

Design and Practice of Intelligence Teaching in Colleges and Universities under the Background of Informatization

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Abstract-The emergence of advanced technologies such as mobile Internet and cloud computing has brought tremendous changes to the field of education. Educational informatization has become an important way to promote educational modernization in China. Educational informatization has brought great opportunities to the development of education, but at the same time, it also poses great challenges to educators. Focusing on the basic requirements of talent training in Higher Education under the background of information age, this paper expounds the connotations of intelligent teaching, intelligent classroom and network teaching resources platform, probes into the teaching design and practice under the intelligent environment, and combines the actual teaching cases, studies the intellectualization in the whole process of teaching from theory to practice, aiming at enhancing the informatization of university teachers' teaching ability, promoting the construction of intelligent education system, and cultivating more outstanding talents.

Key words: *intelligent teaching; learning environment; teaching design; education informatization*

I. INTRODUCTION

Under the background of information age, the tide of "Internet +" has been rushing rapidly and fiercely. The development of modern information technology at full speed promotes greatly the deep reform in the field of education. Relying on mobile Internet, cloud computing, big data and other emerging technical means and their deeply integration with teaching activities, teaching concept, teaching methods and content, teaching management and evaluation has got more progress with the characteristics of more open, flexible, universal and interactive than traditional education [1].

The Ten-Year Development Rules of Education Informatization (2011-2020), published in 2012, clearly put forward a new strategy of "building an intelligent teaching environment, providing high-quality digital education resources and software tools, using information technology to carry out heuristic, inquiry, discussion and participatory teaching, encourage developmental evaluation, explore the establishment of a new learner-centered teaching model, and improve the information-based teaching level".

With the further development of information industry, wisdom or intelligent education has become a new demand for

the progress of educational informatization [2]. Intelligence education has played a very important role in the development of education by building a smart learning environment, adopting intelligent teaching methods and focusing on cultivating the innovative ability of college students [3].

II. IDEAS AND UNDERSTANDING OF INTELLIGENT EDUCATION

A. Intelligent Teaching

The idea of wisdom education has been proposed for years, which aims at stimulating and developing people's wisdom endlessly. In the background of advanced technologies and modern information, lots of scholars have been discussing this topic and put forward different explanations on wisdom, or intelligent education [4]. For example, Professor Zhu Zhiting elaborated the connotation of wisdom education: "by constructing a wise learning environment and using the wisdom teaching method, the learners are facilitated to carry out wisdom learning so as to cultivate people with high intelligence and creativity." Scholar Ke Qingchao believes that wisdom education is to apply a new generation of information technology, change school teaching of "factory"-type into education in an open environment, improve the efficiency and intelligence of the education system, and train talents to adapt to the development of the times for the information society [5].

From the above elaboration, it is able to be seen that wisdom teaching aims at breaking the traditional "full-room irrigation" teaching by using the wisdom of teachers, flexibly adapting teaching methods and strategies, fully relying on modern information technology, enhancing the individualization and intellectualization of teaching, and better meeting the needs of students' development.

B. Intelligent Classroom

The traditional knowledge teaching mode bears the brand of industrialized production. Usually, teachers decide the teaching mode and content, and use uniform curriculum materials, uniform teaching content and uniform curriculum evaluation criteria for all students. This "industrialized pipeline" model obliterates the students' individualized learning needs. Students only show solicitude for passing examinations by passive mechanical learning, rather than giving full play to their subjective initiative in learning. They

are not good at tapping the practical value of subject knowledge and innovation.

Intelligent classroom makes students change from passive reading to active learning. Students complete the acceptance of knowledge by the teaching resources online and offline prepared before class [6]. In the wisdom classroom, teachers fully respect learners' individual differences and learning preferences, and create a wisdom classroom based on students' personalized needs.

With the support of mobile Internet and big data, teachers can collect students' learning behavior data in time [7]. According to the feedback of students' learning data, teachers could provide classified and individualized guidance to separate students, accurately grasp the teaching progress in class, explain the difficult contents in detail in teaching, and provide students with the whole process of learning guidance and learning evaluation [8]. This combination of intelligent learning and wisdom teaching conforms to the basic law of teaching and achieves good teaching result.

C. Network Teaching Resource Platform

The realization of intelligent teaching cannot be separated from the support of network teaching resources platform, which store a large amount of subject and related knowledge materials, including e-books, videos, animation and so on, and helps teachers and students to interconnect to each other on the platform [9].

Teachers can directly transmit teaching courseware and extracurricular videos on the platform, use the platform to prepare lessons, correct homework, carry out tests, etc. Students can read, do homework, answer questions, and take tests on the platform [10]. Drawing support from the platform of network teaching resources, teachers can get timely feedback of students' learning effect, enhance interaction with students, and better encourage students' learning motivation. Students can also share their learning experience through the platform, or share learning notes, and exchange views with other students.

III. DESIGN OF INTELLIGENCE TEACHING

The design of wisdom teaching should pay attention to the development of students' higher-order thinking ability supported by the basic theory and skills [11]. High-quality learning resources provide excellent conditions for the students to learn theory and skills at anytime and anywhere, and to cultivate their self-learning ability. At the same time, in the classroom, flexible use of information technology means, real-time grasp of students' learning behavior, intelligent organization of teaching, are all available to offer students some personalized and accurate services, and promote the improvement of teaching quality by means of the platform and the massive recourses.

A. Building High Quality Learning Resources

In traditional education, the resources are scarce and the amount of knowledge is relatively fixed. The learners mainly use textbooks to learn and practice knowledge points of the course. Under the condition of Internet, the network is rich in resources, but there are many problems such as low-quality

content, redundancy, closure etc. In that sense, teachers must attach importance to the development and application of learning resources, build a number of high-level, expedient, niche targeting resources not only meet the requirements of the curriculum, but also suitable for students to carry out online learning to obtain a bigger harvest [12].

Learning resources should embody the wisdom of knowledge and are designed in the way of student-centered. At the same time, what should be paid attention to is the interaction between students and teachers in the process of teaching and learning.

Learning resources typically include:

(1) *teaching aids resources*: curriculum outline, curriculum teaching plan, curriculum exercise set, extracurricular reference books, etc.;

(2) *sharing resources*: micro-lesson video (short video for a specific knowledge point), academic papers and news related to knowledge points, which are available for the students to carry out comprehensive learning and practice around knowledge points.

(3) *Learning and exchange community*, where students discuss and share experiences and ideas with each other, and teachers answer questions posed by students.

The design of learning resources needs to embody the wisdom of knowledge, aiming at cultivating students' ability to discover and solve problems.

According to cognitive structure theory, learning does not lie in passively forming stimulus-response connections, but in initiatively forming cognitive structures [13]. Therefore, the construction of learning resources should include broad and persuasive concepts and principles in disciplines, reasonably arrange the order of learning content in accordance with the inherent logic of learning content, pay attention to the order from simple to complex, explain important concepts and point out the differences and connections between different concepts, organize and arrange practice tests to help students consolidate concepts and principia. Learning content should be provided not only by inductive sequence from "special" to "general", but also by deductive sequence from "general" to "special".

B. Flexible Use of Technical Means

In teaching practice, some teachers lack the ability to integrate information technology and the curriculum effectively, and are not familiar with the means of using information technology. As a result, students spend a lot of time waiting for debugging, and there is a problem of deviating from the teaching objectives. It should be emphasized that teachers should be skilled in mastering and using teaching techniques to integrate online and offline.

In the choice strategy of teaching media and interaction mode, it is serviceable to use virtual reality technology and mobile Internet to actively create a real situation close to real life. The purpose of learning is to be able to use the knowledge learned to solve practical problems [14]. The closer the situation of learners is to real life, the more specific

the problems need to be solved, the more vivid and interesting the learning process, the higher the enthusiasm of students, and the more guaranteed the learning effect [15]. Create a real learning situation, and show the learning content to the learners in the most intuitive form, is useful to give the learners a feeling of being there, and better achieve the teaching objectives.

Online learning mainly focuses on students' self-study. Through reading learning resources on the platform, watching micro-lesson videos, students could complete the self-study process, and realize the preliminary construction of knowledge. But at this time, the students' mastery of knowledge only stays at the level of superficial understanding and memory. In the classroom, teachers should take the responsibility of guidance and evaluation, do a good job in teaching design, use teaching technology flexibly to create real situations, inspire students to think, help students to carry out in-depth learning, so that students from the previous simple understanding of knowledge to the application level of knowledge, cultivate students' high-level thinking ability and complex problem solving ability.

C. Intelligently Organizing Teaching

The teaching of learning content should be suitable for students' cognitive development level. According to the principle of simplicity to complexity, usually ask the learners to understand the basic concepts, theories and the structure of learning content at the first stage. As for the teaching organization, teachers may flexibly adopt a variety of various organizational forms, such as "seminar learning", "learning by doing", "flipping classroom" and so on, all of which are problem-solving-oriented.

It is testified to be available by using a series of questions, such as, "Why?" "What will happen?" to initiate deeper content and skills, and to build a more systematic content. The targets of learning are to solve practical problems in life and create products and abilities that society needs which are on the basis of learning and mastering theoretical knowledge. In that sense, the goal of wisdom teaching is to help learners acquire higher cognitive processing ability, problem solving ability and creative ability [16].

Furthermore, in order to achieve the deep integration of online and offline teaching, not only the form, but also to content of the teaching are laid stress on. Designing abundant curriculum contents and activities in teaching, such as "seminar" learning activities, can make learners more in touch with ideas and viewpoints, exchange ideas with each other, learn from others and make up for each other's weaknesses. Being directed against the learning behavior process of students pushed by big data revealed on the platform, several members are grouped to discuss and study and hierarchical classified teaching is carried out to provide personalized service for students' learning needs.

IV. PRACTICAL ANALYSIS OF INTELLIGENT TEACHING

Wisdom is a kind of high-order thinking ability and complex problem-solving ability. Wisdom needs the support of knowledge theory and skills of basic disciplines, but it emphasizes the development of students' comprehensive

quality, problem-solving ability, inventive and creative ability and other high-order thinking ability. The whole process design of wisdom classroom teaching should integrate teaching and learning as a unified system. It is necessary not only to create a learning environment for students, but to control the whole process of wisdom teaching. Both of the two parts permeate each other, deepen the integration of teaching and learning, and improve the quality of teaching.

A. Creation of Learning Environment

Environment has positive or negative effects on human beings. Compared with the traditional learning ambient, the internet-based learning environment presents a diversified trend, among which the external environment influences learners' studying and promotes learners' active construction of learning and development ability. It includes learning resources and interpersonal communication.

Learning resources include various learning materials, such as electronic textbooks, micro-lesson videos, case studies, learning courseware, extra-curricular books, etc. They also include learning platforms, which provide the students good conditions to read the materials, do tests and watch micro-lesson videos, and to realize interpersonal communication in the ways of students introducing questions, and teachers guiding and helping the learners, as well as group learning among learners.

Intelligent education should embody two-way nature. Besides students' smart learning, teachers should feedback students' learning behavior and results based on big data, do a good job of supervision, and ensure students' learning quality and its enhancement. For the students who are active in learning and have good learning results, their teachers should affirm and praise them positively and give full play to their leading role; for the students who are passive in learning, teachers should find out the reasons, give individualized teaching content guidance and design, and offer a precise service.

B. Practice of Teaching Process

1) Practice before class

Before class, teachers transfer resources such as preview materials, micro-lesson videos, preview quizzes and so on, which provide students to do the pre-study on the platform. Students log into the platform for preview. For example, in the chapter "Trade in Goods" of the course "Introduction to China's Foreign Trade", learning materials have been upload by the teachers beforehand which are about the total import and export of Chinese goods after the founding of New China. The students may have a general understanding of the development of China's trade in goods through preview of those materials, complete pre-class exercises and upload their answer to the platform.

The web-based teaching resource platform will accurately present the data of students'preview behavior, such as preview time, browsing times and practice results. According to the data, teachers can see the shortcomings of students in the learning process, so as to make timely adjustments in the following classroom teaching.

Teachers need to clarify what students want to learn in class in advance, and adjust the teaching content and decide the key and difficult points according to the preview of students' feedback from the platform. For those students who have not previewed or completed the preview exercises, teachers have the responsibility to give timely attention and guidance.

Teachers should reasonably choose teaching methods and contents, presuppose the difficulties that students may have in learning, choose teaching strategies, and arrange teaching activities. Teachers need to choose appropriate exercises or discussion questions before class. Taking a collective lesson preparation or peer exchange is evidently the good ways to effectively perfect the teaching program and improve the quality of teaching.

2) *Practice in Class*

In the classroom, teachers can create problem situations for students, cultivate students' ability to find and solve problems.

In the problem situation created by teachers, students conduct inquiry-based learning by using the form of group discussion and teachers are at the side of guidance. In the process, teachers should adjust flexibly according to the specific circumstances or temporary situation of students, and find out the difficulties of each group in time and give advice to ensure that the process of group learning is carried out efficiently and effectively.

A communication and discussion is organized after the group discussion, which is actually an exchange exhibition and share the results of the groups. In the process of interactive exchange and display of results, various methods, such as picture display, language display, video display, etc. are adopted. It is better to encourage other students to complement around topic, exchange ideas, so that everyone can be further sublimated. Such a kind of querying and quizzing is considered to be the best way to raise students' thinking ability to a higher level.

Through summing up the past teaching experience, we realize that the plan made before class cannot be carried out rigidly. Teachers should refer to the classroom atmosphere on the spot and the students' situation, and make flexible response. At the same time, in the classroom, we should also do a good job in real-time teaching evaluation, assign tasks to complete in the classroom, in order to consolidate the knowledge learned. Before the end of the class, we should sum up the contents of this lesson, help students to clear up their learning ideas and improve their learning efficiency.

For example, in the section of the application of the debit and credit accounting method in the course of Basic Accounting, combined with the rules of the debit and credit accounting method learnt by the students before class, the students are assigned the main business of manufacturing industry which happens every day, and are asked to do the accounting processing. Although the task is challenging, students have a theoretical basis and it is not very difficult to operate.

Teachers observe the process of group learning and find that students often have different opinions when discussing

how to deal with accounts. Teachers should encourage them to find the crux of the problem and answer questions for students when necessary to help them complete their tasks. Based on the problem accounting task, the ability of students to discover and solve problems is developed, and the ability of students to use theoretical knowledge to solve practical problems is enhanced.

3) *Practice after class*

After-class testing can be done online or offline. It can be a standardized test mode, and the personalized one according to the different situations of students. Teachers should do a good job of after-class testing and counseling, answer questions, summarize and reflect at the same time, improve the teaching level, and ensure the quality of teaching.

The teaching platform quickly and accurately presents various and multi-dimensional information reports. Teachers can correct homework through the teachers' end of the network. Real-time data such as teachers' login port, students' scores in homework and the time taken to complete homework can be presented. Through the data, teachers can grasp the students' learning situation and determine the key points of personalized counseling. At the same time, through the analysis of students' erroneous questions, teacher could call out the transformed questions to guide students to practice again, and carry out deep knowledge processing.

Teachers timely adjust the teaching process according to the students' homework data. If the collective work of diagnostic class finds that the key and difficult teaching objectives of knowledge points have not been achieved, they will supplement and explain the current weak knowledge. When the teaching objectives are achieved, they will continue to complete the teaching progress and repeat according to the previous procedures until all the teaching objectives are achieved across-the-board.

Educational evaluation can be carried out in a diversified channel. In addition to traditional assignments and tests, comprehensive assessments are also conducted, such as subject competitions and project contests. Schools should encourage students to participate in a variety of competitions. Discipline contest is capable to help students consolidate their knowledge, enhance their ability of knowledge application, and deepen their ability of teamwork and practical application.

The judges of subject competitions are generally experts and scholars in related fields. Supported by their professional background, their evaluation results are objective and pertinent, which can reflect students' learning behavior and results.

V. CONCLUSION

The aim of intelligent education is to stimulate and develop people's wisdom. By breaking the traditional "one-way inculcating" teaching mode, with the help of modern information technology and using scientific teaching methods and strategies, students can change from passive learning to active studying, which conforms to the basic law of teaching and can better meet the needs of students' development.

Network teaching resource platform provides technical support for intelligent teaching. A large number of different forms of learning resources are shared on the platform. Students and teachers can complete reading, learning, discussing, asking, answering, assignments, tests, examinations and other work through the platform. They can also realize information feedback and interconnection between teachers and students on the platform.

Wisdom teaching should be embodied in the whole process of teaching.

1) *Before class*, teachers upload preview materials to the platform. Students log on to the platform to preview and complete the exercises. According to the data of students' pre-studying, teachers can understand the situations, especially the shortcomings of students in the learning process, and then make an adjustment in time in the following classroom.

2) *In the classroom*, teachers create problem situations for students, cultivate their ability to discover and solve problems, organize students to carry out inquiry-based learning, timely discover the difficulties of various groups, conduct guidance, encourage students to question, and guide students' thinking ability to a deeper level.

3) *After-class* detection can be either online assignment or offline detection. It can be either a standardized test or a personalized assessment for students. All information about pedagogy can be quickly and accurately reflected by the network teaching platform.

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