Research on Training System Optimization of College Teachers Based on Internet+ and Big Data

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Abstract—With the advent of the era of Internet+ and cloud computing, more and more mature key technologies of big data, including data acquisition, data processing, data storage and visualization analysis, have provided new thoughts and opportunities for the reform of college teachers training system. In this context, this study analyzed the shortcomings of the traditional training mode and conducted SWOT analysis on application of big data technologies in training of teachers. Under the guidance of the idea of Internet + and big data, this study optimized the training steps including training preparation, training practice, training evaluation as well as training feedback. It also proposed some important issues worth attention from the training departments in universities –to enrich the repository of online open courses, to ensure security of the training data, to strengthen cooperation with the big data management department on campus and to improve the training management system.

1. INTRODUCTION

Teacher training is an important step to promote progress of teachers and better teaching management in universities. As the age of Internet+ and cloud computing arrives, more and more mature big-data technologies such as data acquisition, data processing, data storage and visualization analysis, come into being and provide new ideas and opportunities to reform of the teacher training system.

Researchers have begun to pay attention to the value and specific application of Internet + and big data technology in the field of education, and have begun to explore and analyze, and have made many valuable research results. However, looking at the relevant research results in the past, most researchers focus on the integration of big data and artificial intelligence technology with student management, teaching model reform, student academic management, teacher professional growth and financial management [1]. These results focus on macro-discussion and relatively lack of special studies on teacher training. Of course, some research results have also appeared on the application of big data technology to teacher training, but also pay attention to the application of primary and secondary school teacher training, and less attention to the field of college teacher training.

Therefore, universities need to adopt big data technologies to fully explore and analyze data concerning the needs for teacher training, career planning and teaching behaviors to optimize and reform the teacher training system and promote progress of teachers.
2. ANALYSIS OF VALUE OF INTERNET+ AND BIG DATA APPLIED TO TEACHER TRAINING IN UNIVERSITIES

2.1 Defects of traditional training modes

There is no deny that Internet+ and big data technologies have brought a great impact to teacher training in universities. Defects of traditional teacher training modes in universities such as collective training and online training have been exposed. Some researchers summarized problems in the teacher training process: monotonous forms of training, ivory-tower training content of little practical use, defective appraisal standards that focused on superficial indicators and lack of interaction, all of which resulted in a perfunctory attitude of the teachers being trained [2]. For example, in traditional training modes, the needs for teacher training are confirmed by questionnaire surveys and interviews, and the training content and schedules are determined accordingly. Though this method is simple and convenient to implement, factors such as the training organizer’s capacity in questionnaire design and interview arrangement as well as the survey subjects’ ability to understand the questionnaires or interview questions may affect the result of the surveys and interviews. Consequently, the needs obtained through this method would fail to reflect the teachers’ real needs for training. In addition, with the increasing demand for personalized training, the traditional teacher training methods can no longer satisfy the dynamic demands of teachers to seek career development. Therefore, it is necessary for colleges and universities to objectively understand the value and practical significance of "Internet +" and big data technology for higher education management, and make a rational analysis of the application of big data technology to teacher training.

2.2 SWOT analysis of application of big data technologies in teacher training

To tackle the problems summarized above, the training department (teacher development center) in universities can conduct SWOT analysis (Table 1) about application of big data technologies in teacher training under the guidance of big data theories. In fact, fast growing big data technologies such as data acquisition, data processing, data storage and visualization analysis, have played their roles in training demand analysis, training plan design, training content determination, training evaluation feedback in enterprises. It is foreseeable that these technologies will also provide strong support for teacher training in universities.

| SWOT Analysis                  |
|--------------------------------|
| **Strengths**                  |
| 1. Deeply explore and analyze demands for teacher training. |
| 2. Improve the value of online training resources. |
| 3. Accelerate the intelligent and refined management of teacher training in universities. |
| **Weaknesses**                 |
| 1. High early-stage investment. |
| 2. Immature research on application of big data technologies in teacher training in universities. |
| 3. Big-data-aided training management still in its infancy. |
| **Opportunities**              |
| 1. Technologies of cloud computing and big data are maturing; network technologies are developing quickly. |
| 2. Teacher training in universities becomes more refined and intelligent. |
| 3. Ways to obtain information of demands for teacher training have become more diversified. |
| **Threats**                    |
| 1. Data security protective system needs to be strengthened to protect the teachers’ privacy. |
| 2. The training management department and training staff need to meet higher requirements for personal quality and expertise. |
3. OPTIMIZATION OF TRAINING SYSTEM BASED ON INTERNET+ AND BIG DATA

In the age of Internet+ and big data, there have been tremendous changes in the mode of thinking and learning of university teachers, which provides conditions and possibility to reform the university teacher training model. To solve the problems of traditional training models, this study referred to relevant studies and, under the guidance of theories of Internet + and big data, optimized the progress of the training system to meet the increasing demand for teacher training in universities.

3.1 Training preparation: Collecting and analyzing information concerning teacher training demands based on big data

Accurately accessing and positioning the training demand of different groups of teachers is the prerequisite to develop training plans, generate training programs and implement training. Since the traditional channels cannot obtain enough information regarding the demand for teacher training, training departments in universities can conduct surveys on training demands through big data platforms, tablet computers and mobile apps, and collect information like the explicit demand, personal performance, self-assessment and attitude evaluation expressed by teachers on big data platforms. Moreover, with the assistance of big data analysis technology, the training department can make in-depth clustering analysis and accurately match the teachers with the teachers with the content of training to produce training demand analysis reports and training plans [3]. This analysis process can be seen in Figure 1. Furthermore, the training management department can use big data technologies to quantify the annual development goals, training objectives and existing resources from the perspective of the whole university and make overall arrangements according to the training demands of different groups of teachers. After confirming the training content and plan, the training department can invite training experts and backbone teachers inside and outside the university to assess the training plans to ensure the training plans are scientific.

![Figure 1](Training_theme_determination_based_on_big_data_analysis.png)

**Figure 1. Training Theme Determination Based on Big Data Analysis**

3.2 Training implementation: hybrid training mode based on Internet+

Due to the characteristics of the in-service training for adults and diversified training needs, the training department needs to provide different kinds of training services. Currently, the development of “Internet + education” can meet the diversified training demands of university teachers. By making full use of the development, universities can upgrade the original online course platforms or purchase high-quality university MOOC platform services. By relying on the repository of rich online courses, universities can provide network platform learning and mobile learning experiences for teachers, thereby expanding the training space further. Moreover, the Internet technology supports teachers to share the teaching cases on course platforms and download the teaching videos (such as MOOC teaching videos), which is helpful to promote the communication among the trainees and further improve the training effect. In one case of training, 85% participants express that the teaching videos of training experts and other teachers provide good comparisons and demonstrations, which is beneficial for the training and study [4]. Obviously, internet online training and on-site centralized training or...
workplace training can complement and support each other. This hybrid training mode can meet the teachers’ demand for “elastic learning” and improve the training effect.

3.3 Training evaluation and feedback: training evaluation and feedback based on big data analysis

Training evaluation and feedback, the key part of the training system, can systematically reflect the study processes and results of the trainees. The advent of Internet+ and big data brings about reforms in training evaluation and feedback. University training management departments can make full use of big data technology to carry out training effect evaluation.

On the one hand, the training management department can use intelligent terminals, such as PC, tablets, mobile phones and wearable devices, to collect evaluation data and the gamified interface to enhance the interest of training participants in participating in the evaluation, so that relevant data can be collected more quickly and comprehensively. When a large number of evaluation data fragments are collected and aggregated, the university training management department can use the big data technology to evaluate the training effect. However, it should be noted that before the data collection, the university training department also needs to build a training evaluation index system supported by big data. The evaluation index system is an organic whole and consists of several independent and interrelated statistical indicators. It is an indispensable part of the training evaluation system and helps the evaluation body to deeply analyze the training effect. Therefore, when designing the indicator system, the university training department must not only ensure the scientificity and rationality of the evaluation index design, but also fully consider the possibility and operability of the evaluation data collection.

On the other hand, the training management department can use big data analysis technology to process and analyze the collected data on teachers’ behaviors in the process of training so that it can master and evaluate the learning needs, learning styles, learning attitudes, knowledge and skill acquisition of the participating teachers. After evaluation, the data platform displays behavioral biases and suggestions in the training to the training managers and teachers with visual results, which maximizes the training effect. Furthermore, the evaluation result of the training effect can render the reference and improvement suggestions for the following training activities. Based on the results of the training evaluation, the training department reorganizes the entire process of training, identifies and solves existing problems and deficiencies, and makes reasonable adjustments to subsequent training programs and plans based on the results of big data analysis, thus ensuring a virtuous cycle of training.

4. IMPORTANT ISSUES WORTH ATTENTION OF TRAINING DEPARTMENT OF UNIVERSITIES

4.1 Enriching resource database of online open courses

A database of course resources is an important medium and support for developing training activities, so it is of great significance. As the big data and Internet technologies are increasingly mature, construction of a database of online open courses becomes the top priority of the training management department. Universities can not only use China University MOOC, XuetangX.com, CNMOOC and other online course platforms to design their curriculum, but also cooperate with the big data management department and the network management center to build course platforms. However, no matter which platform the university uses, the training management department should actively organize teachers (especially excellent teachers and backbone teachers) to participate in the construction of online excellent courses to enrich the database of courses and provide strong support for teacher training activities.

4.2 Security management of training data

The security management of training data is an important premise to conduct training and deserves special attention from the training managers in universities. To protect the teachers’ privacy from being leaked and infringed, the management department should establish a big data security protection system from the technical level and the system level. On the technical level, universities should not only
continuously update data protection technology, such as identity authentication, data encryption, firewall, virus detection, access threshold, anonymity, and fuzzification, but also develop and introduce new data protection technologies, such as blockchain technology and data desensitization technology [5]. Additionally, on the system level, universities should formulate regulations concerning education data collection as well as storage, big data analysis and application of education and establish education big data privacy as well as ethical and safety specifications to improve the data security protection system [6]. Finally, the university training department should further improve the security risk assessment and improvement mechanism, and set up a special review agency to conduct regular security assessment analysis, security vulnerability monitoring and data backup.

4.3 Strengthening cooperation with big data management department
As some professional work, such as collection, processing, analysis and sharing of training data, are included in the whole process, the training management department should actively communicate and cooperate with the big data management department in the university to avoid problems and hidden troubles caused by poor communication and incorrect information and improve the training efficiency. At the same time, the university training management department should also strengthen the necessary links with the Academic Affairs Office, the Scientific Research Office and the secondary colleges, and strive to obtain strong support from the leaders of these departments. In order to ensure technical communication and service work with big data management departments and other departments, universities should also greatly enhance the data literacy of training managers to improve their data awareness, data collection capabilities, data analysis, data interpretation and other capabilities [7]. In this way, they can take the lead in becoming a “data literate person” to further improve the quality of training services.

4.4 Strengthen top-level design and improve training management system
The construction of the training system is not only an important basis for training daily management, but also an important part of the management of university systems. The construction and operation of the data platform during the training process, the training methods of the school-enterprise cooperation, and the good measures and experiences formed during the training can be standardized and normalized through the system guarantee. However, some colleges lack institutional design and innovation in the development of teacher training. Although online and offline training is included, there are lack of institutional links such as supervision, feedback and summary in the process of implementation and implementation. This directly led to a significant reduction in the effectiveness and service level of training activities. Therefore, the university training department should strengthen the top-level design on the basis of overall planning, grasp the key points and core of the training work, and provide a solid guarantee based on institutionalization. In the process of system improvement, the university training management department must first fully collect the feedback needs of trainees and various teaching departments, and truly listen, answer questions and analyze problems, not just from the manager's point of view. Then, the training management department will summarize and summarize based on these needs and evaluation feedback, and give full attention and utilization when the system is revised and improved.

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