

# Research on the Innovation of University Smart Teaching Management Mode under the Background of Digital Transformation

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**Abstract:** With the comprehensive advancement of educational digitalization, university teaching management is undergoing a transformation from traditional manual, offline, decentralized, and experience-based management to a smart teaching management mode featuring digitalization, intelligence, refinement, integration, and service orientation. Supported by big data, cloud computing, artificial intelligence, Internet of Things, and other technologies, smart teaching management enables efficient teaching operation, targeted teaching services, data-based teaching decision-making, and real-time teaching quality monitoring. Against the backdrop of digital transformation, this paper interprets the connotation and characteristics of smart teaching management, analyzes prominent problems existing in current university teaching management, and proposes innovative paths for smart teaching management mode from the perspectives of concept, technology, process, system, and service. It provides practical references for universities to construct a modern, intelligent, and highly efficient teaching management system.

**Keywords:** Educational digitalization; Smart teaching management; Universities; Management mode innovation; Big data; Smart academic affairs

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## 1. Introduction

For a long time, most universities in China have adopted the traditional teaching management mode, relying on manual statistics, offline approval, and experiential decision-making to carry out academic affairs management, student status administration, quality monitoring, and teaching services. This mode is plagued by many problems such as data fragmentation, cumbersome procedures, lagging supervision, passive service, and subjective decision-making. Under the impact of the digital wave, the limitations of the traditional management mode continue to expand<sup>[1]</sup>. It cannot adapt to the development needs of new teaching models such as online teaching, blended teaching, and personalized training, and seriously restricts the deepening of university teaching reform and the modernization of governance capacity.

Smart teaching management is the concentrated embodiment of educational digital transformation in the field of teaching management, and a new form of teaching management constructed through a data-driven approach, technological empowerment, process reengineering, and service upgrading. Compared with the traditional mode, smart teaching management places greater emphasis on data integration, intelligent collaboration, targeted service, dynamic early warning, and scientific decision-making, serving as a key measure to solve current pain points in teaching management, improve management efficiency, and guarantee the quality of talent cultivation <sup>[2]</sup>. In this context, exploring the innovation of university smart teaching management mode under digital transformation and reconstructing management logic, technical architecture, operational processes, and institutional systems is not only an urgent need to promote the modernization of university teaching management, but also an important support for deepening teaching reform and enhancing the core competitiveness of universities.

## **2. Connotation and practical value of university smart teaching management under digital transformation**

### **2.1. Connotation**

#### **2.1.1. Educational digitalization and smart teaching management**

Educational digitalization is a systematic reform process that takes digital technology as the core driving force and data resources as the key production factors. Through the in-depth integration of digital technology with education and teaching, management services, and campus governance, it reconstructs the educational ecosystem, optimizes the allocation of educational resources, and improves the efficiency of educational governance <sup>[3]</sup>. Different from the popularization of equipment and online migration in traditional educational informatization, educational digitalization highlights data empowerment, intelligent empowerment, and system reconstruction, realizing the digital upgrading of the whole process, all elements, and full scenarios of education, and becoming the core driver for the high-quality development of higher education.

Smart teaching management is the concrete implementation of educational digitalization in university academic affairs management and an iterative upgrading form of traditional teaching management. Specifically, oriented to the fundamental task of fostering virtue through education, smart teaching management integrates university teaching resources, faculty resources, student resources, and management resources relying on digital technologies such as big data, artificial intelligence, cloud computing, and Internet of Things, so as to build an intelligent, integrated, and refined teaching management system <sup>[4]</sup>. Its core is to break the limitations of manual management, take data as the fundamental basis, cover the entire teaching chain including teaching plan formulation, curriculum construction, classroom teaching, student status assessment, quality monitoring, and teacher-student services, and realize intelligent perception, precise analysis, dynamic early warning, scientific decision-making, and efficient service in teaching management. It represents a modern management paradigm adapted to the development of higher education in the new era.

#### **2.1.2. Core characteristics of smart teaching management**

Compared with the traditional university teaching management mode, smart teaching management under digital transformation has five core characteristics with differentiated management advantages. First, data-based. The whole process of teaching activities can be perceived, collected, recorded, and analyzed. Data runs through the whole cycle of management, service, evaluation, and decision-making, realizing data-

based management and decision-making. Second, integrated. It breaks down the system barriers of academic affairs, teaching, student status, academic performance, internship, supervision, and evaluation, realizing unified platforms, homologous data, and business collaboration, and eliminating information islands. Third, intelligent. By applying AI algorithms, robotic process automation (RPA) and intelligent matching technology, it realizes intelligent timetable arrangement, intelligent course selection, intelligent examination and approval, dynamic early warning, and intelligent recommendation, reducing manual costs. Fourth, refined. Teaching management shifts from a one-size-fits-all model to precise and personalized governance, implementing differentiated management and services for different majors, grades, and students. Fifth, service-oriented<sup>[5]</sup>. Adhering to the student and teacher-centered concept, management is regarded as service and process optimization as experience improvement, achieving convenient, one-stop, and mobile teaching services.

## **2.2. Practical value**

### **2.2.1. Practical demand for improving teaching management efficiency and governance capacity**

Traditional teaching management relies on manual filing, offline approval, and repeated verification, featuring a heavy workload, high error rates, long cycles, and difficult traceability. Through process automation, online business processing, and real-time data update, smart teaching management greatly simplifies operational procedures and reduces manual intervention. Applications such as intelligent timetabling, automatic grade synthesis, online student status change, automatic graduation qualification review, and electronic certificates can significantly shorten processing time, reduce management costs, and minimize human errors, promoting the standardization, normalization, and high efficiency of teaching management<sup>[6]</sup>. It is the most direct and effective way to enhance university teaching governance capacity.

### **2.2.2. Important support for promoting teaching reform and improving talent cultivation quality**

The talent cultivation reform of universities in the new era puts forward higher requirements for teaching management. The implementation of the credit system, flexible academic system, minor and micro majors, modular courses, blended teaching, practical teaching, and process assessment all rely on the support of digital systems. Smart teaching management can dynamically collect data on teaching behavior, curriculum learning, practical training, and supervision evaluation, and realize real-time monitoring of teaching quality and timely early warning of academic risks as well as continuous optimization of curriculum systems. It promotes the effective implementation of teaching reform driven by data, and provides a solid guarantee for improving the quality of talent cultivation.

### **2.2.3. Inevitable requirement for modernizing university governance system and governance capacity**

Teaching management is a key link in the internal governance of universities. Traditional teaching management operates in a decentralized and departmental manner with weak overall coordination and experience-dependent decision-making. Based on the data middle platform, smart teaching management realizes data interconnection and collaborative governance across departments, levels, and businesses, promoting the transformation of teaching management from experience-based decision-making to data-driven decision-making and from decentralized management to collaborative governance<sup>[7]</sup>. The construction of smart teaching management mode can drive the optimization of overall governance processes and

efficiency improvement of universities, serving as an important breakthrough for universities to modernize their governance system and governance capacity.

### **3. Innovation paths of university smart teaching management mode under digital transformation**

#### **3.1. Concept innovation: Establishing digital, intelligent, and service-oriented management philosophy**

Concept transformation is the premise of smart teaching management innovation. First, establish a data-driven philosophy, regard data as the core production factor, and promote data collection, analysis, and decision-making throughout the whole process of teaching management. Second, uphold the concept of intelligence and efficiency, take technology-enabled burden reduction and efficiency improvement as the orientation, abandon cumbersome procedures and formalism, and adopt intelligent tools to boost management efficiency. Third, adhere to the teacher and student-centered philosophy, promote the transformation of teaching management from control-oriented to service-oriented, facilitating teachers and students while leaving complex processing to the system and efficiency to management. Fourth, build the concept of collaborative governance, break the barriers among academic affairs offices, secondary colleges, teaching and research offices, and information technology departments, and construct a teaching governance pattern with vertical linkage, horizontal collaboration, and full participation.

#### **3.2. Technological innovation: Building an integrated smart teaching management platform and data middle platform**

Technical architecture is the foundation for the implementation of smart teaching management. First, construct an integrated smart academic affairs platform, integrating core modules such as talent training programs, curriculum database, timetable arrangement and course selection, attendance management, academic performance and student status, practical training, quality evaluation, and graduation review, realizing one-time entry, network-wide sharing, and whole-process traceability. Second, build a teaching data middle platform, unify data standards, interfaces, coding, and permissions, break down barriers of various business systems, and completely solve problems of data inconsistency, information islands, and repeated entry<sup>[8]</sup>. Third, strengthen the application of intelligent technologies, introduce capabilities such as AI intelligent recommendation, big data analysis, robotic process automation, and mobile office to support intelligent early warning, intelligent examination and approval, intelligent analysis, and scientific decision-making. Fourth, construct a security protection system, improve mechanisms of permission management, data desensitization, operation audit, emergency backup, and network security to ensure safe, reliable, and controllable teaching data.

#### **3.3. Process innovation: Promoting whole-process reengineering of teaching management and online one-stop service**

Process reengineering is the core link of smart teaching management. First, comprehensively sort out and optimize business processes, cancel redundant links, merge repeated affairs, and simplify certification materials to achieve the shortest process, simplest materials, and highest efficiency. Second, promote in-depth integration of online and offline services, realizing one-stop online handling, whole-process online

processing, and at-most-one offline visit for high-frequency affairs such as course selection and withdrawal, student status change, grade review, make-up and re-study examination, certificate processing, and internship filing. Third, build an automated closed-loop management, realizing automatic circulation of the whole process from teaching task issuance, timetable arrangement, classroom teaching and attendance to assessment, grading, and filing, reducing manual transmission and verification <sup>[9]</sup>. Fourth, improve the two-level intelligent management of university and college, clarify the boundary of power and responsibility, grant more management authority to secondary colleges, and realize overall planning at the university level, implementation at the college level, controllable nodes, and traceable processes.

### **3.4. Application innovation: Realizing precise management, intelligent early warning, and dynamic monitoring based on big data**

Data application is the core value of smart teaching management. First, construct a dynamic monitoring system for teaching operation, real-time monitoring of key indicators such as course offering rate, classroom attendance rate, grade distribution, practical completion degree, and teaching progress, realizing visible status and traceable problems. Second, establish a full-scenario intelligent early warning mechanism to automatically identify, real-time push, and timely intervene in academic risks, attendance abnormalities, curriculum problems, graduation risks, and teaching anomalies. Third, strengthen the continuous improvement of teaching quality, integrate supervisor evaluation, student evaluation, peer evaluation, classroom data, and learning behavior data to form a closed-loop quality system of “monitoring-analysis-feedback-improvement-re-monitoring.” Fourth, support scientific management decision-making, provide accurate data support for the revision of talent training programs, professional accreditation, and resource allocation through visual analysis of professional layout, curriculum structure, faculty workload, student learning characteristics, and graduate employment trends.

### **3.5. Service innovation: Building a teacher and student-centered smart teaching service system**

Service upgrading is the ultimate goal of smart teaching management. First, build a one-stop teaching service portal, integrating service guidelines, progress inquiry, online consultation, message push, and result feedback, enabling all affairs to be handled through a unified entrance. Second, provide personalized and targeted services: push course selection suggestions, learning reminders, academic guidance, and graduation progress tips for students; provide curriculum schedule reminders, learning situation analysis, teaching evaluation feedback, and teaching research support for teachers. Third, promote mobile convenient services, enabling leave application, attendance checking, examination and approval, inquiry, contract signing, and payment via mobile terminals to realize anytime and anywhere service handling <sup>[10]</sup>. Fourth, improve the rapid response and return visit mechanism, establish intelligent customer service, online message leaving, time-limited handling, and satisfaction evaluation system to continuously enhance teachers’ and students’ sense of gain and experience.

### **3.6. Team innovation: Improving the digital literacy and professional competence of teaching administrators**

Team competence is the key to the sustainable operation of smart teaching management. First, strengthen special training on digital skills, carry out regular training on smart platform operation, data processing,

intelligent application, and information security to improve administrators' technical application capabilities. Second, enhance professional competence, strengthen the learning of educational policies, teaching management norms, pedagogy, management science, and quality assurance knowledge, and promote the professionalization and career development of the team. Third, encourage innovative management practice, support administrators to participate in process optimization, function iteration, and service innovation to stimulate internal motivation. Fourth, improve the cross-departmental collaboration mechanism, strengthen the linkage of academic affairs, information technology, colleges, and supervision teams, and build a compound management team proficient in business, technology, and service.

### **3.7. Institutional innovation: Improving standard norms, security guarantees, and long-term operation mechanisms**

Institutional guarantee is the fundamental foundation for the steady development of smart teaching management. First, formulate unified data standards and business norms, clarify data elements, coding rules, process nodes, examination and approval authority, and operational requirements to ensure the standardized operation of the system. Second, improve the assessment and evaluation mechanism, incorporate digital application, service efficiency, business standardization, teacher-student satisfaction, and reform effectiveness into the assessment system, and strengthen the application of assessment results. Third, optimize the system of data security and privacy protection, clarify the boundary of data use, division of responsibilities, and emergency disposal procedures to ensure information security and personal privacy. Fourth, establish a continuous iteration and upgrading mechanism, continuously optimize platform functions, management processes, and service content according to policy changes, teaching reforms, and teacher-student needs, so as to keep smart teaching management adapted to university development demands.

## **4. Conclusion**

The transformation of educational digitalization is profoundly reshaping the form and logic of university teaching management, and smart teaching management has become an inevitable path for universities to improve teaching governance efficiency, deepen teaching reform, and enhance talent cultivation quality in the new era. Centering on data, supported by platforms, taking process reengineering as the key and teacher-student service as the orientation, smart teaching management boasts distinctive characteristics of dataization, integration, intelligence, refinement, and service orientation, and has irreplaceable value in solving the pain points of traditional teaching management and promoting the modernization of university governance.

To promote the innovation of smart teaching management mode, universities must adhere to systematic thinking and overall advancement, take concept innovation as guidance, technological innovation as the foundation, process innovation as the core, application innovation as the key, service innovation as the goal, team innovation as the support and institutional innovation as the guarantee, so as to construct a full-cycle, integrated, high-efficiency, and intelligent modern teaching management system. By further deepening the in-depth integration of digital technology and teaching management, continuously optimizing platform functions, operational mechanisms, and service quality, universities can empower teaching reform through digitalization, enhance governance efficiency through intelligence, and serve high-quality talent cultivation with high-standard management, providing solid teaching management support for the connotative development of higher education and the construction of an educational power.

## Disclosure statement

The author declares no conflict of interest.

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