Research on Excellent Teaching Development Strategies in the Background of Data Modeling

Pu Zhang, Xingfang Yang*

School of Education, Hubei University of Science and Technology, Xianning, China
*Corresponding author

Abstract: The implementation of excellent teaching needs the support of excellent teachers, and teachers 'professional development is an important factor affecting the improvement of teachers' teaching ability. The pursuit of excellent teaching, the most important thing is to constantly create, reflect, criticize self-centered thoughts, to form a unique teaching ideas, teaching beliefs. The key to promoting the development of teachers 'teaching is to establish a dynamic mechanism that attaches importance to teaching and encourages teaching, and its core is to improve teachers' teaching ability. Big data provides technical support for the realization of the whole process and personalized training of excellent teachers. It is suggested to use the intelligent education system to fully understand the operation status of education, promote the digital integration of resources, and implement the concept of cross-border knowledge integration, so as to achieve the goal of using big data to promote lifelong education for excellent teachers.

1. Introduction

In the 1980s, Schumann pointed out that "no one has questioned how the content of a subject translates from the teacher knowledge into teaching knowledge, and no one asks how the special formula of the subject content is linked to the student's understanding or misunderstanding."[1] In order to explore the complexity of teachers' understanding and dissemination of subject knowledge, Schumann put forward the concept of pedagogical content knowledge. In his opinion, pedagogical content knowledge is essentially beyond the subject knowledge itself, and it has its specific content, characteristics and ways of expression. In fact, in the process of teaching, teachers present and explain subject knowledge through teaching design, teaching strategies, teaching methods and other teaching abilities, so that subject knowledge can be understood by others [2].

In May 2014, the Ministry of Education issued the Opinions of the Ministry of Education on the Implementation of the Excellent Teacher Training Plan, which aims to reform the teacher training mode, deepen the new mechanism of teacher development, and truly train a group of excellent teachers with noble ethics, solid professional knowledge and outstanding teaching ability on the premise of adapting to the rapid development of national economy and society and the in-depth development of educational reform. In September 2018, the Ministry of Education issued the Opinions on the Implementation of the Excellent Teacher Training Plan 2.0[3]. It aims to promote the modernization of education in an all-round way, run a number of high-level and distinctive

teacher education institutions and normal majors, basically form a new form of education and teaching centered on normal students, comprehensively carry out the education of teachers' morality cultivation, vigorously promote the wisdom education under the background of the new scientific and technological revolution, and strive to cultivate outstanding teachers who are "learning high as a teacher and being upright as a model"[4].As shown in Figure 1.

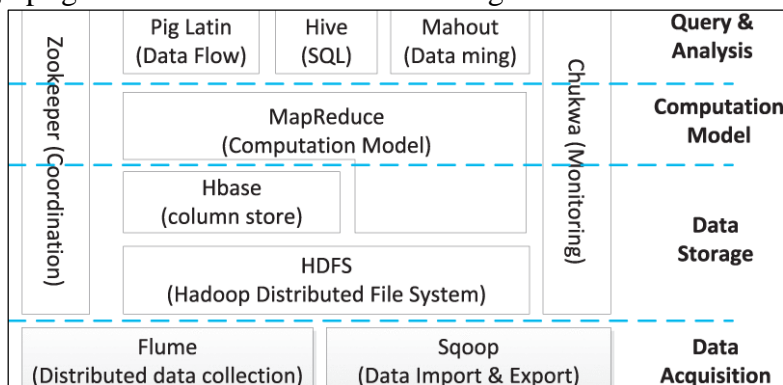| Zookeeper (Coordination)	Pig Latin (Data Flow)	Hive (SQL)	Mahout (Data ming)	Chukwa (Monitoring)	Query & Analysis
	MapReduce (Computation Model)				Computation Model
	Hbase (column store)				Data Storage
	HDFS (Hadoop Distributed File System)				
Flume (Distributed data collection)		Sqoop (Data Import & Export)			Data Acquisition

Figure 1: The Data Flow Analysis Framework [5]

The vigorous rise of new technology, the rapid development of big data, and the deep integration of artificial intelligence and education system provide new solutions for the development of excellent teaching teachers. Based on big data technology, through the establishment of an intelligent integrated platform and standardized network database, it not only effectively opens all aspects of the process of teachers' professional development, but also provides strong support for the real realization of the intelligent development of excellent teachers [6]. Based on big data analysis, we can track the development process of teachers, insight into the law of teaching, and provide timely and effective personalized support. Intelligent development of education system provides school education with more modern educational governance, more scientific educational decision-making, more reasonable management system and more personalized curriculum system. The deep integration of education and big data provides an effective way to realize the lifelong development of teachers. The theoretical focus and key points of excellent teaching based on data modeling are shown in Table 1.

With the rapid development of science and technology, the amount of data generated globally has exploded in recent years. Humanity has entered the "big data" era. The emergence of big data will have a profound impact on all areas of society. In the field of education, with the continuous advancement of education informatization, more and more digital intelligent systems and smart terminals are widely used in educational practice. More and more information is collected and presented in the form of data, including schools, in the education process with management data, student behavior data, student learning data, and more. How to fully analyze and mine the massive information contained in these data and apply it to educational practice to provide support for educational decision-making, education services, etc. to better promote teaching and learning is closely followed by educators, administrators, and researchers problem. In 2012, the U.S. Department of Education released the report "To Promote Teaching and Learning through Educational Data Mining and Learning Analysis", which introduced in detail the challenges faced by U.S. educational big data applications and application implementation [7]. The Ministry of the Education and other five ministries and commissions pointed out in the "Implementation Plan for Establishing an Effective Mechanism for Utilizing Informatization Measures to Expand the Coverage of Quality Education Resources" in 2014. It was pointed out that by 2020, an education informatization system suited to the development goals of national education modernization will be formed. The level of integration of information technology and education has increased

significantly; the role of education informatization in supporting and leading education reform and development has fully emerged. It can be seen that the use of big data to promote education development has been promoted to the national level.

Table 1: The Theoretical Focuses and Essentials for the Outstanding Teaching Based on Data Modeling

Theoretical Focuses and Essentials	Discussions
Enhance the big data awareness	No matter from career to or from the point of social development, I think teachers to adapt to the era development, technology will never be replaced, because teachers have their own advantages, is that students lack and most in need of experience and experience, which is data and technology can't replace teachers, we should make full use of and develop good play its advantages. Effective labor model focus on human capital in the process of labor in the production of internalization, use the model to detect the role of human capital is limited to improve the contribution of labor output, not all of the primary human capital contribution.
Be good at doing the behind-the-scenes work	In big data era, it is becoming more and more teachers were ignored, and is becoming more and more the importance of teachers out with the Big Wave Sentosa see real gold" mission. To that end, as teachers, we are about to enter behind-the-scenes, giving students a real help and support to allow students to truly become the masters of the classroom, let the students' talents are then fully realized.
Student enrollment and learning data analysis	Integrate student enrollment and school learning. In-depth analysis and understanding of different students that meet different grades, different professional with the different personality traits of students during the period of school performance, optimize the admissions measures to provide the decision support for admissions department.
School-based features	On the one hand, the professional attributes of the school, the advantages and shortcomings of the teacher structure, and the factors such as school spirit, teaching style, and style of study determine that the development of the teachers' development center in each institution will be unique and unique; on the other hand, apart from Higher vocational colleges have their own teacher development centers, and there is no hierarchy of teacher development promotion agencies that may pay attention to the professional development of each teacher in the school and establish a professional development archive for them. All of these require that the development of teachers' development centers in higher vocational colleges must be school-based.

2. Teaching Development Strategy of Outstanding Teaching Based on Data Modeling in Big Data Environment

2.1. Mathematical Modeling

In the past half century or so, with the rapid development of computer technology, the application of mathematics has not only played an increasingly important role in engineering and natural sciences, but has also brought unprecedented breadth and depth to economics, management, and finance. Infiltration of new fields such as biology, medicine, environment, geology, population,

and transportation, so-called mathematical technology has become an important part of contemporary high-tech.

Mathematical model is a kind of simulation. It uses mathematical symbols, mathematical formulas, procedures, graphics, etc. to abstract the abstract nature of the actual subject. It can explain some objective phenomena, or can predict the future. The law of development may provide an optimal strategy or a better strategy for controlling the development of a certain phenomenon. Mathematical models are generally not a direct reprint of the actual problems. The establishment of the mathematical model often requires people to observe and analyze the actual issues in detail, and it requires people to use various mathematical knowledges flexibly and skillfully [8]. The process of abstracting and abstracting mathematical models from practical tasks is called mathematical modeling. As shown in Figure 2.
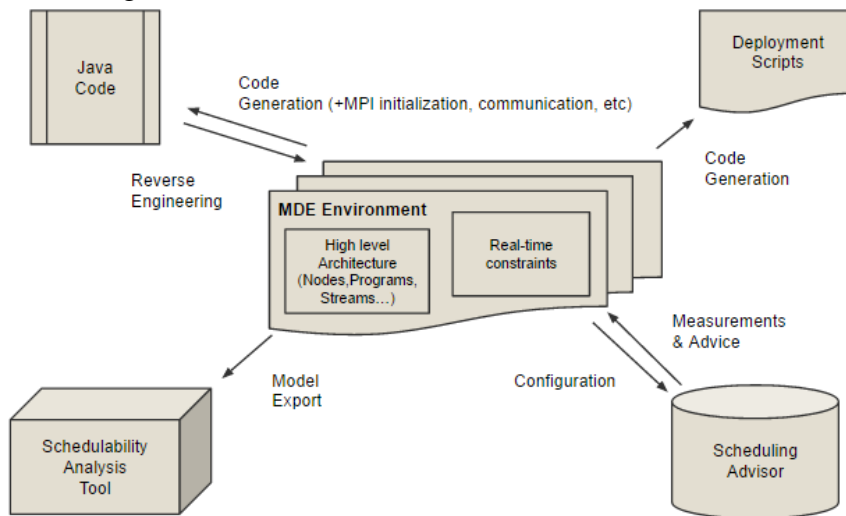

Figure 2: The Modelling Framework

Whether it is a mathematical problem solving practical problems in the field of science and technology and production, or a cross-discipline in combination with other disciplines, the first and most important step is to establish a mathematical model of the object of study and to solve it (usually by means of a computer).

Mathematics is the science that studies the quantitative relationship and spatial form of the real world. It has always been closely related to various application problems in the history of its development and development. The characteristics of mathematics lie not only in the abstractness of the concept, the rigor of the logic, the clarity of the conclusion and the integrity of the system, but also in the breadth of its application. Since the 20th century, with the rapid development of science and technology and the increasing popularity of computers, people's requirements for various problems have become more and more accurate, making the application of mathematics more and more extensive and in-depth. The globalization of economic development, the rapid development of computers, and the continuous expansion of mathematical theories and methods have made mathematics an important part of contemporary high technology and a repository of ideas. Mathematics has become a technology that can be universally implemented. Cultivating students' awareness and ability to apply mathematics has become an important aspect of mathematics teaching that should consider the following models.

$$CI = \frac{\lambda - n}{n - 1} \tag{1}$$

$$CR = \frac{CI}{RI} < 0.1 \qquad (2)$$

$$w^{(s)} = W^{(s)}W^{(s-1)}...W^{(1)} \qquad (3)$$

2.2. Teacher Teaching Development Plan

At present, the sky classroom software developed by the Ministry of Education allows each user to share resources, discuss and improve together through the Internet. Each college can use the sky classroom to form its own professional teaching website, realize the sharing of teaching resources and the interaction between teachers and students, and use the collective power to maximize the use of teaching resources. At the same time, the individual microteaching cases can be posted on the Sky website. Colleagues can observe each other and learn from each other in the form of peer assistance. They can help teachers discover the advantages and disadvantages of their own teaching, and put forward improvement measures in the form of group discussion to help teachers. Improve teaching ability.

According to the connotation requirements of the "excellence plan," students in colleges and universities should have a sound knowledge structure and a comprehensive ability structure. Perfect knowledge structure: academic basic knowledge, industry knowledge, engineering knowledge. Comprehensive capacity structure: professional application capabilities, engineering practice capabilities, and engineering innovation capabilities [9]. For teachers, the knowledge structure should also include the theoretical knowledge of education and teaching, and its ability structure should also include education and teaching capabilities. The best way to reasonably evaluate the level of teachers' knowledge structure and ability structure is to conduct teaching inspections and teaching supervision. First of all, we must do a good job of three teaching inspections: pre-teaching examination, mid-term education inspection and post-teaching inspection. Among them, the pre-teaching exams mainly examine the basic teaching skills of teachers. By checking the lesson plan preparation and the design of multimedia courseware, a comprehensive evaluation of the teacher's teaching ability is made to determine whether the teacher has the ability to teach the course and whether he can start the course on schedule. The medium-term teaching inspection mainly consists of organizing experts to listen to the lectures, offering opinions and improving measures for the class assessment, and improving the teachers' teaching ability through review-based hearings. The post-teaching inspection mainly checks teachers' teaching plans and students' evaluation results. Through the teaching inspection, we found problems in teaching, communicated with teachers, helped teachers clarify the advantages and disadvantages in the teaching process, and proposed improvement measures to help teachers further improve their teaching ability.

From the above-mentioned research shows that the more developed economies in the region, the human capital on economic growth, the higher the level, and as promoting the economic development and in the different stages of the development of the teaching profession has different content. In the pre-employment preparation stage, future teachers mainly to general education philosophy, multidisciplinary professional education, education, education and skills training, in order to lay the foundation for the teaching profession; in the establishment phase, the teacher is mainly used in the pre-employment preparation stage of the biotechnology-related knowledge and skills, in educational practice, step-by-step through their own teachers role to play to the mission of the teaching profession; in the professional development of teachers while mainly in the professional practice, and also continuous self-improvement to develop their career in mind, the unique working style and effective education, management, and make it possible to maintain and develop. Therefore, listed aspects should be highlighted.

1) In an era of limited information processing capabilities, people can only randomly collect data

for research. The goal is to get the most information with the least amount of general data. However, this "maximum information" has a very big limitation. It can only draw the results of the pre-designed problems from the sampled data, but it cannot be applied to all situations, especially it cannot be applied to deeper understanding. Segmentation of the situation and if the core sampling target is a network, then no standard of "optimal sampling" can be found at all, and it is even less likely that the small sampled network can reflect all the structural features of the population.

2) The establishment of the teachers' professional development files and makes it a teacher development resource. Teacher development center should be a teacher professional development archives for their general professional development background and development goals to guide their career development. The teacher's growth profile coverage is wide, time gradually for a long time, any one of the teachers' professional development experience can serve as valuable resources for the development of newcomers.

Therefore, in order to comprehensively evaluate the teaching ability and teaching level of teachers, in addition to the above-mentioned teaching inspection and teaching supervision, it is more important to look at the feedback of students on teaching effectiveness. Therefore, the establishment of a sound student assessment and the evaluation mechanism will help to objectively evaluate the teaching level of teachers. The well-developed student evaluation mechanism for assessment of teaching generally includes a student representative seminar organized by the teaching department, a student representative seminar organized by the second-level college and also the on-line evaluation of teaching evaluation [10]. In the end, the teaching department will feedback the evaluation opinions of the students to the teachers in an appropriate form and then organizes the experts to discuss and research the concrete methods for improvement, and also give feedback to the teachers.

This can also help teachers to correctly understand their own teaching ability and level and recognize their own growth. As the summary, the principles can be re-organized as the follows. (1) We must adhere to the principle of combining engineering theory with engineering practice training. Strengthen mutual penetration and mutual promotion of practical teaching and theoretical teaching, and form a practical teaching system with clear objectives, clear levels, and continuity, system, and creativity. (2) We should play the role of the extracurricular activities. Strengthening the combination of the inside and outside class practice, create conditions to make the students to participate in extra-curricular science and technology activities, community activities and social practice, play to the initiative of the students practice, developing students' consciousness of the systematic, comprehensive and innovative engineering and organization and coordination ability and team spirit. (3) We should strengthen the cultivation of humanistic spirit in engineering education. The trained students should not only have solid professional knowledge and also the engineering practice ability, but also have certain engineering ethics consciousness and humanistic spirit.

The adoption of practical courses or project development, engineering with practical problems in the classroom, and students in the enterprise for hands-on skills training as this is our country's higher engineering education has important significance for the drawing, in our country, business and industry development in the engineer's responsibilities are not clearly defined, market economy, as a result of college students to business practice lack of institutional support and policy support to enterprises' lack of acceptance as an intern, basic engineering training this training is an important aspect of the engineer is deprecated, to varying the degrees, affected the quality of engineering talent [11]. Through a three-stage cultivation, to cultivate high quality to satisfy the needs of the economic and social development of all kinds of engineering and technical personnel, the purpose of different types of the universities and different types of some engineering talents training target, research universities should be dedicated to cultivate engineering research, engineering innovative

talents, to cultivate engineering of the academic research scientists, developers and design engineers, type and teaching at the university of the engineering application-oriented, personnel training target should be engineering master's training for the next step and lay a solid foundation.

2.3. Optimize Normal Students' Training Based on Big Data

Normal student education is the most crucial link in the growth of outstanding teachers. The study and life of colleges and universities promoted the rapid completion of the initial academic knowledge accumulation for normal school students. Individual character, personality and values of the students gradually formed and stabilized at this stage [12]. Therefore, the Ministry of Education's training program for outstanding teachers is mainly based on pre-service teacher education. At this stage, the application of big data is mainly reflected in the three aspects of curriculum, learning, and teacher training around normal students.

Big data can effectively improve the scientific and forward-looking construction of the teacher education curriculum system. The traditional curriculum system planning mainly relies on the experience of academic experts and post requirements of post-service teachers. The former has a strong subjectivity and lacks scientific basis; the latter has a long feedback cycle from obtaining job requirements to school adjustments, and then to cultivating students [13]. Based on the ideas of big data, we can provide forward-looking information for curriculum planning. Through the smart campus platform, we record and analyze the history of graduates who have graduated from previous years, and information on the needs of teachers in primary and secondary schools. As shown in fig.3, Precisely predict teacher education position requirements, and adjust professional orientation and corresponding curriculum structure according to requirements.
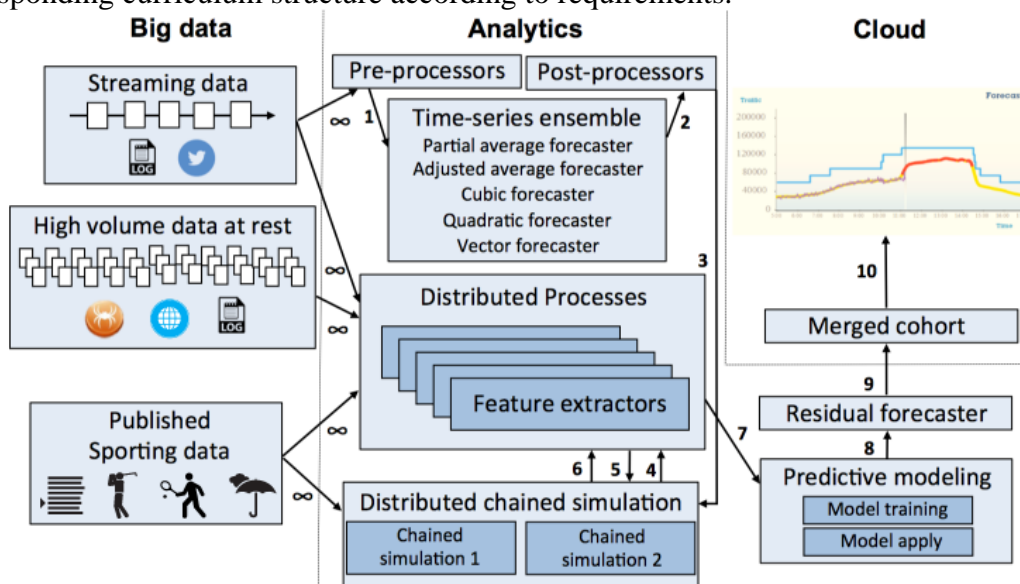

Figure 3: The Data Related Concerns and Analysis

In terms of personalized learning, based on big data, it can effectively break the traditional problem of large class teaching and learning synchronization, plan individualized and challenging learning paths for students, and record and evaluate student learning processes to effectively alert students' academic risks. Through the construction of an intelligent, adaptive course learning system, the school uses big data technology to acquire and analyze various types of data (such as course resource click-through rate, resource form, login duration, video rejuvenation rate, etc.) generated by normal students during the learning process. Based on learning and analysis techniques, the correlation between learning content, learning behavior and learning outcomes is analyzed, and a

learning model for normal students is constructed. Based on the learner model and data analysis results, learner behaviors are predicted. Based on the prediction results, the follow-up learning contents, learning guidance, and learning progress of the normal students are dynamically adjusted to establish an adaptive learning path.

3. Conclusion

The implementation of excellent teaching needs the support of excellent teachers, and the professional development of teachers is an important factor affecting the improvement of teachers' teaching ability. Teaching professional development is the basic content of the development of outstanding teachers. The key to promote the development of teachers' teaching is to create a dynamic mechanism that attaches importance to teaching and encourages teaching, and the core is to enhance teachers' teaching ability. Big data has provided technical support for the realization of the whole process and personalized training of excellent teachers. It is suggested that the intelligent education system should be used to fully understand the operation status of education, promote the digital integration of resources, and implement the concept of cross-border integration of knowledge, so as to achieve the goal of using big data to promote the lifelong education of excellent teachers.

In the post-epidemic era, universities should fully realize the opportunity brought by the COVID-19 epidemic, actively respond to the call of the Ministry of Education, build a cloud platform through big data, use the Internet, artificial intelligence and other modern information technologies to promote the standardized development of excellent teaching, and jointly build a long-term education ecology.

Acknowledgements

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