Service-Oriented Higher Education Intelligent Teaching Management Practice: a Case Study of Beijing Normal University At Zhuhai

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Abstract: With the continuous innovation of the Internet of things, education and management work has gradually moved towards science and technology. This article takes the exploration and practice of teaching management as the theme. It constructs teachers, students, and the teaching management system to enhance the education teaching work efficiency. What's more, it can better serve the university work.

1. Introduction

The essence of information construction in colleges and universities is to improve the data quality of the data center through the new productivity of information. It provides targeted and high-quality service items and service contents for all kinds of role groups, including teachers, students, and leaders at all levels. But, for a long time, the information construction of colleges and universities focuses on solving the teaching management work of the business department but lacks the convenient experience design in the aspects of the study, teaching, and management of individual teachers and students. Although the information construction investment is big, the service experience of teachers and students is difficult to promote. Teachers and students can not feedback the evaluation system of school informatization, and their application demands can not be satisfied. Therefore, how to improve the management efficiency and teaching quality, and how to provide perfect information service to teachers and students using information is an important issue to be considered in the future, and is also the focus of this paper.

2. Background

The construction of teaching informatization in colleges and universities is being promoted. But there are still some problems.

First, the traditional concept of teaching management falls behind. The concept of teaching management is still limited to the management of teachers. Second, the teaching management system adopted by many colleges and universities does not conform to the actual needs. Third, the overall quality of teaching management system development is low. The design of the teaching management system in many colleges and universities is one-sided. The whole content of the system is thin, the level of information and technology needs to be improved.

Owing to these questions, since 2014, the author's unit has carried out the exploration and practice of teaching management informatization. To improve the efficiency of teaching management, a system based on information technology was developed, which was oriented to teachers, students, and leaders.

At present, the construction of teaching management information has been quite large-scale,

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under the strong support of all sides has formed a good network basic environment. It has accumulated a large number of digital resources and a wealth of automated business processing tools. The teaching management system has the characteristics of visualization, intelligent diagnosis and automatic adjustment, big data collection, and scientific decision-making, which can provide better service for the teaching management in colleges and universities.

3. Intelligent Teaching Management System

3.1 Content

The intelligent teaching management system is a teaching management system based on the information platform, which is oriented to teachers, students, and leadership decision support. The system uses a bottom-up, demand-oriented "Building Block" assembly model. It does not adhere to the specific system structure and system form and digital campus construction form a complementary. It can improve the efficiency of space and time. Finally, it can enhance the user experience for students, teachers, and leaders.

3.2 Design of Intelligent Teaching Management System

3.2.1 Intelligent Teaching Management System: Architecture Design

As shown in Figure 1, the positioning of the system is college-level intelligent teaching management exploration and practice. Specifically, based on building the college-level information platform, the college has carried out the exploration and practice of teaching management information for teachers, students, and leadership decision support. It completes the innovation practice of "One body, three dimensions" in all directions. Among them, the teacher level includes "Teacher's Handbook", classroom face recognition system; the student level includes search-and-search, online consultation, and course selection system; the leadership decision support level includes teaching cost diagnosis and optimization, course matrix analysis.

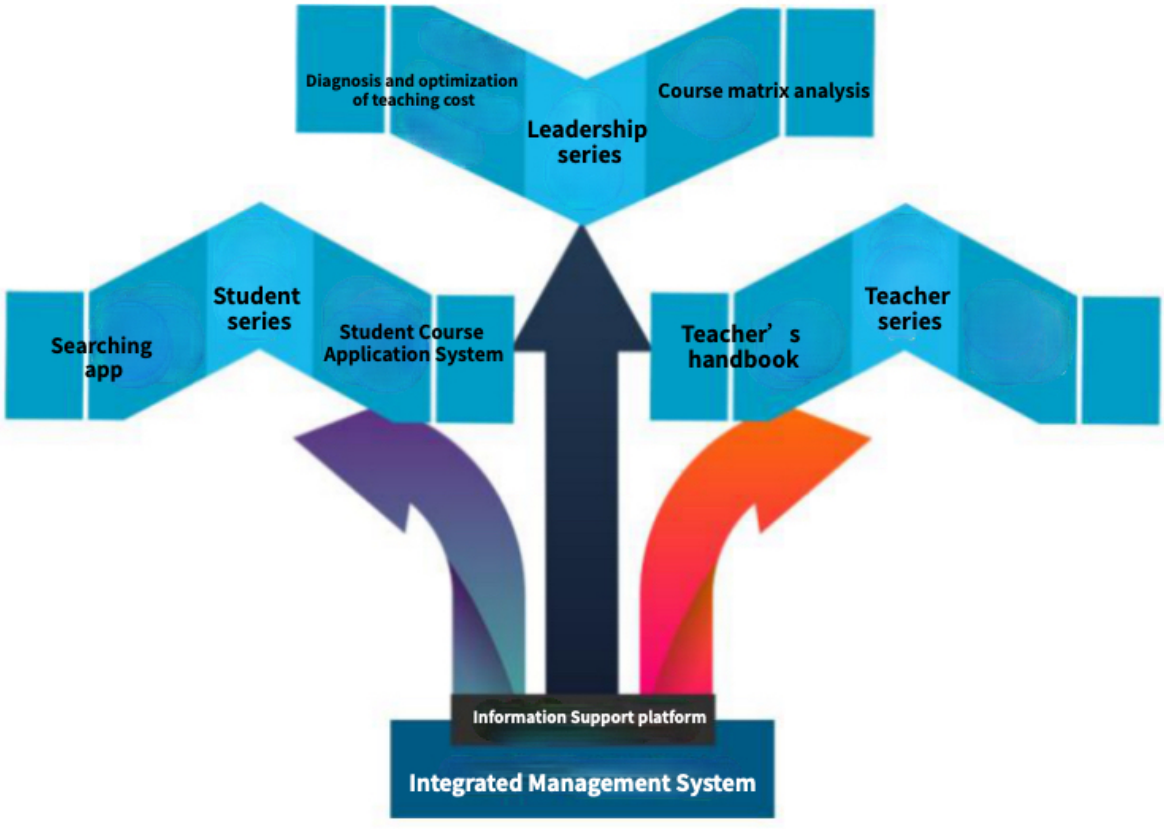


Fig.1 Architecture Design of Intelligent Instruction Management

Table 1 the Summary Of Intelligent Tutoring Management System Planning and Construction

Category series	System name	Start-up time	Primary function	Technical form
Information Support platform	Integrated Management System	2014(Phase I) 2015(Phase II)	Basic data storage and management for students, teachers and courses	B/S system
Student series	"Searching"APP	2018	Learning guidance and academic information search service for new students	Wechat APP
	Student Course Application System	2019	Consultation and Management System of course withdrawal, course selection and restudy for students with different courses	B/S system
Teacher series	Teacher's handbook	2014(Phase I) 2017(Phase II)	School-level, college-level teaching system carding and service, online search educational work guide	Wikipedia
	Classroom face recognition system	2017	The level of students attending class and the supervision of class quality	Java data analysis system
Leadership series	Diagnosis and optimization of teaching cost	2016	Information Quantitative Analysis Method of teaching cost management decision support based on FCE	Application of Excel data analysis
	Course matrix analysis	2015	Curriculum planning and decision support for the construction of teaching staff	Application of Excel data analysis

3.2.2 Intelligent Teaching Management Information Support Platform: Integrated Management System

The platform collects various data of students, teachers, and teaching management from various departments of the school. On the one hand, the system makes clear the data association in the business systems and meets the inter-departmental synergy requirement. What's more, it defines the cross-system business process. On the other hand, the open and extensible business system architecture provides reliable support for the new information system and provides the foundation for the iterative.

The Integrated Management System is based on pure (B/S) application architecture. The system enables the educational administration to realize remote office, off-site office, mobile office. It can meet the present and future needs of information resource collection, storage, processing, organization, management, and utilization. Finally, it realizes the high integration and sharing of information resources, centralized management, and unified scheduling of information resources. The system can further improve the management level and office efficiency of managers in various departments and reduce the workload. The system signed a cooperation agreement with a well-known software development enterprise, carried out the second phase of development, has been put into use, the effect is remarkable.

3.3 Student Series: Interactive Learning App

3.3.1 "Searching" App

This APP is for freshmen. After opening the APP interface, freshmen can visually search for the information they want to inquire, They can understand every aspect of study and life conveniently.

The original system would have delayed processing time for students and made the faculty's workload too concentrated in the first week, making it difficult to process hundreds of applications. The new system is designed to allow students to apply online for major retakes, patches, drop-outs, and minor replacement courses, while extending the time frame for students to apply for courses from the start of winter and summer vacation to the first week of school, in case students miss

application time.

Finally, they have realized the new method of orientation for freshmen. It is also beneficial to the academic administration and academic affairs to the freshmen's study and life before entering the school.

3.3.2 Student Programme Application System

In the past, students needed to fill out a form in the academic affairs office of the college in order to make a course adjustment. But the time to fill out the form is concentrated in the first week of school, resulting in a large number of students to deal with. As a result, the student processing time will be delayed. It is difficult to process hundreds of applications.

After using this system, students can find the course information they need to apply for. So that students can save time to fill in the application form. If the application does not meet the requirements, students can also be informed through the system to revise and resubmit the application. This system has realized the student apply for the curriculum the new method. It will be advantageous to the student to choose the curriculum in the future.

3.4 Teacher Series: Teaching Support and Supervision

3.4.1 The Teacher's Wikipedia System

The concepts of collaboration, sharing, and participation advocated by Wikipedia coincide with the needs of academic knowledge management in universities. Therefore, the Wikipedia system is applied to the knowledge management of educational administration. The function of the "Teacher's handbook" is established.

The Wikipedia system is applied to the knowledge management of educational administration in colleges and universities. As shown in Fig2, teachers can query the information in the manual at any time. Also, they can query the required system document. It is easy to operate. So the office efficiency greatly improve.

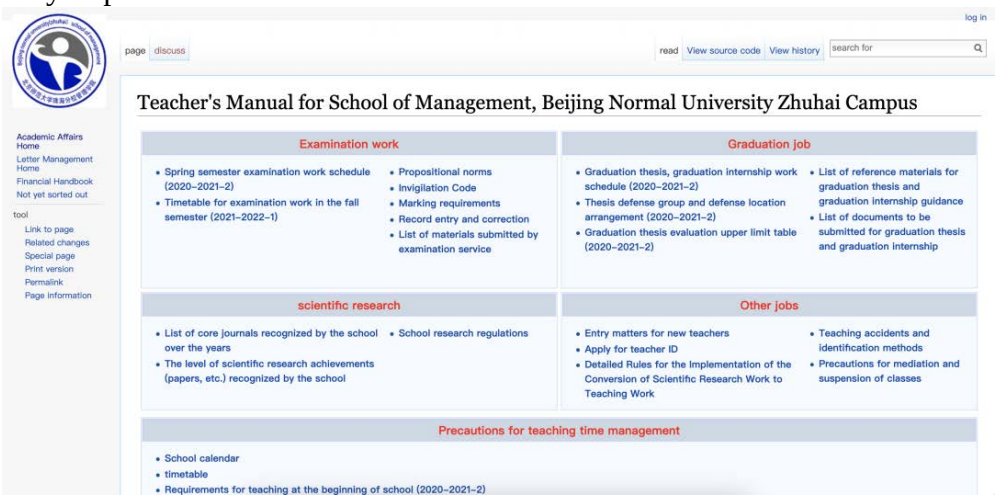


Fig.2 The Front Page of the Teacher's Handbook

3.4.2 Face Recognition System in Class

In the evaluation of teaching quality in colleges and universities, the evaluation of classroom learning quality is an important part. Most of the traditional classroom monitoring is under the control of the teacher, while the teacher still manages the discipline and attention of the students. To a certain extent, this distracts teachers teaching energy and affects the quality of classroom teaching. In some schools, a staff member will spot check to keep track of the class. But situations that often take too much energy to be truly comprehensive have a little overall effect.

Classroom faces recognition system through the camera to achieve real-time monitoring of the class situation. The system will capture and process the face information, analyze and evaluate the students listening level and give them feedback. After the extraction and analysis of a large amount

of data, the distribution levels of students' attentiveness and concentration in class are obtained. The final result is the level of students listening and the quality of the class.

3.5 Leadership Series: Instructional Management Decision Support

3.5.1 Diagnosis and Optimization of Teaching Cost Based on Full-Course Equivalent (Fce)

The core problem is the teaching cost, teaching quality, and contradiction trade-off of private colleges and universities in China. For example, there is no restriction on the faculty budget in private colleges and universities, and each department has autonomy. If the “Student-teacher ratio” to calculate, it is difficult to cover the role of the different characteristics of different colleges and different departments at different stages of development. The difference in human cost caused by different decision-making results can be as much as 20% to 30%, and the difference in teachers' funds is in the millions every year. In addition, class size, the proportion of theory and practice courses are the practical problems of teaching cost control.

Based on the theory and technology of big data analysis in foreign universities, the diagnosis of teaching cost is organized and implemented. As shown in Fig3, three-course cost analysis indexes are used to form some measurement standards, and the optimal analysis results can be obtained. This paper presents an information-based quantitative analysis method based on FCE for teaching management decision support.

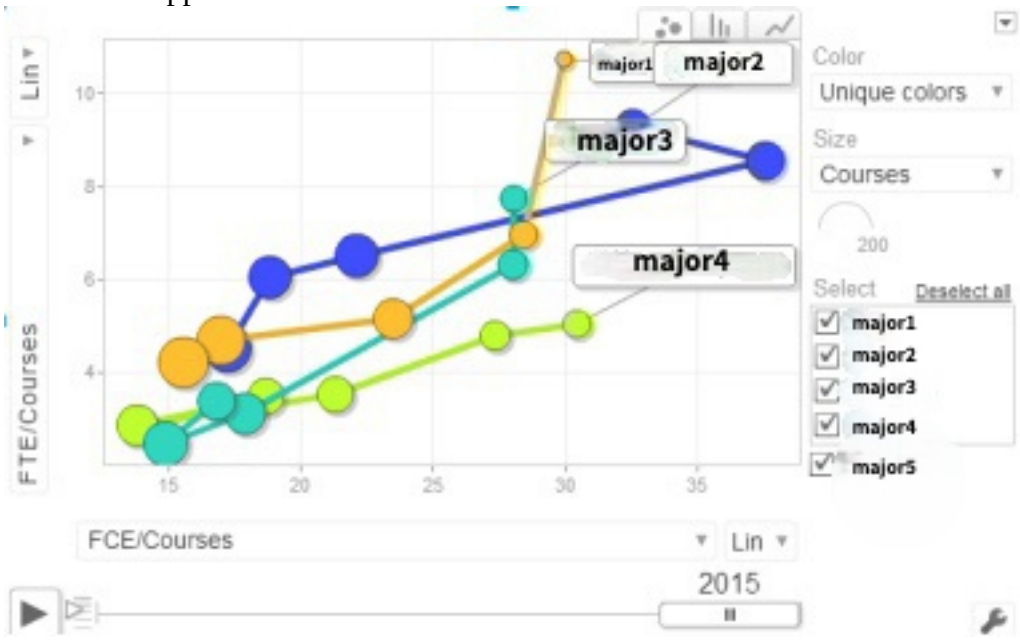
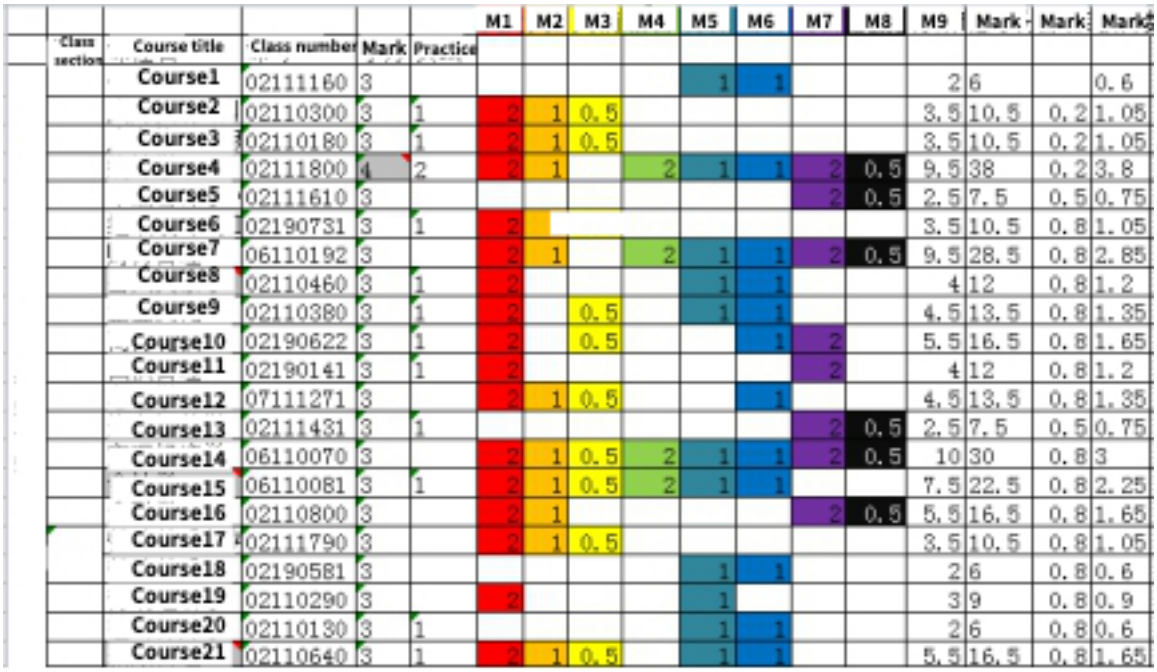


Fig.3 The Dynamic Chart of Teaching Cost Analysis Index Process

3.5.2 Decision Support for the Construction of Teaching Staff Based on Curriculum Matrix

In the selection and appointment of teachers, we should consider many problems, such as: what professional type of teachers to choose, what level of teachers to choose, how many teachers to recruit, and so on. These questions can be solved by the intelligent teaching management system.

As shown in Fig4, the introduction of Big Data Technology and concepts in teaching management can change the shortcomings of traditional human resource management in universities. It is able to establish a faculty evaluation system based on a broader timeline based on the curriculum matrix. It not only contributes to the construction of the specific human resource management system but also improves the efficiency of the construction and management of the teaching staff.



Class section	Course title	Class number	Mark	Practice	M1	M2	M3	M4	M5	M6	M7	M8	M9	Mark	Mark	Mark
	Course1	02111160	3						1	1			2	6		0.6
	Course2	02110300	3	1	2	1	0.5						3.5	10.5	0.2	1.05
	Course3	02110180	3	1	2	1	0.5						3.5	10.5	0.2	1.05
	Course4	02111800	4	2	2	1		2	1	1	2	0.5	9.5	38	0.2	3.8
	Course5	02111610	3								2	0.5	2.5	7.5	0.5	0.75
	Course6	02190731	3	1	2								3.5	10.5	0.8	1.05
	Course7	06110192	3		2	1		2	1	1	2	0.5	9.5	28.5	0.8	2.85
	Course8	02110460	3	1	2				1	1			4	12	0.8	1.2
	Course9	02110380	3	1	2		0.5		1	1			4.5	13.5	0.8	1.35
	Course10	02190622	3	1	2		0.5			1	2		5.5	16.5	0.8	1.65
	Course11	02190141	3	1	2						2		4	12	0.8	1.2
	Course12	07111271	3		2	1	0.5			1			4.5	13.5	0.8	1.35
	Course13	02111431	3	1							2	0.5	2.5	7.5	0.5	0.75
	Course14	06110070	3		2	1	0.5	2	1	1	2	0.5	10	30	0.8	3
	Course15	06110081	3	1	2	1	0.5	2	1	1			7.5	22.5	0.8	2.25
	Course16	02110800	3		2	1					2	0.5	5.5	16.5	0.8	1.65
	Course17	02111790	3		2	1	0.5						3.5	10.5	0.8	1.05
	Course18	02190581	3						1	1			2	6	0.8	0.6
	Course19	02110290	3		2				1				3	9	0.8	0.9
	Course20	02110130	3	1					1	1			2	6	0.8	0.6
	Course21	02110640	3	1	2	1	0.5		1	1			5.5	16.5	0.8	1.65

Fig.4 The Schematic Diagram of Matrix Analysis for the Course

4. Conclusion

4.1 Innovation in the Concept of Intelligent Teaching Management

First, the use of information technology means to improve the quality of data and provide high-quality service. Secondly, It can improve the management efficiency and level of support service. Third, the system can change the inherent thinking from the original “Manual” to “Information Processing.

4.2 Content Innovation of Wisdom Teaching Management

The system implements three dimensions of teaching management information exploration and practice, which are teacher-oriented, student-oriented, and leader-oriented. It can make the teaching management process more complete and promote teaching management orderly.

4.3 Innovation in the Form of Wisdom Teaching Management

The system adopts a bottom-up, demand-oriented “Building Block” assembly model. Also, it uses the overall framework design and sub-module system design. From the student APP design, the course selection system design, the teacher “Wikipedia” construction to the leadership of the cost control system construction, all related data collection and analysis. The system makes the teaching management work in colleges and universities better more than ever.

Acknowledgement

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