data security guarantee system

Build a "multi-level" data security guarantee system:

(1) On a technical level, deploy firewalls, intrusion detection systems, and data encryption software to prevent data leakage and hacker attacks;

(2) At the management level, formulate the 'Data Security Emergency Plan', regularly conduct data security drills, and enhance emergency response capabilities;

(3) At the personnel level, conduct "data security training" to enhance the data security awareness of management personnel and strictly prohibit the leakage of sensitive data; At the same time, sign a Data Security Responsibility Agreement with management personnel to clarify data security responsibilities.

5 Conclusion

Digital transformation is an inevitable choice for vocational education management to adapt to modern development and overcome efficiency bottlenecks, with core value in reconstructing processes, optimizing resources, and innovating decision-making models through digital technology to fundamentally improve efficiency. Current challenges include weak awareness, outdated infrastructure, data silos, talent shortages, and inadequate systems, requiring promotion via a five-dimensional strategy: strengthening awareness, upgrading facilities, integrating data, cultivating talents, and improving systems. Looking ahead, advancements in AI, 5G, and IoT will drive intelligent management, such as AI-automated operations and digital twin virtual campuses. Vocational colleges must align with technological trends, refine digital systems, and enhance efficiency to support high-quality technical talent cultivation and industrial upgrading.

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