TOWARDS THE O2O TEACHING PLATFORM BASED ON TEACHING PRACTICE IN UNIVERSITIES

Hua Wang
College of Information and Electronic Engineering
Zhejiang University of Science and Technology, Hangzhou, Zhejiang, China

Abstract—**Due to the differences of individual learners in universities, the existing teaching methods and modes cannot meet the different individual learning needs of learners. The O2O (i.e. Online to Offline) teaching mode using the teaching platform residing in Internet cloud is a product of the development of the times, which breaks the existing teaching management concept and mode. The O2O teaching mode will have a positive impact on the direction of teaching reform in universities. Online learning will take place at any time and any place, so learners can get the best teaching resources and they can get personalized learning and counseling offline. The construction of O2O teaching platform is the key to the transformation from traditional teaching mode to O2O teaching mode.**

Keywords— **O2O teaching platform, personalized learning, teaching model**

I. INTRODUCTION

Since the expansion of colleges and universities in China, due to the rapid growth rate, the corresponding infrastructure has not kept up, making our higher education still has many shortcomings. The substantial increase of enrollment in colleges and universities has made higher education become mass education instead of elite education as before, and the quality of student source is not as good as before the expansion. The teachers in colleges and universities also mostly use the traditional teaching methods, coupled with the rapid development of new technology. As a result, the relative number of credit hours of the course is reduced, and teachers need to teach more contents in relatively less class-time, thus the basic knowledge and key contents could only be taught in class, and students need to study and digest and absorb the knowledge after classes, which adds difficulties to the teaching in universities. Therefore, the teaching methods and management mode of college education need to be improved to meet the current situation of colleges and universities.

After the expansion of colleges and universities, most of them lack teachers, and the faculty of excellent or new majors is even more obviously insufficient. Some famous schools with relatively good wages and benefits, will have stronger faculty, but in general, the number of faculty is still insufficient.

Each university is relatively independent in routine operation and personnel management. Teachers' work and assessment are generally carried out by the universities where teachers are located, and teachers from different universities mostly communicate through academic exchanges, while teachers take up cooperation teaching and research work rarely, thus to some extent causing a big difference in teachers' strength between universities. In addition, in order to meet the teaching requirements of universities, the construction of corresponding laboratories is basically completed, and the experimental equipment of some colleges and universities is still quite advanced, but the utilization rate is too low. Even some experimental equipment is only open for a few hours of every year, which causes great waste. Of course, there are also some universities did not purchase necessary infrastructure because of financial problems, thus affecting the course teaching. Especially, university managers have almost no support for reasoning about questions such as: How could they arrange the teaching process to achieve teaching goals in the presence of limited laboratory equipment?

Finally, there is lack of interaction with social forces. The change of talent cultivation plan affects the change of the structure of teacher resource. However, the training of teachers needs cycles, which leads to the situation that the training for teachers lags behind the market, and some colleges and universities even have teachers with aging knowledge and still teach backward and eliminated knowledge in the classroom. At the same time, people who are rich in this professional knowledge and experience in the society can hardly come to the podium of colleges and universities due to various reasons.

There have been past attempts at meliorating teaching process to tackle these limitations. [1] put forward the construction idea of "Internet plus computer laboratory" which is deeply integrated with experimental teaching, taking "Internet plus" as an opportunity, taking talent team construction as the fundamental, resource construction as the core, and intelligent platform as the approach. BAI Jing and her colleagues reasoned about the optimized implementation framework of the construction of teaching quality assurance system based on

the trinity of "concept-mechanism-system"[2]. This study focused on the teaching process, quality assurance and quality evaluation system, and constructed a teaching process with curriculum as the main body, an all-round quality assurance system and a student-centered teaching quality evaluation system in [3]. Based on the education and teaching practice, Jia analyzed four strategies to improve the quality of online teaching from the practical level of curriculum implementation under the background of information technology, and put forward targeted suggestions for improving the quality of online teaching [4]. The literature [5] explained the way to improve teaching quality in universities. Lauer expatiated on the institutional environment affects collegial exchange about teaching in universities [6]. Other works also shows efforts in this direction, such as [7-10], to name a few. However, on the issue of how to take effective action to reconcile teaching behaviour when teaching resource lacks, research is still in its infancy. As a general rule of thumb, past efforts about online education with insufficient learning modes, weak interactivity and poor learning experience could not better and faster meet the learning needs of learners with different personalities and emotion styles.

Through the organic interaction and effective combination of online education and offline education with more scientific and reasonable teaching mode. Endowing an online learning system with an offline learning property can be more efficient and interactive teaching process [11, 12]. To this end, it is necessary to effectively apply the concept and method of online and offline linkage, carry out educational innovation and teaching reform. O2O teaching method is a teaching mode based on the combination of online learning on the Internet cloud platform and offline organized teaching in colleges and universities. It is an inevitable product of the development of Internet technology. It can enable any student to enjoy the best teaching resources in the country at any time. This is an important way to solve the problem for a populous country with a serious shortage and uneven distribution of teaching resources.

II. THE MAIN OBJECTIVES OF O2O TEACHING PLATFORM IN UNIVERSITIES

A. Foster and build adaptive learning behaviors for students

In the context of big data, teachers should focus on cultivating and guiding self-learning behaviors of students and fostering their ability to learn independently. As students acquire knowledge in diverse ways in the era of big data, the proportion of classroom teaching will gradually decrease with the addition of new learning tools. Teachers should help and guide students to establish self-directed learning goals and introduce bottom-up goal management methods in the limited classroom teaching, so that students can self-manage the goals set by independent participation with the assistance of teachers. Through goal decomposition, students can clarify their motivation for learning and complete the process of designing and implementing their own personalized learning goals.

B. Strengthening training in data acquisition and discrimination

The focus of education in the data era should be data-orientation training. Although the amount of information has increased in the era of big data, the essence of data still has to be reflected through the steps of data discrimination. It is important for students to think proactively and know what data they want and what to accomplish with data, otherwise they will be drowning in a sea of data. It is the responsibility for teachers to teach students how to independently accomplish the use of data in the future through personal power and implement the concept of lifelong learning before they leave the classroom.

C. Complete personalized learning design and introduce new educational tools

Due to the social transformation, what is needed is no longer the standardized talents of the industrial era. Personalized talents will be more marketable, and the future education should also be personalized and oriented to the individual needs of the educated. The unified education standard is only a kind of self-requirement of educators for individuals, and the background of personalized era will not require to train all talents according to the unified standard. The needs for personalized talent make the corresponding personal growth and education stages be personalized, and teachers should consider how to meet the needs of students. The role of intelligent analysis and design played by education and teaching software should be fully utilized. Through intelligent analysis and design, together with the understanding and judgment of individual needs for students in the classroom, personal learning plans and future growth plans that better meet needs for students are formulated.

D. Big data technologies will create better models to predict student learning and future behavior

First, technology is used to design new types of teaching systems that collect and mine self-learning data of students and automatically provide individual learning plans for each student. Second, new classroom models such as online learning, smart tutoring systems, virtual labs, simulations, and other new classroom formats have been developed. Third, data is used to discover abnormal student behavior, such as analyzing data on abnormal information in daily behavior of students to discover learning interruptions, dropping out of school, or other abnormal behavior of individual students. However, there are still various problems in practicing the above means. For instance, the conditions do not allow the full penetration of terminals in new-style classrooms. Furthermore, acceptance of the new software is low for teachers, and studies show that teachers rarely use the features of the new teaching software developed, and teachers do not rate the training

content of the system design highly and do not use the data as a necessary part of the classroom implementation.

III. BUSINESS PROCESS OF O2O TEACHING PLATFORM IN UNIVERSITIES

A. Business process analysis of O2O teaching platform

Based on the main objectives of the above O2O teaching platform for colleges and universities, its business process is analyzed and obtained as follows.

(1) Learner Knowledge Modeling

By collecting data on learner interactions with the online learning system, including time spent answering questions, the number and characteristics of requests for help, and the repetition rate of incorrect responses. This data could be at the course level, the learning unit level, or the knowledge point level. Through data mining and analysis, a learner knowledge model is constructed, and then the individual learning content is provided to learners at the right time through automatic or manual feedback in the right way.

(2) Learner behavior modeling

By collecting data on learning time spent in the e-learning system, the completion degree of the course, changes in learning behaviors in classroom or other situations, and online or offline test scores, we explore the correlation between learning behaviors and learning outcomes, and finally construct a model of learning behaviors.

(3) Learner Experience Modeling

The learner experience model is constructed by collecting data from learning satisfaction questionnaires or scales, as well as their selection, behavior, performance and retention data in subsequent modules or courses, and using the model to evaluate the courses and features in the online learning system.

(4) Learner Archiving

The data related to learners in the online learning system and the basic information of offline learners are collected. By employing data mining and machine learning algorithms, the personal learning profiles of learners are constructed, the learning characteristics of learners are analyzed, learners with the same learning characteristics are clustered and grouped, and finally a personalized learning environment is provided for different types of learners to facilitate the occurrence of effective learning. The results are mainly used to classify new learners and provide appropriate learning support and interaction support.

(5) Domain Knowledge Modeling

Through mining and learning analysis of educational big data, existing domain knowledge models are reconstructed to explore the correlation between the way learning content is organized in courses and the learning outcomes of learners.

(6) Learning component analysis and instructional strategy analysis

By collecting and analyzing learning-related data from online learning system, we explore the correlation between the functions of learning components in the online learning system, online teaching strategies and learning outcomes of learners to realize the evaluation of the online learning system.

(7) Trend Analysis

By collecting and analyzing a large amounts of learning-related data over a period of time, we explore the changes in learning outcomes during this period of learning, and discover the correlations between current learning behaviors of learners and future learning outcomes. And the established correlations are employed to predict the future learning trends and outcomes of new learners based on their current learning behaviors.

(8) Self-adaptive learning system and personalized learning

This part is the advanced application of educational data mining and learning behavior analytics, which is the ultimate goal of big data-related research on education. Through the collection, processing and analysis of big data of education, the construction of self-adaptive and personalized learning environment for learners is finally completed.

B. Self-adaptive learning system of O2O teaching platform

The self-adaptive learning system contains several modules as follows.

(1) **Content delivery module**. To manage, maintain, and deliver personalized learning content and assessment to learners to support their learning behaviors.

(2) **Learner database**. To Store input of learners and learning behavior data tagged with timestamps of learners in the learning system.

(3) **Prediction module.** To integrate data from the learner information system outside the system and learning behavior data inside the system, and predict future learning behaviors of learners and outcomes by processing and analyzing the learning data.

(4) **Display module**. To display the operation results in the prediction module to various users in a visual way.

(5) **Self-adaptive module**. Based on the operation results of the prediction module, the content delivery module is triggered, and then appropriate learning content is pushed to the learners according to their learning levels, styles and interests.

(6) **Intervention module.** To allow teachers, instructional managers and system developers to implement human intervention in the self-adaptive system based on the results of the prediction module.

The big data-based self-adaptive learning system operates as follows. Fisrt, the learner generates learning behavior data, which will be time-stamped after the content delivery module. Second, the data is stored in the learner database according to a predefined structure. Third, the prediction module collects data

from the learner database and the student information system, and invokes different analysis tools and models to analyze the data according to different analysis purposes. Fourth, the self-adaptive module provides learners with appropriate learning guidance and learning strategies through the content delivery module based on the results of data mining and analysis in the prediction module. Fifth, the results of the data mining and analysis in the prediction module are simultaneously passed to the display module for teachers and instructional managers to use. Finally, teachers and instructional administrators make human interventions to the system through the intervention module based on the analysis results.

IV. REFORM OF EXISTING TEACHING METHODS AND TEACHING MANAGEMENT BY O2O TEACHING PLATFORM IN UNIVERSITIES

A. Reform of existing teaching methods

O2O-based teaching is very different from the existing teaching methods and thus requires a more substantial course teaching reform. In the O2O environment, students can learn the basic content of the course at any time, and as a platform a course has multiple teaching resources for students to choose from to meet the requirements of different levels of students. On this basis, the college course schedule still has the need to exist. In the offline situation, the content of the lecture is to consolidate and improve knowledge, either in the form of topics or interactive teaching, to further strengthen the experimental teaching links. This offline environment truly reflect the quality of teaching in our university.

As teachers, their teaching methods and concepts need to make certain improvements. Firstly, they should actively develop high-quality teaching resources and participate in the competition to be selected for the national cloud teaching platform, and secondly, they should do a good job in experimental teaching and thematic teaching.

Teachers should be online in order to answer the many questions that students encounter in online learning, and these selected teachers should be competitively outstanding ones or front-line engineers. At the same time, a discussion forum should be added for teachers and students to discuss related topics in order to expand interest of students and knowledge as well as to enhance the relationship between disciplines.

The reform of the assessment system, on the one hand, the university should develop a good assessment mechanism for teachers in the O2O teaching environment to motivate teachers to work hard, on the other hand, it should also develop a good assessment system for learning performance of students. The assessment of performance in course teaching is relatively easy and can be divided into online and offline. The former is based on online exams, while offline exams can be conducted with reference to the current examination system.

B. The value of O2O teaching platform in universities for education reform

From the perspective of actual situation of China, the formulation and implementation of education policies are top-down, which is conducive to the authority of policies and the efficiency of implementation, but the disadvantages of ignoring the actual teaching and students also objectively exist. In the era of big data, it will be possible to analyze educational data to find out the actual situation of teaching, learning, and assessment in line with the actual situation of students and teaching, so that educational policies can be formulated and implemented in a targeted manner, and thus a more realistic educational strategy can be formulated for students.

(1) Reconstructing teaching evaluation methods

The O2O teaching platform based on university practices can derive teaching behaviors, habits, and approaches with personalization by analyzing the long-term behaviors of teachers and students. With the arrival of big data, it is possible to evaluate, analyze, and then improve teaching activities through technical aspects. First of all, the way of teaching evaluation is no longer empirical, but can be "generalized" through a large amount of data to find the rules of teaching activities. The new generation of online learning platforms, for example, has an additional section on behavior and learning elicitation. By recording the mouse clicks of learners, it is possible to study the trajectory of learning activities and find out how different learners react differently to different knowledge points, how long it takes, and which knowledge points need to be repeated or emphasized. For learning activities, the learning effect is reflected in daily behavior, such as which knowledge is not mastered, which types of questions are most likely to be wrong, etc. This becomes a direct result of analyzing each individual behavior of learners.

Secondly, students can be evaluated in multiple ways, not just in a single dimension of knowledge mastery. In particular, data analysis can reveal changes in thoughts, mindsets and behaviors of students. For example, if there is no data generated between the roommates, there must be a problem in the relationship between the students, and through data analysis, care should be taken in the psychology and behavior of students. If the recent emotional state of students is analyzed through text analysis and information capture, many tragedies may be avoided. Even the single dimension of mastery of knowledge is multifaceted in its factors, from good memory to strong logical thinking skills. Through big data technology, the characteristics of each student can be analyzed so that strengths can be identified, weaknesses can be avoided, and bad thinking and behavior can be corrected. Teaching evaluation jumps out of the circle of result evaluation and realizes process evaluation, because traditional teaching evaluation is mostly about whether teaching is good or not, learning is good or not, focusing on the results. The era of big data can record the process of education through technical means. Now some

universities have implemented electronic textbooks, if you can record the homework, classroom speech and behavior, teacher-student interaction, peer interaction, and bring these data together, you can not only find out the characteristics of students, but also it is easy for teachers how to write the final evaluation.

(2) Innovating thought about teaching and learning of educators

Most of the traditional authorities and educators consider certain factors important for teaching activities and thus emphasize them again and again through learning from teaching experiences and their own summaries. But some experiences are not scientific in nature, and have sometimes influences on their judgment.

The proposed teaching platform can shift the need of teaching thought from the way of group education to individual education. In the teaching process, we can really teach students according to their aptitude and vary from person to person. Traditional education also advocates teaching according to the individual ability. However, due to the constraints of the number of students, heavy educational tasks, teaching according to the individual ability is always somewhat lacking. Big data technology will provide teachers with the most realistic and personalized characteristics of students, and teachers can target their teaching process to suit their needs. For example, during the learning process in the classroom, the proposed teaching platform could identify which students should pay attention to the basic part, which students should focus on the practical content, which students should complete a certain exercise, which students can read the recommended books, etc. This is similar to online shopping, through your past purchase traces, the website will analyze your shopping interests, so as to push you targeted advertising information.

Not only that, when students finish the homework assigned by the teacher, they can also strengthen learning through data analysis. For example, when doing homework through electronic equipment, if a certain type of topic is correct several times, you can skip similar topics; If a certain type of question makes a mistake, the system can strengthen it many times, which not only improves the learning efficiency, but also reduces the learning burden of students.

(3) Influence on the educational model of the school

School age children and adolescents need to enter schools and learn through teaching. However, with the advent of the era of big data, this teaching mode may be changed. The online course platform can solve the problem of going back and forth to class. Teachers interact with students through the proposed platform. At the same time, learning, examination, data distribution and uploading are all completed through the website. The development of the education platform has enabled the rapid development of online courses. The development of online courses has brought a great impact on traditional teaching. On the one hand, the way of education will no longer be limited to school education. On the other hand, classroom teaching will appear a new alternative mode.

V. CONCLUSION

The traditional teaching mode has teachers' supervision, communication at any time and emotional exchange, which is to complete teaching activities step by step according to the teaching syllabus. This teaching mode is planned, step-by-step and reflects order, but it also frames the thinking framework of students to a certain extent, and innovative ability of students has not been brought into full play. Many business tycoons in the United States have dropped out of school, and some venture funds even require students to drop out of school to pay. This reflects the fact that non-school education is also creative. This proposed project can push more personalized learning content by employing learning interest of students, time spent in an online course, click through rate, emotional reaction, etc. This is particularly important in the era of knowledge explosion. In addition, with the advent of the era of media socialization, the networking of learning and life of students has become a reality. Students can learn the courses online, which is a challenge to teachers who are teaching the same courses offline. With the development of technology and supported by big data, education websites will continue to optimize teaching contents and methods according to the form of knowledge dissemination and the interests of the audience, so as to provide students with higher quality learning content.

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